Abstracts of Scientific Papers

presented at the
Society for Obstetric Anesthesia and Perinatology
39th Annual Meeting
May 16-19, 2007

Fairmont Banff Springs "Castle in the Rockies"
Banff, Alberta, Canada

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SOAP 39th Annual Meeting Preliminary Exhibitor Listing:

Arrow Medical Products Ltd. (Canada)
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Masimo
Smiths Medical MD, Inc.*
SonoSite Canada, Inc.
Vitaid Ltd.
Wolters Kluwer Health - Lippincott Williams & Wilkins

* Meeting Sponsor

The exhibit hours are:

Thursday, May 17 • 6:45 a.m. – 6:00 p.m.
Friday, May 18 • 6:45 a.m. – 10:30 a.m.

Tours: A list of tour options is available on the SOAP website. Along with important travel, hotel and airport transportation information.

Pre-SOAP Meetings

WEDNESDAY, MAY 16, 2007

7:00 a.m. - 2:00 p.m. **Simulation Workshops Registration (By Ticket Only – Limited Registration)**

Faculty: Christopher Burkle, MD; Paula Craigo, MD; Patricia Dalby, MD; Bhargavi Gali, MD; Deepi Goyal, MD; Rita Patel, MD; Ryan Romeo, MD; John Thomas, MD; Kevin Torsher, MD, FRCPC; Laurence Torsher, MD, FRCPC; Manuel Vallejo, MD, DMD; Jonathan Waters, MD

1:00 - 5:30 p.m. **Joint Symposium of the Japanese Society of Anesthesiology (JSA) & Society for Obstetric Anesthesia and Perinatology (SOAP) (Symposium included with meeting registration fee)**

Welcome: *Junzo Takeda, MD; David J. Wlody, MD*

Session 1: Co-Chairs: Kan Amano, MD; Hisayo Morishima, MD, PhD

1:15 - 1:45 p.m. **What's New in OB Medicine in Japan: Preeclampsia and Preterm Labor** Motoi Sugimura, MD

1:45 - 2:15 p.m. **OB Anesthesia Research in Japan -** Hiroshi Ueyama, MD

2:15 - 2:45 p.m. **Anesthesia for the High-Risk Parturient -** Richard N. Wissler, MD, PhD

2:45 - 3:00 p.m. ***Break***

Session 2: Co-Chairs: Toshiyuki Okutomi, MD; William R. Camann, MD

3:00 - 3:45 p.m. **American Anesthesia Workforce -** Brenda Bucklin, MD

3:45 - 4:30 p.m. **Crisis in Japanese Perinatal Medicine:**
Obstetrician View - Nobuya Unno, MD
Anesthesiology View - Katsuo Terui, MD

4:30 - 5:15 p.m. **American Society of Anesthesiologists Guidelines for Obstetric Anesthesia** David J. Wlody, MD

5:15 - 5:30 p.m. ***Questions & Answer***

1:00 - 5:00 p.m. **American Academy of Pediatric Neonatal Resuscitation Certification Program (By Ticket Only – Limited Registration – Pre-registration is essential for exam materials)**

Course Directors: Edwin Rho, MD; Gurinder M.S. Vasdev, MD, FRCA
NRP Liaison: Janet Henderson
Faculty: Kristi Boldt, MD; Robert Chantigian, MD; Robert Friedhoff, MD; Brian Hall, MD; Robert Johnson, MD; Gerard S. Kamath, MD; Ku-mie Kim, MD, PhD; Julian Loke, MBBS, FRCPC; Edward McGonigal, MD; Jeff Pasternak, MD; Medge Owen, MD; Deborah Qualey, MD; Edwin Rho, MD; Ratna Sashidharan, FRCA; Kenneth E. Scott, MD; Dennis Shay, MD; Peter Southorn, MD; Ivan Velickovic, MD

1) American Academy of Pediatrics training video
2) Lectures:
What's New in Neonatal Resuscitation for 2006-7 - Robert Johnson, MD
Vignettes in Neonatal Resuscitation - Robert Chantigian, MD
3) Megacode Test
4) MCQ Examination

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SOAP Annual Meeting

THURSDAY, MAY 17, 2007

6:00 a.m. - 5:00 p.m.	***Registration***
6:45 - 8:00 a.m.	***Breakfast with Exhibitors and Poster Review***
8:00 - 10:00 a.m.	***Spouse and Guest Hospitality***
7:45 - 8:00 a.m.	**General Assembly** **Welcome to the 39th Annual SOAP Meeting:** David J. Wlody, MD, President; Raouf Wahba, MD, FRCPC, Host; Gurinder M.S. Vasdev, MD, FRCA, Chair
8:00 - 9:45 a.m.	**Gertie Marx: Research Competition** Moderator: Alan C. Santos, MD Judges: William R. Camann, MD; Andrew Harris, MD, MHS; Gordon Lyons, FRCA; Linda S. Polley, MD; Maya S. Suresh, MD
9:45 - 10:00 a.m.	**Distinguished Service Award** Presented to Frank James, MD by SOAP President David J. Wlody, MD
10:00 - 10:15 a.m.	***Coffee with Exhibitors/Posters***
10:15 - 11:00 a.m.	**PRO/CON Debate: Neuraxial Techniques for Labor Analgesia Should be Placed in the Lateral Position** Moderator: John Thomas, MD **Pro:** Lawrence C. Tsen, MD **Con:** Linda S. Polley, MD
11:00 - 12:00 p.m.	**Oral Presentations #1** Moderator: Mark Rosen, MD
12:00 - 1:00 p.m.	***Lunch with Exhibitors and Poster Review***
1:00 - 2:00 p.m.	**What's New in Obstetrics?** Introduction: Raouf Wahba, MD, FRCPC Presenter: Michael Helewa, MD, FRCPC
2:00 - 3:00 p.m.	**Zuspan Award: Research Competition** Moderator: Vernon Ross, MD Judges: Linda Barbour, MD, MSPH; Michael Helewa, MD, FRCPC; Edward T. Riley, MD; Junzo Takeda, MD; Kathryn Zuspan, MD
3:00 - 3:30 p.m.	***Coffee Break with Exhibitors and Poster Review***
3:30 - 6:00 p.m.	**SOAP Business Meeting – Awards Presentations** David J. Wlody, MD

6:00 - 9:00 p.m.	**Residents/Fellows/Students Only Forum (Trainees & Mentors)** Session Chair: Gurinder M.S. Vasdev, MD, FRCA
6:00 - 7:00 p.m.	Welcome Reception for Trainees - David J. Wlody, MD, President, SOAP
7:00 - 9:00 p.m.	Oral Presentations Judges: Terrance Breen, MD; M. Joanne Douglas, MD, FRCPC; Helene Finegold, MD; Linda S. Polley, MD; Monica Riesner, MD; Barbara Scavone, MD; John Sullivan, MD; Gurinder M.S. Vasdev, MD, FRCA; Raouf Wahba, MD, FRCPC; David J. Wlody, MD

FRIDAY, MAY 18, 2007

6:45 - 8:00 a.m.	***Breakfast with Exhibits and Poster Review***
6:45 - 7:45 a.m.	**Breakfast with the Experts** **Co-Chairs**: David Campbell, MD, MSc, FRCPC; Michael Paech, MD
8:00 - 9:00 a.m.	**Poster Review #1 -** Moderator: Yaakov Beilin, MD
9:00 - 10:00 a.m.	**What's New in Obstetric Medicine?** Introduction: William R. Camann, MD Speaker: Linda Barbour, MD, MSPH

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SOAP Annual Meeting

FRIDAY, MAY 18, 2007 (continued)

10:00 - 10:30 a.m.	***Coffee with Exhibitors and Poster Review***
10:30 - 1:00 p.m.	**Patient Safety Session -** Chair: Stephen Pratt, MD
10:30 - 11:15 a.m.	**Role of Simulation in Teaching Obstetric Anesthesia** John Sullivan, MD
11:15 - 12:15 p.m.	**Pro-Con Debate #2: Crew Resource Management in Medicine is a Fad** Moderator: May Pian-Smith, MD, MS **Pro:** Richard N. Wissler, MD, PhD **Con:** John Pawlowski, MD
12:15 - 1:00 p.m.	**The Impact of National Patient Safety Goals from the Joint Commission on the Accreditation of Healthcare Organization for Obstetrics and Obstetric Anesthesia** Speaker: Edward Molina-Lamas, MD, FACA
2:00 - 4:45 p.m.	**Regional Workshop in Obstetric Anesthesia (By Ticket Only – Limited Registration)** Director: Jose Carvalho, MD, PhD, FRCPC Faculty: Cristian Arzola, MD; Mirinalini Balki, MD; Jose Carvalho, MD, PhD, FRCPC; Barry Harrison, MD, FANZCA; James Hebl, MD; Shreeniwas Jawalekar, MD; Sandra Kopp, MD; Krzysztof M. Kuczkowski, MD; Hugh Smith, MD, PhD; Jack Wilson, MD

SATURDAY, MAY 19, 2007

6:30 - 7:45 a.m.	**Breakfast Panel: Genomics in Obstetric Anesthesia** Chair: Richard Smiley, MD, PhD Speakers: William Hartman, MD, PhD; Ruth Landau, MD
8:00 - 9:00 a.m.	**OB Anesthesia Research: The Unanswered Questions** Speakers: Robert D'Angelo, MD; Philip Hess, MD; Barbara Leighton, MD; Edward Riley, MD; Scott Segal, MD; Richard Smiley, MD, PhD
9:00 - 10:00 a.m.	**Gerard W. Ostheimer Lecture: What's New in OB Anesthesia?** Introduction: Roshan Fernando, FRCA Speaker: Alison Macarthur, MD, MSc, FRCPC
10:00 - 10:15 a.m.	***Break***
10:15 - 11:15 a.m.	**Oral Presentation #2** Moderator: Michael Froelich, MD
11:15 - 12:15 p.m.	**Fred Hehre Lecture: Malpractice or Miscommunication? The Importance of Improved Communication between Anesthesiologists, Patients and our Colleagues** Introduction: David J. Wlody, MD Speaker: David J. Birnbach, MD, MPH
12:15 - 1:00 p.m.	***Lunch*** *(on your own)*
1:00 - 2:00 p.m.	**Best Paper Presentations** Moderator: Gordon Lyons, FRCA
2:00 - 3:00 p.m.	**Best Case Reports: You Did What?** Moderator: Robert Gaiser, MD
3:00 - 3:15 p.m.	***Break***
3:15 - 4:00 p.m.	**Poster Review #2** Moderator: Moeen K. Panni, MD
4:00 - 5:30 p.m.	**Panel on Infection after Neuraxial Anesthesia** Chair: Peter H. Pan, MD Panelists: Joy Hawkins, MD; Terese T. Horlocker, MD; Samuel Hughes, MD; Ruth Landau, MD

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GERTIE MARX SYMPOSIUM

A-1.

CEREBROSPINAL FLUID PRESSURE AND SENSORY BLOCK HEIGHT WITH SINGLE-SHOT SPINAL COMPARED TO COMBINED-SPINAL EPIDURAL ANESTHESIA FOR CESAREAN SECTION

AUTHORS: D. Horstman, E. Riley, S. Mehta, B. Carvalho;
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Introduction: Most cesarean sections (CS) are performed under neuraxial anesthesia using either a single-shot spinal (SSS) or a combined-spinal epidural (CSE). Intrathecal doses are generally not altered based on the neuraxial technique. However, sensory levels up to five dermatomes higher have been reported with CSE compared with SSS in patients undergoing elective CS[1] and gynecological surgery.[2] It has been postulated that this difference is due to exposure of the epidural space to atmospheric pressure when performing the epidural component of the CSE. This may increase pressure on the dural sac, raise cerebrospinal fluid pressure (CSFP) and favor rostral spread of the intrathecal dose. We tested the hypothesis that CSE results in greater CSFP and consequently higher sensory blocks compared to SSS.
Methods: Following IRB approval and informed consent, we recruited 30 healthy parturients scheduled for elective CS into this randomized, double-blinded study. The CSE and SSS were performed at L3/4 in the right lateral position. The CSFP was measured at the hub of a 26G Gertie Marx needle with a fiber-optic pressure sensor (Photon Control Inc., Burnaby, Canada) after confirming free flow of CSF prior to intrathecal administration. All patients received a standard intrathecal anesthetic dose (12 mg heavy bupivacane, 10 mcg fentanyl and 200 mcg morphine). For the CSE technique, we used a loss-of-resistance technique to air and removed the Touhy needle immediately after intrathecal dosing without threading the epidural catheter. The sensory block height was measured using pin-prick, cold and touch and the total dose of phenylephrine required to maintain normotension was recorded.
Results: There were no statistically significant differences in CSFP, sensory block heights or vasopressor requirement between the two study groups (Table 1). We observed no significant correlation between opening CSFP and maximum block height (P>0.05).

Table 1: Important outcome variables between the single-shot spinal (SSS) and the combined-spinal anesthetic (CSE) study groups.

	SSS (n=13)	CSE (n=14)	P-Value
Opening CSF pressure (mmHg)	6 (4-11.5)	9 (8.5-12)	0.09
Maximum sensoryblock height			
Cold	T3 (T3-T2)	T2 (T3-C8)	0.30
Pin-prick	T4 (T5-T2)	T3 (T4-T3)	0.30
Touch	T4 (T4-T2)	T3 (T4-T1)	0.48
Phenylephrine requirements (mcg)	1304 ± 637	1164 ± 770	0.61

Data are presented as median (interquartile range) and mean ± SD. P value computed from two-tailed Student's t test and two-sample Mann-Whitney tests as appropriate. CSF=cerebrospinal fluid.

Conclusion: There were no significant differences in sensory block heights and vasopressor requirement between the study groups despite a trend towards greater CSFP in the CSE group. Although the concept that exposing the epidural space to atmospheric pressure increases CSFP cannot be dismissed, our findings suggest that intrathecal anesthetic dose alterations are not necessary when performing CSE instead of SSS for CS.
REFERENCES:
1. Ithnin F, et al.Anesth Analg 2006;102:577-80.
2. Goy RW, et al. Anesth Analg 2004; 98(2):491-6.

A-2.

EFFECT OF SPINAL VERSUS EPIDURAL ANALGESIA ON UTERINE CERVICAL DILATION AND CYTOKINE EXPRESSION IN LABORING WOMEN

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Introduction: Cervical ripening and rate of cervical dilatation reflect poorly understood processes. There is a current consensus that cervical ripening represents a local inflammatory process mediated by cytokines and immune cell activation, and some evidence suggests that sensory nerves in the cervix may participate in this process. Others have observed more rapid cervical dilatation with combined spinal epidural (CSE) than epidural analgesia, perhaps reflecting different effects of these methods on these sensory nerves. Those studies did not, however, control the timing of checking cervical dilatation. We therefore tested the hypotheses that CSE analgesia for labor results in more rapid cervical dilatation than epidural analgesia and that rate of dilatation correlates with concentrations of cytokines in cervical mucous.
Methods: After IRB approval and written informed consents, 100 ASA I-II, nulliparous, term, uncomplicated parturients in spontaneous labor with cervical dilation < 5 cm will be randomized to either CSE or EPI (Epidural Only) analgesia. CSE is provided with 0.7 ml 0.25% bupivacaine with 15 mcg of fentanyl diluted to 2 mL with CSF. EPI is initiated with 2 mL followed by 5 mL of 2% lidocaine, followed by bupivacine, 0.11% plus fentanyl, 2 mcg/ml by infusion. Once analgesia, defined as a verbal pain score (0-10) of < 3 is achieved a sterile speculum exam is performed by the obstetrician and a sterile swab is inserted into the cervical os for 20 seconds. The speculum is removed and a digital exam is performed to determine cervical dilation. Two hours later these procedures are repeated. Each cervical mucous sample is centrifuged, frozen, and stored at -86°C for subsequent cytokine analysis.
Results: To date 20 patients have been enrolled with 18 evaluable pts**:** 10 in CSE and 8 in EPI. Two patients in the CSE group were dropped**:** missed cervical check and a protocol violation. Interim analysis shows that groups are similar in age, height, and weight. Groups did not differ on cervical dilatation immediately after obtaining analgesia (3.5 ± 0.4 in CSE vs 3.0 ± 0.5 in EPI; mean ± SEM) or 2 hrs later (4.3 ± 0.3 in CSE vs 5.1 ± 0.8 in EPI). Change in cervical dilatation overall during the 2 hr period ranged from 0 to 8.5 cm. Cytokine analysis is pending.
DISCUSSION: These preliminary data replicate previous observations of a rate of cervical dilatation in the EPI analgesic treatment of approximately 1 cm/hr, but fail to replicate the previously reported cervical dilatation in the CSE analgesic treatment of approximately 2 cm/hr. There was, as expected, a wide range of rate of cervical dilatation, and whether these reflect individual differences in concentrations of cytokines in cervical mucous will be tested.
Supported in part by NIH grant NS48065.

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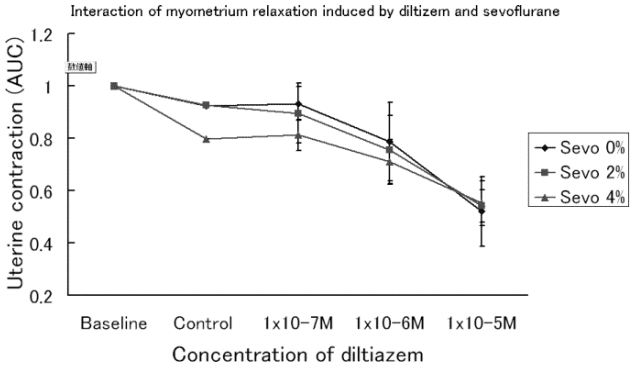
GERTIE MARX SYMPOSIUM

A-3.

INTERACTION BETWEEN DILTIAZEM AND SEVOFLURANE ON MYOMETRIUM RELAXATION IN RATS

AUTHORS: Y. Ohashi, H. Sumikura, T. Tateda;
AFFILIATION: St. Marianna University School of Medicine Hospital, Kawasaki, Japan.

Introduction: It has been well known that volatile anesthetics cause myometrium relaxation (1). Calcium antagonist has been also known to induce myometrium relaxation (2). Therefore there may be a risk of severe uterine relaxation as a result of combined use of them. No previous study has investigated an interaction between them. In the present study, we investigated an interaction between sevoflurane and diltiazem on myometrium relaxation using myometrium strips isolated from pregnant rats.
Methods: 24 strips of uterine smooth muscle were obtained from Sprague-Daley rats at the late stage of gestation. The strips were held in organ baths, and one end of strip was connected to a bath body and the other end was held to a strain gauge transducer. The bath solution was continuously gassed (95%O2 and 5%CO2) and temperature was kept at 37 C. Each strip was then subjected to optimal resting tension (10mN) over 60-min period. Myometrium contraction was recorded and evaluated using a special computer program. After baseline contraction was measured, diltiazem was added to the bath solution to titrate low (1x10-7g/ml), middle (1x10-6g/ml) and high (1x10-5g/ml) concentration and the contractions was measured at each concentration (n=8 for each concentration). The procedure was repeated under 2% and 4% Sevoflurane. Uterine contraction was evaluated as areas under curves for 5 minutes (AUC). Data were analyzed by two-way repeated measure ANOVA.
Results: Two-way ANOVA showed significant decrease of AUC by diltiazem but not by sevoflurane, and there is no interaction between sevoflurane and diltiazem.



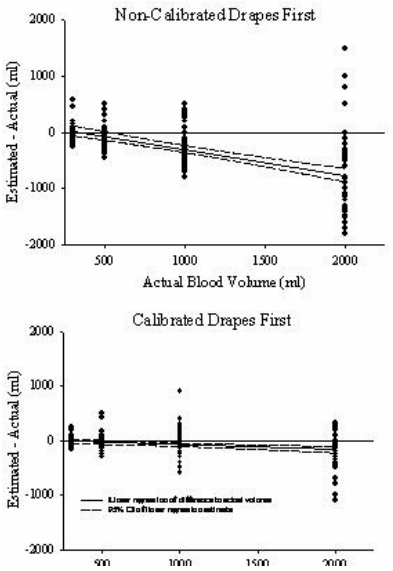
DISCUSSION: In the present study, it was shown that diltiazem induced myometrium relaxation with dose-dependent manner. However, combination of sevoflurane at high concentration and diltiazem at high dose did not show additive effect. As both agents have been reported to reduce calcium influx through voltage dependent calcium channel, intracellular calcium might be used to sustain myometrium contraction.
References:
1. Yamakage M, et al.**:** Sevoflurane inhibits contraction of uterine smooth muscle from pregnant rats similarly to halothane and isoflurane. Can J Anesth; 49**:** 62-6 2002
2. Lechner W, et al**:** Calcium antagonists for uterine relaxation. Gynecol Obstet Invest; 28**:** 144-6 1989
3. Hayashi Y, et al.**:** Postpartum acute myocardial infarction induced by ergonovine administration. Intern Med; 42**:** 983-6 2003

A-4.

ACCURACY OF BLOOD LOSS ESTIMATION AFTER VAGINAL DELIVERY

AUTHORS: P. Toledo, C. A. Wong, P. Fitzgerald, R. J. McCarthy;
AFFILIATION: Northwestern University, Chicago, IL.

Introduction: Post-partum hemorrhage (PPH), blood loss greater than 500 mL after vaginal delivery, is a major cause of maternal morbidity and mortality. Visual assessment has been shown to underestimate post-partum blood loss by 33% to 50% compared to photospectrometry.[1] Estimates worsen in proportion to the amount of blood loss.[2] The purpose of this study was to determine the effect of calibrated markings on visual blood loss estimation (VBLE) in a simulated vaginal delivery. A second purpose was to determine if provider type (obstetric and anesthesia attendings, residents, and nurses), or years of experience, influence the accuracy VBLE.
Methods: In this IRB approved, randomized cross-over study, subjects were randomized in block, by department, to estimate blood loss at four isolated stations of calibrated or non-calibrated vaginal delivery drapes, and then crossed-over. Volumes were randomly ordered within each station. Delivery drapes had a known volume (300, 500, 1000 and 2000 mL) of blood (HCT of 33%), 100 mL of urine, and surgical sponges. Drapes were calibrated in 500 mL increments to 2500 mL. Answers could not be reviewed or changed between stations. The difference between VBLE and actual blood volume was compared between the group that estimated the calibrated versus the non-calibrated drapes using ANOVA with repeated measures with provider type, training level, and gender as covariates. Accuracy of estimates was determined by Bland-Altman analysis. P<0.05 was used to reject the null hypothesis.
Results: Subjects randomized to the non-calibrated drapes underestimated the blood loss, with worsening accuracy as the blood loss increased (Figure). Subjects randomized to view the calibrated drapes first were more accurate in their VBLE in the non-calibrated drapes than those who did not see the calibrations first. All provider groups were equally accurate at VBLE in the calibrated vaginal delivery drapes. There was no difference in VBLE between provider groups or training levels.



Discussion: All care providers were equally inaccurate at VBLE in a simulated vaginal delivery without calibrated markings. Calibrated markings improved the VBLE in all groups. In conclusion, clinicians underestimate blood loss following vaginal deliveries. The addition of calibrations to vaginal delivery drapes could prevent delay in diagnosis and treatment of PPH.
References**:**
1. Int J Gynecol Obstet 2006; 93:220-4.
2. Int J Gynecol Obstet 2000; 71:69-70.

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GERTIE MARX SYMPOSIUM

A-5.

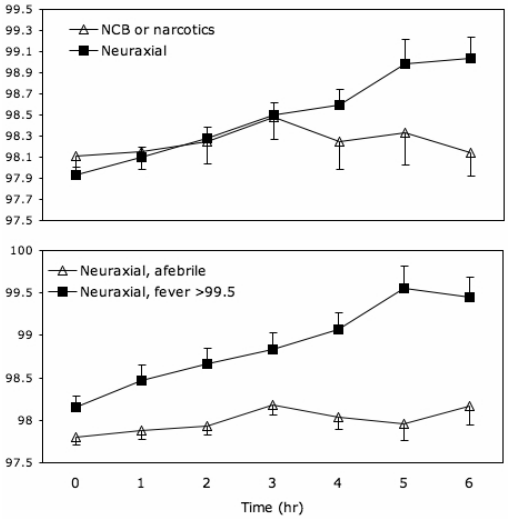
WARMING IN PARTURIENTS WITH EPIDURALS IS AN AVERAGING ARTIFACT

AUTHORS: T. Gelfand, A. Palanisamy, L. C. Tsen, S. Segal;
AFFILIATION: Brigham & Women's Hospital, Boston, MA.

Introduction: Parturients with epidural analgesia in labor experience a gradual increase in body temperature, on average, which is not seen in those without epidurals (1). However, overt fever is also increased in women with epidurals, as demonstrated by both observational and randomized studies (2). We hypothesized that the gradual warming is in fact an artifact of averaging patients experiencing no change in temperature with those developing clinical fever.

Methods: With IRB approval, we measured maternal temperature every hour in healthy women at term admitted for labor. Demographic data, details of labor management, mode of analgesia, and delivery were recorded. Patients selected their analgesia without reference to the study. Temperatures were recorded and corrected to oral equivalent from study entry until delivery. Curves of mean temperature were constructed for each analgesic type and compared by a variation of ANOVA for repeated measures. Curves were plotted and compared within analgesic type for patients eventually developing clinical fever (using >99.5 or >100.4 F as cutoffs) vs. those who did not. Finally, pre-analgesic temperatures were compared over time for patients who did and did not develop clinical fever. In all cases $P<0.05$ was considered significant.

Results: 107 patients have been studied to date, 86 neuraxial (epidural or CSE) and 21 NCB (opioids or no analgesia). Mean temperature gradually increased in the neuraxial group, averaging 0.18 F per hour over the first six hours after onset of analgesia, but did not change in the NCB group (P<.0001) [see Figure, top]. 35% overall developed T>99.5 and 17% had T> 100.4. Epidural patients showed no change in temperature over time if they did not develop clinical fever, but a progressive rise of approximately 0.22 F per hour in the group that developed T>99.5 (P<.0001) [see Figure, bottom]. Similar results were seen when T>100.4 was used (P<.0001). Temperatures in the six hours prior to analgesia were also significantly higher in the group that eventually developed fever (P=.01).



Discussion: The results suggest that the previously observed slow progressive rise in temperature with epidural analgesia is an artifact due to averaging patients who develop clinical fever with those who do not. This has implications for understanding the mechanism of epidural-associated fever.

References**:** (1)Br J Anaesth 1991;67:565-8 (2)Am J Obstet Gynecol 2002;186:S69-77.

A-6.

JULY IN MIAMI OR DECEMBER IN BANFF - CAN EXTREMES OF TEMPERATURE CAUSE FAILED SPINALS? EFFECTS OF TEMPERATURE ON BUPIVACAINE CONCENTRATION

AUTHORS: M. A. Soens, D. J. Birnbach, J. S. Ranasinghe, B. W. Steele, H. C. Walls, K. Candiotti;
AFFILIATION: University of Miami Miller School of Medicine, Miami, FL.

Introduction: Failed spinal anesthesia after presumed subarachnoid injection of local anesthetics has been reported.[1] Although technical errors may account for these failed spinals, cases in which there was confirmation of correct placement have also been described.[1] Tetracaine was associated with more failures, attributed to lability of esters especially during transport.[2] Bupivacaine, an amide, should not require stringent transport conditions. However, the FDA states that bupivacaine is “heat intolerant”, and transportation during summer months could result in loss of potency.[1] Furthermore, the product insert states “solutions should be stored at controlled room temperature 15-30°C.” However, temperatures during shipment can exceed these limits. We investigated whether exposure of 0.75% hyperbaric bupivacaine to extreme temperatures could alter its concentration.

Methods: After calibration and validation with 5 ampules of hyperbaric bupivacaine 0.75% not exposed to extreme temperatures, various samples were analyzed. All bupivacaine ampules were drawn up into 3 cc syringes for transport and personnel were blinded to contents. Contents of the syringes were diluted in DI water to appropriate concentrations for capillary gas chromatography-mass spectrometric (GC/MS) assay. One mL aliquots of each sample were fortified with mepivacaine as an internal standard, basified and extracted with an organic solvent. The solvent was collected, evaporated and reconstituted for analysis. The samples were first screened to look for degradation products or impurities. The samples were quantified against least squares standard curve spanning the expected concentration range of the samples. Data are reported as means and standard deviations. We used contrasts in one-way analysis of variance to test the significance of hypothesized differences. $P<0.05$ was used for statistical significance.

Results: No impurities were identified. Room temperature bupivacaine had an average concentration of 6.9mg/ml (92.5 ± 0.7 % target). Cooled bupivacaine had an average concentration of 6.1 mg/ml(81.3 ± 3.8% target). Heated bupivacaine had an average concentration of 6.4mg/ml (85.3 ± 5.7% target). While a trend was noted (p=0.066), statistical significance was not achieved.

Table 1

SAMPLE	CONTENT
Syringe 1	hyperbaric bupivacaine 0.75% exposed to 50 degrees C for 5 days
Syringe 2	hyperbaric bupivacaine 0.75% exposed to 50 degrees C for 5 days
Syringe 3	hyperbaric bupivacaine 0.75% exposed to -18 degrees C for 5 days
Syringe 4	hyperbaric bupivacaine 0.75% exposed to -18 degrees C for 5 days
Syringe 5	lidocaine 2% not exposed to heat or cold
Syringe 6	saline, room temperature
Syringe 7	hyperbaric bupivacaine 0.75%, not exposed to heat or cold
Syringe 8	hyperbaric bupivacaine 0.75%, not exposed to heat or cold

Conclusion: This pilot study comparing concentrations of heated or cooled bupivacaine demonstrated that concentrations may change, however, the study is not yet adequately powered. Clinical significance has not been evaluated.

References:
1. Int J Obstet Anesth 2004 ;13 **:** 131-134
2. Ann Fr Anesth Reanim 1988;7:383-386.

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GERTIE MARX SYMPOSIUM

A-7.

FACTORS IN THE OBSTETRIC PATIENT WHICH PREDISPOSE TO REQUIRING A REPEAT EPIDURAL BLOOD PATCH AS TREATMENT FOR POST-DURAL PUNCTURE HEADACHE.

AUTHORS: P. J. Tan, S. M. Barsoum, J. E. Dalton;
AFFILIATION: Cleveland Clinic, Cleveland, OH.

Introduction: Epidural blood patch (EBP) has been used to treat post dural puncture headache (PDPH) since it was first described by Gormley in 1960[(1)]. EBP is effective in treating PDPH with success rates ranging from 56-98% in obstetric patients[(2)]. Patients may require a repeat blood patch if their initial EBP fails to resolve their headache. We sought to determine which factors, if any, are associated with obstetric patients requiring a repeat EBP for treatment of PDPH.
Methods: After IRB approval, a retrospective review was performed at Cleveland Clinic main campus and at Hillcrest Hospital. All obstetric patients who received EBP for treatment of PDPH from January 1998 to July 2006 were included. A total of 137 patients received EBP; four charts were unavailable and three patients received prophylactic EBP. These patients were excluded from our analysis. Each chart was reviewed by the primary author. Factors evaluated were**:** whether the patient received a repeat EBP, age, height, weight, BMI, parity, needle type, amount of blood injected in first EBP, time from dural puncture to headache onset, time from headache onset to first EBP, and time from dural puncture to first EBP.
Results: Of the 130 patients analyzed, 47 (36.2%) required a second EBP and 83 (63.8%) did not. Results of the univariable tests of association are summarized in the table below.

Summary statistics for the requirement of a second EBP for N=130 OB patients receiving EBP for PDPH.

		Required 2nd EBP				
		Yes	No	Units	Odds Ratio (95% C.I.)	p†
Factor	Level	N (%) of Patients				
Hospital	Hillcrest	36 (40.9)	52 (59.1)		1.0	0.10
	Main Campus	11 (26.2)	31 (73.8)	–	0.51 (0.23 ,1.2)	
	17G Touhy	38 (38)	62 (62)		1.0	
Needle Type	25G Whitacre	4 (21.1)	15 (79.0)	–	0.44 (0.13 ,1.4)	0.30
	Other	5 (45.5)	6 (54.6)		1.4 (0.39 ,4.8)	
		Mean (Std. Dev.)				
Age (Years)		32.1 (5.0)	31.4 (5.2)	5	1.2 (0.81 ,1.6)	0.44
Height (in)		65.4 (2.7)	64.9 (2.5)	1	1.08 (0.94 ,1.2)	0.32
Weight (lbs)		171 (27)	190 (46)	10	0.87 (0.77 ,0.97)	0.003
Body Mass Index		28.2 (4.5)	31.7 (7.1)	1	0.89 (0.82 ,0.96)	<0.001
Blood (cc) Injected at 1st EBP		18.4 (3.7)	18.1 (3.7)	5	1.09 (0.67 ,1.8)	0.72
		Median (Q1, Q3)				
Parity		1.0 (0.0, 2.0)	1.0 (0.0, 1.0)	1	1.3 (0.89 ,1.8)	0.15
Time (h) - Dural Puncture to PDPH Onset (T_1)		10.0 (5.0, 17.0)	17.0 (9.0, 32.0)	1	0.94 (0.91 ,0.97)	<0.001
Time (h) - PDPH Onset to 1st EBP (T_2)		16.0 (5.0, 23.0)	29.0 (19.0, 46.0)	1	0.96 (0.94 ,0.98)	<0.001
Time (h) - Dural Puncture to 1st EBP (T_{total})		28.0 (19.0, 35.0)	52.0 (34.0, 75.0)	1	0.95 (0.93 ,0.97)	<0.001

† Likelihood ratio test comparing a univariable logistic regression model with each factor as a predictor to the null model (including no predictors).

Multivariable analysis resulted in a non-significant relationship between BMI and repeat EBP, with estimated odds ratio (OR) (95% CI) of 0.93 (0.84, 1.01) (P=0.11). With respect to time, the relationship remained significant showing that doubling of the value for T_1 (an increase of 1.0 on $\log_2$ scale) reduces the odds of receiving a second EBP by an estimated 46%, corresponding to an OR (95% CI) of 0.54 (0.36, 0.78). Similarly, doubling of the value for T_2 reduces the odds of receiving a second EBP by an estimated 41%, corresponding to an OR (95% CI) of 0.59 (0.43, 0.79).
Conclusion: BMI, time, and weight were significant in the univariable analysis; however, the only independent predictors of obstetric patients requiring repeat EBP were time from dural puncture to headache onset and time from headache onset to first EBP.
References**:** 1. Anesthesiology. 21**:** 565-566. 1960. 2. International Journal of Obstetric Anesthesia. 10**:** 172-176. 2001.

A-8.

THE ROLE OF THE CD38/CADPR SIGNALING PATHWAY IN OXYTOCIN-INDUCED CONTRACTION IN HUMAN MYOMETRIUM

AUTHORS: W. Zielinska[1], E. Chini[2], G. M. Vasdev[2];
AFFILIATION: [1]Mayo Medical School, Rochester, MN, [2]Mayo Clinic College of Medicine, Rochester, MN.

Introduction: Dysfunctional Uterine Contraction Is An Important Cause Of Failure To Progress In Labor. The Mechanisms For Controlling Myometrial Contractions Are Not Well Understood. Several Mechanisms Are Present In Smooth Muscle Which Result In Increase The Intracellular Ca^{2+} (Ica^{2+}). For The Human Uterus, Only 1,4,5-trisphosphate-induced Ca^{2+} Release Has Been Studied. Ryanodine Receptors Are Also Prevalant In Human Myometrium. The Aim Of Our Study Was To Determine The Role Of Ryanodine Receptor Channels In Increasing Ica^{2+}.
Methods: To determine the role of the cyclic ADP-ribose (cADPR)-signaling pathway in oxytocin-induced iCa^{2+} transients in human myometrial, uterine cells from non pregnant and term pregnant were needed. After IRB approval and patient consent, stripes of myometrium were harvested at either elective hysterectomy or Cesarean Section. Using standardized techniques of cell preparation, microsomal fractionation, confocal Ca^{2+} imaging and Ca^{2+} antagonist oxytocin response, the signal pathway was determined. CD38 cyclase activity and CD38 expression were determined with western blot and immunohistochemistry.
Results: We found that oxytocin-induced Ca^{2+} transient is dependent on both extra cellular Ca^{2+} and iCa^{2+} stores. Both the 1, 4, 5-trisphosphate- and the cADPR-induced Ca^{2+} releasing systems are important for the induction of iCa^{2+} transients by oxytocin in human myometrial cells. In addition, we observed that the expression of the CD38 enzyme and the intracellular levels of cADPR increase in human myometrium from pregnant patients as compared with age match non pregnant patients.
Discussion: Our study shows that CD38/cADPR increases the release of iCa^{2+} by oxytocin. This is induced by cytokines, estrogens and pregnancy. The observation that the cADPR-signaling pathway is important for the development of iCa^{2+} transients in human myometrial cells raises the possibility that this signaling pathway could serve as a target for the development of new therapeutic strategies for abnormal myometrial contraction observed during dysfunctional labor.
References:
1. Barata H et al. The role of cyclic ADP ribose signaling pathways in oxytocin induced calcium transients in human myometrial cells. Endocrinology 145**:** 881-889, 2004.

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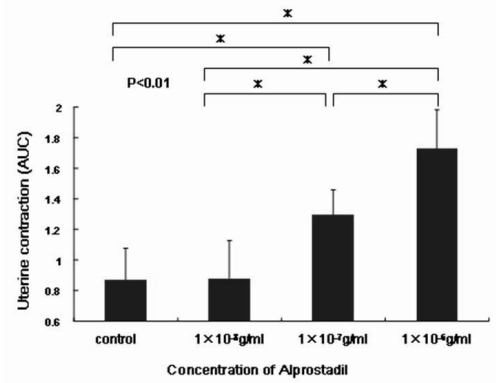
ORAL PRESENTATIONS 1

A-9.

THE INHIBITORY EFFECT OF ALPROSTADIL AGAINST SEVOFLURANE INDUCED MYOMETRIUM RELAXATION IN RATS

AUTHORS: H. Sumikura, Y. Ohashi;
AFFILIATION: St. Marianna Unversity School of Medicine, Kawasakishi, Kanagawaken, Japan.

Introduction: It has been well known that volatile anesthetics cause myometrium relaxation and reduced sensitivity to oxytocin, and for cesarean section under general anesthesia it has been recommended to lower a concentration of volatile anesthetic or to shift an anesthetic agent from volatile anesthetic to intravenous one after the delivery to avoid excessive postpartum bleeding. However, as either low-dose volatile anesthetics or intravenous anesthesia increases a risk of awareness, we need an uterotonic agent other than oxitocin, which prevails against myometrium relaxation induced by volatile anesthetics. Prostaglandins seems to be useful for this purpose, however, it has not been studied if prostaglandins can inhibit myometrium relaxation induced by volatile anesthetics. In the present study, we investigated if alprostadil, which is a composite prostaglandin, can inhibit sevoflurane induced myometrium relaxation in pregnant rats.
Methods: 24 strips of uterine smooth muscle were obtained from Sprague-Daley rats at the late stage of gestation. The strips were held in organ baths, and one end of strip was connected to a bath body and the other end was held to a strain gauge tronsducer. The bath solusion was continuously gassed (95%O_2 and 5%CO_2) and temperature was kept at 37°C. Each strip was then subjected to optimal resting tension (10mN) over 60-min period. Myometrium contraction was recorded and evaluated using a special computer program. After the baseline contraction was measured, sevoflurene (1MAC) was introduced into baths for 60-min, and the contraction was measured again. Then, alprostadil was added to the bath solusion to titrate low($1x10^{-8}$g/ml), middle($1x10^{-7}$g/ml) and high($1x10^{-6}$g/ml) concentration and the contractions was measured at each concentration (n=8 for each concentration). Uterine contraction was evaluated as areas under curves for 5 minutes (AUC). Data were analyzed by one-way ANOVA.
Results: Sevoflurane (1MAC) decresed the AUC by approximately 13%, indicating myometrium relaxation. Alprostadil increased the AUC prevailing against sevoflurane induced myometrium relaxation with dose-dependent manner ($p<0.01$).



Discussion: In the present study, it was shown that alprostadil inhibited the myometrium relaxation induced by sevoflurane with dose-dependent manner. Alprostadil, which has been used to treat a critical hypertension during anesthesia and to induce deliberate hypotension in Japan, seems to be a useful uterotonic agent for cesarean section under general anesthesia.

A-10.

MAXIMIZED LEARNING IN LIMITED TIME: USING HEALTH FAILURE MODES EFFECTS ANALYSIS (HFMEA) IN SIMULATED OBSTETRIC CRISIS DRILLS - POOR COMMUNICATION IS THE HIGHEST RANKING TEAM DEFICIENCY

AUTHORS: S. Lipman[1], K. Daniels[1], B. Valdez[2], D. Lopez[3], M. Druzin[1];
AFFILIATION: [1]Stanford University Medical Center, Stanford, CA, [2]Form Factor Incorporated, Livermore, CA, [3]Lucile Packard Children's Hospital, Stanford, CA.

Introduction: The 'See one, Do one, Teach One' paradigm of medical training does not address gaps in education. Simulation can address these gaps, however, logistic and financial constraints limit time available. We used Health Failure Modes and Effects Analysis (HFMEA) [(1)] to identify recurrent performance deficiencies with the greatest impact on patient outcome in simulated obstetric crisis.
Methods: Six teams comprised of one senior anesthesia resident, two L&D nurses, and two obstetric residents participated in two simulated emergencies**:** 1) hypotension and accompanying fetal bradycardia status post labor epidural, and 2) amniotic fluid embolism with maternal cardio-respiratory arrest. Each team underwent a debriefing session facilitated by two instructors. Using videotape of the scenarios, the team discussed what difficulties they encountered during performance of their duties and identified specific strategies to improve effectiveness. Debriefings were recorded and analyzed by a fellowship-trained Obstetric Anesthesiologist, an experienced L&D nurse, and board certified physicians in Maternal-Fetal medicine and Obstetrics, and a list of deficiencies was compiled. Each deficiency was assigned a category and graded for severity and rate of recurrence. Using HFMEA, a 'Hazard score' was generated.
Results:

General Category	Subcategory	Severity (1-4)	Probability (1-4)	Hazard Score
Communication	Ineffective	2.6	Frequent	10.4
Workload Distribution	Resource Allocation	2.5	Frequent	10
Knowledge Deficit	Within One's Domain	3.1	Occasional	9.2

Discussion: HFMEA was adapted from Failure Modes Effects Analysis (FMEA), which is used in industry to identify recurrent process problems and enhance quality management. In the current environment of decreased trainee hours, medical educators are utilizing simulation as an additional tool to enhance resident education. However, simulation is resource intensive and must be used efficiently. We hypothesized the HFMEA model could help us focus our teaching by identifying the most critical errors. The deficiencies we identified were similar to those presented in 2004 by JCAHO in that ineffective communication was the most common process problem.[(2)] We now focus on communication and other high impact problems during debriefing and encourage the group to move on from discussions of issues that have lower impacts on patient safety.
References:
(1) http://www.patientsafety.gov/SafetyTopics/HFMEA/FMEA2.pdf
(2) JCAHO Sentinel Event Alert; Issue 30 July 21, 2004

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ORAL PRESENTATIONS 1

A-11.

5U BOLUS OXYTOCIN AT CESAREAN SECTION IN WOMEN AT RISK OF ATONY

AUTHORS: K. J. King[1], J. Douglas[2], W. Unger[2], A. B. Wong[2], V. Espinosa[3], R. A. King[4];
AFFILIATION: [1]Maitland Hospital, Maitland, Australia, [2]British Columbia Women's Hospital, Vancouver, BC, Canada, [3]Children and Family Research Institute, Vancouver, BC, Canada, [4]University of Newcastle, Newcastle, Australia.

Introduction: The use of an intravenous bolus of oxytocin during cesarean section (C/S) to prevent uterine atony is the subject of ongoing debate. Much is known about the adverse hemodynamic effects of a bolus, but its effects have never been previously compared with placebo at caesarean section.
Methods: After ethics approval, a prospective, randomized, double-blinded, placebo-controlled trial was conducted in 143 subjects undergoing C/S. Each subject had at least one risk factor for uterine atony. Subjects received either 5 units oxytocin or an equivalent volume of normal saline (NS) via intravenous bolus over 30 seconds, after cord clamping. Then both groups received an identical infusion of 40 Units Oxytocin in 500mL NS over 30 minutes, followed by 20U in 1L over 8 hours. Primary outcome was the need for additional uterotonics as determined by the surgeon (blinded to the treatment group). Secondary outcomes included uterine tone, estimated blood loss, side-effects, need for blood transfusion and time taken to deliver the placenta. Power analysis indicated 62 subjects per group, assuming 40% of placebo group requires additional uterotonics compared with 20 % in the oxytocin group (beta error 0.2, alpha 0.05, for a one tailed chi-squared test (p1>p2).
Results: Baseline demographic data were similar. Although the need for additional uterotonics was greater in the placebo group, this did not reach statistical significance. There was a statistically significant difference in the uterine tone at one minute. The difference in tone was transient, disappearing by five minutes. Giving the oxytocin bolus over 30 seconds did not significantly increase the incidence of hypotension versus placebo. There were no differences in other secondary outcomes.
Discussion**:** This is the first placebo-controlled RCT to look at bolus oxytocin during caesarean section. Despite adequate power, we did not find a statistically significant difference in the need for additional uterotonic agents. We conclude that there appears to be limited additional benefit in giving a bolus, even in a high risk group, provided an adequate dose of oxytocin is administered by infusion. If a bolus is to be used, we recommend giving 5 units over 30 seconds, because this results in significantly greater uterine tone at 1 minute compared with placebo, without a significant difference in the incidence of hypotension.
References**:** Why Mothers Die 1997-1999, 135-7.

Outcome Measures	Oxytocin N=70	Placebo N=73	p-value
Number of Subjects Needing Additional Uterotonics			
1st hour, n(%)	12 (17)	15 (21)	0.38
24 hours, n(%)	20 (29)	29 (40)	0.109
Average Dose Additional Oxytocin Required			
1st hour (units)	16.5	20.6	0.275
24 hours (units)	44.0	45.1	0.465
Number of Subjects Needing Other Uterotonics Hemabate, n(%)	2 (2.9)	2 (2.7)	
Ergot, n(%)	1 (1.4)	1 (1.4)	
Misoprostol, n(%)	1 (1.4)	3 (4.1)	
Uterine Tone 1 Minute after Bolus, mean (95%CI) (scale of 0-4, where 4 is well contracted)	2.8 (2.56-3.04)	2.16 (1.83-2.5)	0.001
Hypotension, n(%)	18 (25.7%)	10 (13.7%)	0.055
Estimated Blood Loss in mL, mean (95%CI)	812 (761-862)	902 (825-980)	0.92
Number Needing Blood Transfusion, n(%)	1 (1.4)	3 (4.1)	0.326

A-12.

COMBINED SPINAL AND EPIDURAL ANALGESIA (CSEA) FOR LABOR : EFFECTS ON UTEROPLACENTAL BLOOD FLOW AND MATERNAL CATECHOLAMINES

AUTHORS: P. L. Matamala[1], M. E. Parra[1], S. E. Cerda[2], V. M. Parra[2], R. E. Terra[1], C. G. Arzola[2], C. Y. Urrejola[2];
AFFILIATION: [1]Fetal Medicine Unit Dept Ob-Gyn University of Chile Clinical Hospital, Santiago, Chile, [2]Dept Ob-Gyn , University of Chile, Santiago Chile.

Introduction: CSEA has been associated with an earlier and higher incidence of fetal heart rate (FHR) changes. A fall in plasma epinephrine has been observed but other mechanisms and potencial effects on fetal well-being are not defined. Main purpose of this study was to assess the effect of CSEA on umbilical and uterine blood flow and maternal catecholamines.
Methods: After IRB approval and informed consent, healthy parturient women with singleton, uncomplicated pregnancies at term received CSEA with bupivacaine and fentanyl. Pain (VAS), maternal blood pressure, fetal and maternal heart rate, blood flow velocity waveforms and pulsatility indices (PI) of the uterine and fetal umbilical arteries were measured before and at 5, 10, 15 and 30 minutes following CSEA. Intervention criteria included IV TNT for uterine relaxation, IV ephedrine and volume loading to correct hypotension. Any other intervention excluded patient from study. FHR tracings were reviewed post hoc. Blood samples to measure plasma epinephrine, normetanephrine and serotonin by HPLC were drawn at baseline 10 and 30 minutes. Statystical analyses included repeated measures of analysis of variance (Friedman) and Bonferroni and Tukey post tests with $p < 0.05$ defined as significant.
Results: 30 patients were studied. VAS pain scores decreased significantly from 5 minutes. Systolic, diastolic and mean arterial blood pressures decreased significantly from 10 to 15 minutes , whitout hypotension and maternal heart rate from 10 to 30 minutes following CSEA. FHR did not change significantly and tracings did not showed altered patterns. No interventions were required. After CSEA the uterine artery mean PI increased at 10 minutes ($p<0.05$) while no changes occurred in umbilical artery mean PI when compared to baseline. Apgar scores were within normal range and all newborns did not show any evidence of fetal distress. Adrenalin and serotonin plasma levels decrease from 10 min onwards, and adrenalin / normetanephrine ratio decrease significantly after CSEA
Discussion: Maternal hemodynamics and FHR recording after CSEA may not reveal stable uteroplacental perfussion. The increase in uterine artery PI indicates increase in uterine vascular resistance without derrangement in fetal perfussion , as umbilical artery PI remained stable. Decrease in epinephrine after pain relief and imbalance in maternal catecholamines favoring noradrenaline vasoconstriction may explain these observations. Additional studies may contribute to define their clinical impact and cautious use of CSEA is suggested when compromised uteroplacental perfussion and fetal well being state are suspected.

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ORAL PRESENTATIONS 1

A-13.

OBSTETRIC REGIONAL ANESTHESIA MALPRACTICE CLAIMS - THE EXTREMES AND THE SURPRISES

AUTHORS: J. M. Davies, B. K. Ross, K. L. Posner, K. B. Domino;
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Introduction: Nerve damage, epidural hematoma/abscess, and postdural puncture headache are well-recognized complications of obstetric regional anesthesia. Less frequently addressed are maternal death/ brain damage and minor injuries, including emotional distress and pain during surgery. We analyzed obstetric regional anesthesia claims from the ASA Closed Claims Database during the last decade, looking at factors which possibly contributed to these latter complications.
Methods: Anesthesia claims from the ASA Closed Claims Database contain standardized summary data on closed malpractice claims from throughout the U.S.1,2 Of the 3183 claims in the database from 1990 to 2001, 255 claims associated with obstetric regional anesthesia were analyzed looking at the frequency of complications, contributing factors, appropriateness of care and payment.
Results: There were 21 claims for maternal death and 15 claims for maternal permanent brain damage, two thirds of each group involving cesarean section and one third, vaginal delivery. The major factors in maternal death were block-related cardiac arrest (e.g., neuraxial cardiac arrest, high block, or unrecognized intrathecal injection), thrombotic events, and preexisting patient conditions (Table 1). More than half of the permanent brain damage claims were associated with block-related cardiac arrest. Of the 26 claims for emotional distress, inadequate regional block (31%), high block requiring conversion to general anesthesia (GA) (15%), accidental dural puncture (15%) and unprofessional behavior (8%) were contributing factors (Table 1). Care was appropriate in 75% and payment made in only 25% of claims. Twenty-one claims were for pain during cesarean section or vaginal delivery (15% vs. 2% of all claims), all related to inadequate anesthesia/analgesia from the regional block. Care was questionable or substandard in nearly half of these claims, due to delayed conversion or failure to convert to GA. Payment was made in 71% of these claims.

Factors contributing to obstetric regional anesthesia malpractice claims

Complications	Contributing Factors	Cesarean Section n = 124 (49%)	Vaginal Delivery n = 131 (51%)	Total n = 255
SEVERE INJURIES				
Maternal Death n = 21 (8% of total claims)	Block-related arrest	4 (29%)	4 (57%)	8 (38%)
	Thrombotic event	3 (21%)	1 (14.3%)	4 (19%)
	Patient condition	4 (29%)	1 (14.3%)	5 (24%)
	Aspiration	1 (7%)	0 (0%)	1 (5%)
	Other	2 (14%)	1 (14.3%)	3 (14%)
	TOTAL	14 (100%)	7 (99.9%)	21(100%)
Permanent Brain Damage n = 15 (6% of total claims)	Block-related arrest	5 (50%)	4 (80%)	9 (60%)
	Other	5 (50%)	1 (20%)	6 (40%)
	TOTAL	10 (100%)	5 (100%)	15(100%)
MINOR INJURIES				
Emotional Distress = 26 (10% of total claims)	Inadequate block	7 (41%)	1 (11%)	8 (31%)
	High Block to GA	3 (18%)	1 (11%)	4 (15%)
	Dural puncture	1 (6%)	3 (33%)	4 (15%)
	Unprofessional MD	1 (6%)	1 (11%)	2 (8%)
	Other	5 (29%)	3 (33%)	8 (31%)
	TOTAL	17 (100%)	9 (99%)	26(100%)
Pain during surgery n = 21 (8% of total claims)	Inadequate block	18 (100%)	3 (100%)	21(100%)

Note: Minor injuries - some claims had multiple injuries.
Percentages may not sum to 100% due to rounding.

Discussion: Careful epidural/spinal placement, test dosing, and meticulous management of regional anesthetics would not only greatly reduce the incidence of block-related cardiac arrest causing maternal death and brain damage, but may reduce claims for more minor injuries associated with regional anesthesia in obstetrics. Professional conduct, the provision of realistic expectations, and education regarding all risks associated with anesthesia procedures may minimize the number of patients, unhappy with their obstetric experience, using malpractice litigation as a means of emotional vindication.3
References:
1. JAMA 261:1599-1603,1989.
2. Anesthesiology 74:242-249,1991.
3. ASA Newsletter 68 (6):12-14,2004

ORAL PRESENTATIONS INCLUDING THE ZUSPAN AWARD

A-14.

EXTERIORIZATION OF THE UTERUS AND INTRA-OPERATIVE NAUSEA: A RANDOMIZED, BLINDED TRIAL

AUTHORS: J. C. Lager, F. J. Spielman, K. A. Boggess, D. Mayer, V. Salo-Coombs;
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Introduction: Intraoperative nausea is a common complaint among women who undergo cesarean delivery (CD) with regional anesthesia. Despite this, no studies exist to date that result in a primary outcome of nausea when comparing uterine repair techniques. The objective of this study was to determine the effect of different uterine repair techniques on intraoperative nausea.
Methods: A double-blinded randomized clinical trial of intra-abdominal versus extra-abdominal uterine incision repair during CD was undertaken. After approval from the IRB, pregnant women who presented for scheduled CD were recruited between August 2005 and January 2007. Exclusion criteria included morbid obesity, < 34 week gestation, or planned bilateral tubal ligation. Enrolled women were randomized to intra-abdominal or extra-abdominal uterine repair during CD by random numbers in a sealed envelope. All patients received spinal anesthesia in a standardized fashion; no prophylactic anti-emetics were administered. The patient and research personnel were blinded to the type of repair. Baseline nausea and pain were recorded using a visual scale ranging from 0 to 10. Zero was no nausea at all, 1 was minimal nausea and 10 was the worst imaginable nausea. During the CD, study personnel assessed nausea and pain every 5 minutes. Moderate to severe nausea was defined as a score ≥ 3. Intent-to-treat analysis was performed, and Student's t and chi-square tests were used to compare demographics between groups. Fisher's Exact test was used to compare the proportion of women who reported moderate to severe nausea between groups. Secondary analyses compared average pain scores, estimated blood loss, change in hematocrit, and operative time. Assuming a 40% nausea rate in extra-abdominal uterine repair, sample size calculation revealed that 35 women in each group were needed to detect a 40% difference in nausea at $\alpha = 0.05$ with 80% power.
Results: Seventy-one patients were enrolled and randomized. No significant differences in age, race, multiparity, prior CDs, BMI, gestational age or weight gain were found between the two groups. Mean nausea at uterine repair was significantly increased in the exteriorization group vs. intra-abdominal group (4.64 vs. 2.30; $P<0.01$). The rate of moderate to severe nausea was significantly increased in the extra-abdominal group (67% vs. 35%, $P<0.01$). No statistically significant differences were found in pain scores, EBL, change in hematocrit, or operative time.
Discussion: Intra-abdominal uterine repair reduces mean nausea score and moderate to severe nausea during cesarean delivery, without significant differences in blood loss or operative time. Most importantly, the reduction in nausea likely improves patient satisfaction. Intra-abdominal repair requires no additional costs and may decrease the use of anti-emetic medications, thereby reducing the overall cost of the procedure. Implementation of intra-abdominal repair as the primary method for uterine repair should be considered.

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ORAL PRESENTATIONS INCLUDING THE ZUSPAN AWARD

A-15.

APOPTOSIS IN THE CHORION OF FETAL MEMBRANES IN PRETERM PREMATURE RUPTURE OF MEMBRANES

AUTHORS: R. B. George[1], J. Kalich[2], B. Yonish[2], A. P. Murtha[2];
AFFILIATION: [1]Department of Anesthesiology, Duke University Medical Center, Durham, NC, [2]Department of Obstetrics and Gynecology, Duke University Medical Center, Durham, NC.

Introduction: Preterm premature rupture of membranes (PPROM) is a leading cause of neonatal morbidity and mortality. Fetal membranes play an integral role in the maintenance of pregnancy. We sought to determine whether apoptosis occurs in the chorion layer of fetal membranes from PPROM subjects, and further, to determine if there is increased apoptosis in the presence of histological chorioamnionitis.
Methods: With IRB approval, all consenting patients admitted during an 18 month period for conservative management of PPROM between 22 and 34 weeks gestation were enrolled. Histological chorioamnionitis was determined by a blinded pathologist. The presence or absence of chorion was confirmed with specific cytokeratin staining, as a marker of epithelial derived tissues. All PPROM fetal membrane samples were stained using the terminal deoxynucleotidal transferase-mediated deoxyuridine triphosphate nick end-labeling method. The end-labeled DNA is then detected in situ with an anti-digoxigenin:peroxidase conjugate antibody and detected with diaminobenzidine substrate. This method is widely used as an immunohistologic marker for apoptosis. Quantification of apoptosis was performed by counting the number of apoptotic nuclei relative to the normal nuclei in 7 random, high-powered fields of the chorion. Subjects were divided into those with and without histologic chorioamnionitis and analyzed using the Mann Whitney U test.
Results: There was no difference in maternal demographics. PPROM fetal membranes with histological evidence of chorioamnionitis had significantly more apoptotic nuclei than those without histologic chorioamnionitis. In addition, the percent of apoptotic nuclei was significantly higher in the chorioamnionitis group when compared to the group without chorioamnionitis (3.5 vs. 1.9%). The chorion layer was not identified in 18 (37%) subjects.

Table 1. Apoptotic nuclei in chorion laeve

	Chorioamnionitis Present	Chorioamnionitis Absent	
# of samples	20	9	
Total nuclei (Mean +/- SD)	555 +/- 106	560 +/- 134	NS
# apoptotic nuclei (Mean +/- SD)	19.1 +/- 7.2	10.8 +/- 5.7	p = 0.005
% apoptotic nuclei (Mean +/- SD)	3.6 +/- 1.3	1.9 +/- 0.8	p = 0.003

Discussion: Apoptosis appears to be accelerated by infection. In the presence of histologic chorioamnionitis, there is a near doubling in the extent of apoptosis in the chorion of fetal membranes that prematurely ruptured. This finding suggests that the presence of infection may alter the balance between cell death and survival in the PPROM fetal membranes and the protective effect of the chorion may be lost. The absence of chorion in 37% of subjects was not seen in prior term subjects (1), suggesting the destruction of the chorion layer may play an important role in the pathophysiology resulting in PPROM.
References**:** 1. Infect Dis Obstet Gynecol 2002; 10**:** 93-6.

A-16.

IS EXTERNAL CEPHALIC VERSION COST-EFFECTIVE?

AUTHORS: J. M. Tan[1], A. Macario[2], B. Carvalho[2], Y. El-Sayed[3];
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INTRODUCTION: External cephalic version (ECV) is recommended by the American College of Obstetricians and Gynecologists to convert a breech fetus to vertex position, and therefore reduce the need for elective cesarean for breech delivery.[1]The cost of performing ECV is estimated at $1,177 (range $1000-1275), and is mostly due to hospital and obstetrician fees. The goal of this study was to determine the cost-effectiveness of ECV compared to directly scheduling a cesarean for breech delivery.
METHODS: A computer-based decision model (TreeAge Pro 2006,Tree Age Software, Inc.) was developed for a hypothetical base case parturient presenting with a confirmed singleton breech fetus at ≥ 36 completed weeks gestation with no contraindications for vaginal delivery. Analyses of peer-reviewed literature provided probabilities of successful ECV trial on first and second attempts, spontaneous reversion, mode of delivery and need for unanticipated emergency cesarean delivery.[2,3,4,5] Hospital cesarean costs were estimated at $7,244 and $5,050 for vaginal delivery. The primary endpoint of the analysis was the incremental cost-effectiveness ratio, in dollars per quality-adjusted year of life (QALY) gained. A threshold of $50,000 per QALY was used to determine cost-effectiveness.
RESULTS: The incremental cost-effectiveness ratio for conducting a trial of ECV was $31,600/QALY. When the probability of successful ECV was between 46% and 79%, trial of ECV was cost-effective but was expected to cost more than cesarean delivery. If the probability of successful ECV was greater than 79%, trial of ECV was less costly and more effective than cesarean delivery.
CONCLUSION: From society's perspective, ECV trial is cost-effective when compared to a scheduled cesarean for breech presentation provided the probability of successful ECV is >46%.
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ORAL PRESENTATIONS INCLUDING THE ZUSPAN AWARD

A-17.

EFFECT OF COMBINED SPINAL-EPIDURAL ANALGESIA VERSUS SYTEMIC OPIOID ANALGESIA ON FETAL HEART RATE FOR EXTERNAL CEPHALIC VERSION

AUTHORS: J. R. Bauchat, W. A. Grobman, J. T. Sullivan, R. J. McCarthy, P. C. Fitzgerald, C. A. Wong;
AFFILIATION: Northwestern University Feinberg School of Medicine, Chicago, IL.

Introduction: External cephalic version (ECV) may cause changes in fetal status and therefore cardiotocography is recommended periprocedure.[1] A reactive fetal heart rate (FHR) postprocedure indicates fetal well-being. Neuraxial analgesia for ECV reduces pain and improves satisfaction but its effects on FHR in comparison to systemic opioid remain unknown.[2] We compared FHR tracings from patients randomized to receive combined spinal-epidural (CSE) or systemic opioid (SYS) analgesia during ECV.
Methods: Patients with breech presentation were randomized to either CSE (n=47) [intrathecal bupivacaine (2.5 mg) plus fentanyl (15 mcg)] or 50 mcg IV systemic fentanyl (n=48) for ECV. FHR tracings were obtained from an IRB-approved study examining the association of analgesic techniques with success of ECV.[4] Using NICHD guidelines, a perinatologist blinded to patient assignment evaluated FHR patterns for 30 min before and for 60 min after ECV. Baseline FHR, degree of variability, number of accelerations, number and type of decelerations and time to reactivity (TTR) were recorded. TTR was defined as time from initiation of analgesia to the development of two, fifteen beat accelerations (of 15 seconds duration) occurring within 20 minutes of each other.[3] Differences in FHR parameters were compared between groups using the χ^2 and Mann-Whitney U tests.
Results: There were no differences between the CSE and SYS groups in preprocedural and postprocedural baseline FHR, degree of variability, number of accelerations and number and type of decelerations. Median TTR was 13 (IQR 9-21) min in the CSE group versus 39 (IQR 23-51) min in the SYS group (P=0.02). There was no relationship between success of version and FHR changes. One patient in each analgesic group underwent cesarean delivery immediately following ECV for nonreassuring FHR tracings.

	SYS	CSE	P
Variability			
Absent	1	0	
Minimal (1-5 BPM)	0	3	0.13
Moderate (6-25 BPM)	46	44	
Decelerations (decrease FHR > 15 BPM for 15-120 sec)	6	7	0.84
Persistent Decelerations (decrease FHR > BPM for 2-10 min)	7	5	0.76
Time to reactivity (min) †	39 (23-51)	13 (9-21)	0.02

† = see text for definition, data presented as median (IQR)
Discussion: CSE analgesia for ECV has no discernible deleterious impact on FHR pattern as compared to systemic opioid. Furthermore, it results in a more rapid return of a reactive FHR tracing; hence, CSE may provide more immediate reassurance of fetal well-being following ECV.
References:
1. ACOG Practice Bulletin No.13, 2000
2. Anesth Analg 2001; 93**:** 410-13
3. Obstet Gynecol 2000; 96**:** 565-70
4. Anesthesiology 2006; A917
FHR Changes Following CSE or SYS Analgesia For ECV

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A-18.

EXPLICIT COMMUNICATION DURING OBSTETRIC EMERGENCIES: ROOM FOR IMPROVEMENT?

AUTHORS: R. D. Minehart[1], M. A. Podraza[2], D. B. Raemer[2], R. Gardner[1], T. B. Walzer[1], R. Simon[2], M. C. Pian-Smith[2];
AFFILIATION: [1]Brigham & Women's Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA.

Introduction: Optimal management of obstetric emergencies requires highly-functioning and effective teams as well as clear communication[1]. We believe that maximizing explicitness can improve patient safety for both mother and fetus. This study seeks to characterize interdisciplinary communication patterns during a simulated obstetric emergency (maternal code), with the goal of identifying key language that results in formation of a coordinated clinical plan.
Methods: Obstetricians, anesthesiologists, and labor nurses participated in a recurring team-training course developed at the Center for Medical Simulation. We evaluated the quality of explicit communication between the obstetricians and anesthesiologists regarding the patient's evolving condition, along with their respective plans for patient management, during a simulated case of maternal instability. Participants' explicit language to (1)convey information or (2)develop a plan was coded as "advocacy" (observation, opinion, position) and/or "inquiry" (question for counterpart)**:** i.e., "info-advocacy", "info-inquiry", "plan-advocacy", and "plan-inquiry". We also determined whether the team was able to develop a joint management plan. Videotaped scenarios were evaluated independently by two physician investigators, with discrepancies resolved by consensus.
Results: Data from 20 (of a projected 50) scenarios demonstrate that while anesthesiologists advocate frequently, they do not often make inquiries to elicit information from obstetric colleagues (100% info-advocacy, 20% info-inquiry, 95% plan-advocacy, 25% plan-inquiry). In contrast, obstetricians advocate and inquire in more balanced proportions (70% info-advocacy, 75% info-inquiry, 70% plan-advocacy, 55% plan-inquiry). Only ten (50%) of the teams were able to form a coordinated management plan. Preliminary data suggest that language patterns used by these teams differ from those used by teams that were not able to coordinate a plan; specifically, the rate of inquiries made by anesthesiologists of their obstetric colleagues is 3-4 fold higher. (No joint plan achieved**:** info-inquiry 10%, plan-inquiry 10%; vs. Joint plan successfully achieved**:** info-inquiry 30%, plan-inquiry 40%.)
Discussion: Use of effective language during management of medical crises remains an area where much improvement is needed. Techniques for effective communication should be an integral part of medical training, and will be facilitated by an understanding of prevalent language patterns and barriers to coordinated teamwork. Our results suggest that the use of language that includes inquiry, and encourages input from interdisciplinary colleagues, may result in a greater likelihood of a coordinated patient management plan. Ultimately, factors that improve teamwork may result in improved patient outcomes[2].
References:
1] Ann Emerg Med 1999;34(3):373-83.
2] Acad Med 2004;79(2):186-94.

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ORAL PRESENTATIONS 2

A-19.

MU-OPIOID RECEPTOR BINDING AFFINITY TO FENTANYL IS AFFECTED BY SEX BUT NOT BY A118G POLYMORPHISM

AUTHORS: R. Landau, I. Charvet, J. Blouin;
AFFILIATION: University Hospital of Geneva, Geneva, Switzerland.

Background and Goals**:** Opioids are widely used for management of pain, even though they display large inter-individual variability in efficacy and side effects. The μ-opioid receptor (μOR) is the primary site of action for endogenous peptides including β-endorphin, and the major target for opioid analgesics such as fentanyl. The μOR displays genetic variability and several single nucleotide polymorphisms (SNPs) have been described, including A118G with a reported fequency of 30% in Caucasians[1]. In vitro, the G118 allele of A118G polymorphism increases the binding affinity of β-endorphin[2], and a reduced ED50 of spinal fentanyl for labor analgesia in women with the G118 allele has been shown[3]. We examined whether subjects carrying the G118 allele have an increased binding affinity to fentanyl.
Material and Methods: In this pilot and ongoing study, blood samples were obtained from healthy volunteers for genotyping of μOR[3]. In addition, we determined by radioligand binding assays the capacity of fentanyl to displace ^{4}[H]-naloxone bound to whole, freshly isolated lymphocytes[4]. Displacement of ^{3}[H]-naloxone (20nM) by fentanyl (20μM) was compared to the maximal displacement by unlabeled naloxone (20μM) itself in a triplicate manner.
Results: While the A118G polymorphism of μOR did not seem to affect μOR binding affinity, we found a significant difference between men and women regardless of genotype (data presented as relative 'naloxone displacement ability' of fentanyl, in %).

Table**:** Binding of fentanyl in % (presented as mean +/- SD), *p<0.0001 (between men and women)

Men	%	Women	%
Total (n=12)	41.1 ± 2.8	Total (n=12)	74.5 ± 4.8 *
A118 homozygotes(n=9)	40.1 ±3.5	A118 homozygotes(n=8)	73.3 ±3.6
A118G heterozygotes and G118 homozygotes (n=3)	44.0 ± 1.73	A118G heterozygotes and G118 homozygotes (n=4)	77.0 ±6.4

Conclusions**:** We found a significant and consistent difference between men and women with regards to fentanyl binding properties. This finding is congruent with previously described sex differences in opioid analgesia[5] and may explain why women have been shown to require less opioids for management of pain. However, other pathways such as expression, transduction or receptor trafficking rather than μOR binding affinity need to be explored to investigate the potential mechanism by which A118G polymorphism appears to affect the clinical response to opioid therapy.
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A-20.

ABA/ASA IN-TRAINING EXAMINATION SUBTEST SCORES: A NEW OPPORTUNITY

AUTHORS: R. R. Gaiser, T. Cheek;
AFFILIATION: University of Pennsylvania, Philadelphia, PA.

Introduction: In 2006, the ABA/ASA In-Training Examination provided subtest scores, one of which was for Obstetrics and Gynecology (OB/GYN). The provision of these scores allows for the assessment of the education program in OB/GYN as well as for the study of factors impacting the subtest score.
Methods: Current CA-II (n=21) and CA-III (n=22) residents had their subtest scores in OB/GYN analyzed. All residents provided oral consent. Factors analyzed included USMLE I and II scores, In-training examination scores at the end of CA-I year, and medical school grades in OB/GYN. Data analysis included t-test and multivariate regression using Intercooled Stata 9.
Results: Four residents from the CA-II class were included in the CA-III group as they had completed their obstetric rotation during the CA-I year. Two residents in the CA-III group were eliminated due to taking COMLEX examinations. The mean subtest score for CA-II residents (n=17) was 26.1$\pm$2.4 was different for the mean score for the CA-III residents (n=24), 36.3$\pm$2.2 (p=0.0019). There was no correlation between test scores and grades obtained in medical school. For the CA-III residents, test scores did not correlate significantly with grades, CA-I In-Training examination scores, or USMLE I scores. The correlation between the subtest score and USMLE II was 0.46 (p=0.027). Linear regression between USMLE II and subtest score yields: predicted subtest score = 0.218(USMLE II score) - 11.3
Conclusions**:** The didactic program improves the resident's knowledge in anesthesia for OB/GYN. According to the ABA/ASA In-Training Examination, the mean score for the calibration group was 40. Using this score, a resident with a USMLE II score of 235 or higher would be predicted to score at or above the mean. Our analysis suggests that those residents with low USMLE II scores would have trouble with the OB/GYN component of the In-Training examination. Specific education efforts should be focused on these residents.

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ORAL PRESENTATIONS 2

A-21.

ARE PARTURIENTS SENSITIVE TO INHALATIONAL ANESTHETICS? EEG ANALYSIS STUDY

AUTHORS: H. Ueyama, S. Hagihira, M. Takashina, R. Hanada, T. Mashimo;
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Introduction: Parturients are thought to be more sensitive to inhalational anesthetics, because of the decrease in minimum alveolar concentration (MAC). The brain has been assumed to be the site of anesthetic action. However, recent animal studies have showed that anesthesia as defined MAC is determined by anesthetic actions on the spinal cord other than those on the brain1-2). Amnesia and unconsciousness occur as a result of anesthetic actions on the brain. Therefore, it is likely that decreased MAC does not necessarily mean the increase in anesthetic effect on the brain. Recent studies suggested that electroencephalogram (EEG) monitoring can be used as a good indicator of inhalational anesthetic actions on the brain. The aim of this study was to investigate the differences in anesthetic actions on the brain of sevoflurane between parturients and non-pregnant patients by EEG monitoring.
Methods: After IRB approval, 15 parturients undergoing cesarean section (pregnant group, aged 25 to 39) and 15 patients undergoing elective gynecologic surgery (non-pregnant group, aged 26 to 38) were enrolled. No premedication except H2-blocker were administered. Anesthesia was induced with 4mg/kg of thiopental, 0.1mg of fentanyl and 0.15mg/kg of vecuronium. Anesthesia was maintained with sevoflurane and fentanyl. Nitrous oxide was not used. The EEG was monitored using BIS monitor, and the EEG signals were recorded on a computer. We calculated spectral edge frequency 95% (SEF95) and amplitude using our original software named "BSA-BIS". After confirming that end-tidal sevoflurane had reached the equilibrium, we measured EEG derived parameters of sevoflurane at 2.0% and 1.5% during surgery and at 1.0% and 0.5% after operation.
Results: With end-tidal sevoflurane concentration decreasing from 2.0% to 0.5%, SEF95, amplitude and BIS values changed almost linearly in both groups(table, mean±SD). However, there were no significant differences in those EEG parameters between pregnant and non-pregnant group (P<0.05).

	EEG derived parameters					
	Pregnant	Pregnant	Pregnant	Non-Preg-nant	Non-Preg-nant	Non-Preg-nant
Sevoflurane (%)	SEF95(%)	amplitude (μv)	BIS	SEF95(%)	amplitude (μv)	BIS
2.0%	13.8±2.3	15.1±3.0	42.4±7.2	13.3±1.4	14.2±1.7	37.3±4.9
1.5%	16.2±1.9	12.3±1.9	48.9±8.4	15.7±1.9	11.7±1.8	47.4±7.2
1.0%	18.3±3.6	9.5±2.2	60.3±9.5	19.3±2.3	8.9±1.3	58.9±11.2
0.5%	19.7±2.7	7.9±1.4	77.9±6.3	21.8±3.5	7.1±0.7	83.4±9.1

Conclusion: If parturients are more sensitive to anesthetics, their EEG parameter changes must be larger than those of non-pregnant group at each concentration. This study has shown that anesthetic actions on the brain of sevoflurane are the same between pregnant and non-pregnant groups. We believe that decreased MAC during pregnancy does not mean the decrease in anesthetic requirements.
References**:** 1) Rampil IJ et.al. Anesthesiology 78:707-12, 1993
2) Antognini JF et.al. Anesthesiology 79:1244-49, 1993

A-22.

PLASMA AND WOUND EXUDATE PROSTAGLANDIN E2 AND SUBSTANCE P RELEASE FOLLOWING CESAREAN SECTION

AUTHORS: B. Carvalho, M. Angst, D. Clark;
AFFILIATION: Stanford University Medical Center, Stanford, CA.

Background**:** Prostaglandin E2 (PGE2) and Substance P (SP) are thought to play an important role in the nociceptive and inflammatory response following surgery. The release profile of PGE2 and SP in surgical wounds have not been studied in humans. The objective of this study was to determine and compare the site-specific and systemic release of PGE2 and SP post-cesarean section.
Methodology**:** Following IRB approval and informed consent, 10 healthy women with a singleton, term pregnancy undergoing elective cesarean delivery were enrolled in this prospective observational study. All patients received a standard spinal anesthesia (intrathecal bupivacaine plus opioid) and patients were followed for 48-hours postoperatively. Wound exudate and plasma PGE2 and SP samples were secured using a wound drain technique we recently developed and assayed using the Luminex Multiplex System (Bio-Rad. Philadelphia, PA). Samples were collected at 1, 6, 24, and 48-hours post-cesarean. Postoperative pain scores, supplemental opioid analgesics consumption and the area of secondary wound hyperalgesia were recorded.
Results: Wound and plasma PGE2 and SP levels over the 48h time course are shown in Figure 1 and 2. In wounds, PGE2 peaked early and returned close to plasma levels at 24h. PGE2 plasma concentrations did not change during the course of the study. SP levels in wound or plasma did not change during the course of the study.

Figure 1: Prostaglandin E2 Release Post-Cesarean

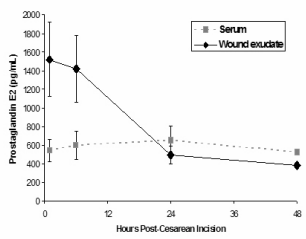
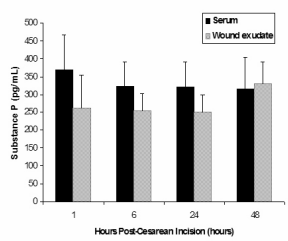


Figure 2: Substance P Release Post-Cesarean



Conclusions**:** PGE2 appears to be a potential nociceptive mediator in the very acute time period. Though not previously documented, human wound PGE2 levels parallel what we might expect based on animal experimentation. Plasma levels of PGE2 or other prostanoids might not provide an accurate picture of levels operative at the incision site. Neither wound nor plasma levels of SP appear to change significantly after surgical incision. This may in part explain the clinical failure of NK-1 antagonists in controlling acute pain.

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ORAL PRESENTATIONS 2

A-23.

DEVELOPMENT OF THE CHILDBIRTH PAIN BELIEFS SCALE: ITEM SELECTION AND PRELIMINARY VALIDATION

AUTHORS: J. M. Mhyre, M. V. Greenfield, D. A. Williams;
AFFILIATION: University of Michigan, Ann Arbor, MI.

Introduction: A scale to measure women's antepartum beliefs about labor pain may be helpful in studying the relationships between pain beliefs, expectations for pain, experience of pain, and satisfaction with pain management services. We describe the initial psychometric properties of the new Childbirth Pain Beliefs Scale (CPBS), a 19-item scale developed in 1088 parturients.
Methods: A total of 105 sample items derived from qualitative analysis of focus group data[1] were tested between two surveys. Survey A contained 48 items about the meaning of childbirth pain, and Survey B contained 57 items about the management of childbirth pain. After IRB approval, English-speaking parturients expecting a vaginal delivery were recruited from the University of Michigan Women's Hospital Birth Center Tours. Tour groups, with up to 8 participants each, were randomized to Survey A or B. All participants completed the survey antepartum. Data were analyzed using exploratory factor analysis to identify independent subscales. Items were selected to maximize subscale internal consistency and item-scale correlation, and to minimize item-other correlation.
Results: There were no demographic differences between the 511 women who completed Survey A, and the 577 women who completed Survey B (mean age 30.2 [SD=5.0] vs. 30.3 [SD=5.0] t-test P=0.79; mean gestational age 33.5 [SD=3.6] vs. 33.5 [SD=4.3] t-test P=0.87; nulliparous 75.5% vs. 78.9% χ^2 P=0.86; Caucasian 77.4% vs. 78.9% χ^2 P=0.54). Exploratory factor analysis revealed four consistent, independent and theoretically meaningful factors**:** Factor 1_"Childbirth pain is perceived as a challenge" (5-item Cronbach's $\alpha = 0.85$); Factor 2_"Childbirth pain is perceived as a threat" (5-item $\alpha = 0.75$); Factor 3_" Medications are welcomed as a coping resource or perceived as a threat" (6-item bidirectional scale with $\alpha = 0.87$); Factor 4_"Personal pain tolerance is perceived as high or low" (3-item bidirectional scale $\alpha = 0.88$). Using ordered logistic regression to predict plans for labor pain management (measured on a five point scale from "natural methods only, such as patterned breathing, massage, and deep relaxation" to "pain medications only"), Factors 1-4 were all statistically significant (P<0.0001). Controlling for demographic and clinical variables, Factor 1 explained 4.3% of the variance in plans for labor pain management, Factor 2 explained 4.2%, Factor 3 explained 25.6%, and Factor 4 explained 6.2%.
Discussion: This phase of survey development identified 19 items that appear to measure four independent beliefs about childbirth pain, each of which correlates with plans for pain management in labor. Future scale development tasks include confirmatory factor analysis, tests for reliability, and validation. Once finalized, the entire CPBS or individual subscales may be used to evaluate how beliefs about pain and pain management may impact women's experience of pain and pain management in labor.
References**:** 1) Anesthesiology 2005; 102; A74

BEST PAPER PRESENTATIONS

A-24.

INTERNAL JUGULAR VEIN AND CAROTID ARTERY ANATOMIC RELATION AS DETERMINED BY ULTRASONOGRAPHY IN OBSTETRIC PATIENTS

AUTHORS: N. Siddiqui, E. Goldszmidt, S. Haque, L. Weiss, J. Carvalho;
AFFILIATION: [1]Mount Sinai Hospital, Toronto, ON, Canada.

Introduction: There is no data regarding success rates and incidence of carotid punctures during central venous cannulation (CVC) in pregnant patients. We hypothesize that anatomical and physiological changes associated with pregnancy put these patients at higher risk for procedure failure and carotid puncture during CVC. The purpose of our study is to determine the success rate and incidence of carotid punctures in pregnant versus non-pregnant women.
Methods: With REB approval and informed consent, pregnant patients (cases) and adult female volunteers of child-bearing age (controls) were recruited. Subjects were placed supine with wedge under the right hip, and their head turned 35 degrees to the left (1). Different approaches for CVC, the central landmark (2) and the palpatory approach (3) were used. The ease of identification of the landmarks was noted. CVC was simulated using an ultrasound (U/S linear probe, 10-15 mHz). U/S images were obtained on 6 pre-marked insertion points, within the same parasagittal plane, directed 30 degrees caudad, simulating how a syringe and needle would be placed for CVC (4). The investigator placing the probe was blinded to the image being generated. The vertical cursor of the U/S, which serves to delineate the path of a needle was placed in the image. If the cursor intersected the vein, the attempt was considered successful. For the analysis of the relative position of vessels, the best image was recorded, and three experienced anesthesiologists scored the degree of vascular overlap according to a validated scoring system(5).
Results: We have performed an interim analysis of 58 patients of a calculated sample size of 250 patients. Table 1

	Pregnant		Non pregnant	
	Mean (SD)	Percent	Mean (SD)	Percent
Age	32.7(5.1)		27.5(4.0)	
BMI	28.6(5.4)		24.2(9.0)	
Ease of Identification				
Easily palpable		37%		75%
Palpable against resistance		61%		25%
Not palpable		2%		0%
First attempt success				
Central landmark		63%		83%
Palpatory approach		39%		58%
Carotid Puncture				
Central landmark		15%		8%
Palpatory approach		2%		0%
Position of vessels				
Completely lateral		6%		17%
Upto 25% overlap		10%		25%
25% - 50% overlap		42%		42%
50% - 75% overlap		29%		8%
More than 75% overlap		13%		8%

Discussion: The success rate of the procedure was lower and the incidence of carotid puncture was higher in pregnant compared to non-pregnant patients using both approaches to CVC.In a majority of pregnant patients, the vein is not lateral to the carotid artery (C.A) in an U/S imaging plane.The vein overlies the artery more in pregnant patients compared to non-pregnant, predisposing these patients to C.A puncture if the cannulating needle passes through the vein. The preliminary data confirm our hypothesis and suggest that U/S might improve the safety of the procedure, especially in pregnant patients.
Reference**:** 1) Anesth Analg 2006;102:1327-3; 2) Anaesthesia 1969;24:521-31; 3)Arch Surg 1970;101:431-2; 4) Anesth Analg 2004;99:982-8;5) Anesthesiology 1996;85:43-8.

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BEST PAPER PRESENTATIONS

A-25

RANDOMIZED TRIAL OF NEURAXIAL VS. SYSTEMIC ANALGESIA FOR LABOR INDUCTION: EFFECT ON INCIDENCE OF CESAREAN DELIVERY

AUTHORS: C. A. Wong, J. T. Sullivan, R. J. McCarthy, B. M. Scavone, R. Patel, M. J. Ebarvia;
AFFILIATION: Northwestern University Feinberg School of Medicine, Chicago, IL.

Introduction: Early labor initiation of neuraxial analgesia is associated with an increased rate of cesarean delivery (CD); however recent randomized controlled trials in nulliparas in spontaneous labor[1] or mixed spontaneous/induced labors[2] found no difference in the CD rate in women who received early vs. late initiation of neuraxial analgesia. The purpose of this randomized trial was to determine if neuraxial compared to systemic analgesia, initiated during early labor in nulliparas undergoing induction of labor, increases the incidence of CD.
Methods: Term, nulliparas with singleton, vertex presentation, undergoing induction of labor, gave written, informed consent to participate in this IRB-approved study. Parturients who requested analgesia with cervical dilation <4cm were randomized to receive intrathecal fentanyl (IT) or systemic hydromorphone (SYS). Epidural analgesia, followed by patient controlled epidural analgesia (PCEA), was initiated at the 2nd analgesia request in the IT group and when the cervix was ≥4 cm or at the 3rd request for analgesia in the SYS group. The primary outcome variable was rate of CD. Demographic characteristics, mode of delivery, time to complete cervical dilation and delivery, average verbal rating score for pain (VRSP) between the 1st and 2nd analgesia requests, Apgar scores and cord gases were compared between groups using the χ^2, Mann-Whitney U and log-rank tests with intent-to-treat analysis.
Results: Eight hundred six women participated in the study. Demographic characteristics were similar between groups, including indication for induction of labor. There were no differences between groups in the incidence of CD, indications for CD, incidence of operative vaginal delivery, time from initiation of labor analgesia to complete cervical dilation or delivery. The verbal rating score for pain (VRSP) was lower in the IT group, as was the incidence of nausea and vomiting. There were no differences in the Apgar scores or umbilical cord gases.

	IT (N=406)	SYS (N=400)	P-value
Cervical dilation at neuraxial analgesia (cm)	2 (0, 5)	4 (1, 10)	<0.001
Cesarean delivery (%)	33.0	31.5	0.65
Operative vaginal delivery (%)	21.0	21.5	0.62
Maximum oxytocin dose (mu/min)	18 (0, 40)	20 (0, 55)	0.28
Duration 1st stage labor (min) (95% CI)	375 (342, 1595)	405 (376, 434)	0.25
Duration 2nd stage labor (min) (95% CI)	89 (78, 100)	90 (79, 100)	0.42
Average VRSP	1 (0, 10)	5 (0, 10)	<0.001
Incidence of nausea/vomiting (%)	7.9/3.0	33.6/15.3	<0.001
Umbilical artery pH	7.24 (6.91, 7.39)	7.24 (6.87, 7.38)	0.57

Values are median (range), median (95% CI), or percent.
Conclusion: Early labor initiation of neuraxial analgesia did not increase the CD rate and provided better analgesia compared to early systemic analgesia, followed by neuraxial analgesia in nulliparas undergoing induction of labor. Neuraxial labor analgesia need not be withheld until cervical dilation = 4-5 cm for fear of increasing the risk of CD in this patient population.
References**:** 1) N Eng J Med 2005;352:655-65. 2) Am J Obstet Gynecol 2006;194:600-5.

A-26.

MU-OPIOID RECEPTOR GENETIC POLYMORPHISM AND THE DURATION OF INTRATHECAL FENTANYL LABOR ANALGESIA

AUTHORS: C. A. Wong[1], R. Landau[2], J. Blouin[2], R. J. McCarthy[1];
AFFILIATION: [1]Northwestern University, Chicago, IL, [2]University Hospitals of Geneva, Geneva, Switzerland.

Introduction: Single nucleotide polymorphisms (SNP) have been described for the μ-opioid receptor gene (OPRM1). The A118G polymorphism (p.40N>D) is the most frequent mutation. In vitro, c.118A>G increases the binding affinity and potency of β-endorphin approximately 3-fold.[1] The ED_{50} of intrathecal (IT) fentanyl for labor analgesia was lower in women who carry the A118G or G118 genotype compared to the homozygous A118 wild-type genotype.[2,3] We hypothesized that the duration of IT fentanyl labor analgesia is longer in parturients with the G118 polymorphism.
Methods: Healthy term nulliparas in spontaneous labor, with cervical dilation 2-5 cm gave informed, written consent to participate in this IRB-approved study. Analgesia was initiated with IT fentanyl 25 μg. At the next request for analgesia epidural analgesia was initiated with bupivacaine and maintained with bupivacaine/fentanyl via patient controlled epidural analgesia (PCEA). The OPRM1 gene was amplified by PCR on DNA isolated from venous blood and genotypes were determined using minisequencing (Pryosequencing, Biotage). The primary outcome variable was duration of intrathecal fentanyl analgesia in A118 homozygotes (Group A) compared to A118G heterozygotes and G118 homozygotes (Group G). Groups were compared using the Kaplan-Meier survival method/log-rank, the χ^2, or Mann-Whitney U tests. $P < 0.05$ was considered significant.
Results: 146 parturients were enrolled. 23.3% of subjects carried the G118 allele. Clinical characteristics, including duration of IT fentanyl analgesia, did not differ between the groups except that cervical dilation at the request for analgesia was greater, severity of pruritus was lower, and satisfaction scores for analgesia were greater in Group G compared to Group A (Table).

	Group A	Group G	P
Number of subjects	112	34	
Age (y)	30 (16-39)	31 (18-38)	0.71
Gestational age (w)	40 (37-41)	39 (37-41)	0.11
Cervical dilation at IT fentanyl (cm)	3 (2-5)	3.5 (2-5)	0.02
VAS at 1st analgesia request (mm)	72 (20-100)	68 (29-100)	0.71
VAS 10 min after IT fentanyl (mm)	3 (0-70)	3 (0-70)	0.41
Duration of IT fentanyl analgesia (min)	70 (10-186)	61 (18-192)	0.21
VAS at 2nd analgesia request (mm)	35 (0-91)	37 (14-96)	0.53
Cervical dilation at 2nd request (cm)	4 (2-7)	4 (2-6)	0.66
Maximum oxytocin infusion (mU/min)	8 (0-32)	8 (0-32)	0.86
Total manual epidural bupivacaine bolus dose (mg)	15 (6 - 116)	17 (6 - 48)	0.95
Time from first analgesia to delivery (min)	400 (166-1057)	393 (182-884)	0.87
Severity of pruritus (none/mild/mod/severe) (%)	8/46/39/7	12/62/26/0	0.03
Instrumental deliveries (%)	14.3	8.8	0.56
Satisfaction with analgesia (VAS) mm	92 (5-100)	97 (33-100)	0.04

Conclusions**:** There was no difference in the duration of intrathecal fentanyl analgesia in women carrying the G118 allele; however, among these women, request for analgesia occurred at a greater cervical dilation, severity of pruritus was less, and women were more satisfied. Possible explanations include**:** 1) women with the G118 allele have better tolerance for pain and hence are able to wait longer in early labor before requesting analgesia, 2) at doses greater than the ED_{50} SNPs may play a minor role in the characteristics of intrathecal opioid analgesia, 3) other factors may influence response to labor analgesia, including ethnicity, environmental, or other genetic factors.
References:
1. Proc Natl Acad Sci USA 1998;95:9608.
2. http://www.asaabstracts.com. 2005;A1469.
3. http://www.asaabstracts.com. 2006;A999.

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BEST PAPER PRESENTATIONS

A-27.

PREDICTIVE FACTORS FOR ACUTE PAIN AFTER VAGINAL AND CESAREAN DELIVERIES

AUTHORS: R. Landau[1], P. Lavand'Homme[2], T. Houle[3], R. Smiley[4], L. Harris[3], P. H. Pan[3], J. Eisenach[3];
AFFILIATION: [1]University of Geneva, Geneva, Switzerland, [2]St. Luc Hospital Medical School, Brussels, Belgium, [3]Wake Forest University, Winston-Salem, NC, [4]Columbia University Medical Center, New York, NY.

Introduction: Carvalho reported pain during and after C/S was the greatest perioperative concern of patients. Individual variability in severity of post-vaginal or operative delivery pain is influenced by multiple factors including sensitivity to pain, psychological factors, age, and genetics. As part of a larger multi-center, prospective cohort study on pain after delivery, we report here the predictive factors for severity of acute pain after deliveries.
Methods: After IRB approval and informed consent, women were enrolled during their hospitalization for delivery at 4 major medical institutions located in NC and NY of USA, Brussels, Belgium and Geneva, Switzerland. After delivery while they were in the hospital, an extensive questionnaire and interview were conducted to assess pre-existing pain syndromes, psychological and sensory perception and sensitivity, and obstetric/anesthetic course. Patients were followed up by telephone interview at US sites and by postal survey at European sites for presence of delivery-related pain at 8 weeks and (if pain at 8 weeks) at 6 months and 1 year postpartum. This abstract presents the data for the prediction of acute pain (24hr postpartum) from patients of all 4 sites.
Results: 2518 patients were enrolled. Excluding incomplete forms and pain unrelated to delivery, 1861 (74%; n=865USA, n=996Europe) evaluable patients' data were included in the statistic model. 10.6% of vaginal deliveries and 16.5% of operative deliveries reported having severe postpartum pain (≥7/10) while in-hospital. 120 variables were initially identified as related to pain after delivery. Using principal component factor analysis to reduce data into smaller meaningful subgroups, the final independent predictive variables were regressed on average pain 24 hours postdelivery. (Table 1) The predictive variables were grouped into predelivery, delivery and postdelivery variables. Pain outcome was dichotomized and logistically regressed to predict severe pain (≥7/10) at 24 hours postdelivery. Using a receiver operating characteristic curve for predicting this outcome with the predictive variables yielded an optimal sensitivity and specificity of 0.80 and 0.51, and 0.80 and 0.71 for vaginal and cesarean deliveries, respectively.

Table 1. Independent Predictive Variables for Pain at 24 hours Post Delivery

	Vaginal Delivery (n=1244) Post Delivery Average Pain		Cesarean Delivery (n=617) Post Delivery Average Pain	
	*B (SE)	95% CI	*B (SE)	95% CI
Predelivery Variables:				
Age(yr)	-.03(.01)	-.05, -.002		
Gestational Age (wks)	+.11(.04)	.04, .19		
Somatization Score	+.05(.009)	.03, .07	+.02(.01)	.001, .05
Prior Pain	+.38(.17)	.05, .70	+.58(.21)	.16, 1.0
Regular Doctor Visit/Medications	-.22(.14)	-.50, .04		
Alcohol <1drink/day	-.28(.13)	-.53, -.02		
Pain During Pregnancy	+.22(.06)	.10, .34		
State of Health			-.38(.12)	-.61, -.15
Number of Fetuses			+.96(.39)	.19, 1.7
Delivery Variables:				
Other Surgery during delivery	+1.3(.58)	.11, 2.4		
Episiotomy	+.36(.16)	.05, .67		
Assisted Forceps	+.73(.32)	.10, 1.36		
Perineal Laceration - 3rd degree	+.78(.31)	.17, 1.39		
Midazolam Use in C/S			+2.9(1.4)	.05, 5.7
Ketamine Use in C/S			+2.19(.96)	.31, 4.1
Added Analgesic in C/S			+.76(.27)	.23, 1.3
Midline C/S Skin Incision			+1.6(.69)	.22, 2.93
Blood Transfusion			-2.6(1.0)	-4.6, -.62
Post Delivery Variables:				
Delivery Experience	-.19(.08)	-.35, -.04		
Rate Tx of Pain after Delivery	-.46(.08)	-.61, -.31	-.52(.09)	-.07, -.35
Oral Opioid	+.85(.18)	.50, 1.2	+.48(.21)	.07, .90

*B - For every unit change in the predictive variable, B is the corresponding change in the average pain score (ranged from 0 to 10). SE - Standard Error

Conclusion: These data suggest patients-at-risk for postdelivery severe pain can be predicted with predelivery and delivery information. These findings may have significant relevance to tailor treatment to patients-at-risk to improve outcome and quality of care.
Supported in part from a grant from the Sceptor Pain Foundation, Winston-Salem, NC.

A-28.

CHRONIC PAIN AFTER DELIVERY - IS IT DIFFERENT BETWEEN VAGINAL AND OPERATIVE DELIVERIES?

AUTHORS: P. H. Pan[1], R. Smiley[2], T. Houle[1], R. Landau[3], P. Lavand'Homme[4], L. Harris[1], J. Eisenach[1];
AFFILIATION: [1]Wake Forest University, Winston-Salem, NC, [2]Columbia University, New York, NY, [3]University of Geneva, Geneva, Switzerland, [4]St Luc Hospital Medical School, Brussels, Belgium.

Introduction: Almeida reported an increased incidence of women with history of C/S presenting with chronic pain. Nikolajsen reported a 12.3%-incidence of post-cesarean pain at 10 months and 18% at 3 months. Thompson and Macarthur reported perineal pain incidence ranged 4% to 7% during 6 to 24 weeks post-vaginal delivery. Previous work on chronic pain after C/S had been either retrospective or involved small groups outside USA. This multi-center, prospective-cohort study aimed to estimate the incidence and predictive risk factors of chronic pain after childbirth, its severity and impact on daily activities.
Methods: After IRB approval and informed consent, women were enrolled during their hospitalization for delivery at 4 major medical institutions located in NC and NY, USA, Brussels ,Belgium and Geneva, Switzerland. After delivery and while they were in the hospital, an extensive questionnaire and interview were conducted to assess pre-existing pain syndromes, psychological and sensory perception and sensitivity, and obstetric/anesthetic course. Patients were followed up (by survey research center telephone interview for USA sites, and by postal survey for European sites) at 8 weeks postpartum to assess for presence of pain related to delivery, its severity/location and impact on daily living and clinical depression. Those with pain at 8 weeks were re-interviewed/re-surveyed at 6 months and 1 year to determine if pain continued. Pain at 8 weeks postpartum was defined as pain which began at delivery and was rated above zero for the past week prior to interview.
Results: 2518 patients were enrolled. Excluding lost to follow-up, data from 1863 (74.0%; n=972 USA, n=891 Europe) evaluable patients were analyzed. This abstract only presents data from USA sites. Results shown in table 1 below indicate no difference in pain incidence, severity, or effect on daily activities when comparing mode of delivery (P>0.05). Incidence of pain at 8 weeks was nearly 10%, regardless of mode of delivery, with half of those having activities of daily living affected by pain.

Table 1. Outcome Variables in Chronic Pain After Delivery

		USA sites
Total # subjects completing 8 week postpartum interview		972(79.2%)
Cesarean Delivery	Total # (%) with C/S - n (%)	304(31%)
	# (%) with Pain at 8 wk - n (%)	28(9.2%)
	Average 8-wk Pain Score ±SD (0-10)	2.0±1.9
	Worst 8-wk Pain Score ±SD (0-10)	2.1±2.1
	Current 8th wk Pain Score ±SD (0-10)	0.7±1.4
	Pain affects Daily Activities (%)	45%
Vaginal Delivery	Total # (%) with Vag Delivery - n (%)	668(69%)
	# (%) with Pain at 8 wk - n (%)	67(10%)
	Average 8-wk Pain Score ±SD (0-10)	2.6±2.7
	Worst 8-wk Pain Score ±SD (0-10)	3.1±2.7
	Current 8th wk Pain Score ±SD (0-10)	1.2±1.9
	Pain affects Daily Activities (%)	49%

Conclusion: These data suggest no difference in persistent pain, at least at 8 weeks after delivery, between patients with C/S and vaginal deliveries. These prospective data further suggest that previous reports may have overestimated the incidence of persistent pain after delivery.
Supported in part from a grant from the Sceptor Pain Foundation, Winston-Salem, NC.

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POSTER REVIEW 1

A-29.

REGIONAL ANESTHESIA IN CROATIAN OBSTETRICS AFTER KYBELE EDUCATION PROGRAM

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Introduction: In Croatia, regional anesthesia (RA) for Caesarian section (C/S) was seldom used outside of the university setting (<7% prior to 2005)[1]. Epidural analgesia for standard vaginal delivery (SVD) occurred in less than 1% of births outside of a university hospital. In September 2005 Kybele experts (12 anesthesiologists, an internist and a midwife) carried out an educational program (EP) for local practitioners on regional anesthesia techniques in 9 hospitals. This report examines the effect of that EP on the use of RA in Croatian obstetrics.
Methods: Hospitals participating in the EP were analyzed retrospectively, pre- and post- the Kybele EP. The pre-Kybele period comprised the year prior to the EP (October 1st 2004 to September 30th 2005); the post-Kybele period comprised the year after the EP (October 1st 2005 to September 30th 2006). Total number of deliveries, types of analgesia for SVD, the frequency of C/Ss, and types of anesthesia for C/Ss were analyzed. Statistical analysis was performed with χ^2 test. ($p<0.05$).
Results: 8 out of 9 hospitals delivered the requested data (88%). The total number of deliveries in the pre-Kybele period was 14,481, and the total number of C/Ss was 1,904 (13.1%). RA for C/S was used in 20.6% of cases, ranging from 5.8% to 44% at different institutions. Epidural analgesia for SVD was used in 1% of cases, ranging from 0% to 3.9%. In the post-Kybele period deliveries numbered 14,354, with 2,473 C/Ss (17.2%). RA for C/Ss was used in 34.3% of cases, ranging from 15.5% to 51.4%. Epidural analgesia was used in 2.1% of SVDs, ranging from 0.4% to 5.1%. In the post-Kybele period, 7 out of 8 hospitals significantly increased the rate of RA for C/S compared to pre Kybele period (Table).

	Regional anesthesia for C/S (N)							
	Zagreb	Split	Zadar	Sibenik	Dubrovnik	Cakovec	Osijek	Sisak
Pre-Kybele	73	83	10	6	59	51	61	71
Post-Kybele	146	134	43	19	88	88	78	107
p*	<0.001	<0.001	<0.001	0.031	0.0096	0.009	0.512 (NS)	0.0021

* Chi squared test

The Kybele EP was associated with increased rates of epidural analgesia for SVD in 4 hospitals.
Conclusion: An EP conducted by Kybele experts resulted in a significant increase in the use of RA for C/Ss in 87.5% of hospitals. Epidural analgesia for SVD was significantly increased only in 50% of hospitals. For a further increase in the use of RA in obstetrics, additional education of medical staff and patients is necessary.
Reference**:** (1) Anesthesiology 2004;100, Supp1:A 67.

A-30.

DOES SEVOFLURANE ANESTHESIA IMPROVE REPRODUCTIVE OUTCOME THAN PROPOFOL FOR TRANSVAGINAL OOCYTE RETRIEVAL?

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Introduction: Propofol is commonly used for transvaginal oocyte retrieval for in vitro fertilization. However, in vitro animal studies have suggested adverse effect of propofol on oocyte or embryo, such as decreased blastocyst formation. To the contrary, sevoflurane, because of its low solubility, may minimize exposure to harvested oocyte, and it may be less likely to affect oocyte adversely. The purpose of this study was to compare sevoflurane volatile induction and maintenance anesthesia (VIMA) with propofol total intravenous anesthesia (TIVA), with regard to follicular fluid drug concentration, recovery profile after anesthesia, and reproductive outcome when used for transvaginal oocyte retrieval for IVF.
Methods: After IRB approval and written informed consent, 149 patients were randomly assigned to sevoflurane VIMA (group S) or propofol TIVA (group P). Anesthesia for patients in group S (74 patients) was induced with vital capacity induction of 5% sevoflurane, followed by inspiratory concentration of 3% sevoflurane in oxygen. Patients in group P (75 patients) received fentanyl 2μg/kg IV followed by propofol target controlled infusion at 4μg/ml. Diclofenac was given upon request after the procedure. Recovery profile and patient acceptance of anesthesia were recorded immediately after anesthesia and 2 hours later. Follicular fluid concentration of propofol and sevoflurane were measured in all the aspirated follicles and compared to serum concentration in 5 minutes interval. Pregnancy rate was compared between the two groups.
Results: Patients in group S woke up faster from anesthesia than group P (12.9 vs.15.2min), and complained less dizziness two hours later (19% vs. 52%). They complained pain more frequently immediately after anesthesia (37% vs.8%), required diclofenac more frequently (20% vs.0%). The incidence of nausea was the same (9%), and about 95% of the patients in both groups would request the same anesthetic on the next occasion. Follicular fluid sevoflurane concentration gradually increased with time, from 1.7±1.0μg/ml(mean±SD) at time 0 to 5 min, to 11.0±3.9μg/ml at time 36 to 40min, which corresponded to 2.2% and 12.7% of serum concentration, respectively. Follicular fluid propofol concentration also gradually increased with time, from 0.0479±0.073μg/ml at time 0 to 5 min, to 0.273±0.16μg/ml at time 31 to 35min. The follicular fluid concentration of propofol was 1.8% and 8.4% of serum concentration, respectively. Pregnancy rate in group S was 28.4%, which was similar to group P (26.7%).
Discussion: Our results showed that sevoflurane VIMA was well accepted by patients for oocyte retrieval with faster recovery and minimal side effects. However, sevoflurane was shown to transfer rapidly to follicular fluid during oocyte retrieval. Pregnancy rate was not increased with sevoflurane VIMA compared to propofol TIVA. This may have been affected by fentanyl in propofol group and diclofenac in sevoflurane group.

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POSTER REVIEW 1

A-31.

MANAGING CESAREAN SECTION (C/S) OVERFLOW AT EMORY CRAWFORD LONG HOSPITAL - LESSONS LEARNED

AUTHORS: J. A. Dolak, D. Warth;
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Introduction: Our hospital is a mixed practice (university and private), tertiary referral center. A new labor and delivery (L&D) ward opened in July 2002, which included 11 labor rooms, 29 post-partum beds, 2 operating rooms (ORs), 2-bed PACU, and a 28-bed Level III nursery. Services for L&D have greatly expanded since then, and currently include 4, 281 deliveries (35% increase) and 1,293 C/Ss (47% increase). As C/Ss are not evenly distributed during the week, the present facilities (especially the OB ORs) and manpower (physicians, anesthetists, nursing, and housekeeping) are often overwhelmed, leading to queues for both L&D rooms and ORs (especially for elective C/Ss). This report discusses an attempt to decompress the L&D ORs by providing for a maximum of 4 elective C/Ss per day in a dedicated outpatient surgery (OPS) OR from W-F. These days were chosen in consultation with our obstetric and nursing colleagues, as they were thought to represent the busiest days on L&D.
Methods: Data was collected retrospectively from delivery logs during the time period between 7/21/06 to 10/31/06 (3.3 months), and comprises information garnered from 0700 - 1600 during the normal workweek (M-F). Statistical analysis utilized multiple t-tests for unpaired data using the Bonferroni correction.
Results: During this period a total of 176 C/Ss were done in both L&D and OPS. While 174 slots were available in OPS, only 39 C/S (22% of total) were performed there - resulting in a 23% utilization rate. In L&D by contrast, 75 C/S (43% of total) were done on M and T, and 62 C/S (35% of total) were done on W-F. The average C/S rate (C/Ss per 0700-1600 time slot) in L&D on M-T (2.5) was significantly higher than that either in OPS on W-F (0.9) or L&D on W-F (1.4) ($p<0.01$). Additionally, we found that the ratios of C/Ss judged as inappropriately performed in L&D to the total C/Ss during the same time period as significantly greater on M-T (0.61) than on W-F (0.35) ($p<0.05$). Indications for inappropriate C/Ss included elective repeat C/S, prior myomectomy, breech, and other; with the majority accounted for by elective repeat C/S (88% on M-T, 45% on W-F).
Discussion: It was thought that by providing scheduled time in OPS for elective C/Ss, we would be able decompress our L&D unit. Instead, the caseload appeared to shift to M-T. Reasons given for this underutilization of new resources/shift in practice pattern included obstetrician inconvenience, lack of surgical assistants in OPS, and confusion regarding scheduling C/Ss. We are addressing the inconvenience aspect by providing 3 slots/day in OPS (a net gain of 2 slots spread over 5 days) on M-F. We are also hiring more surgical assistants, and attempting to streamline OPS C/S scheduling.

A-32.

NEURAXIAL TECHNIQUES IN LABOR ANALGESIA IN A BUENOS AIRES PUBLIC HOSPITAL

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Objective: Neuraxial analgesia techniques are the most effective treatments for labor pain. Acording different authors, continuous lumbar epidural, spinal, and combined spinal-epidural are the frequently used for labor analgesia [(1)] Lumbar epidural, CSE and spinal are currently used in our country for labor analgesia. A wide variety of local anesthetic (LA) have been used to achieve analgesia; alone or mixed with other agent. The choice of technique, agent, and dosage is based on numerous factors, including patient preference, medical condition and contraindications.
Objective: To describe different neuraxial blockades and drugs employed for labor analgesia at the (HMIRS), a teaching and free paid institution.
Method: We retrospectively analyzed the data obtained from anesthesia reports at the existing hospital database from July 1st to December 31st 2006.
Results: Data from 164 patients receiving labor analgesia were analyzed out of which 35 women (21.34%) received CSE and 129 women (78.66%) had lumbar epidural analgesia. No spinal or epidural single shot was administered. CSE**:** Spinal drugs used were**:** hyperbaric bupivacaine alone, 1w. (2.9%); bupivacaine + fentanyl 29 w (82.8%); fentanyl alone 4 w (11.4%) and morphine 1 w. (2.9%). Spinal bupivacaine doses were**:** 2mg 2women (w.) (6.7%); 2,5mg. 26w. (86.7%); 3mg. 1w (3.3%) and 5mg 1w. (3.3%). Intrathecal fentanyl employed doses were**:** 10mcg 1w (3.03%); 12mcg 1w. (3.03%); 12,5mcg 1w (3.03%); 15mcg 1w (3.03%); 20mcg 4w. (12.12%), 25mcg 24w (72.73%) and 30mcg 1w (3.03 %). Nine women needed supplemental local anesthetic and the epidural catheter was used. Local anesthetics used for epidural top-ups were**:** lidocaine1%**:** 2 (22.22%), lidocaine1% + lidocaine 2%**:** 1 (11.11%)**:** lidocaine 2%**:** 1 (11.11%); ropivacaine 0,1% + lidocaine 1%**:** 1 (11.11%); ropivacaine 0,1% + lidocaine 2%**:** 2 (22.22%); ropivacaine 0,2% 2 (22.22%). Continuous lumbar epidural**:** Drugs administered through lumbar epidural catheter were**:** ropivacaine 0,2%, 81w. (62.8%); lidocaine 0,8%, 7w. (5.43%); lidocaine 1%, 25w (19.38%); bupivacaine 0,125%, 3w. (2.32%); bupivacaine 0,25%, 12 w. (9.30%) and bupivacaine 0,5%, 1w (0.77%). Ninety-three women (72.09%) received LA plus fentanyl epidurally.
Discussion: At the HMIRS, Bs. As. were employed two types of neuraxial blockades for labor analgesia**:** continuous lumbar epidural (78.66%) and CSE (21.34%). Intrathecal drug used was bupivacaine plus fentanyl (82.8%). Labor continuous epidural`s drug used was ropivacaine 0,2%, (62,8%) and lidocaine 1%, (19,38%). . Local anesthetic plus fentanyl were used for continuous lumbar epidural in 72.09%_of cases.
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POSTER REVIEW 1

A-33.

MATERNAL AND PRETERM FETAL SHEEP RESPONSES TO DEXMEDETOMIDINE

AUTHORS: K. Shimazutsu[1], K. Uemura[1], R. J. McClaine[1], D. J. McClaine[1], W. D. White[1], P. Benni[2], J. D. Reynolds[1];
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Introduction: The α2 adrenergic receptor agonist dexmedetomidine has some unique pharmacologic properties that could benefit pregnant patients (and their fetuses) who require analgesia and/or anesthesia during gestation. The purpose of the present study was to delineate the maternal and fetal responses to an iv infusion of this agent.
Methods: Using previously instrumented, preterm sheep at gestational day 90 (term, about 145 days), various maternal and fetal parameters were recorded before, during, and after 3 h of dexmedetomidine infusion (iv bolus of 1.0 ug/kg given over 10 min followed by a constant iv infusion at a rate of 1.0 $ugxkg^{-1}xhr^{-1}$).
Results: Drug infusion produced overt sedation but no excessive respiratory depression. On the maternal side, dexmedetomidine produced bradycardia, hypotension, and fluctuations in uterine blood flow. None of these actions significantly affected fetal arterial blood gas status; the ewe's arterial blood gases also remained stable. The one exception was a significant increase in both maternal and fetal blood glucose concentrations. Dexmedetomidine had no discernable effect on fetal heart rate or mean arterial pressure. Likewise, drug infusion had no effect on fetal cerebral oxygenation, as measured by *in utero* near-infrared spectroscopy; measures of oxygenated, deoxygenated, and total hemoglobin remained within +/- 5% of the pre-infusion levels ($p>0.05$).
Conclusion: Using a clinically-relevant dosing regimen, iv infusion of dexmedetomidine produced significant maternal sedation without altering fetal physiologic status. While the long-term consequences of *in utero* exposure should be determined, results from this initial acute assessment suggest that dexmedetomidine may have clinical utility for sedation and pain control during gestation.
This work was supported by grants from the National Institutes of Health (NS 042664, HD 042471), the Duke Anesthesiology Research Fund, and the Duke Endosurgery Center. RJ McClaine was the recipient of a medical student fellowship from the Howard Hughes Medical Institute.

A-34.

PREVENTION OF MATERNAL DENTAL INJURIES: A QUALITY ASSURANCE PROGRAM

AUTHORS: M. C. Vallejo, S. J. Fauls, J. M. O'Donnell, B. Kaul, J. H. Waters;
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Introduction: General anesthesia in obstetrics, especially under emergent conditions, is a significant cause of maternal mortality (1). Airway management problems, including aspiration, failed intubation, inadequate ventilation, and respiratory failure are a considerable source of malpractice claims in obstetrics (2). Nevertheless, dental injury under general anesthesia remains the most common cause of malpractice claims in anesthesia (3). Risk factors associated with dental injury include general endotracheal anesthesia, emergency surgery, difficult airway, and obesity; all of which are common in obstetrics. The maternal Dental Risk Recognition and Injury Prevention Program (DRRIPP) is an integrated internet-based/part-task training educational program that focuses on identification of patients at risk, prevention of dental injury through anesthetic approach modification, and demonstration of the safe use of dental injury protective devices to decrease risk.
Methods: This educational intervention program was developed over two years. Online educational modules, assessment tools, evaluations tools, and training videos designed to be used in conjunction with part task simulators to train all University of Pittsburgh Medical Center (UPMC) anesthesia providers in dental injury prevention is utilized on the Blackboard LMS software system and the Internet-Based Studies in Education and Research (ISER) website (see DVD).
Results: The alpha version of the course has been developed with full implementation started in the fall of 2006. All anesthesia providers (anesthesiologists, residents, CRNA's, SRNA's) throughout the UPMC health system will be trained via the modules which will be incorporated as part of the training curriculum (residents/students) or as a component of annual credentialing (Anesthesiologists/CRNA's). Baseline rates of dental injury within UPMC system facilities have been collected over the past two years and will continue to be followed through implementation of the protocol. Incident dental injury rates will be prospectively evaluated over the two year post implementation period with change in dental injury rate compared for the pre and post implementation periods.
Discussion**:** Despite the prevalence of dental injury in anesthesia, to our knowledge this is the first prospective, health system wide, web and simulation-based educational intervention for the prevention of dental injury reported. We have designed the program to be intuitive and practical which will support broad adoption. Funding will be sought to allow ongoing evaluation of the program, facilitate data collection, conduct statistical analysis and to augment adherence efforts. Preliminary support for development of the project was obtained through the University of Pittsburgh/UPMC Health System.
Conclusion: Implementation of DRRIPP in the maternal suite will provide education to all anesthesia providers within the system and we hypothesize that our efforts will decrease the rate and consequences of dental injury to the benefit of patients and anesthesia providers alike.
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POSTER REVIEW 1

A-35.

ALTERNATIVE TECHNIQUES IN RESIDENT EDUCATION: SIMULATION TEAM TRAINING FOR OBSTETRIC CRISES

AUTHORS: K. Daniels[1], S. Lipman[1], K. Harney[1], J. Arafeh[2], K. Yeager[2], A. Puck[2], M. Druzin[1];
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Introduction: Obstetric crises are unexpected and random. Traditional training includes lectures and unpredictable clinical experience. This model has inherent limitations. Our objective was to create a simulation program to fill this experiential gap.
Materials and Methods: Ten senior anesthesia residents or obstetric anesthesia fellows participated in simulation team training. Each of the ten teams consisted of one anesthesia resident or fellow, two Labor and Delivery nurses, and two OB residents (PGY2 and PGY 3/4). Instructors were faculty physicians at Stanford University Medical Center who were trained to facilitate simulation and provide guidance in debriefing. Scenarios were designed based on current literature and ASA, ACLS, and obstetric guidelines. The initial scenario was epidural-induced hypotension with fetal bradycardia. Immediately following was an amniotic fluid embolus scenario with maternal cardio-respiratory arrest and fetal compromise. An evaluation tool was developed by the faculty to assess clinical and behavioral performance. Each simulation was recorded and graded by two reviewers. Debriefing is a powerful learning tool. Debriefing consisted of self-review and discussion of individual performance facilitated by trained faculty. At the end of the course, all participants completed evaluations in five areas to assess the utility of the program.
Results: A 5-point LIKERT scale was used (Range**:** 1 = poor to 5 = excellent).
Course evaluation (All participants)
Simulator realism = 4.23; scenario realism = 4.65; debriefing utility = 4.74; ability of faculty to create a positive learning environment = 4.93, improvement of technical, behavioral, intellectual and self-confidence skills = 4.7.
Clinical and Behavioral Performance (as scored by faculty for OB Residents only)
Epidural induced hypotension and fetal bradycardia = 4.42, AFE = 4.06, vaginal operative delivery = 3.36, adult resuscitation = 3.69, behavioral performance = 4.14.
Conclusion: Simulation for obstetric crisis training is sufficiently realistic to create a positive and safe learning environment. This training requires demonstration of technical ability and critical communication and behavioral skills. The use of simulation may allow for focused teaching opportunities tailored to individual deficiencies. In addition, simulation may improve interactions with other members of the healthcare team.
This study was funded in part by the APGO/Martin L. Stone, M.D. Fund for the Advancement of Medical Education in Obstetrics.

A-36.

THE ANESTHETIC MANAGEMENT OF WOMEN WITH HEART DISEASE FOR LABOR AND DELIVERY

AUTHORS: E. Goldszmidt[1], A. Macarthur[1], M. Sermer[1], S. Siu[2];
AFFILIATION: [1]Mount Sinai Hospital, Toronto, ON, Canada, [2]University Health Network, Toronto, ON, Canada.

Introduction: The prevalence of heart disease in pregnancy is estimated to be about 1% of all pregnancies in the developed world. The most recent confidential enquiries into maternal deaths in the UK (2000-02) found maternal heart disease to be the second most common cause overall. The purpose of this observational study is to report on our experience with the anesthetic management of a large cohort of pregnant women with heart disease during labor and delivery.
Methods: The medical records of 522 parturients (655 pregnancies) with heart disease who delivered at our institution between 1986 and 2004 were identified and reviewed. Inclusion criteria for the database included all pregnant women with congenital or acquired heart disease. Women with arrhythmias were also included providing they had had symptomatic tachy or brady arrhythmias requiring treatment. Women with isolated mitral valve prolapse including those with mild to moderated mitral regurgitation were excluded as were women referred for termination of pregnancy. All admissions during pregnancy and up to 6 weeks post-partum were examined. Data were collected and entered into an electronic database.
Results: The number of deliveries and NYH functional status by class of primary cardiac lesion are shown in the table. 86% of patients experienced labor prior to delivery with a 84% epidural rate. 39% had operative vaginal deliveries with a 90% epidural rate. 29% had cesarean sections, 80% of those under regional anesthesia. Only 5 of these were planned for maternal cardiac indications. Arterial lines were used in 28% of the cases, CVP monitoring in 6.5% and PA catheter monitoring in 2.6%. 3% of patients suffered intrapartum cardiac complications, of which 65% were CHF and 15% were arrhythmic. 13% of patients required postpartum critical care admissions and 0.5% required pharmacologic hemodynamic support. There was only 1 mortality, in a patient with secondary pulmonary hypertension.

Primary Lesion	Number of deliveries n (% of deliveries) total N = 655	NYH 3 or 4 at baseline n (% of deliveries with that lesion) N= 17	NYH 3 or 4 at delivery n (% of deliveries with that lesion) N=55
Simple Congenital	156 (23.8)	0	0
Complex congenital	118 (18.0)	2 (1.7)	7 (5.9)
Valvular	235 (35.9)	7 (3.0)	32 (13.6)
Cardiomyopathy	49 (7.5)	5 (10.2)	11 (22.4)
Electrical	82 (12.5)	0	1 (1.2)
Ischemic	7 (1.1)	1 (14.3)	2 (28.6)
Miscellaneous	8 (1.2)	2 (25)	2 (25)

Discussion: Our results demonstrate that labor and delivery can be safely managed for most women with heart disease, particularly if their baseline functional status is good. Cesarean section for cardiac indications will be rare and regional anesthesia can be extensively used. Central venous lines and PA catheters may be of limited use.

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POSTER REVIEW 1

A-37.

OPTIMAL MATERNAL DOSING OF PENICILLIN G AT DELIVERY FOR PROPHYLAXIS AGAINST NEONATAL INFECTIONS FROM GROUP B STREPTOCOCCUS (GBS)

AUTHORS: J. Spiegel, P. Fan-Havard, J. Johnson;
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Intrapartum PCN G is the preferred antibiotic for the prevention of invasive neonatal Group B Streptococcal (GBS) infections due to its narrow spectrum and high bactericidal activity. The CDC recommends a dose of 2.5 million units of standard IV penicillin G for prophylaxis; however, this dose has not been based on specific pharmacokinetic data. We previously demonstrated that one million units of penicillin is an adequate maternal intravenous dose to reach mean inhibitory concentration (MIC) for GBS. This study attempts to evaluate the time course to reach MIC (0.1mcg/ml) in the fetus, and evaluate the maternal-fetal clearance of penicillin, for optimal PCN dosing.
Methods: 20 healthy women, at term, scheduled for cesarean section were recruited. One million U of IV PCN G was administered over 2 minutes. Maternal and fetal cord blood samples were collected at the time of the fetus delivery. PCN levels were determined by HPLC method. Cord blood to maternal PCN ratios were plotted against time from completion of intravenous penicillin G administration. Mean maternal and cord plasma levels were 31mcg/ml and 3.4mcg/ml, respectively. A post-hoc power analysis from our previous studies suggested 9-18 patients were required. Least squares regression analysis was used for analysis. Cord blood samples were below 0.5mcg/ml in 5 samples.
Results: All patients met eligibility requirements; 2 patients were labeled “outliers”. The linear regression graph below reveals a positive correlation between the timing of PCN dosing and fetal cord PCN concentration; that is, cord blood concentration increases in the cord blood, as expected, over time (P=0.039), when the outliers are removed. This suggests there is a decreased overall total clearance of PCN in the fetus. Penicillin rapidly appears in the fetal compartment following maternal administration, and all measurable fetal cord PCN concentrations were above MIC.

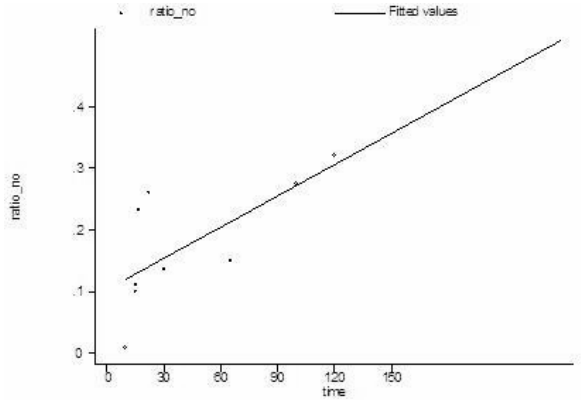

Figure 1.Regression analysis of time (mins) since PCN administration and ratio of maternal to cord blood concentrations.

DISCUSSION: GBS remains an important pathogen in neonatal disease, and the administration of PCN to mothers colonized with GBS has reduced early-onset neonatal sepsis by 85-90%. Based upon this study, we find that 1 million units of PCN G administered to the mother every 4 hours is adequate to achieve MIC in both mother and fetus. More frequent dosing and higher dosages do not result in increased activity.
References 1.Am J Obstet Gynecol 2001; 185**:** 850-853 2. Am J Obstet Gynecol 2006; 194**:** 466-47

A-38.

OBSTETRICS AND OBSTETRICAL ANESTHESIA ISSUES IN WOMEN WITH DWARFISM

AUTHORS: J. Hoover-Fong[1], I. Berkowitz[1], J. Rossiter[2], D. Krakow[3], D. Miller[1], G. Oswald[1], J. Leadroot[1], H. Barnes[1], D. Penning[4];
AFFILIATION: [1]Johns Hopkins University, Baltimore, MD, [2]St. Joseph Medical Center, Towson, MD, [3]Cedars-Sinai Medical Center, Los Angeles, CA, [4]University of Miami Miller School of Medicine, Miami, FL.

Objective: To assess current clinical practice, opinion and training of obstetrical anesthesiologists for dwarf women (aka Little People, LPs) and survey obstetrical experiences and opinions of dwarf women. There is no recognized infertility predisposition in LPs, yet there is limited medical literature regarding pregnancy and obstetrical care in this population. Dissemination of information about pregnancy and delivery in dwarf women is needed.
Study Design: Part 1**:** A comprehensive survey of the Society of Obstetrical Anesthesia and Perinatology (SOAP) members regarding formal training, clinical practice and opinions about 3 hypothetical case scenarios concerning anesthesia for pregnant dwarfs. Part 2**:** A retrospective cohort study of LPs with $\geq$ 1 prior conception, regarding pregnancy and delivery experience, physical status pre- and post-partum, and general opinions about pregnancy in LPs.
Results: Part 1**:** One-hundred forty nine SOAP members completed the survey (99 male, mean 48.7 yrs; 50 female, mean 46.3 yrs) with 3765 average deliveries/yr at primary hospital sites. One-hundred thirty four are currently board certified in general anesthesia or a related field. Career contact with dwarf women to administer OB anesthesia**:** none (3.5%), <5 (79.7%), 5-10 (11.4%), 11-20 (3.4%) and >20 (2%). Only 15% report receiving specific instructions regarding OB anesthesia for dwarf women in training. Part 2**:** To date, 61 women representing 129 pregnancies with 13 different skeletal dysplasias are enrolled, including achondroplasia (38), pseudoachondroplasia (6), SED variants (5), hypochondroplasia (3), diastrophic dysplasia (2), other (7). Eighty-eight liveborn infants were delivered via C-section (47 general anesthesia-GA, 41 spinal and/or epidural), 19 miscarriages, and 3 terminations. Five liveborn infants were delivered vaginally; 3 without regional anesthesia (hypochondroplasia), 2 with epidural (femoral hypoplasia). Only 46.7% received genetic counseling for any pregnancy and 28.9% had genetic testing for a skeletal dysplasia. 24.4% of respondents were told she should not carry a pregnancy. Forty percent believe LP women should have GA for all deliveries; 28.9% epidural or spinal. 4.4% regret carrying a pregnancy and 20% believe carrying the pregnancy damaged her health overall.
Conclusions: There is no evidence of increased fetal loss or maternal pregnancy complications due to dwarfism thus far. Most LP women will require C-section due to cephalopelvic disproportion, yet vaginal delivery is found in dysplasias with minimal truncal or pelvic disproportion. Many LPs have carried successful pregnancies and delivered with adequate pain control with general and regional anesthesia, despite the lack of medical literature and formal training in obstetrical anesthesia for this specific patient population. We neither promote nor discourage childbearing in dwarf women, yet more published data is needed for those who choose to have children and those who provide their medical care.

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POSTER REVIEW 1

A-39.

CHRONIC PAIN AFTER CESAREAN SECTION. IS IT A PROBLEM?

AUTHORS: M. M. Cardoso, M. C. Rizzo, A. R. Amaro, E. Lorenz;
AFFILIATION: Hospital e Maternidade Santa Joana, São Paulo, Brazil.

Introduction: The c-section rate is increasing worldwide. A recent study has highlighted that chronic pain may be a significant clinical problem after c-section, being present in at least 5.9% of women (1). This study evaluated the incidence of chronic pain after c-section under spinal anesthesia.
Methods: After Institutional board approval and written informed consent 73 patients submitted to elective c-section were studied. Spinal anesthesia was performed with 15mg of hyperbaric bupivacaine and 40mcg of morphine. In the postoperative period, they also received NSAIDs systemically. In the first and second days following surgery and then, by a telephone interview, at one week and every month for 6 months, patients were questioned about the presence of pain at rest and movement. If pain was present, they were asked to describe**:** its frequency (constantly, daily or briefly); its intensity, according to the numerical scale of pain (0 = no pain and 10cm = worst possible pain) and also its impact on simple tasks (getting up from bed, walking, touching the scar, deep breaths, coughing or carrying heavy bags). Questions about previous abdominal surgeries, pain problems elsewhere, and details regarding any problems during surgery, anesthesia and the need of rescue analgesics during the immediate postoperative period were also obtained from all patients.
Results: The mean follow up time was 2.5 months (range between 1 and 3 months). None of the patients had history of abdominal pain and 58.5% had one or more previous abdominal surgeries. Postoperative pain at rest was present in 4/73 patients in the first week and in 1/67,1/54,1/46 patients in the first, second and third months respectively. Pain at movement was present in 55/73 patients in the first week and in 18/67, 7/54, 3/46 patients in the first, second and third months respectively. Of those patients who had pain, none of them had it constantly or daily. They described the pain as being brief and it was most commonly present when getting up from bed. At the first week phone interview, 52/73 patients were still taking analgesics, but none of the patients reported their use beyond the first month following surgery. All patients received a Phanneenstiel incision under spinal anesthesia and no total or partial failure blocks were observed.
Discussion: Chronic pelvic pain is defined as a non-cyclic lower abdominal pain present for at least 6 moths. This ongoing study showed that although 7,9% of patients still had residual pain at the 3 month interview, the pain was described as being brief and did not impair the quality of women's life. The future extended evaluation until the sixth month following surgery will further clarify the impact of the c-section in women population.
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Acta Anaesthesiol Scand 2004; 48:111-116

A-40.

OBSTETRIC ANESTHESIA COMPLICATIONS IN A TERTIARY CARE CENTER - A SIX YEAR REVIEW

AUTHORS: J. S. Ranasinghe, G. Wirth, L. Garcia, M. Lai, D. H. Penning, D. J. Birnbach;
AFFILIATION: University of Miami Miller School of Medicine, Miami, FL.

Introduction: In order to better understand our anesthetic practice at Jackson Memorial Hospital (tertiary care center with approximately 7000 deliveries/year), we reviewed the quality assurance data of all deliveries between 2000- 2005. Approximately 70% of those deliveries were "high risk" parturients. Therefore, we believe that our incidence of complications may be different than those previously reported.
Methods: All anesthesia records of women who delivered during this 6 year period were reviewed. A total of 39,334 deliveries occurred during this period, of which 31,583 (80%) received neuraxial analgesia or anesthesia. We evaluated "major" (life threatening or potentially disabling) complications.
Results: Eight major complications (1/4000) were identified:
(A) failed intubations = 4:
LMA was attempted in all of these cases and placed successfully in 3. In the LMA failure, mask ventilation was successful and used for the entire C/S.
(B) Total spinal anesthetics = 2:
One intrathecal catheter (intended CSE was placed for labor analgesia) was unsuspected. The second intrathecal catheter was intentionally placed following a "wet tap", but poorly communicated to the new team. Both catheters were bolused with a full dose of local anesthetic in incremental doses, both patients required intubation.
(C) Epidural hematoma = 1:
Patient complained of severe back pain following uneventful labor epidural. Patient had no risk factors for hematoma. MRI showed a small epidural hematoma of questionable clinical significance. Based on the small size and resolving symptoms, non-surgical management was provided. Symptoms resolved totally over three days.
(D) Hemiplegia following hypertensive hemorrhagic stroke:
Hypotension during neuraxial block for C/S in a healthy patient was treated with intravenous ephedrine plus phenylephrine. Nevertheless, blood pressure increased to 180/120 after a second dose of phenylephrine (100 mcg), which was given one minute after the first dose. Hypertension was immediately treated with nitroglycerine and nicardipine. However the patient continued to complain of severe headache. Neurological symptoms appeared one hour later (confusion, slurred speech, unilateral weakness) and CT revealed an extensive external capsular bleed. Patient is currently undergoing rehabilitation with slow recovery.
Discussion: A frequent factor that these cases shared was suboptimal communication**:** sometimes between anesthesia providers, between nursing and anesthesiology, and often between obstetricians and anesthesiologists. Based on these findings, we have instituted team training with early improvement that we will be able to discuss in further detail at the SOAP meeting.

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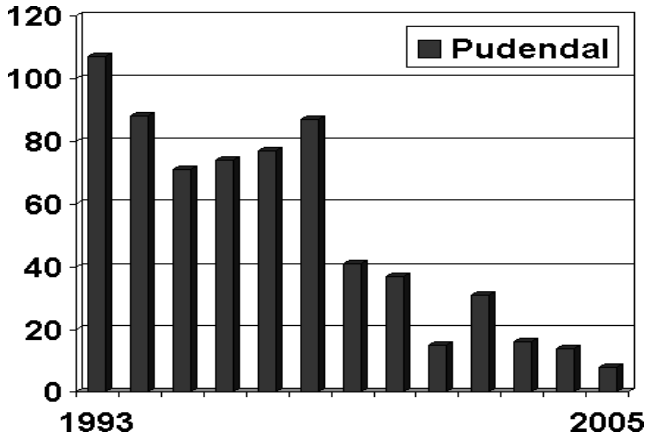
POSTER REVIEW 1

A-41.

WHERE HAVE ALL THE PUDENDALS GONE?

AUTHORS: M. H. Amols, K. D. Traynor, D. J. Creedon;
AFFILIATION: Mayo Clinic College of Medicine, Rochester, MN.

Introduction: Although epidural analgesia has become the mainstay for management of labor pain, pudendal nerve block can also provide effective pain relief, especially during the second stage of labor. The administration of this form of regional anesthesia has traditionally been performed by the obstetrician. One concern is whether the high rate of epidural use will decrease the number of pudendal blocks; this could limit resident training in this procedure resulting in a lack of familiarity with pudendals by future generations of obstetricians, eventually removing it as an option for analgesia during labor.
Methods: The number of pudendal nerve blocks administered during labor was determined for all deliveries occurring at a midwestern teaching hospital from 1993 to 2005. This information was obtained from a database maintained within our Obstetrics Department. Delivery records that include method of analgesia were used to compile this database. Our program has sixteen residents who participate in the critical portion of all deliveries.
Results: The number of pudendal nerve blocks administered during labor decreased significantly between 1993 and 2005 (Figure 1). During this same time period the percentage of epidurals remained relatively constant with a range of 59% to 64% of total deliveries. At the current rate of pudendal nerve blocks, the sixteen residents within the OB program will, on average, perform or participate in less than one pudendal nerve block per year.



Discussion: Obstetricians have become increasingly reliant on our anesthesia colleagues to provide labor analgesia. Yet, the number of pudendal nerve blocks administered decreased significantly despite a relatively steady rate of epidural administration. This likely reflects a continued decline that began in the years prior to the study period. Regardless, at current levels, it is unlikely that residents graduating from our program will have the skills and confidence to perform this procedure independently. To help reverse this trend and maintain skills for pudendal administration, we have incorporated pudendal nerve block simulation into the curriculum. Since pudendal nerve blocks are not typically incorporated into anesthesia resident teaching, it is imperative that obstetricians remain proficient in this procedure if it is to remain a viable option for obstetrical analgesia.

A-42.

NEW AUTODETECT SYRINGE FOR LABOR EPIDURAL ANALGESIA

AUTHORS: V. Soskin, H. Marsh, Z. Injic, T. Tenenboym, D. Deppen, J. Cox, K. Ferguson;
AFFILIATION: Wayne State University, Detroit, MI.

Introduction: The loss of resistance (LOR) technique is currently used for localization of the epidural space. However, false positive results in obese patients or dural puncture and headache (PDPHA) incidences still occur. In this prospective study we used the FDA-approved AutoDetect™ Syringe (ADS) developed by Indigo-Orb to evaluate user opinion and satisfaction. Equipped with an internal compression spring, this syringe allows one to apply a constant uniform pressure to the syringe barrel, alleviating the need for thumb pressure, thus identifying entry into the epidural space more objectively. The ADS was previously evaluated in animal models[1] and a clinical trial in 10 patients[2].
Methods: After IRB approval, groups consisting of Attendings (Group 1), CRNAs (Group 2) and Anesthesia Residents (Group 3) followed protocol in placing161 epidurals on laboring patients (ASAI-III). All insertions were in a sitting position at L2-3/L3-4 interspace, using 17G Tuohy needles and 19G closed-tip springwood catheters. LOR was detected using the ADS loaded with 3-5ml of normal saline. Data collected included demographics, history of previous epidurals/PDPHA, and epidural placement difficulties. Participants completed a pre- and post-study satisfaction survey.
Results: The average patient age was 25.1±6.0 years and the average BMI was 33.1±8.2. No significant statistical differences between BMI and age or number of passes among groups were found. A past history of labor epidurals (#69) and dural puncture/ PDPHA (#2) were reported. There were 3 (BMI 38-43.3), 14 (BMI 28.8-52.7), and 11 (BMI 23.9-49.3) insertions in Groups 1-3, respectively, requiring more than1 pass. Group 2 reported 2 dural punctures.

Table: Epidural Experiences with the AutoDetect™ Syringe (ADS)

		Epidural Placement			Post-Study Satisfaction Survey with AutoDetect™ Syringe			
		Depth of Epidural Space (cm)	# of passes	# of Dural Punctures	Identify Epidural Space *1=not accurate 5=very accurate*	2 Hands Improves Method *1=no improvement 5=significant Improvement*	Easy to Use *1=very difficult 5=very easy*	Useful Learning Tool *1= not at all 5=very useful*
All Groups (N=161)	Mean	6.43±1.75	1.26±0.68	0.01±0.11	4.40±0.84	3.90±1.60	3.70±0.82	3.40±1.26
Group 1 (n=32)	Mean	6.34±2.13	1.44±1.13	0	5.00±0	4.50±0.71	3.50±0.71	4.00±0
Group 2 (n=58)	Mean	6.08±1.86	1.26±0.55	0.03±0.18	4.00±0.82	2.50±1.73	3.25±0.96	2.50±1.29
Group 3 (n=71)	Mean	6.75±1.41	1.18±0.46	0	4.50±1.00	5.00±0	4.25±0.50	4.00±1.15

Discussion: The overall comments were positive “easy placement, very good experience with difficult epidural placement, good experience in patient with severe scoliosis.” In two cases failed attempts by the CRNA and Anesthesia Resident using a regular LOR syringe were successfully placed by the Attending using the ADS. A locking mechanism for redirection would be a good addition especially for difficult epidural placement in obese patients. Our study showed the ADS improves accuracy and objectivity in identifying the epidural space, providing more stability and controlled movement by allowing two hands for placement. It could be a very useful addition to Anesthesia training, especially for Residents.
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POSTER REVIEW 1

A-43.

SIX-COMPARTMENT PHARMACOKINETIC MODEL TO PREDICT MATERNAL AND FETAL PROPOFOL CONCENTRATION DURING CESAREAN SECTION IN ANTENATALLY DIAGNOSED CONGENITAL DIAPHRAGMATIC HERNIA

AUTHORS: K. Yokota[1], O. Nagata[2], K. Terui[1], M. Tamura[1], R. Uokawa[3], M. Tamura[1], H. Miyao[4];
AFFILIATION: [1]Center for Maternal, Fetal, and Neonatal Medicine, Kawagoe, Japan, [2]Tokyo Metropolitan Police Hospital, Tokyo, Japan, [3]Kobe University School of Medicine, Kobe, Japan, [4]Saitama Medical Center, Saitama Medical University, Kawagoe, Japan.

Introduction: Neonates with congenital diaphragmatic hernia (CDH) often suffer lung hypoplasia and pulmonary hypertension, which could be aggravated by crying and/or bag-mask ventilation upon delivery due to GI tract distention. In an attempt to improve outcome of neonates with severe CDH, we deliberately deliver depressed neonates via cesarean section by maternally administered anesthetic agents and umbilical cord morphine and pancuronium administration. Neonates are immediately intubated and mechanically ventilated with high frequency oscillation, with nitric oxide inhalation in the operating room. Generous amounts of propofol and fentanyl are administered to the mother for general anesthesia in cesarean section, in order to prevent respiratory effort of the neonate before umbilical cord drug administration. To find out the adequate dose of propofol for this protocol, we used the simulation model developed by the second author, which based on the 6-compartment maternal fetal pharmacokinetic model. The purpose of this study was to compare the simulated maternal and fetal propofol concentrations with the actual measurements in cesarean section for CDH.
Methods: Three consecutive cases of CDH were managed by this protocol. The mothers received general anesthesia with fentanyl 500μg and propofol TCI at 3 to 6μg/ml before delivery. Umbilical cord morphine with or without pancuronium was administered when difficult intubation was not suspected upon delivery of the fetal head. Maternal artery and umbilical artery and vein blood were sampled upon delivery, and propofol concentration was measured by HPLC (CoulArray, ESA, Boston).
Results: Time interval from the induction of anesthesia to delivery were 18, 21, 30 minutes. Neonates were born floppy, but one neonate showed respiratory movement. Apgar scores at 1 and 5 minutes were 2 and 3, 3 and 4, 1 and 5. Umbilical arterial pH was greater than 7.3 in all three. All the neonates underwent CDH repair in NICU within a week. and were discharged home without complications. The maternal and fetal propofol concentrations were shown in the table.

Predicted and measured maternal and fetal propofol concentrations upon delivery

	case 1	case 2	case 3
TCI(mcg/ml)	5.0	4.0	5.0
MA measured(mcg/ml)	9.24	7.65	4.64
MA predicted (mcg/ml)	3.75	3.14	3.87
UV measured(mcg/ml)	1.50	2.09	1.45
UA measured(mcg/ml)	-	1.27	1.11
UA predicted(mcg/ml)	1.93	1.59	1.72
measured UV/MA ratio	0.16	0.27	0.32

Discussion: The simulation model based on 6 compartment model predicted fetal propofol concentration very well, but it tended to underestimate maternal propofol concentration. These fetal concentrations seemed inadequate to depress neonate upon delivery. We are currently trying increased propofol TCI setting at 10μg/ml and repeating the simulation.

A-44.

LIDOCAIN VS ROPIVACAINE FOR EPIDURAL ANALGESIA IN LABOR: THE FREQUENCY OF TRANSIENT NEUROLOGICAL SYMPTOMS

AUTHORS: E. M. Shifman, S. Floka, I. Got;
AFFILIATION: Republican Perinatal Center, Petrozavodsk, Russian Federation.

Introduction: Several recent studies suggested that lidocaine used for spinal anesthesia for caesarean section can be associated with transient neurological symptoms. At the same time the level of risk of side effects during lidocaine epidural analgesia (EA) in labor still remains unclear. The purpose of this study was to examine the effect of epidural analgesia in labor on the incidence rate of transient neurological symptoms (TNS).
Methods: With the local ethics committee approval, informed consent was obtained from 90 healthy parturients who were randomized into three groups (30/group). The lumbar epidural catheter was inserted in all parturients at the beginning of labor. 1.0% lidocaine was used for epidural analgesia in the first group and 0.2% ropivacaine in the second. The third group served as the control and received no epidural injection. Two days after labor, an impartial observer interviewed the women about transient neurological symptoms using standardized questionnaire [1]. Transient neurological symptoms were defined as symmetrical pain and/or dysaesthesia in the buttocks, lower back and/or legs. Parturients reporting symptoms were asked to rate the degree of discomfort using a 10-point verbal scale. The collected data sets were statistically analyzed using U-test and [chi] ^{2}-test ($P < 0.05$).
Results: Overall, 22 patients (25%) complained of transient neurological symptoms, 7 patients in Group I (23%), 8 patients in Group II (27%) and 7 patients in Group III (23%). This difference was not statistically significant. The duration of symptoms was generally short and in all patients symptoms resolved completely within 24-72h.
Discussion: The suggestion that epidural analgesia during labor can cause TNS was not proved by this study. The type of anesthetic (lidocaine, ropivacaine) does not affect the frequency of transient neurological symptoms in parturients after labor EA.
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POSTER REVIEW 1

A-45.

IMPACT OF ADVANCED MATERNAL AGE ON PREGNANCY OUTCOMES

AUTHORS: Y. You, G. Lee;
AFFILIATION: The Catholic University of Korea, Seoul, Republic of Korea.

Introduction: The aim of this study was to investigate the influence of maternal age on perinatal and obstetric outcome in women ages 35-39 years and those 40 years or older.
Methods: A retrospective review of maternal and newborn records of women ages 35-39 years (group B; n= 276) and 40 years and older (group C; n= 347) were compared with those of women aged 25-29 (group A; n= 214) delivered at the same period with respect to pregnancy complications and perinatal outcomes in Hospitals of the Catholic University of Korea between January 1, 2000 and July 1, 2005. Data included antenatal data, gestational age, mode of delivery, birth weight, preterm birth, Apgar scores, SGA, perinatal death, NICU admission.
Results: The incidence of PIH. preterm birth and the rate of cesarian section in the group C were significantly greatest. Those in group B was not significantly different compared to that of group A. The incidence of GDM, PPROM and oligohydroamnios was not significantly different among three groups. The incidence of postterm in the group A was the highest. Previous cesarian section and placenta previa were the most frequent causes of cesarian section in the group C. The indications of cesarian section in the group A and B were not significantly different. The incidence of SGA and NICU admission in the group C were higher than that in the group A and B, The incidence of stillbirth, fetal distress and low apgar score were not significantly different among three groups.
Discussion: In this study, maternal ages 35-39 years dose not seems to be associated with adverse perinatal and obstetrical outcomes. And also,maternal ages over 40 years may be safe in the incidence of GDM, PPROM, oligohydramnios, still birth, fetal distress and low apgar score, although they have the risk of PIH, preterm birth, cesarian section, placenta previa, SGA and NMICU admission.
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A-46.

SURVEY AMONG SOAP MEMBERSHIP ON THE USE OF BENZODIAZEPINES DURING PREGNANCY, LABOR AND C-SECTION

AUTHORS: L. Hebbar, M. Bamert, K. Coyle;
AFFILIATION: MUSC, Charleston, SC.

Introduction: Most information about the effect of benzodiazepines (BZ) on the developing fetus has been based on retrospective studies. The current survey was designed to consolidate practices of SOAP members with regards to use of BZ given the controversial and paucity of literature available on this issue during pregnancy, labor and c-section. Chronic use of BZ during pregnancy for depression, especially diazepam has been associated with an increased risk of cleft lip and palate, low birth weight and small head circumference.[1] Other BZ that have been associated with fetal birth anomalies include chlordiazepoxide, clonazepam and lorazepam.[1]
Methods: A total of 764 surveys were mailed out to the SOAP members. The questionnaire included details about the number of deliveries per year, use of BZ for non-obstetric surgery during the first, second and third trimester, during labor and c-section and disclosure of risk of BZ administration to patients.
Results: 70% of responders were from practices with over 2000 deliveries per year. Pregnancy**:** Percentage of responders who did not administer BZ during the first, second and third trimesters were 76%, 65% and 45% respectively. Midazolam was the common BZ to be used during the first trimester at a dose of 1-2mg. Of the responders who used BZ during the first trimester, 61% did not explain possibility of any fetal risk with use of BZ to the patient. Labor**:** 80% of responders did not administer BZ during labor and 90% responders who used it explained the risk of neonatal depression to the parturient. Midazolam was the common BZ to be used during labor at a dose of 1-2mg. C-section**:** 75% of responders administered BZ during c-sections 35% of who administered it after birth of baby and 65% were variable in their decision of administering it before or after the birth of the baby.
Discussion: From the responses received it appears that administration of BZ during the first trimester is not acceptable to most obstetric anesthesiologists with a change in practice during the third trimester, and midazolam was the drug of choice to be used by most anesthesiologists. Informing patients about the possible teratogenic risk of midazolam was not considered important in 61% of anesthesiologists who used it during the first trimester. Use of midazolam during labor was not popular, the only indications being anxiety disorder or chronic use of BZ, in which event patients were informed of neonatal depression. Most anesthesiologists used midazolam during c-section though the timing of was variable. Since this is a preliminary report from an on-going survey, a better understanding of obstetric anesthetic practice with respect to the use of BZ in the pregnant will be available on completion of the survey.
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POSTER REVIEW 1

A-47.

ANTIEMETIC PROPHYLAXIS FOR POST DISCHARGE NAUSEA AND VOMITING AND IMPACT ON FUNCTIONAL QUALITY OF LIVING DURING RECOVERY IN GYNECOLOGICAL AND POSTPARTUM OUT-PATIENTS WITH HIGH EMETIC RISKS: A PROSPECTIVE RANDOMIZED, DOUBLE-BLIND COMPARISON OF TWO PROPHYLACTIC ANTIEMETIC REGIMENS

AUTHORS: S. Lee, L. Harris, P. H. Pan;
AFFILIATION: Wake Forest University, Winston-Salem, NC.

Introduction: Numerous studies/guidelines have been published on prevention of PONV, but few on PDNV or its impact on quality of functional living. PDNV can negatively affect quality of living especially in postpartum patients such as those undergoing laparoscopic tubal ligation. This prospective, double-blind, randomized study compared two forms of antiemetic-prophylaxis in high emetic-risk gynecological patients on the efficacy for PDNV and its impact on quality of functional living for 120 hours post-anesthesia.
Method and Materials: After IRB approval and informed consent, 64 ASA I-II women with high-emetic risk factors undergoing elective laparoscopic gynecological surgery with volatile inhalation anesthetic, N2O and opioids were randomized in a double-blind fashion into one of two antiemetic prophylaxis groups. Study group received intraoperatively intravenous dexamethasone 8mg and ondansetron 4mg, followed with ODT ondansetron 8mg, one each at discharge, and on the morning of postoperative day one and two. Control group received intravenous ondansetron 4mg as in the study group, but received placebos instead of dexamethasone and ODT ondansetron received in the study group. Patients were assessed for incidence and severity of emetic symptoms, pain and rescue medication need in the recovery room in person, and after discharge via telephone interview at 8^{th}, 24^{th}, 48^{th}, 96^{th} and 120^{th} hours post-anesthesia. A modified functional living index of emesis questionnaire(FLIE) was administered via interview to assess the incidence and severity of the impact on recovery daily quality of living.
Results: Demographics, emetic risk factors and anesthetic management were similar between groups. Incidences for PDN were 57% and 20%, and for PDV were 20% and 3% for the control and study group respectively for the period between the 8^{th} and 120^{th} hours post anesthesia ($P<0.05$). The study group (33%) had a lower incidence than the control group (60%) in reporting emetic symptoms negatively impacting their quality of living during recovery, as well as less severity impacting quality of life with a lower modified cumulative FLIE score ($P<0.05$). However, the study regimen did not differ from the control regimen in reducing PDNV for the immediate post-discharge period (discharge to 8^{th} hour post-anesthesia).
Conclusion: When compared to single dose intraoperative intravenous ondansetron prophylaxis, our study regimen using intraoperative intravenous dexamethasone and ondansetron together with ODT ondansetron administered at discharge and postoperative day one and two significantly reduced incidences of PDN and PDV between the 8^{th} to 120th hour post anesthetic, as well as reducing incidence of reporting and severity of negative impact on quality of daily living during recovery. However, the two groups did not differ in reducing PDNV in the immediate post-discharge period between discharge to 8^{th} hr post anesthesia. Future research can focus on prophylaxis for the immediate postdischarge period.
In part supported by a grant from GlaxoSmithKline.

A-48.

CAN PREOPERATIVE VITAL SIGNS PREDICT THE DEGREE OF HYPOTENSION AFTER SPINAL ANESTHESIA IN THE CESAREAN SECTION?

AUTHORS: J. Hwang[1], H. Park[1], Y. Jeon[1], S. Do[2];
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Introduction: Hypotension is a very common side effect of spinal anesthesia for cesarean section and it may produce poor neonatal outcome. We studied if preoperative vital signs can predict the degree of hypotension after spinal anesthesia.
Methods: Fifty three patients for elective cesarean section were enrolled and the gestation periods of all parturient were over 36 weeks. In the supine position, noninvasive blood pressure (BP) and heart rates (HR) were measured five times at one minute intervals and the lowest BP and HR were recorded as baseline values. After change to the right decubitus position for the procedure of spinal anesthesia, BP and HR of right arm were measured again. Hyperbaric bupivacaine 8 mg and fentanyl 15 mcg were injected intrathecally through 26G spinal needle. After return to the wedged supine position, BP and HR were measured every minute until anesthetic level was fixed. Hartmann solution (10 mL/kg) was fully dripped with the help of pressure bag. If mean BP (MBP) was below 55 mmHg, ephedrine 5 mg was injected intravenously. The change of MBP (Baseline MBP minus Minimum MBP after spinal anesthesia) and total ephedrine requirement were recorded. Polynomial and linear regression were used for statistical analysis.
Results: The patients who showed more increase of MBP with decubitus position, tended to have higher change of MBP after spinal anesthesia ($P=0.0001$, $R=0.77$, Fig.1) and lower minimum MBP ($P=0.0001$, $R=0.61$). And larger amount of ephedrine was needed ($P=0.0001$, $R=0.61$). Preoperative HR had not a good correlation with either the decrease of BP after spinal anesthesia ($P=0.058$) or ephedrine requirement ($P=0.462$). However, HR was a little correlated with the minimum MBP ($P=0.028$, $R=0.30$).

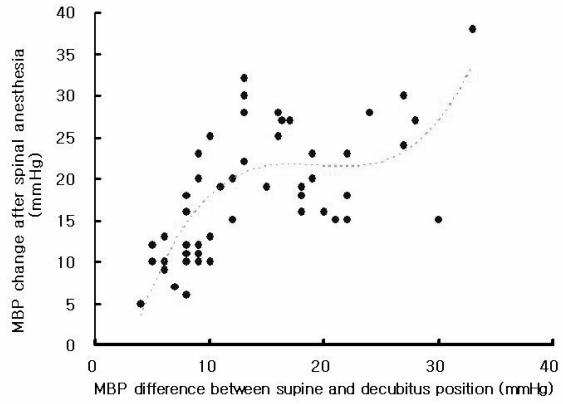

Figure 1. Correlation of mean blood pressure (MBP) change with decubitus position and MBP change after spinal anesthesia for cesarean section. MBP change increases as preoperative positional MBP difference increases, however, it tends to show no more increase if preoperative positional MBP difference is above 15 mmHg because ephedrine was administered due to hypotension.
Discussion: Positional BP change in parturient may be related with the effective circulatory volume deficit after spinal anesthesia. Preoperative BP difference between supine and decubitus position can be a good parameter to predict the degree of hypotension after spinal anesthesia for cesarean section.

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POSTER REVIEW 1

A-49.

TEACHING RESIDENTS TO QUESTION AND CHALLENGE THEIR TEACHERS: A SIMULATOR-BASED APPROACH TO IMPROVE EDUCATION AND PROMOTE PATIENT SAFETY

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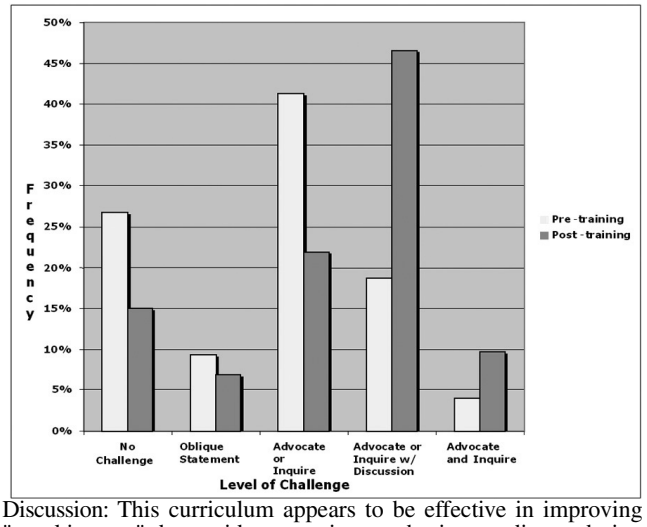
AFFILIATION: [1]Brigham & Women's Hospital, Boston, MA, [2]Massachusetts General Hospital, Boston, MA.

Introduction: Residents learn medical knowledge and procedures, and develop independent clinical judgment within a system that is historically hierarchical. Anesthesiology residents may be compelled to question their teachers if they disagree, have a patient safety concern, or when treatment plans are unclear. We sought to determine if a debriefing curriculum that emphasizes a diplomatic conversational technique (employing advocacy and inquiry) can improve the frequency and effectiveness with which residents "speak up" to superiors during simulated obstetric emergencies.
Methods: In a simulated OR, anesthesiology trainees were presented with opportunities to challenge co-workers (e.g., scripted orders to administer a relatively contraindicated medication or perform a potentially unsafe procedure). Challenges involved the anesthesiology attending, obstetrician, and circulating nurse (all confederates). In a debriefing, subjects were taught a diplomatic challenge technique involving both "advocacy" (stating resident's observation) and "inquiry" (open, curious request for the other's reasoning)[1]. Subjects then participated in a second scenario with new opportunities to challenge. Videotaped scenarios were evaluated by 2 investigators and trainee language was rated on a 5-point scale.
Results: Twenty-eight of a projected 40 subjects have participated to date. Pooled data is shown in the figure**:** overall use of advocacy and inquiry during challenge situations increases after debriefing, with fewer oblique statements or absent challenges. Preliminary analysis of subgroup data suggests that the debriefing curriculum specifically improves quality of challenges directed toward other physicians, without impacting resident challenges directed towards nurses. With nurses, (1)baseline pre-debriefing challenge scores tend to be high, which may reflect a lower threshold for residents to challenge nurses as compared with challenging physicians; and (2)many residents do not recognize these opportunities for challenging, which may reflect a perceived diminished role for the nurse in critical events.



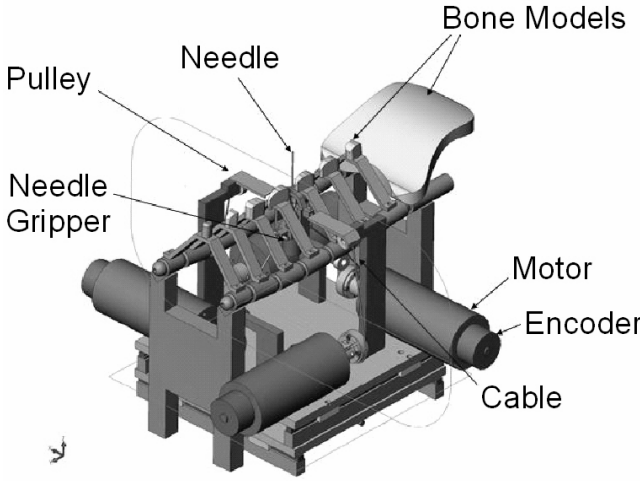
Discussion: This curriculum appears to be effective in improving "speaking up" by residents against authority gradients during simulated obstetric emergencies. Overcoming communication barriers within the medical hierarchy may improve learning opportunities and further assure patient safety.
Reference**:**
1] Simul Healthcare 2006;1:49-55.

A-50.

A SIMULATION PLATFORM FOR EPIDURAL ANESTHESIA TRAINING

AUTHORS: J. C. Magill[1], M. F. Byl[1], M. F. Hinds[1], S. D. Pratt[2], P. E. Hess[2], S. M. Cotin[3];
AFFILIATION: [1]Physical Sciences Inc., Andover, MA, [2]Beth Israel Deaconess Medical Center, Boston, MA, [3]CIMIT, Cambridge, MA.

Introduction: Successful placement of an epidural needle requires attention to tactile cues such as texture, toughness, and dimensions of tissue structures, as well as the transition between layers. The tactile feedback must be integrated with a mental model of the anatomy to keep track of needle location. This navigation of the tissue layers must flow within a larger process that involves procedure preparations and choosing the insertion point. A simulator that allows training in all key parts of the procedure is expected to accelerate development of proficiency, help maintain skills, and reduce complications.
Methods: The computer-controlled electromechanical simulator uses a set of flexible cables to attach a needle tip receiver to motors that produce the viscous and elastic properties appropriate to a wide range of tissues. A graphical user interface provides a way to adjust tissue layer dimensions and toughness, as well as tissue texture (e.g., “crunchiness”). A study to validate the simulator and the scoring algorithm is underway. The concurrent-validity study will evaluate whether the score obtained on the simulator is correlated with the user’s experience level.
Results: Figure 1**:** Internal simulator components.



Discussion: The four-motor version of the simulator described in the paper supersedes a simpler 2-axis system built previously[1]. The new system allows the needle angle to vary in both the transverse and saggital planes. The actuators are located inside a torso model. Figure 1 shows the internal components, without the torso. The trainee can palpate and identify landmarks, determine the insertion point, and insert the needle to the epidural space. The modified syringe is fitted with a valve to simulate loss of resistance upon entering the epidural space or in other cases such as a lateral exit from the interspinous ligament. A companion scoring algorithm evaluates the trainee’s performance. A graphical display of the needle path is provided to the user on the computer screen.
References:
1. "Multi-axis Mechanical Simulator for Epidural Needle Insertion", International Symposium on Medical Simulation, Cambridge, MA, June 2004, Springer Verlag Lecture notes in Computer Science, LNCS 3078.

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POSTER REVIEW 1

A-51.

RISK FACTORS FOR FEVER DURING LABOR EPIDURAL ANALGESIA

AUTHORS: V. R. Mantha, A. Daftari, V. Ramesh, M. Vallejo, S. Ramanathan;
AFFILIATION: Magee-Womens Hospital, Pittsburgh, PA.

Introduction: Various investigators, in prospective studies, reported risk factors for fever during labor[1-4]. These included nulliparity, labor epidural analgesia (LEA) and long labor. Fusi [1] and Camman [2] did not find number of vaginal examinations and use of internal monitors to be risk factors, while Philip [3] did find significant association between use of internal monitors and fever. In these studies, patients who had LEA were compared with those who did not. In the last study quoted[4], all the patients received LEA. The risk factors in this study, among others, were "length of epidural", "length of rupture of membranes", and number of vaginal examinations. Here we report the results of a study in which all patients received epidurals, and those who developed fever were compared with those who did not.
Methods: This was part of another investigation in which the effect of epidural analgesia with continuous infusions versus intermittent injections on intrapartum fever was studied. It was a prospective, randomized, IRB approved study. Inclusion criteria were healthy, nulliparous women, term gestation, singleton fetus in vertex presentation and spontaneous labor. Forty six were randomized to continuous infusions, and 46 to intermittent injections as-required. Epidural medications in both groups were 0.0002% fentanyl, and 0.125% bupivacaine or 0.1% ropivacaine. Maternal tympanic temperature was checked at the time of catheter insertion, and then at 4-hourly intervals until 4 hours post-partum. Fever was defined as temperature ≥ 38° C. The results were combined and then reclassified into fever and no-fever groups. Statistics**:** Student's t test and chi-square were used as appropriate. A p value of < 0.05 was considered significant.
Results: There was no difference between the two groups in age, height, weight, gestation, and those who developed chorioamnionitis. The other results are shown in the table. There was also a highly significant difference (p= < 0.001) in the temperature between the two groups at all time points (not shown in table).

Variable	Fever group mean ± SD	n	No-fever group mean ± SD	n	p
Baseline C-dilatation	2.75 (1.67)	26	3.78 (1.35)	63	0.003
Baseline temp ^{0} C	36.9 ± 0.44	26	36.5 ± 0.55	63	0.003
# vaginal exams	6.58 ± 2.53	26	5.5 ± 2.04	63	0.045
Internal Monitors	14	26	18	63	0.044
ROM to "Complete"(min)	479 ± 288	23	347 ± 245	54	0.043
ROM to del.	586 ± 287	26	462 ± 288	63	0.068
Epid to "Complete" (min)	356 ± 130	23	269.5 ± 168	56	0.029
Epidural to del	481± 140	26	380.3 ± 204	63	0.024

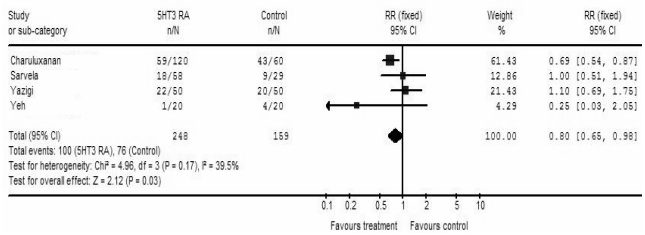
ROM**:** rupture of membranes.
Discussion: In our study, all the parameters given in the table were found to be risk factors for fever during labor epidural analgesia.
References**:**
1. Lancet. 1989; 1**:** 1250-1252.
2. Br J anesth. 1991; 67**:** 565-568
3. Anesthesiology 1999. 90 (5) 1271-1275.
4. Am J Obstet Gynecol 2002; 187**:** 834-838.

A-52.

PROPHYLAXIS OF NEURAXIAL OPIOID INDUCED PRURITUS WITH 5HT3 RECEPTOR ANTAGONISTS IN WOMEN UNDERGOING CESAREAN DELIVERY: A SYSTEMATIC REVIEW OF RANDOMIZED CONTROLLED TRIALS

AUTHORS: R. B. George, A. S. Habib, T. K. Allen;
AFFILIATION: Department of Anesthesiology, Duke University Medical Center, Durham, NC.

Introduction: Neuraxial opioids are commonly used in women undergoing cesarean delivery (CD). The incidence of pruritus in this setting is 30 - 100% (1). The $5HT_3$ receptor has been implicated in the etiology of pruritus. The aim of this review was to examine the efficacy of $5HT_3$ receptor antagonists in the prophylaxis against opioid induced pruritus in this patient population.
Methods: We performed a systematic search of MEDLINE (1966-2006), the Cochrane Central Register of Controlled Trials, and CINAHL for randomized comparisons of $5HT_3$ antagonists versus placebo for prophylaxis against pruritus in women receiving neuraxial opioids for CD. The first two authors read all included trials and scored them independently for methodological quality using the Jadad score. Data was extracted independently by the first two authors. Data on the incidence of postoperative pruritus and the need for rescue anti-pruritic treatment were extracted. The pooled relative risks (RR) with 95% confidence intervals (CI) were calculated
Results: We identified 5 randomized comparisons of $5HT_3$ antagonists to placebo for the prophylaxis of pruritus in obstetric patients . Yeh et al scored 3/5 on the Jadad score the other four studies 5/5. One study was not considered because it was a labor study. Ondansetron 4 - 8 mg was used in all studies. In addition, tropisetron 5 mg was used in one study . All studies used intrathecal morphine (0.15 - 0.20 mg). Yazigi et al used intrathecal sufentanil (2.5 mcg) in addition to morphine. The average incidence of pruritus was 79% with $5HT_3$ antagonists and 86% with placebo (RR [95% CI] = 0.90 [0.72, 1.12]). Rescue treatment for pruritus in the postoperative period (0-24 hours) was 40% with $5HT_3$ antagonists and 48% with placebo (RR [95% CI] = 0.80 [0.65, 0.98]) (Figure).



Discussion: $5HT_3$ antagonists were not effective in decreasing the incidence of postoperative pruritus in obstetric patients receiving neuraxial opioids for CD. However, $5HT_3$ antagonists may decrease the need for rescue treatment of neuraxial-induced pruritus.
References:
1. J Clin Anesth 2003; 15**:** 234-9
2. Anesth Analg 2003; 96**:** 1789-93
3. Acta Anaesthesiol Scand 2006; 50**:** 239-44
4. Int J Obstet Anesth 2004; 13**:** 35-9
5. J Clin Anesth 2002; 14**:** 183-6
6. Anesth Analg 2000; 91**:** 172-5

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POSTER REVIEW 1

A-53.

A NOVEL CONCEPT ON HUMAN MYOMETRIAL ACTIVATION IN CONTRACTILE FUNCTION DURING LATE PREGNANCY

AUTHORS: Y. Li[1], M. Reznichenko[1], R. M. Tribe[2], P. E. Hess[1], M. Taggart[3], K. G. Morgan[4];
AFFILIATION: [1]Dept. of Anesthesia, Critical Care and Pain Medicine, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, [2]Division of Reproduction and Endocrinology, King's College London, London, United Kingdom, [3]Maternal and Fetal Health Research Center, University of Manchester, Manchester, United Kingdom, [4]Boston Biomedical Research Institute, Watertown, MA.

Introduction: In late pregnancy increasing fetal growth increases uterine wall tension. This has been implicated in the activation of the myometrium for labor, but the mechanisms involved are unclear. It is also known that multiple gestation pregnancies and polyhydramnios, conditions associated with increased tension/ stretch on the uterine wall, cause an increased incidence of premature labor. Understanding the molecular basis of uterine contraction will aid the better control and manipulation of uterine contractile function in preterm and dysfunctional labor.
Methods and Results: In the current study, we investigated the molecular mechanisms by which gestation-dependent stretch contributes to myometrial activation, by using human uterine samples from gynecologic hysterectomies and Cesarean sections. Data from a rat model led us to postulate that increased caldesmon (CaD) protein levels during pregnancy may lead to a decreased Ca sensitivity of the contractile filaments, contributing to relative myometrial quiescence (1). Here, we report that the CaD content of human pregnant myometrial samples is significantly greater to that of non-pregnant samples, consistent with previous reports (2-3). Additionally, permeabilized human myometrial samples (term, not-in-labor) exhibit an increased Ca threshold for contraction compared to that for samples from non-pregnant women. The rat model had indicated that phosphorylation of CaD by ERK1/2 reversed the inhibitory effect of CaD on actin-myosin interaction. Now we clearly demonstrate an increase in CaD phosphorylation in myometrial samples from women in labor, but not from those not-in-labor, consistent with CaD phosphorylation being one factor involved in labor onset. To study the upstream events responsible for CaD phosphorylation, we conducted in vitro stretch experiments. Human myometrial strips (term, not-in-labor) were stretched to 2x slack length and quickly frozen for measurement of phosphorylation by immunoblotting. Stretch activated focal adhesion signaling and increased ERK and CaD phosphorylation. Anti-phosphotyrosine screening revealed a significant increase in the tyrosine phosphorylated 125kD, 68kD and 60kD bands, identified as focal adhesion kinase, paxillin and Src kinase respectively in the rat model (4). Also, tyrosine phosphorylation of 2 new bands with approximate molecular weights of 100kD and 52kD increased with stretch. More interestingly, we found that p130Cas, an adaptor protein at focal adhesions, was quickly phosphorylated and activated in response to mechanical stretch in human pregnant myometrium.
Conclusions: These results indicate that**:** 1. The observed decreased Ca sensitivity of the contractile apparatus is one mechanism by which increased CaD levels contribute to relative myometrial quiescence during normal human pregnancy; 2. A stretch-dependent activation of focal adhesion-dependent ERK signaling reverses CaD-dependent inhibition of labor, and promotes contraction of the uterus during labor.
References**:**
1. Am J Physiol 284**:** R192-199, 2003.
2. J Clin Invest 92**:** 29-37, 1993.
3. J. Cell. Mol. Med. 9**:** 122-134, 2005
4. J Cell Biochem 100**:** 129-140, 2007

A-54.

DO INTERMITTENT EPIDURAL INJECTIONS HAVE A LOWER INCIDENCE OF FEVER IN EARLY LABOR VERSUS CONTINUOUS INFUSIONS?

AUTHORS: V. R. Mantha, V. Ramesh, M. C. Vallejo, A. Daftary, S. Ramanathan;
AFFILIATION: Magee-Womens Hospital, Pittsburgh, PA.

Introduction: Labor epidural analgesia (LEA) may be associated with maternal intrapartum fever. The mechanisms are thought to be physiological, partly from loss of sweating in the lower half of the body [1,2]. Most studies reporting the fever were in parturients who received continuous epidural infusions. We hypothesized that intermittent injections might be protective, because they may allow intermittent recovery of the sympathetic blockade and sweating mechanisms.
Methods: This IRB approved prospective, randomized study recruited 46 parturients to each of two groups- Continuous LEA (CLEA) and Intermittent LEA (ILEA). Inclusion criteria were healthy nulliparous women in spontaneous labor at term with a singleton fetus in vertex presentation. In both groups, epidural analgesia was established with fentanyl 100 ugm, and 8 ml of either 0.125% bupivacaine or 0.1% ropivacaine. Then, the CLEA group had a continuous infusion of 0.125% bupivacaine plus 0.0002% fentanyl or 0.1% ropivacaine plus 0.0002% fentanyl, at 10-12 ml/hr to maintain a T-10 level or higher. In the ILEA group, bolus doses of 10-15 ml of one of the above solutions were given on an as-needed basis. Maternal tympanic temperature was checked at the time of catheter insertion, and then at 4-hourly intervals until 4 hours post-partum. Fever was defined as temperature ≥ 38º C. Statistics**:** Student's t test and chi-square were used as appropriate. A p value of < 0.05 was considered significant.
Results: Three subjects in the ILEA group dropped out of the study before it was completed. There was no difference between the two groups in demographic data, baseline cervical dilatation and baseline temperature. The overall incidence of intrapartum fever in the CLEA group was 14/46 (30.4%), and in the ILEA group, 12/43 (27.9 %) (Table). There was, however, a significantly lower incidence of fever in the ILEA group at the 4-hour time point. The ILEA group also had higher pain scores and lower dermatome levels at this time point compared to the CLEA group.

Time from Epidural insert	CLEA		ILEA		P value
	Fever	n	Fever	n	
4 hours	9	40	2	39	0.047
8 hours	7	23	7	21	Ns
Delivery	4	24	6	23	Ns
Any time intrapartum	14	46	12	43	Ns
4 hrs post partum	3	46	2	43	Ns

Ns = not significant
Discussion: Our study shows that intermittent labor epidural injections may be protective against intrapartum fever at 4 hours. The reasons could be their higher pain scores and lower dermatome levels, allowing them to lose heat by hyperventilation and sweating.
References**:**
1. Lancet. 1989. 1**:** 1250-1252
2. Anesthesiology 1999. 90 (5) 1271-1275.

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POSTER REVIEW 1

A-55.

PAIN RELIEF AFTER CESAREAN SECTION: A PROSPECTIVE COHORT STUDY

AUTHORS: S. H. Halpern, J. Yee, C. Oliver, P. Angle;
AFFILIATION: Sunnybrook @ Women's College Hospital, Toronto, ON, Canada.

Introduction: Women should receive adequate analgesia after cesarean section. The Royal College of Anaesthetists[1] has proposed standards for post C/S pain relief, including the following**:** 1) >90% women to have a worst pain score of <3 on a VAS of 0-10, 2) 100% women to be prescribed NSAIDs, and 3) >90% women to be satisfied with pain management. We sought to compare our practice with these standards.
Methods: After obtaining ethics approval, we recruited a convenience sample of 100 women. Questionnaires were administered via face-to-face interviews between postoperative days 2 and 4. Term, ASA I and II patients who had elective C/S under spinal anesthesia were included. We collected data related to the following**:** spinal morphine dose, analgesic consumption, worst pain scores, pain at rest and on movement, monitoring of respiratory rate and sedation level, side effects (pruritis, nausea and vomiting, drowsiness, constipation), and satisfaction with post C/S pain management. Data were gathered from August to December, 2006. Descriptive statistics were used for group data. Non parametric tests were used for comparative data.
Results: 100 women were interviewed in hospital between 42 and 119hrs postoperatively. Demographic data are shown in the table. All women received a self-medication package upon transfer to the postpartum ward, including acetaminophen, ibuprofen, and docusate sodium. All patients who were did not have allergies to NSAIDS received them (N=98). The mean overall VAS worst pain score was 6.43+/-2.12. No significant differences were seen in oxycodone consumption, worst pain scores, pain at rest and on movement as a function of spinal morphine dose. Patients who received 0.2mg of spinal morphine experienced more pruritus than those that received 0.15mg (p=0.01). 94%(94/100) of women were satisfied or very satisfied with their pain management.

Demographics	
Mean Age yrs (sd)	34(4)
BMI (sd)	29(6)
Nullip/Multip	41/59
Singleton/Twins	93/7
Mg Dose of spinal morphine (n)	
0.15	65
0.20	31
0.30	4

DISCUSSION: The VAS pain scores were significantly higher than those recommended by the College, in spite of the administration of appropriate analgesia. However, maternal satisfaction with analgesia exceeded the recommendation. Our results suggest that the analgesic target, derived from the general surgery literature[2], is not appropriate for obstetric patients possibly because of our poor understanding of pain measurement and the interplay between the pain experience and patient expectations.
References:
1 http://www.rcoa.ac.uk/docs/arb-section8.pdf Last accessed**:** Dec. 22, 2006.
2 BMJ 2002;305:1187-93.

A-56.

AN AUDIT OF MATERNAL NAUSEA AND VOMITING FOLLOWING A CHANGE FROM PHENYLEPHRINE BOLUSES TO AN INFUSION

AUTHORS: A. J. Macfarlane, M. McCormick, E. McGrady;
AFFILIATION: Glasgow Royal Infirmary, Glasgow, United Kingdom.

Introduction: Phenylephrine has been shown to be preferable to ephedrine to combat maternal hypotension following spinal anaesthesia[1]. In our institution phenylephrine is given as 20-40µg boluses. In published research using phenylephrine infusions the quoted rates of hypotension and nausea were less than our experience. We decided therefore to introduce an infusion protocol and audit hypotension and nausea incidence before and after the change in practice.
Methods: Following confirmation that ethical approval was not required a 2 stage prospective audit was undertaken. For 5 weeks all elective Caesarean sections undertaken using regional anaesthesia in ASA 1 and 2 patients were audited. Blood pressure was measured every minute and corrected with phenylephrine 20-40µg boluses as required. Data collected is outlined in the table below. Nausea was scored as none, nausea or vomiting. Maternal satisfaction was scored using a visual analogue scale 0-10. A previously published protocol was then instituted running a 100µg/ml phenylephrine infusion between 0 and 40ml/hr to maintain blood pressure at the starting level[2]. A second 5 week period was then audited. Statistical analysis was performed using Students t-test, Mann-Whitney U test and Chi squared testing.
Results: These are shown in the table below. There was no significant difference in intrathecal dose or block height between the groups.

	Bolus group (n=55)	Infusion group (n=51)	Signifi-cance
Phenylephrine used Mean (S.D)	90.2µg (73.1)	1256.6µg (539.6)	P<0.00001
Apgars Median [range]			
1 minute	9 [6-9]	9 [5-9]	N.S.
5 minute	10 [9-10]	10 [9-10]	N.S.
Largest fall in MAP from baseline Mean (S.D)	30.1mmHg (14.7)	25.1mmHg (12.3)	P<0.05
Vagolytic required (n)	5	16	P<0.01
Nausea (n)	19	9	P<0.01
Vomiting (n)	13	4	P<0.01
Satisfaction Median [range]	10 [6-10]	10 [7-10]	P<0.05

DISCUSSION: There was a significantly lower incidence of hypotension, nausea and vomiting in the infusion group than the bolus group. The infusion group however received significantly more phenylephrine and vagolytics. Maternal satisfaction was statistically better in the infusion group although high in both groups. We conclude that the use of an infusion results in less nausea and vomiting. This appeared more marked than would be anticipated from the effect on reduction in hypotension.
References:
1. Cooper D, Carpenter M, Mowbray P, Desira W, Ryall D, Kokri M. Fetal and Maternal Effects of Phenylephrine and Ephedrine during Spinal Anesthesia for Cesarean Delivery. Anesthesiology, 97:1582-90 (2002)
2. Bythell VE, Mowbray P, Cooper DW. Phenylephrine in obstetric regional anaesthesia. Anaesthesia, 58**:** 288-9 (2003)

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POSTER REVIEW 1

A-57.

DOES INTERMITTENT EPIDURAL ANALGESIA HAVE BETTER LABOR OUTCOME COMPARED TO CONTINUOUS ANALGESIA?

AUTHORS: V. R. Mantha, M. C. Vallejo, V. Ramesh, A. Daftary, S. Ramanathan;
AFFILIATION: Magee-Womens Hospital, Pittsburgh, PA.

Introduction: Labor epidural analgesia (LEA) may be associated with more instrumental/operative deliveries and prolonged second stage of labor. Studies that compared continuous with intermittent epidural medications did not see any difference in these parameters [1-3]. Here we report our findings of a study in which we did find such a difference.
Methods: This prospective, IRB approved, randomized study was part of another that compared the effects of continuous and intermittent epidural analgesia on maternal fever. Inclusion criteria were healthy, term, nulliparous women in spontaneous labor with singleton fetus in vertex presentation. Randomization was to one of two groups- Continuous (CLEA) and Intermittent (ILEA), 46 in each. In both groups, epidural analgesia was established with fentanyl 100 ugm plus 8 ml of either 0.125% bupivacaine or 0.1% ropivacaine. Then, in the CLEA group a continuous infusion was given with 0.125% bupivacaine plus 0.0002% fentanyl or 0.1% ropivacaine plus 0.0002% fentanyl, at 10-12 ml/hr. A sensory level of T-10 or higher was maintained. In the ILEA group, bolus doses of 10-15 ml of one of the above solutions were given at first maternal request for more analgesia. This usually occurred when the sensory level regressed to T-12 or lower. Statistics**:** Student's t test and chi-square were used as appropriate. A p value of < 0.05 was considered significant.
Results: These are given in the table. Three subjects in the ILEA group dropped out. There was no difference between the two groups in demographic data and baseline cervical dilatation. We found that instrumental/operative delivery, and duration of second stage were significantly higher with CLEA compared to ILEA. C-Section rate was also higher in the former but did not quite reach statistical significance.

	CLEA Mean ± 1 SD where applicable	Valid n =	ILEA Mean ± 1 SD where applicable	Valid n =	p value
AROM	30	46	29	43	1.0
Oxytocin augmentation	32	46	37	43	0.11
Instrumental/operative delivery	15	41	4	41	0.009
Instrumental delivery	5	41	1	41	0.20
C/Section	10	41	3	41	0.070
ROM to "Complete" (min)	369.5 ± 267.2	38	404.2 ± 260.6	39	0.57
"Complete" to del (min)	133.1 ± 91.83	39	79.9 ± 64.8	40	0.004
Epidural to "Complete" (min)	289.8 ± 158.1	39	299.7 ± 167.8	40	0.83
Epidural to delivery (min)	426 ± 187	46	393 ± 199	43	0.42

DISCUSSION: Our findings differ from the studies quoted below. This may be from a higher concentration of bupivacaine used (0.25%) in the intermittent group [1], or the methodology (retrospective study and definition of prolonged second stage > 3 hours [2], or combined spinal-epidural analgesia) [3]. The findings in our study might be because of ineffective pushing in CLEA group secondary to continuous perineal analgesia and decreased pelvic floor tone.
References**:** 1. Obstet Gynecol 2005; 106(2) 301-6
2. Int J Obstet Anesth. 2003; 12(1) 9-11 3. Anesth Analg 2006; 102**:** 904-9.

A-58.

THE INCIDENCE OF GENERAL ANESTHESIA FOR CESAREAN SECTION IN PARTURIENTS WITH A PREVIOUS LABOR EPIDURAL: A PROSPECTIVE STUDY

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Introduction: The incidence of general anesthesia (GA) for cesarean section (CS) in parturients with a previously placed labor epidural has been estimated to be between 5.2% and 19.8%[1;2]. Recent guidelines from the Royal College suggest that the incidence should be <3%[3]. The purpose of this study is to determine the incidence of conversion of epidural analgesia to GA in the setting of a busy high risk obstetric unit.
Methods: After REB approval, we prospectively studied all parturients who had an epidural for labor and required a CS. Data was collected on a form collected by an anesthesiologist not involved with patient care. The type of anesthesia, anesthetic agents used, the time from the initiation of anesthesia to incision, and previously identified determinants of failure of epidural anesthesia[1;2;4] were recorded. The primary outcome was the incidence of GA. Secondary outcomes included the incidence of epidural anesthesia failure and the factors that correlated with failure. Sample size was based on the assumption that the incidence of failure would be 6%. A sample size of 1000 CS, this would allow calculation of up to 6 factors that correlate with failure. The proportion of GAs (and 95% confidence interval) was calculated and compared to 3%. Descriptive statistics were used to analyze the demographics. Multivariate statistics will be used to determine the important factors that correlated with failure.
Results: Between 03/01/06 and 12/21/06, we recruited 327 patients. Demographics, the time from initiation of anesthesia to incision, and dose epidural drug are shown in the table. The incidence of GA was 13/327 (4.0%, 95% CI 2.1%-6.7%, p=0.31). The total incidence of failure was 20/327 (6.1%, 95% CI 3.7-9.2%). The factors that correlate with epidural failure will be reported after the total sample has been collected.

Demographics	
Maternal Age Mean yrs (SD)	33 (4.3)
BMI Mean (SD)	29 (6.9)
Time (minutes) anesthesia to delivery (SD)	21 (13)
Total dose (ml) local anesthetic (SD)	18 (4)
Staff/Trainee anesthesia (n/n)	242/83

DISCUSSION: Epidural analgesia for labor can be successfully converted to anesthesia for CS in most patients. The incidence of GA in our sample was not statistically different from the guidelines suggested by the Royal College. Clear definition of factors that are associated with failure may help in early prediction and allow time to use other forms of regional anesthesia instead of GA in selected patients.
References:
1) IJOA 2002;11:81-4
2) Acta Anaesthesiol Scand 2006;50:793-7
3) http://www.rcoa.ac.uk/docs/arb-section8.pdf. Last access Jan4/07
4) IJOA 2002;11:9-12

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POSTER REVIEW 1

A-59.

COMPLICATIONS ASSOCIATED WITH CSE V SPINALS FOR CAESAREANS

AUTHORS: A. Allnatt, R. Sashidharan;
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Introduction: CSE is a well established technique for providing anaesthesia for Caesareans[1]. The reliability of the spinal block with the flexibility of the epidural, enabling it to be extended or prolonged has made CSE the technique of choice for de novo Caesareans, especially in the UK. On the other hand it potentially exposes the patient to more complications than either alone. These include inadequacy and failure of the spinal component[2].
Method**:** We retrospectively analysed the data in our obstetric anaesthetic data base in relation to all de novo regional anaesthetics conducted for Caesareans between the years 2001-2006. We reviewed complications associated with the two procedures.
Results: During this period there was 2412 de novo regional anaesthesia for Caesareans. Of these 1550 (64.2%) had CSE and 862 (35.7%) had single shot spinals. All received 10mg of bupivacaine and 250µgm of diamorphine intrathecally.

	Spinals (n=862)	CSE (n=1550)
Parasthesia	16 (1.8%)	88 (5.7%)
High block	3 (0.3%)	23 (1.5%)
Bloody tap	1 (0.1%)	55 (3.5%)
Hypotension	37 (4.3%)	124 (8.0%)
Incomplete block	13 (1.5%)	54 (3.5%)
Conversion to GA	32 (3.7%)	35 (2.3%)

Discussion: The complication rate in the CSEs was 39.9% compared to 31.8% in the spinals. All complications except conversion to GA were commoner in the CSE group. Compared to 54 (3.5%) in the CSE group, only 13 (1.5%) in the spinals had inadequate analgesia from the sub-arachnoid block. 35 (2.3%) CSEs were converted to GA compared with 32 (3.7%) spinals.
CSE has proven to be a versatile technique and does definitely have a useful place in obstetric anaesthesia. However its use should be tailored to the individual case and the risks and benefits considered rather than be used as a routine technique.
References:
1. Shibli KU, Russell IF. IJOA 2000; 9**:** 160-7
2. Levy N, Fernando R. Anaesthesia 2000; 55(12)**:** 1230-1

A-60.

SURVEY OF OBSTETRIC ANESTHESIA PRACTICES IN ARMENIA

AUTHORS: A. Amroyan[1], S. Millar[2], M. D. Owen[3];
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Introduction: Armenian independence following the Soviet disintegration saw economic transition and war with Azerbaijan. The 3.3 million population declined by 700,000 with impoverishment, lower fertility rates, and fewer public health services. Recently, economic stability has improved living standards; birth rates have increased and maternal mortality has decreased from 40/100,000 in 1990 to 22/100,000 in 2003[1]. Governmental support now includes maternity care. Of the 10 maternity clinics in Yerevan, only 3 were known to utilize regional anesthesia (RA) techniques. The purpose of this survey was to determine the extent of anesthesia involvement in maternal care, and the degree of RA use.
Methods: Short questionnaires were dispatched to obstetric anesthesia departments requesting for 2006**:** numbers of deliveries and cesarean sections, type of analgesia for vaginal deliveries, and type of anesthesia for cesarean section.
Results: Eight of 10 maternity clinics participated. These 14,172 deliveries represented 41% of the 34,348 deliveries registered in Armenia for 2006. Deliveries were evenly distributed (range 1402 to 2111) and size was not related to RA use. Cesarean section rates were 12.7% to 17.3%. In the centers with RA experience, RA rates for cesarean section were 30%, 40% and 94%. These centers also provided epidural labor analgesia for 2-12% of parturients. Only one clinic offered systemic analgesia. Half of the deliveries in Yerevan had no access to medical analgesia for labor, and of all deliveries narcotic or epidural analgesia was used in 4.4%.

	Anesthesia for C/S (%)		Analgesia for SVD (%)		
Summary data	GA	RA	None	Narcotic	Epidural
Clinics with RA(3)	50.7	49.3	92.1	0	7.9
Clinics nil or limited RA(5)	97.7	2.3	97.8	2.2	<0.1

DISCUSSION: Utilization of RA varied markedly; even in centers with established skills. Many Armenian women deliver without access to RA services. OB anesthesia deaths in the UK are related to general anesthesia[2]. Support for training and education may see greater uptake as part of safe compassionate care.
References**:**
1.WHO Europe, Highlights on Health in Armenia 2005, p13.
2. Why Mothers Die 2000-2002, Ch9, p122-133
Acknowledgment**:** This project was supported by Kybele, Inc. a 501(c)(3) organization to promote obstetric anesthesia education.

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A-61.

INTRODUCTION OF AN ELECTRONIC AUTOMATED INFORMATION SYSTEM FOR OBSTETRIC ANESTHESIA SERVICES

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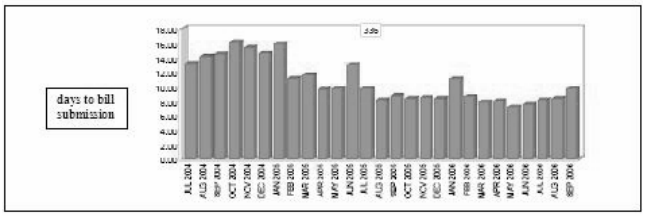
Introduction: Despite numerous studies showing benefits to safety and efficiency, Operating room use of electronic anesthesia record keeping continues to be poorly adopted in the United States, with only about 3% of anesthesia practices reporting using an electronic automated information system (AIMS). Additionally, when an AIMS is implemented at an institution, obstetric anesthesia services are often omitted from the process. Anesthesia for obstetric services can extend for many hours during which multiple users document care on the same patient, many patients are cared for concurrently, and anesthesia personnel shifts change. Electronic charting for obstetric services may therefore offer significant improvement over paper charting. At our institution, AIMS (GasChart) has been in place for 8 years and was introduced for Cesarean Section in Jan.2004 and for labor epidurals in Jan. 2005. We report our experiences following the implementation of electronic AIMS for obstetric anesthesia services.
Methods: After IRB approval, 100 charts for both cesarean section and labor epidural from the 3 month interval prior to electronic chart implementation were randomly selected for review. Medical records were screened for the presence and legibility of paper anesthesia records by one observer. From the period of July 2004 through September 2006, obstetric anesthesia billings were reviewed for time to bill submission, lost records, and administrative time. A survey to evaluate provider experiences comparing electronic to paper charting for both C/S and labor analgesia is in progress.
Results: Of 95 paper C/S charts reviewed, 90 anesthesia records were present, 5 were absent. 3 were very legible, 47 legible, 35 difficult to read, 3 could not be read. Of 91 labor epidural charts reviewed, 82 were present, 8 were absent. 3 were very legible, 58 were legible, 22 were difficult to read, 0 were unreadable. Time to bill submission (Graph 1) was reduced by 6 days. OB administrative assistant time was reduced from 5 to 10 hours to week to 0. Billing office administrative time was also markedly reduced. Provider Survey results will be reported at the time of presentation.



Discussion: Implementation of GasChart for obstetrical services has resulted in decreases in billing time, eliminated the issue of lost records. and marked reductions in administrative efforts at our institution. Electronic anesthesia charting may be particularly advantageous for obstetric anesthesia services.

A-62.

THE EFFECT OF OBESITY ON REGIONAL ANESTHESIA DIFFICULTY IN PARTURIENTS: A PROSPECTIVE OBSERVATIONAL STUDY

AUTHORS: E. H. Ellinas, S. N. Patel, H. Shankar, A. Maitra-D'Cruze;
AFFILIATION: Medical College of WI, Milwaukee, WI.

Introduction: The combination of obesity and pregnancy has confronted anesthesiologists at a growing rate over the last several decades.[i] Many anesthesiologists are concerned that placement of a regional anesthetic in an obese parturient will be difficult. Several papers have discussed the potential difficulty with regional anesthetics in this population, but none have systematically examined risk factors for difficulty.[ii] In non-obstetric patients, researchers found that placement difficulty in neuraxial anesthetics was most affected by two things**:** obvious spinal deformity and the ability to adequately palpate bony landmarks.[iii,iv,v] None have examined the placement in detail, documenting total placement time or needle passes. By investigating potential predictors of regional anesthetic difficulty, we plan to discover whether obese parturients truly are "difficult placements."
Methods: Multiple potential risk factors for difficulty were recorded, including**:** body mass index (BMI), back position, spine flexion, level of cooperation, and scoliosis. Regional anesthesia difficulty was then assessed through "placement time:" the time from skin local anesthetic to threading the catheter. We also recorded the total number of needle passes, and whether the staff anesthesiologist had to take over the case.
Results: Preliminary results (first 50 patients) did not show correlation between BMI and difficulty ($p>0.05$), either in placement time or redirections. Several factors did correlate with difficulty, however, including the ability to palpate spinous processes ($p=0.01$), the patient's ability to flex their spine ($p=0.02$), and the patient's level of cooperation ($p=0.002$). In addition, there was correlation between BMI and the predictors (especially the ability to flex the spine).
Discussion: Many obese parturients have surprisingly easy epidural placements. This study corroborates this clinical finding. No correlation was found between obesity and difficulty. There was, however, correlation between obesity and several risk factors that were predictive of difficulty. Practitioners should look for those factors in their obese parturients, rather than at the patient's obesity alone.
Endnotes
References:
[i] CDC Behavioral Risk Factor Surveillance System. Internet.
[ii] Hodgkinson R, Husain FJ. Cesarean section associated with gross obesity. Br J Anaesth 1980;52:919-23.
[iii] Sprung J, Bourke DL, Grass J, Hammel J, Mascha E, Thomas P, Tubin I. Predicting the difficult neuraxial block**:** A prospective study. Anesth Analg 1999;89:384-9.
[iv] De Oliveira Filho GR, Gomes HP, da Fonseca MHZ, Hoffman JC, Pederneiras SG, Garcia JHS. Predictors of successful neuraxial block**:** a prospective study. Eur J Anaesthesiol 2002;19:447-51.
[v] Atallah MM, Demian AD, Shorrab AA. Development of a difficulty score for spinal anesthesia. Br J Anaesth 2004;92:354-60.

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POSTER REVIEW 1

A-63.

DOES SOCIAL DEPRIVATION AFFECT EPIDURAL REQUESTS?

AUTHORS: A. J. Macfarlane, S. Young;
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Introduction: Social deprivation is known to a have a profound effect on health and likelihood to seek medical intervention.[1] We aimed to investigate whether requests for a labouring epidural were linked to social deprivation by using the DEPCAT score. The DEPCAT score, which can be calculated from the postcode, is an area based measure of deprivation in Scotland and is a composite score based on unemployment, social class, over-crowding and non-car ownership.[2]
Methods: The study design was a retrospective analysis incorporating the period 1st December 2005 to November 30th 2006. Using the unit database patients who had labouring epidurals were identified and the postcode noted. Patients with an obstetric indication for the epidural were excluded. All vaginal deliveries without an epidural were also identified. For each DEPCAT score 1-7 the number of deliveries was calculated, as was the proportion of mothers who requested an epidural. Chi squared testing was used to identify any statistical differences between the groups and the correlation coefficient was also calculated.
Results: In the year studied the total number of deliveries was 5445, 1456 of whom had epidurals. Obstetric conditions were the indication in 51 cases and these were excluded. 1958 women delivered vaginally without an epidural. Of the 3363 cases studied, no DEPCAT score was available for 692 (20.6%). Table 1 shows the final numbers of vaginal deliveries studied and epidural rate grouped by DEPCAT score (DEPCAT 1 is most affluent).

Table 1

DEPCAT	1	2	3	4	5	6	7
Total deliveries	12	126	233	555	274	280	1191
Epidural rate (%)	58.3	40.5	48.1*	46.5*	42.7	41.1	40.1

* significant vs DEPCAT 7 ($p<0.05$)
The overall epidural rate in DEPCAT 1-4 added together was significantly greater than DEPCAT 5-7 together ($p<0.025$). The correlation coefficient was -0.70 suggesting that epidural rate did decrease as deprivation increased.
Discussion: Based on DEPCAT scores, 43.8% of the patients delivering vaginally in our unit come from the most deprived areas in Scotland. Our initial work suggests that deprived patients as a group request a labour epidural significantly less. Further work needs to be done to establish why however or if there are confounding factors.
References:
1. Scambler G. Sociology as Applied to Medicine, 5th edition. Saunders. (2003)
2. McLoone P. Carstairs scores for Scottish Postcode sectors from the 2001 Census. Report. MRC social and Public health Sciences unit. (2004).

A-64.

EXIT (EX UTERO INTRAPARTUM TREATMENT) PROCEDURE: UNIVERSITY OF MICHIGAN EXPERIENCE 2005-2006

AUTHORS: S. Reddy, J. R. Kwak, A. Shanks, A. S. Bullough;
AFFILIATION: University of Michigan, Ann Arbor, MI.

INTRODUCTION**:** The Exit (ex-utero intrapartum treatment) procedure was designed for fetuses with congenital diaphragmatic hernias(CDH). It has been adapted to treat other fetal anomalies which are incompatible with life after delivery. These anomalies include reversal of tracheal occlusion, neck masses e.g. cystic hygroma, cervical teratoma and thoracic abnormalites. We reviewed the practice of EXIT procedure in our institution and looked at indications, anesthesia and outcomes.
METHODS: With IRB approval, we reviewed eight records retrospectively from 2005 - 2006. All cases were performed by the same paediatric surgeon.
RESULTS: Indications for EXIT procedure:
CDH n=4
Neck Mass n=2
Thoracic Mass n=2

EXIT Procedure Outcomes

Gestational age at birth (weeks)	Female: Male	Birth weight (grams)	Survival n=7	Time from uterine incision to cord clamping (min)	Maternal age(years)	Maternal EBL (Estimated Blood Loss) (ml)	Duration of surgery (min)
36.6±0.6	3 : 5	288±425	86%	59±29	28+/-4	975±167	157±41

Note**:** Data represents eight patients except where noted.

DISCUSSION: The EXIT team is large and comprises obstetric & paediatric surgery, obstetric & paediatric anaesthesia, neonatology, paediatric cardiology, radiology, nursing, social workers and genetic counsellors. The procedure converts an emergent and possible fatal delivery into one that is planned and controlled. In our institution, after maternal rapid sequence induction and muscle paralysis, deep sevoflurane anaesthesia is imperative to maintain uterine relaxation. Haemostasis during caesarean section (CS) is achieved with specially designed uterine staples. The fetuses are partially delivered to reduce heat loss and umbilical cord compromise. Fetal monitors include pulse oximetry and ultrasound of umbilical cord blood flow.The fetuses also receive a supplemental paediatric anaesthetic in addition to the 'placental anaesthetic'. While on uteroplacental 'bypass', the fetal airway is secured and if warranted ECMO is implemented. Five of our cases required ECMO. After delivery, the newborns are transferred to the NICU or undergo emergency surgery. In our case series, one neonate with CDH died 6 days post-operatively. Bouchard et al [1] looked at 31 EXIT procedures where there were 2 fetal neck mass deaths secondary to ETT dislodgement and parental wish for no tracheostomy. Regarding maternal outcome, Noah et al [2] compared short term maternal outcomes after EXIT procedure with those patients who underwent routine CS. They found an increase in wound complications and EBL. This latter finding concurs with our maternal EBL. The EXIT procedure is highly specialised and is only performed in certain centres. It represents a modern day medical success story incorporating multidisciplinary cooperation and good maternal and fetal outcomes.
References:
1.S. Bouchard, J Ped Surg , 37 p418-426, 2002
2.M. M. Noah, Am J Obstet Gynecol, 186 p773-777, 2002

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POSTER REVIEW 1

A-65.

SAFETY OF REGIONAL ANESTHESIA IN PREGNANT PATIENTS WITH THROMBOCYTOPENIA: A CHART REVIEW

AUTHORS: M. Tanaka[1], M. Balki[1], A. McLeod[2], J. Carvalho[1];
AFFILIATION: [1]Department of Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada, [2]Department of Medicine, University of Toronto, Toronto, ON, Canada.

Introduction: Although regional anesthesia is the gold standard in Obstetrics, it may be contra-indicated in some pregnant patients with thrombocytopenia (1, 2), depending on the number, numerical trend and function of platelets. Assuming platelet count is stable and function is normal, a cut off value of 75,000/mm^3 has been suggested by Orlikowski et al (1), based on his results in which TEG remained normal until platelet count was 45,000/mm^3 (CI 95% 40-75,000). The purpose of this study was to investigate the type of anesthesia administered to thrombocytopenic pregnant patients who delivered at our institution, as well as to review any complications secondary to the anesthetic technique.
Methods: With REB approval, we selected all obstetric patients who delivered at our institution with a diagnosis of thrombocytopenia (excluded pre-eclampsia) between April 1, 2001 and March 31, 2006. We then reviewed charts of patients with platelet count <100,000 /mm^3 on the delivery date. For each chart reviewed, the etiology of thrombocytopenia, type of anesthesia, mode of delivery, and complications were noted.
Results: 104 patients with diagnosis of thrombocytopenia without pre-eclampsia were identified by Health Records, 75 of which had platelet count < 100,000 /mm^3 on the delivery date. Etiology of thrombocytopenia was immune thrombocytopenic purpura (ITP) in 48 cases, gestational thrombocytopenia in 20 cases, and other in 7 cases. No patient with platelet count of less than 50,000 /mm^3 received regional anesthesia. All patients whose platelet counts were more than 80,000 /mm^3 received regional anesthesia, with the exception of 3 patients, in whom the anesthesia choice was not related to their hematologic condition. Forty-eight percent of patients with platelet count between 50-79,999/mm^3 received regional techniques. No anesthetic complications were observed in this series.

Platelet count on delivery date (/mm^3)	Number of patients	Number of patients administered regional anesthesia
< 49,999	11	0
50,000-59,999	3	2
60,000-69,999	10	2
70,000-79,999	14	9
80,000-89,999	18	16
90,000-99,999	19	18
Total	75	47

Discussion: Regional anesthesia for thrombocytopenic patients whose platelet counts are between 50,000 /mm^3 and 79,999 /mm^3 is still controversial, but in our series, it was safely used in 50% of patients. We suggest that TEG or some other bedside method of assessing coagulation could increase the number of patients with ITP or gestational thrombocytopenia benefiting from regional anesthesia in labor.
References**:**
1) Anesthesiol Clin N Am 2003; 21:99-109;
2) Anaesthesia 2004; 59**:** 244-264

A-66.

COMPARISON OF OBSTETRIC ANAESTHETIC STUDY POPULATIONS WITH A TERTIARY REFERRAL OBSTETRIC POPULATION

AUTHORS: A. J. Macfarlane, H. McKay, S. Young;
AFFILIATION: Glasgow Royal Infirmary, Glasgow, United Kingdom.

Introduction: Evidence based medicine has become a major driving force in current medical practice. However, clinical expertise is required to determine whether external evidence applies to individual patients.[1] We aimed to compare the study populations in applicable randomised controlled studies (RCTs) with the actual patient population in our service.
Methods: We retrospectively examined all deliveries recorded in the two most recently completed unit birth register books (2006). Parameters recorded were**:** age, parity, gestation and whether it was a singleton pregnancy. We subdivided the groups into vaginal and caesarean deliveries and noted whether the caesarean was elective or emergency. All RCTs published in the International Journal of Obstetric Anaesthesia from January 2004 to October 2006 were identified. Inclusion and exclusion criteria regarding age, parity, gestation and singleton pregnancies were noted. Trials were compared to the appropriate patient group above. We calculated for each trial the percentage of patients in our unit who would meet the stated inclusion criteria.
Results: There were 3289 deliveries in our sample (7 months 19 days total) equating to an annual delivery rate of 5689. The Caesarean section rate was 28.2%, 37.0% of which were elective. 13 RCTs were identified. The percentages of the patients in our population who met the stated inclusion criteria for entry to each trial were as follows. For the 6 labouring women trials the mean was 72.9% (range 40.9% to 99.4%). For the 7 caesarean section trials the mean was 36.0% (range 33.6% to 37%), primarily because the trials only studied elective operations and the majority in our unit were emergencies.
Discussion: Whilst there must be inclusion and exclusion criteria in rigid RCTs we have shown that the demographics of study populations can be very different from those of a “real” population. Our comparison only included 4 parameters and it is likely that including others such as ASA status and co-morbidity would have further reduced the applicability of trial data to our patients. Our study confirms that care must be taken in extrapolating data from RCTs to one’s own patient population.
References
1. Sackett, D.L., Rosenberg W.M., Gray, J.A., Haynes, R.B. and Richardson W.S. Evidence based medicine**:** what it is and what it isn't. Brit Med J 312 ,71-72 (1996).

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A-67.

MANAGEMENT OF LABOR PAIN WITH SINGLE DOSE SPINAL ANALGESIA: INDONESIAN PERSPECTIVE

AUTHORS: S. Chandra[1], K. M. Kuczkowski[2];
AFFILIATION: [1]University of Indonesia, Jakarta, Indonesia, [2]University of California, San Diego, San Diego, CA.

Introduction: Management of labor pain with single dose spinal analgesia with combination of morphine, 0.25 mg, bupivacaine, 2.5 mg, and clonidine, 45 µg [although popular in North America and Europe (1)] has not been previously studied in Indonesia. We herein present the results of the first such study conducted in Indonesia.
Methods: Following IRB approval 62 laboring women received single dose spinal anesthesia (27-gauge pencil point needle at the L3-4 or L4-5 interspace) with combination of morphine, 0.25 mg, bupivacaine, 2.5 mg, and clonidine, 45 µg for labor analgesia. Duration of labor analgesia, mode of delivery, side effects, and patients' satisfaction were recorded.
Results: The average duration of labor pain relief in our study group was 12 hours. The overall maternal satisfaction with labor analgesia was high (81% of patients were very satisfied). Ninety four percent of patients delivered vaginally (normal spontaneous vaginal delivery in 66% of parturients and vacuum extraction in 28% of parturients). Six percent of patients required Cesarean section for obstetric indications. Minor side effects of labor analgesia in our study group included nausea, pruritus and shivering. No complications (e.g., respiratory depression) were reported.
Conclusions: We concluded that single dose spinal analgesia with combination of morphine, 0.25 mg, bupivacaine, 2.5 mg, and clonidine, 45 µg can be safely (and effectively) used for pain control in labor in Indonesian women.
References**:** Arch Obstet Gynecol 2005; 271:97-103.

A-68.

NGF- A LABOR PAIN MEDIATOR?

AUTHORS: B. K. Tingåker[1], S. Forsgren[2], L. Irestedt[1], G. Ekman-Ordeberg[1];
AFFILIATION: [1]Karolinska Institute, Stockholm, Sweden, [2]Umeå University, Umeå, Sweden.

Introduction: The cervix uteri could possibly be the main site from where labor pain emanates (1). Neurotrophins may participate in the cervical softening and labor pain due to their involvement in nociceptive pathways. Therefore, the aim of our study was to examine the occurrence and distribution of nerve growth factor receptor p75 (NGFR p75) and the mRNA expression for NGFß and NGFR p75 in the human corpus and cervix uteri during pregnancy and labor.
Methods: Biopsies were excised from the upper edge of the hysterotomy during caesarean section at term (n=8) before onset of labor, in labor (n=7) and from the corresponding area in the non-pregnant uterus after hysterectomy (n=8). Cervical biopsies were obtained transvaginally from the anterior cervical lip. Serial cryostat sections were prepared for immunohistochemistry using polyclonal antibodies to NGFR p75. The mRNA expression of NGFß and NGFR p75 using Real-Time PCR were studied in similar biopsies (term pregnant n=9, in labor n=9, non pregnant n=10).
Results: Nerve fiber profiles displaying NGFR p75 immunoreactivity were observed in sections from the three groups. However, there was a marked decline of p75 immunoreactive nerve fibers in the pregnant and the labouring corpus compared to the non-pregnant. In contrast, the immunoreactivity was unaltered in the cervix. The mRNA expression of NGFR p75 was significantly lower ($p<0,02$, Mann-Whitney U-test) in the pregnant corpus and during labor compared to the non-pregnant state. However, there was no significant difference of the mRNA expression in the cervix. Preliminary data indicates mRNA expression of NGFß in all groups.
Discussion: According to our knowledge this is the first study to describe and compare the occurrence of NGFR p75 in the human corpus and cervix uteri during pregnancy and labor as well as the mRNA expression of NGFR p 75 and NGFß. Cervical immunoreactive NGFR p75 nerve fiber profiles and the mRNA expression are unaltered throughout pregnancy and labor in contrast to the decrease in the corpus. This is well in accordance with previous studies on nerve related changes (1,2). Neurotrophic factors not at least NGF is known to play important roles in sensory nociceptive pathways (3). Our study shows a decrease of NGFR p75 immunoreactivity and mRNA expression in the corpus during pregnancy and labor in contrast to the preserved occurrence in the cervix. These findings suggest that NGF may be involved as a mediator of labor pain. These observations support our previous assumption that the cervix could be the main site from where labor pain emanates. Further studies are needed to clarify the reasons and the impact of these findings.
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POSTER REVIEW 1

A-69.

VARIATION IN THE RELATIVE POSITION OF THE CONUS MEDULLARIS IN THE NEUTRAL AND LATERAL DECUBITUS FLEXED POSITIONS OF THE LUMBAR SPINE IN HEALTHY FEMALES: A MAGNETIC RESONANCE IMAGING STUDY

AUTHORS: U. Misra, P. Evans, S. England;
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Introduction: Following case reports of damage to the conus medullaris associated with spinal anaesthesia, there is increasing concern about practising safe spinal analgesia among obstetric anaesthetists [1]. An MRI study looking at the variation of position of conus medullaris in an adult population found its position ranged from middle third of T12 to upper third of L3 [2].
The position of the conus can be altered at post mortem by altering the degree of flexion of the spine [3]. A recent study by Fettes et al [4] looked at movement of the conus on flexion using an open MRI system. This would be relevant as spinal anaesthesia is usually conducted in the erect or lateral flexed position.
Methodology: Following Central Ethics and Research committee approval twenty healthy female volunteers in the reproductive age group were recruited in the study . A pilot study demonstrated poor localisation of the conus using an open MRI scanner. We decided to use a high field strength closed MRI, Signa 1.5T HD Excite scanner (General Electric, Milwaukee, USA). All volunteers were scanned in the neutral and left lateral decubitus flexed position. The flexed position was limited due to the closed MRI however we felt it mimicked limited flexion of the lumbar spine in the third trimester of pregnancy. A 4channel torso coil was wrapped around the volunteers in the left lateral flexed position to accurately identify the end of the conus medullaris. The parameters were SaggitalT2;TR2320; TE125; ETL17. The MRI images were then examined by a single radiologist in a blind fashion.
Results: The conus moved cephalad in 12 volunteers in the lateral flexed position, 4 volunteers it moved caudad and remained the same in 4 patients. The angle of flexion was also measured.There was significant cephalad movement in 3 patients.Using the Binomial test for one proportion a 95%CI,flexion does not cause significant movement in 62%to97%of patients.
Discussion: The conus medullaris moved caudad in the majority of cases in relation to the verterbral column in the lateral decubitus flexed poistion. In pregnat women in the third trimester it is difficult ot flex the spine adequately and flexion cannot be relied upon to confer extra protection against spinal cord damage during dural puncture.
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A-70.

INCISIONAL WOUND AND SYSTEMIC CYTOKINES RELEASE FOLLOWING CESAREAN SECTION

AUTHORS: B. Carvalho, D. Clark, M. Angst;
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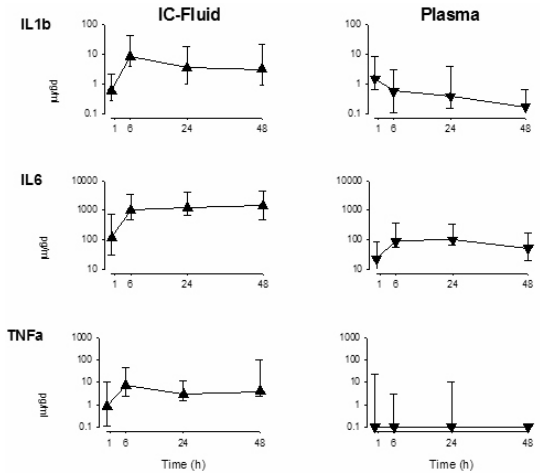
Background: A number of animal studies indicate an important role of pro- and anti-inflammatory cytokines in processing acute pain. This role is poorly understood in humans in part due to the difficulty of measuring site-specific, wound cytokine production. The objectives of this study were to 1) test the feasibility of measuring wound cytokine levels over a 48 hour period following cesarean section and 2) assess the relationship between wound and plasma cytokine levels.
Methodology: Following IRB approval and written informed consent, 10 healthy women with a singleton, term pregnancy undergoing elective cesarean section were enrolled in this prospective study. All patients received a standard spinal anesthesia (intrathecal bupivacaine plus opioid) and patients were followed for 48 hours to determine study endpoints and clinical outcome measures. Wound exudate and serum cytokine levels were measured at 1, 6, 24, and 48 hours post-cesarean incision. Wound exudate cytokines were secured using a subcutaneous wound drain technique we recently developed and measured using multiplex Bio-Plex cytokine assays (Bio-Rad. Philadelphia, PA). Postoperative pain scores, supplemental opioid analgesics consumption and the area of secondary wound hyperalgesia were recorded.
Results: We were able to detect 16/17 cytokines and nerve growth factor in wound exudate**:** IL1β, IL2, IL4, IL5, IL6, IL7, IL8, IL10, IL12, IL13, IL17, TNFα, INFγ, G-CSF, MCP-1 and MIP-1. GM-CSF was not detected. Figure 1 depicts wound (IC-fluid) and plasma levels for IL1β, IL6, and TNFα. Results demonstrate:
1. The feasibility of this wound exudate cytokine collection method.
2. Differential time release profiles for different cytokines (e.g. early versus delayed response).
3. Poor correlation between wound and serum cytokine release profiles.
4. Elevation of some but not all assayed cytokines post-cesarean.



Conclusions**:** This study demonstrates the feasibility of wound cytokine collection in humans and suggests that wound and serum cytokine levels are poorly correlated. Results point to differential release profiles for different cytokines in wounds and emphasize the importance of determining the site-specific release of cytokines if localized pathologies are to be studied. Follow-up studies are underway to examine the potential relationship between wound cytokine release and postoperative pain and analgesic administration.

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POSTER REVIEW 1

A-71.

NON-PHARMACOLOGICAL TECHNIQUES FOR PREVENTION OF NAUSEA AND VOMITING ASSOCIATED WITH CESAREAN DELIVERY UNDER NEURAXIAL ANESTHESIA: A SYSTEMATIC REVIEW

AUTHORS: T. K. Allen, A. S. Habib;
AFFILIATION: Duke University Medical Center, Durham, NC.

Introduction: Intraoperative nausea and vomiting (IONV) and postoperative nausea and vomiting (PONV) are common problems in women having Cesarean delivery (CD) under neuraxial anesthesia(1,2). The use of non-pharmacological techniques such as acupuncture, acupressure and transcutaneous acupoint electrical stimulation (TAES) for the prevention of IONV and PONV in women having CD under neuraxial anesthesia has been investigated with inconsistent results. As a result we performed a systematic review to determine the overall efficacy of non-pharmacological techniques in preventing IONV and PONV in this patient population.
Methods: We performed a literature search of MEDLINE (1966-2006), the Cochrane Central Register of Controlled Trials, Scopus and CINAHL for all randomized controlled trials (RCT) which compared non-pharmacological techniques with placebo in women having CD under neuraxial anesthesia. Data was extracted independently by the 2 authors on the primary outcomes including the incidence of nausea, vomiting and the need for rescue antiemetic therapy both intraoperatively and postoperatively (0-24h). The pooled relative risks (RR) with 95 % confidence intervals (CI) were calculated. For statistically significant differences in outcome the Number-Needed-to-Treat (NNT) was calculated to estimate the overall clinical impact of the intervention.
Results: Six of the 7 retrieved studies were included for analysis(3-8) . The reported outcomes are shown in the attached table. The average incidence of intraoperative nausea was 32% with the non-pharmacological techniques and 45% with placebo (RR [95%CI] = 0.66 [0.46-0.95]) which was statistically significant (NNT=8). There were no statistically significant differences between the non-pharmacological techniques and placebo controls with respect to the other primary outcomes.

The effect of non-pharmacological techniques and placebo controls on the observed primary outcomes.

Outcomes (n studies included in the analysis)	No. of events in the Treatment group n/N (%)	No. of events in the Placebo group n/N (%)	Relative Risk (95%CI)
Intraoperative Nausea (5)	95/296 (32)	131/293 (45)	0.66(0.46-0.95)
Intraoperative Vomiting (5)	33/296 (11)	40/293 (14)	0.82(0.53-1.25)
Postoperative Nausea (4)	85/246 (35)	117/243 (48)	0.59(0.32-1.11)
Postoperative vomiting (4)	75/246 (31)	105/243 (43)	0.67(0.42-1.05)
Need for intraoperative anti-emetic rescue therapy (3)	33/224 (15)	21/221 (9)	1.53(0.93-2.55)
Need for postoperative anti-emetic rescue therapy (4)	70/246 (28)	75/243 (31)	0.83(0.50-1.38)

Discussion: This meta-analysis shows that non-pharmacological techniques were effective in reducing the incidence of intraoperative nausea during CD performed under neuraxial anesthesia. This agrees with other studies demonstrating a good antinausea effect of these treatment modalities(9,10). Although there was a lower incidence of PONV with non-pharmacologic techniques, the differences did not achieve statistical significance. Further large RCTs are needed to definitively determine the clinical applicability of these techniques in obstetric anesthetic practice.
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POSTER AND RESIDENT 1

A-72.

PREFERRED DIFFICULT AIRWAY DEVICES FOR CESAREAN SECTION: RESULTS OF A SOAP MEMBER SURVEY

AUTHORS: O. Khodadadi, M. Smith;
AFFILIATION: Cleveland Clinic, Cleveland, OH.

Introduction: The difficult airway is of paramount concern for all anesthesiologists and obstetrical anesthesia in particular. We present a survery of OB difficult airway techniques of the members of the Society for Obstetrical Anesthesia and Perinatology (SOAP).
Methods: SOAP members were invited to complete a survey regarding difficult intubation airway management strategies. Survey questions included demographics, airway management devices and frequency of use, preferred airway device use for planned difficult airway management in OB and non OB airways and the level of comfort and likeliness of use of difficult intubation OB situation.
Results: The difficult intubation airway survey was completed by 134 of 149 individuals (89%). Of responders, 39% were private practice and 61% were academic in whole or in part. 47% practiced primarily OB anesthesia with 30% working at centers with greater than 4900 deliveries/ year. The average years in practice was 21.8. At centers doing more than 1000 deliveries a year, the average member was personally involved with 11 general anesthetics for cesarean section within the past year. 67% report using difficult airway devices in a controlled environment to maintain their skills. The respondents reported a high comfort level with a variety of intubating techniques (Table 1). Primary favored devices of these members include the Stylette (97%), Intubating LMA (93%), Fiberoptic scope(86%) and Bougie (83%). However the fiberoptic was not the device of choice for difficult airway intubation management in 57% of members. A majority of those surveyed (70%) felt there may be a need for a modified difficult airway algorithm for OB anesthesia.(Table 1).
TABLE 1**:**

Device	Comfortable	Not Comfortable
Stylette	97.6%	2.4%
Intubating LMA	93.4%	7.4%
Fiberoptic scope	86.3%	13.7%
Bougie	83.7%	16.3%
Lightwand	66.4%	34.4%
Bullard scope	37.2%	63.8%
Videolaryngoscope (Glidescope)	35.8%	65%
Esophageal Obturator	35.8%	65%
King Tube	15.1%	84.9%

Discussion: Literature search reveals that alternative airway management routes in obstetric anesthesia are favored by anesthesiologists when they are faced with potentially difficult airway scenarios. This survey of SOAP members demonstrate that most maintain their difficult airway skills by utilizing airway devices in routine cases. Most members have several devices they are comfortable using and the Intubating LMA was found to be favored over the fiberoptic scope. Newer devices such as the videolaryngoscope are used to a lesser extent. Difficult airway management is a concern for OB anesthesiologists and 67% maintain their skills by utilizing difficult airway devices in routine OR cases. Favored devices include the Stylette (97%), Intubating LMA (93%), Fiberoptic scope (86%) and Bougie (83%).

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POSTER AND RESIDENT 1

A-73.

THE USE OF INTRATHECAL CATHETER IN THE MANAGEMENT OF ACCIDENTAL DURAL PUNCTURE - AN EPILOGUE

AUTHORS: S. Yoon, W. Yi, M. A. Jackson, D. J. Santos;
AFFILIATION: Montefiore Medical Center, Bronx, NY.

Introduction: Last year, we presented our data regarding the insertion of the epidural catheter in the intrathecal space when accidental dural puncture (ADP) occurs. We were impressed with the use of intrathecal catheter in producing rapid, predictable, precise and titratable analgesia for labor or anesthesia for cesarean section while reducing the incidence of headache (PDPH) and the need for epidural blood patch (EBP). We are still awaiting approval from our Institutional Review Board (IRB) to conduct a prospective randomized study. While waiting to conduct the prospective study, we continued to collect data and decided to expand our previous study.
Methods: Using the anesthesia quality assurance database from January 1, 2006 to December 31, 2006, we reviewed the data of patients who had accidental dural puncture. The attending anesthesiologist decided if the epidural was reinserted and managed as epidural anesthesia (resite group) or if the epidural catheter was inserted intrathecally and managed as spinal anesthesia (intrathecal group). The patients were followed postoperatively for the development of PDPH and were managed according to established protocol.
Results: Of the 2952 patients, 49 had accidental dural puncture for a rate of 1.65 %. Twenty seven patients had intrathecal catheters (10 delivered by C/S, 17 delivered vaginally) while 22 patients had their epidurals resited (4 delivered by C/S, 18 vaginally). There was no difference in demographic data between the two groups except that on average, the patients in the intrathecal group were heavier than those in the resited group (99 kg vs 81 kg). In the intrathecal group, 41% experienced PDPH, 26% required EBP. In the resited group, 73% developed PDPH and 45% required EBP.

	Yoon, S. et al.	Yi, W. et al.	Combined data
Number of Epidural Blocks	2952	2223	5175
Accidental Dural Puncture	49	49	98
Wet Tap Rate	1.65%	2%	1.9%
Intrathecal Catheter	27	23	50
Re-sited Catheter	22	26	48
PDPH Intrathecal	11 (41%)	8 (35%)	19 (38%)
PDPH Re-sited	16 (73%)	20 (77%)	36 (75%)
EBP Intrathecal	7 (26%)	2 (9%)	9 (18%)
EBP Re-sited	10 (45%)	6 (23%)	16 (33%)

Discussion: PDPH is the most common complication of accidental dural puncture. The headache is often severe and debilitating. Although prevention of accidental dural puncture is the ultimate goal, our additional data shows a reduction in the incidence of ADP. In addition, our data continued to show that the incidence of PDPH is lower and the patients required fewer EBP. We are eager to conduct the prospective, randomized study as soon as we obtain the IRB approval.

A-74.

URINARY EXCRETION OF NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN IN PREECLAMPTIC AND HEALTHY PARTURIENTS AND NON-PREGNANT CONTROLS

AUTHORS: L. E. Odekon, H. T. Lee, G. Gubitosa, C. Kuo, G. Wagener, R. M. Smiley;
AFFILIATION: Columbia University, New York, NY.

Introduction: The pathogenesis of preeclampsia (PEC) is attributed to a misdirected inflammatory and immune reaction leading to generalized endothelial dysfunction.
Proteinuria is a diagnostic criterion of PEC that may persist postpartum as microalbuminemia, a manifestation of ongoing endothelial dysfunction.[1] Additionally sediment analysis of urine from preeclamptic women indicates renal tubular damage.[2] Neutrophil gelatinase-associated lipocalin (NGAL) is a member of lipocalin family of proteins. Originally isolated from the supernatant of activated human neutrophils, NGAL a 25 kD protein is expressed in other human tissues including the kidney. Urinary concentrations correlate with plasma levels but high levels are seen when released into urine by kidney tubules. In prospective studies postoperative urinary NGAL concentrations correlate with postoperative acute renal dysfunction.[3] The goal of the present prospective observational study was to compare urinary excretion of NGAL among preeclamptic women, healthy parturients and healthy non-pregnant women of childbearing age.
Methods: Following IRB approval and written informed consent, urine was collected from 11 PEC and 9 healthy parturients 2-12 hours before delivery, and 11 non-pregnant controls. Samples were centrifuged, and the supernatant stored at 4^{o} C. NGAL concentration was determined by an enzyme-linked immunosorbent assay for (Antibodyshop, Gentofte, Denmark). Results were compared between groups by two-sample t test, and are expressed as mean ± SD.
Results: There were no differences in the age or height among the three groups, but the pregnant women were heavier than non-pregnant, as expected. There were no significant differences in the antepartum urinary NGAL concentrations between PEC (8832.8 ± 5362.2 pg/ml) and healthy parturients (9095.6 ± 9001.1). Since there was no difference between PEC and healthy parturients, we combined these data for comparison with the non-pregnant controls. Urinary NGAL in non-pregnant controls (23871 ± 28040) was significantly higher than in parturients (n=20) (8951 ± 7019), p = 0.03. In three patients we obtained postpartum urinary NGAL levels. In all three, NGAL levels increased three- to ten-fold (7753 to 84,400**:** 3270 to 9075**:** and 1491 to 6113 pg/ml) from antepartum levels.
Discussion: This is the first report of urinary excretion of NGAL in pregnancy. Our finding that NGAL excretion is lower in pregnancy could have several explanations. It could be a dilutional effect of the plasma volume or cardiac output/urinary output in pregnancy, or could suggest some differences in renal function in pregnancy versus the non-pregnant state. Future studies will need to examine urinary NGAL levels at various gestational ages, and the timecourse of NGAL levels return to non-pregnant levels after delivery. In additional, determination of urinary NGAL/creatinine ratios and plasma NGAL concentrations will further clarify the effect of pregnancy on this marker.
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POSTER AND RESIDENT 1

A-75.

RISK FACTORS FOR DEVELOPMENT OF CLINICAL FEVER IN LABORING PATIENTS WITH EPIDURAL ANALGESIA

AUTHORS: A. Palanisamy, T. Gelfand, L. C. Tsen, S. Segal;
AFFILIATION: Brigham & Women's Hospital, Boston, MA.

Introduction: Parturients receiving epidural analgesia in labor, in contrast to those who do not, experience a gradual increase in body temperature (1). Moreover, the incidence of overt fever is increased in women with epidurals as demonstrated by both observational and randomized studies (2). Previously, we have shown that the gradual increase is an artifact from averaging patients who remain afebrile with those who eventually develop fever. In this study, we attempted to identify the risk factors for intrapartum fever in patients receiving neuraxial analgesia.
Methods: With IRB approval, we measured hourly maternal temperatures in healthy women at term admitted for labor. Patients selected their mode of analgesia without reference to the study. Demographic data, mode of analgesia, details of obstetric management and delivery were recorded. Obstetric details included rupture of membranes (ROM), duration of ROM to analgesia/delivery, use of prostaglandins, number of vaginal examinations, antibiotic usage and the duration of labor analgesia. Recorded temperatures were corrected to the respective oral equivalents from study entry until delivery. We excluded patients with possible underlying infection (positive GBS culture, baseline white cell count > 15,000, T>99.5 prior to analgesia). Patients developing clinical fever (T>99.5) were compared to those that did not by logistic regression, unpaired t-test, or chi square, as appropriate. In all cases $P<0.05$ was considered significant.
Results: 86 patients received neuraxial analgesia (epidural or CSE). 37% overall developed T>99.5 (“febrile”); the remaining patients demonstrated no change in temperature throughout labor (“afebrile”). Febrile and afebrile patients had similar admission temperatures (P=0.46) but patients developing fever had higher preanalgesia temperatures overall (P=0.01). Although all preanalgesic temperatures remained normal in both groups, the mean temperature was higher in the group eventually developing fever at 1, 2, 4, and 6 hours prior to analgesia. Length of ROM and number of vaginal exams, but not incidence of AROM, were greater in the febrile group. Patient demographics did not differ, though there were trends ($0.05<P<0.1$) for younger maternal age and shorter height being associated with developing fever.
Discussion: Other work from our group shows that the previously observed slow progressive rise in temperature with epidural analgesia is an artifact due to averaging patients who develop clinical fever with those who do not. Patients developing fever had some well-known obstetrical risk factors (longer ROM, more vaginal exams). This study demonstrates that patients who develop fever also have normal but significantly higher temperatures many hours before receiving epidural analgesia, versus those who remain afebrile. This suggests that an inflammatory or subclinical infectious process present prior to epidural initiation may contribute to the association between epidural analgesia and fever.
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A-76.

SYSTEMATIC REVIEW: RCTS EXAMINING INTRAVENOUS REMIFENTANIL VS OTHER PHARMACOLOGIC MODALITIES FOR LABOR ANALGESIA

AUTHORS: A. O. Soliman, P. Angle, A. Iscovich, J. Yee, Y. Murthy, B. Shah;
AFFILIATION: Women's College Hospital, Toronto, ON, Canada.

Introduction: The pharmacological profile of remifentanil indicates that it might be an ideal alternative where epidural analgesia is contraindicated. This systematic review examined RCTs which compared remifentanil to other pharmacologic measures in which labour analgesia was an outcome.
Methodology: Independent systematic searches were done to identify all RCTs published between January 1990 to June 2006 in which remifentanil was compared to other pharmacologic modalities used to provide labor analgesia. Searches were conducted in duplicate using the following keywords [remifentanil, opioid, labour, analgesia],limited to human studies, without language restriction, using all major electronic databases. Hand searches of abstracts of major anesthesia meetings and references of retrieved articles were also examined for potential relevance. Two authors independently rated retrieved articles for relevance and quality using The Cochrane Collaboration Back Review Group for Spinal Disorders checklist. Data extraction related to drugs, analgesia and side-effect outcomes was also done independently. Data not explicitly reported in manuscripts was derived from graphs when possible.
Results: A total of 92 potentially relevant manuscripts and abstracts were identified, including 9 clinical trials .Five RCTs, involving 195 patients, met our inclusion criteria [kappa for agreement 0.92 (95%CI 0.63,0.93)]. Baseline measurements regarding parity, stage of labour and pain levels were comparable in treatment and control groups in all the studies except one(2) where the baseline VAS was higher in the control group. All studies except one(4) reported better patient satisfaction/pain relief in the remifentanil group. Studies are presented in the table.

Study	Type of study / no. of Patients (total) (R + C)	Remifentanil. bolus (b)/lockout (lo)	Control. Bolus (b)/ lockout (lo)	Pain score @ 1 hr.(R) vs. (C)	Maternal side effects(Sedation/ desaturation)	NeonatalAb-normal fetal heart rate trace
1.Blair 2005	Parallel/ (39) (20 + 19)	Iv. 40 ug. (b) / 2 min. (lo)	Meperidine Iv. 15mg (b)/10 min (lo)	7.2(4.3-8) vs. 8(6.7-9.2)	No difference 2 [1-3]	7% R vs. 42 % C
2.Evron 2005	Parallel/ (88) (43+ 45)	Iv. 20 ug. (b) /3 min (lo) dose adjusted by an attending doctor.	Meperidine Iv. 75 mg. (b)+ 75 mg (b) + 50 mg (b).	35.8 (10.2) vs. 58.8 (12.8)*	Sedation 2.8(0.1) C vs. 1.2 (0.1)R* Hypoxia 17% C vs. 0% R*	10.2% R vs. 61.8% C *
3.Thurlow 2002	Parallel/ (36) (18+18)	Iv. 20 ug. (b) /3 min. (lo)	Meperidine im.100 mg.	48(22-50.5) vs. 72(62-80)*	Hypoxia 38.9% R vs. 11 % C	
4.Volikas 2001	Parallel/ (17) (9+8)	Iv. 0.5 ug/kg (app 37.5 ug.) (b) / 2min. (lo)	Meperidine 10 mg iv (b) / 5 min (lo)	28 R vs. 51 C*		Apgar score lower in group C *
5.Volmanen 2005	Cross-over/ (15) 20 min	Iv. 0.4 ug/kg (app 25 ug) (b) / 1 min. (lo)	Inhaled Nitrous oxide 50%	Pain intensity difference 1.5 vs. 0.5*	Sedation (2) R vs.(0.5) C*	20% R vs.13% C

Data are reported as mean (SD), Median (range) or percentage % ,* = statistically significant.

Inter-study heterogeneity rendered it impossible to combine outcomes as a meta-analysis.
Discussion: Current available data favors the use of remifentanil over meperidine, but is not conclusive. The only negative study reported significant increase in patient satisfaction despite there was no difference in pain scores. This might be due to better controllability of PCA remifentanil. One large positive study(2) reported significant lower pain scores with remifentanil, however the baseline VAS was significantly lower in the remifentanil group besides, the remifentanil dose was adjusted by an attending anesthesiologist, which is not ideal. One positive study involved only 17 patients(4), the other compared remifentanil with a single dose intramuscular injection of meperidine, which is not ideal. One study(5) compared remifentanil with nitrous oxide. There were no studies comparing remifentanil with fentanyl PCA.
References**:** Available on request

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POSTER AND RESIDENT 1

A-77.

ATTITUDES OF OBSTETRIC ANESTHESIOLOGISTS REGARDING PHOTOGRAPHY, VIDEOGRAPHY AND AUDIO-RECORDING BY PATIENT'S FAMILY AND FRIENDS DURING DELIVERY

AUTHORS: R. E. Lauer[1], M. M. Neumann[1], S. C. TenClay[2], C. L. Peterson-Layne[2];
AFFILIATION: [1]Loma Linda University Medical Center, Loma Linda, CA, [2]Duke University Medical Center, Durham, NC.

Introduction: The birth of a child is a joyous event that many desire to memorialize. The trend to photograph and/or videotape the actual birth, sometimes with audio included, has been popularized by television productions and made possible for many people due to affordable technology.[1] While accommodating patients' requests is a priority, there also exists the anecdotal concern that this may distract from vigilant patient care or that such documentation may serve as evidence, possibly incomplete or biased, in a malpractice claim.[2] Some institutions have established guidelines to restrict or even prohibit photography, videography and audio-recording by patients' family and friends.[3] Since anesthesiologists caring for parturients are potentially in the position of enforcing these policies, as a pilot study we were interested in obtaining providers' knowledge and opinions about such policies.
Methods: A survey was e-mailed to members of the Society for Obstetric Anesthesia and Perinatology. Questions regarded 1) demographics, 2) current practice policies, and 3) attitudes about current policies and use of media in different clinical situations.
Results: From the 771 members of SOAP, 137 submitted completed surveys. Nine responses were blank or indicated inactive practice. Responses represent different anesthesiology practice settings, with diverse levels of experience. Respondents indicate that their practice has a policy for photography (56.6%), videography (58.8%) and audio recording (30.2%). Nearly a third (31.3%) reports an adequate policy that is uniformly enforced. The remainder report having no policy (33.6%), inadequate policy (10.7%), or non-uniformly enforced policy (22.1%); 12.2% indicate that no policy is needed. Opinions about photography, videography and audio-recording during different procedures are shown in Table 1.

	Photography		Videography		Audio-recording	
	Agree	*Disagree*	*Agree*	*Disagree*	*Agree*	*Disagree*
Epidural	15.9	84.1	9.9	90.2	7.7	92.3
Vaginal Del	78.0	22.0	52.3	47.7	37.7	62.3
C/Section	70.8	29.2	32.3	67.7	28.4	71.7

Table 1: Should the specified media be allowed in the different clinical circumstances? (% of respondents; n = 127-132
Discussion: One objective of this study is to initiate or promote a discussion regarding photography during childbirth. Although the number of surveys returned was limited, the responses suggest that many obstetric anesthesiologists, in various practice settings, favor having a policy regarding media devices. However, since opinions vary widely about when photography, videography and audio recording should be allowed, it is currently unclear if a model, core policy would be useful to practices.
References:
[1]American Journal of Maternal/Child Nursing, 31:8, 2006.
[2]Journal of Family Practice, 46:251-256, 1998.
[3]International Journal of Gynecology and Obstetrics, 64:95, 1999.

A-78.

STUDY OF EPIDURAL SPACE DEPTH DETECTED BY ULTRASONOGRAPHY IN PARTURIENTS UNDERGOING ELECTIVE CESAREAN SECTION: A COMPARISON BETWEEN SITTING AND LATERAL POSITIONS

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Introduction: The epidural space depth from skin ESD is reported to be more superficial in sitting than in lateral position(1). ESD detected by ultrasonography is proved to be accurate(2). The aim of this study is to detect the difference in the ESD in the sitting and the lateral position in the same patient using ultrasonography.
Methodology: After REB approval and informed consent, healthy parturients scheduled for elective cesarean section were enrolled. Patients were asked to flex their back maximally in the left lateral position, then using a 5 MHz curved array probe, the anesthesiologist identified the sacrum with the probe longitudinally applied to the patient's spine. After identifying the L5S1 interspace the probe was rotated 90° to a transverse position. Counting upwards, one image of each of L4-5 and L3-4 inter-spaces was captured and labeled. The skin was marked opposite to each level to make consistent comparisons when the same procedure was repeated in the sitting position. Images were then blinded and an anesthesiologist not involved in patient care measured the ESD and the width of the intrathecal space at L4-5 and L3-4. Paired t-tests were used to compare the ESD and dural sac width at each level. Sample size(n=42) was needed to detect a 4 mm difference(SD=9),95% CI.
Results: To date, we have recruited 10 patients. The mean maternal age was 35.4(5.6) years, BMI 26.2 (3.9) kg/m2. Table1 shows ESD and dural sac width measurements.There was a significant difference in ESD at L3-4 compared to L4-5 in the lateral (3.6mm +/- 4.2 p=0.02) and sitting (2.85mm +/-2.5 p=0.005) positions.

Level	Distance in mm.(Lateral)	Distance in mm.(Sitting)	Difference (mm)	p-value
L4-5 depth	46.6(4.9)	47.7(4.3)	-1.06	0.198
L4-5 width	9.5(2.6)	9.7(1.8)	-0.2	0.826
L3-4 depth	42.9(2.5)	44.8(2.8)	-1.8	0.011*
L3-4width	10.4(2.16)	11.9(2.27)	-0.61	0.4

Data are presented as mean (SD).L=left lateral, S=sitting, *= statistically significant.

Discussion: Hamza(1) found that the ESD in the sitting position is more superficial than ESD in the lateral position by a mean of 5mm. This was a cohort study done on two different groups of patients. In our study, each patient was her own control. There was a small increase in ESD in the sitting position, which is unlikely to be clinically significant. We also found that L3-4 was significantly more superficial than L4-5 in both positions. This might suggest that neuraxial anesthesia is easier at L3-4. There was no difference in sac width. These findings are preliminary and need to be reassessed on completion of the study.
References: :
1.J.Clin.Anesth 1995;7(1):1-4
2.Reg.Anesth.Pain Med 2001;26(1):64-67

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POSTER AND RESIDENT 1

A-79.

COMPARISON OF ULTRALIGHT PATIENT-CONTROLLED VERSUS CONTINUOUS INFUSION EPIDURAL ANALGESIA IN LABOR

AUTHORS: C. L. Mason, E. W. Felton, M. S. Suresh;
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Introduction: Patient-controlled epidural analgesia (PCEA) offers many advantages over continuous epidural infusions (CIEA) for maintenance of labor analgesia. Advantages include increased patient satisfaction and reductions in the number of unscheduled clinician interventions, the amount of drug administered, and the degree of lower extremity motor block.[1] The purpose of this study is to compare PCEA to CIEA for maintenance of labor analgesia using "ultralight" (< 0.125% bupivacaine) local anesthetic solutions as all previous studies to date utilized 0.125% bupivacaine and there are no outcome studies utilizing ultralight solutions.

Methods: Following IRB approval, a double-blinded, randomized study was commenced to include term nulliparous parturients of ASA I-II status in active labor and requesting epidural analgesia. Fifty-seven patients are needed in each group to demonstrate statistical significance. A combined spinal-epidural (CSE) is placed in all patients. Epidural infusion is initiated 30 minutes later with 0.0625% bupivicaine + 2mcg/mL fentanyl. The CIEA group receives 14mL/hr. The PCEA group receives an 8mL/hr background infusion, 5mL demand bolus, 5 minute lockout interval, and hourly limit of 26mL. Primary outcomes (drug amount used, Apgar scores, umbilical artery (UA) blood gas analysis) and continuous outcomes (pain scores, motor block) are recorded during the labor period.

Results: Data has been collected on thirty patients (CIEA group, n=15; PCEA group, n=15). Two patients were dropped due to catheter dislodgement and noncompliance with the study protocol. The T-Test was used to compare the average amount of drug used per hour of labor and UA pH. The average amount of drug administered in the PCEA group was 12.39 ml/hr versus 14 ml/hr in the CIEA group (p= 0.17). UA pH scores were 7.2475 in the CIEA group versus 7.2323 in the PCEA group (p= 0.66). Pain scores and Apgar scores were compared using the Kruskal-Wallis test. Pain scores using the Visual Analgesia Scale at 1, 2, 4, 6, and 8 hours were compared and no statistical differences were determined. Apgar scores were compared and also revealed no significant difference between the two groups. Additional observations include the following**:** No patients exhibited any degree of motor block. Three patients required bolus interventions (2 PCEA, 1 CIEA). The mode of delivery was spontaneous vaginal delivery for 24 patients and cesarean section for 4 patients (2 PCEA, 2 CIEA).

Discussion: Preliminary data reveal no statistically significant differences in Apgar scores, UA gases, or pain scores between the two groups. The PCEA group averaged 12.39 ml/hr versus 14 ml/hr in the control group, a difference which may become significant after achieving sufficient power. Complete data collection is necessary to confirm these observations.

References**:**

1. Van der Vyver M et al. PCEA vs. CI for labor analgesia**:** a meta-analysis. Br J Anaesth 2002; 89(3)**:** 459-465.

A-80.

SEVERE OBSTETRIC MORBIDITY IN AN INNER-CITY TEACHING HOSPITAL

AUTHORS: D. Chitre, G. Karthikeyan, R. Sashidharan;
AFFILIATION: The Royal London Hospital, London, United Kingdom.

Introduction: As maternal mortality has become rare in developed countries, severe maternal morbidity has been suggested as an alternative to measure success and safety of obstetric interventions.[1] As part of an on-going larger study we also aimed to determine and explore the causes of severe obstetric morbidity in our unit.

Method**:** We did a descriptive retrospective review of all obstetric admissions to our intensive care unit (ICU) over a period of 24 months. The labour ward and ICU databases, and individual case notes were reviewed.

Results: The total deliveries during this period were 11,296. There were 22 obstetric admissions to the ICU. Two of these were direct transfers to the ICU from other local hospitals and were not included in the analysis. Of the balance 20 admissions giving an incidence of 1.78/1000 deliveries, one was a planned admission in a woman with cardiac valvular disease following an elective caesarean section. There was one maternal death due to severe HELLP.

REASON	N=20	INCIDENCE/1000
Severe haemorrhage	6	0.53
HELLP	4	0.35
Severe PIH	3	0.27
Neurological	2	0.18
Sepsis	1	0.09
Anaphylaxis	1	0.09
Renal failure	1	0.09
Status epilepticus	1	0.09
Cardiac disease	1	0.09

Discussion: The reasons for admission in our analysis were similar to other studies.[2] We are aiming to reduce the admissions to the intensive care unit by the establishment of an obstetric high dependency unit and the organisation of regular "fire-drills" in various obstetric emergencies.

References**:**

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2. Waterstone M etal. Incidence and predictors of severe obstetric morbidity**:** case-control study. BMJ 2001; 322:1089-1093

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POSTER AND RESIDENT 1

A-81.

NON-INVASIVE BLOOD PRESSURE MEASURED IN THE UPPER ARM MAY UNDERESTIMATE UTERINE ARTERY BLOOD PRESSURE DURING ELECTIVE CESAREAN SECTION

AUTHORS: M. Oshima, K. Warabi, E. Inada;
AFFILIATION: Juntendo University School of Medicine, Tokyo, Japan.

Introduction: In cesarean section (CS), treating criteria for hypotension under regional anesthesia is systolic blood pressure (BP) less than 70% of baseline value or 100 mmHg. Although BP is usually measured in the upper arm, it may underestimate the uterine arterial pressure because of the compression of the abdominal aorta by the gravid uterus. The BP difference between the upper and lower extremities may increase under neuraxial anesthesia. Therefore, we tried to elucidate the extent of the difference between them in patients undergoing CS under regional anesthesia.
Methods: Thirty-eight ASA physical status I or II parturients undergoing elective CS enrolled this study. Written informed consent was obtained. After arriving in the operating room, the standard monitoring was started. The supplemental BP cuffs were applied to another upper arm and bilateral ankle to measure BPs simultaneously using the Form^{TM} (Omron Colin Co., Tokyo, Japan). Baseline BP was measured in the supine position. Combined spinal-epidural anesthesia was completed with hyperbaric bupivacaine 10 mg plus fentanyl 10 mcg. Parturients were randomly divided into two groups; group SL and group L. In Group SL, the parturient was placed in the supine position approximately 2.5 minutes after spinal injection and then the operating table was tilted left-ward to achieve left uterine displacement (LUD). In Group L, the parturient was placed in the supine position with LUD immediately after spinal injection. BPs were measured 3 minutes after spinal injection with LUD in each group. Statistical analysis was using unpaired and paired t test, and a P value less than 0.05 was considered significant.
Results: In Group SL, mean BP significantly decreased after spinal anesthesia; 96 mmHg in upper arm and 90 mmHg in ankle at the baseline to 84 mmHg (-12 mmHg) and 73 mmHg (-17 mmHg), respectively ($P < 0.05$). In Group L, mean BP also significantly decreased after spinal anesthesia; 94 mmHg in upper arm and 83 mmHg in ankle at the baseline to 83 mmHg (-11 mmHg) and 72 mmHg (-11 mmHg), respectively ($P < 0.05$). The mean BP drop in the lower extremities was greater in SL group than in L group ($P < 0.05$). In both groups mean BP measured in ankle were significantly lower than that in the upper arm, whereas systolic BP in ankle showed significantly higher than that in the upper extremities at baseline. Systolic BPs after spinal anesthesia were similar between in upper arm and ankle.
Discussion: Although mean and systolic BPs in the upper extremities were maintained after spinal anesthesia, mean BP in the lower extremities was significantly lower. This suggests that relying on the systolic BP to treat hypotension may lead to undertreatment.

A-82.

THE SODIUM CALCIUM EXCHANGER (NCX) ACTIVITY AND FUNCTION IN HUMAN MYOMETRIAL TISSUE

AUTHORS: J. Murphy, M. Slodzinski;
AFFILIATION: Johns Hopkins University, Baltimore, MD.

Introduction: In the United States, 12% of all births are preterm and account for $26.2 billion ($51,600 per infant) in hospital charges. To explore the pathophysiology of preterm labor, investigators has focused on uterine contraction. In a paradigm shift, this report presents results in human myometrial cellular and tissue preparations regarding uterine relaxation. The NCX is key to Ca^{2+} homeostasis in excitable cells (e.g. cardiomyocytes and neurons). Little is known regarding the NCX in the uterus. This report's hypothesis is**:** the NCX is critical for uterine Ca^{2+} homeostasis and gestational quiescence.
Methods: With IRB approval, human myometrial tissue was obtained from the lower uterine segment of a pregnant woman undergoing elective cesarean delivery at term. Intracellular calcium concentrations ($[Ca^{2+}]_{cyt}$) were measured using ratiometric imaging (340/380nm; fura-2/am, 2μM) on a Nikon TE2000 microscope (40x fluorescent lens) with DG-4 illumination (340/380nm excitation). Tissue force and intracellular Ca^{2+} was measured using a PTI fluorescent imaging and muscle strip force measurement device.
Results: Previously, in culture human myometrial cells, we reported NCX dependent Na^+ dependent Ca^{2+} influx and efflux in culture human myometrial cells and NCX activity and expression correlation with terbutaline desensitization. Now, we report NCX function in fresh human myometrial strips. The strips were tensioned to 2 grams and superfused in Tyrode's solutions containing 1.8mM Ca^{2+}. Strips contracted spontaneously or with oxytocin (10 μM). To activate intracellular Na^+ dependent Ca^{2+} influx (via the NCX) was present in uterine tissue, ouabain (1mM) was added in increase intracellular Na^+. With ouabain, the contractions increased in amplitude and duration. Next, to activate extracellular Na^+ dependent Ca^{2+} influx (via the NCX) stepwise decreases in extracellular Na^+ (replacing Na^+ with NMDG), caused the contraction amplitude and duration to increase. At the lowest extracellular Na^+ (5mM) the tissue demonstrated calcium overload and loss of contractility. After loss of contractility, tissue was superfused with normal Tyrode's and recovery was examined. The first contractions following Ca^{2+} overload were augmented, but returned to normal, suggesting NCX augmentation of stored Ca^{2+}. Using Fura-2 fluorescent imaging of primary cultured human myometrial cells, extracellular and intercellular Na^+ dependent augmentation of stored calcium seen in tissue was demonstrated in primary culture myometrial cells.
Discussion**:** At last year's SOAP, NCX protein and function was reported in human myometrial cells. Furthermore, the data suggests that NCX protein expression correlated with tocolytic desensitization. This year, NCX function was demonstrated in fresh human myometrial tissue strips. Using ouabain and manipulation of the Na^+ gradient, the importance of NCX in uterine contraction amplitude and duration was demonstrated. Furthermore, in human strips and cells, the NCX role in modulation of stored calcium identified. Overall, this is novel evidence the role of NCX in human myometrial physiology.

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POSTER AND RESIDENT 1

A-83.

MATERNAL CARDIAC OUTPUT CHANGES FOLLOWING CRYSTALLOID OR COLLOID COHYDRATION WITH SPINAL ANESTHESIA FOR ELECTIVE CESAREAN SECTION

AUTHORS: S. McDonald[1], R. Fernando[1], K. Ashpole[1], M. Columb[2];
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Introduction: Crystalloid cohydration combined with a phenylephrine infusion (P) reduces hypotension during spinal anesthesia for cesarean section (CS).[1] To test the hypothesis that replacing crystalloid with colloid in such a regimen may offer further advantages, we investigated the efficacy of crystalloid (CSL - compound sodium lactate) versus colloid (HES - 6% w/v hydroxyethyl starch) cohydration, combined with P, in maintaining cardiovascular stability by quantifying changes in systolic blood pressure (SBP), cardiac output (CO) parameters and vasopressor requirements.
Method**:** In this randomized double-blind study, 60 patients for elective CS underwent rapid cohydration with either 1L CSL (N=30) or 1 L HES (N=30) over 5 min commencing at the time of spinal injection (SI). A P infusion (100mcg/min) was also started at this point and titrated to maintain baseline SBP (bSBP) until delivery. Data collection included HR, SBP, P usage, block ht, nausea and vomiting (NV) scores and fetal outcome measures. A suprasternal Doppler cardiac output monitor (Supra Q®) was used to measure CO and parameters such as corrected flow time (FTc) and peak velocity (PV), measures of venous return and contractility respectively. These were measured in the left lateral tilt position before SI and at 5 min intervals for 20 min following SI after which time surgery commenced. Statistical analysis included RMANOVA and Tukey-Kramer tests (P<0.05). Data are expressed as mean (SD)
Results: Maternal characteristics were similar. CO, HR, umbilical cord gases and APGAR scores did not differ. BP control was maintained equally in both groups with no significant differences in episodes of hypotension (SBP<80% bSBP; P=0.17) or hypertension (SBP >120% bSBP; P=0.14). Maternal NV scores were also similar. The total amount of P needed to maintain bSBP did not differ**:** 1.17mg (0.41) vs 1.08mg (0.39); CSL vs. HES.

	Group	Baseline	5 min	10 min	15 min	20 min
CO L/min	CSL	5.43 (0.79)	6.21* (1.24)	5.76 (1.23)	5.41 (0.98)	5.36 (1.06)
	HES	5.00 (0.84)	6.22* (1.37)	5.66* (1.38)	5.52 (1.34)	5.45 (1.08)
SV ml	CSL	66.4 (11.6)	77.7* (10.5)	76.5* (11.4)	76.1* (12.2)	75.9* (14.7)
	HES	62.2 (9.7)	75.6* (13.0)	74.7* (15.2)	76.3* (14.3)	74.4* (11.2)
PV cm/s	CSL	97.7 (9.8)	103.3 (10.2)	98.8 (9.6)	99.3 (10.8)	99.2 (9.3)
	HES	92.9 (8.8)	102.0* (14.2)	100.3* (12.6)	100.1* (13.2)	98.9 (9.4)
FTc ms	CSL	384.3 (39.7)	420.0* (47.6)	421.4* (35.0)	402.9 (29.1)	400.4 (31.4)
	HES	380.3 (18.4)	416.0* (26.4)	408.2* (35.4)	402.9* (33.4)	397.9* (25.9)

Data are mean (SD); *P<0.05 compared to baseline within group
Conclusion: There is no advantage in using HES for rapid cohydration, combined with P, compared to CSL since both provide equal efficacy in maintaining cardiovascular stability and preventing hypotension.
References**:**
1. Ngan Kee WD, Khaw KS, Ng FF**:** Prevention of Hypotension during Spinal Anesthesia for Cesarean Delivery**:** An Effective Technique Using Combination Phenylephrine Infusion and Crystalloid Cohydration. Anesthesiology 2005; 103**:** 744-750

A-84.

TYPES OF ANAESTHESIA FOR GRADE 1 AND 2 CAESAREAN SECTIONS IN 2006

AUTHORS: M. A. Rafi, Z. Arfeen, U. Misra;
AFFILIATION: Sunderland Royal Hospital, Sunderland, United Kingdom.

Introduction: In the UK there has been improvement in direct anaesthetic related maternal deaths. This has been sustained since the 1985-1987 triennium, running at fewer than five deaths per million maternities. The improvement is largely due to the increased use of regional anaesthesia (RA). The recommended standards[1] for the type of anaesthesia for emergency caesarean section (CS) are >85% under RA, and <3% conversion of RA to general anaesthesia (GA). For the standards "emergency" combines grades 1-3 CS, although the situations covered by each grade are fairly diverse. We audited how closely our department conforms to these standards with respect to grade 1 ('immediate threat to the life of the woman or foetus') and grade 2 ('maternal or fetal compromise which is not immediately life-threatening') CS.
Method**:** Data was collected from the obstetric anaesthesia database and an ongoing audit of the reasons for GA in CS.
Results: In 2006 a total of 565 CS were performed.

Grade	1		2	
Of total CS	114	20.2%	238	42.1%
RA	77	67.5%	226	95%
GA	32	28.1%	4	1.7%
RA to GA	5	4.4%	8	3.4%

Indications for GA included**:** acute fetal compromise, cord prolapse, maternal haemorrhage/sepsis, failed ventouse, and failed RA (pain/technical). Four grade 1 conversions to GA were inadequate epidural top-ups and one a failed spinal. There were four inadequate epidural top-ups, three failed spinals and one failure of both methods in the grade 2 cases.
DISCUSSION: The results show a marked difference between the two grades with respect to the recommended audit standards. This may be because the standard is not specific for grade 1 cases, and perhaps a new appropriate standard needs to be defined. A decision-to-delivery interval of <30 minutes is recommended as an audit standard by NICE, although they acknowledge that there is limited research to support this time[2]. However, the clinical negligence scheme for trusts assesses this 'target' as part of the criteria for the coverage of maternity services. Inadvertent pressure in order to meet this 'target' may lead to the administration of unnecessary GA. It may be better to concentrate on optimising fetal and maternal wellbeing than on a specific time limit.
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POSTER AND RESIDENT 1

A-85.

EVALUATION OF THE ASSOCIATION BETWEEN FETAL FATTY ACID OXIDATION DISORDERS AND HYPERTENSIVE DISORDERS OF PREGNANCY

AUTHORS: M. R. Hopkins, J. Huey, F. A. Ajayi, D. Matern;
AFFILIATION: Mayo Graduate School of Medicine, Rochester, MN.

Study Objective: The primary objective was to evaluate the association between fetal fatty acid oxidation (FAO) defects and maternal pregnancy complications (preeclampsia, HELLP, AFLP). A secondary objective was to validate the role of tandem mass spectrometry in neonatal screening for FAO disorders.
Study Design: The study included both a retrospective review and prospective data collection. The retrospective study included two arms. In the first arm mothers diagnosed with severe preeclampsia, eclampsia, and HELLP syndrome were identified from the Department of Obstetrics database. In the second arm, children diagnosed with metabolic disorders were identified from the Department of Medical Genetics database. Information on the children and the respective pregnancies were collected and analyzed. Prospectively, patients diagnosed with severe preeclampsia, eclampsia, HELLP, and AFLP (Acute Fatty Liver of Pregnancy) were identified. A segment of umbilical cord and an aliquot of cord blood were collected. Fibroblasts were cultured from the umbilical cord and analyzed using an in vitro probe assay. Cord blood was used for plasma acylcarnitine analysis and molecular genetic analysis for common mutations in two genes encoding FAO enzymes (LCHAD, SCAD). With permission, the original blood spots from the State of Minnesota newborn screen were analyzed using tandem mass spectrometry. The results of Blood Spot And Fibroblast Assays Were Compared.
RESULTS: One hundred four patients were identified in the Obstetrics database. There was no significant difference between the groups in maternal age, gravity, parity, gestational age at the time of delivery, birth weight or mode of delivery. One infant delivered from a mother with HELLP has a carnitine deficiency; otherwise the remaining infants with follow up have no evidence of having a FAO disorder. One hundred one charts were reviewed from the medical genetics database. The identified FAO disorders included CPT II deficiency (n=1), TFP deficiency (n=1), LCHAD (n=2), MCAD (n=6), SCAD (n=3), and primary carnitine deficiency (n=1). HELLP syndrome complicated both LCHAD pregnancies and one of the SCAD pregnancies. Severe preeclampsia complicated the pregnancy involving the patient with carnitine uptake defect. Prospectively, 27 pregnancies have been identified; 20 complicated by severe preeclampsia, 6 by HELLP, and 1 by AFLP. None of the infants have been found to have a FAO disorder. All biochemical and molecular results are in agreement.
Conclusions: The association of LCHAD with HELLP and AFLP has been reported previously. Our retrospective review identified one infant with SCAD born to a mother with HELLP syndrome. Our retrospective data suggest that FAO disorders occur more frequently in pregnancies complicated by maternal liver disease. Additional subjects need to be enrolled in the prospective arm of the study to further evaluate this association. Acylcarnitine analysis in newborn blood spots appears to be a reliable tool in identifying newborns with FAO disorders.

A-86.

BUPRENORPHINE IMPAIRS INTRAPARTUM PATIENT CONTROLLED EPIDURAL ANALGESIA (PCEA) EFFICACY

AUTHORS: G. Paranya, D. Plante, E. Kristensen, M. Meyer;
AFFILIATION: University of Vermont, Burlington, VT.

Introduction: Buprenorphine, a mu agonist/antagonist, has recently been approved for the office based treatment of opiate dependence. We hypothesized that women receiving buprenorphine during pregnancy would have impaired pain control during labor and postpartum.
Methods: 16 women receiving buprenorphine for opiate dependence were matched retrospectively with controls on the basis of age, parity, gestational age at delivery, onset of labor, mode of delivery, and cigarette smoking. Our primary endpoint was the total amount of opiate medication (transformed to oxycodone equivalents, mg) used post-partum, in 24 hour increments from the time of delivery. Secondary endpoints included the use of intrapartum analgesia and intra-partum and post-partum pain scores reported by patients. All patients with epidural analgesia had patient controlled epidural analgesia. Epidural infusion solution was 0.065% bupivicaine with 2 mcg fentanyl/cc in all patients. Data are reported as mean +STD or median (25%, 75%). Data were analyzed by standard parametric and non-parametric tests, with $p<0.05$ significant.
Results: 13 patient pairs had a trial of labor, with similar utilization of epidural analgesia. Intrapartum epidural analgesia was less effective in women receiving buprenorphine, with higher post epidural pain scores and less reduction in pain score following regional analgesia. Fewer patients on buprenorphine achieved a pain score of 0-1 within an hour of placement despite similar pre-epidural pain score. Basal rate of epidural infusion was similar (BUP**:** 10.4 ±0.84; 10.4+1.3 cc, p=1.0) as was the maximum hourly volume (BUP**:** 35.6+2.2; control**:** 35.4+1.3 cc, p=0.90) although patients on buprenorphine had reduced bolus volume (BUP**:** 5.5+1.4; control 7.2+1.7 cc, p=0.06) which was compensated by decreased delay between bolus (BUP:6.0+2.1; control**:** 9.5+1.6 minutes, p=0.009). Postpartum, women receiving buprenorphine required less oxycodone 24 hours following vaginal birth, although there was no difference in the opiate use following cesarean delivery. Patients receiving buprenorphine had significantly increased pain scores following cesarean delivery but no difference in pain score following vaginal birth.

Intrapartum Analgesia	BUP	Control	p
Epidural analgesia:	12/13 (92.3%)	11/13 (85%)	1.0
Pain scores**:**			
Before (n=7 pair)	7 (6, 9)	10 (6, 10)	0.55
After (n=8 pair)	3 (3, 3.9)	0 (0, 1.8)	0.04
Change following epidural analgesia	4.2+1.9	7.3+2.9	0.02
Achieve 0-1 pain score 1 hour after epidural analgesia	0/11 (0%)	7/10 (70%)	0.001
Postpartum Analgesia			
VAGINAL**:**	BUP	Control	p
Oxycodone use (mg) at 24 hrs (n=8 pair)	6.25+14.1	15.0+18.3	0.046
Pain score at 24 hours (n=10 pair)	2.6 (1.4, 3.6)	2.1 (0.9, 3.0)	0.27
CESAREAN (n=6 pair):			
Oxycodone use (mg) at 24 hrs	100.0+40.9	86.2+17.0	0.52
Pain score 24 hrs	5.5 (4.9, 5.7)	3.2 (2.1, 4.3)	0.046
Oxycodone use (mg) at 48 hrs	81.1+31.0	60.1+0.29	0.14
Pain score 48 hrs	5.8 (5.3, 7.4)	3.4 (2.0, 4.5)	0.046
Oxycodone use at 72 hrs (mg) (n=5 pair)	76.1+29.0	54.6+7.9	0.17
Pain score 72 hrs	5.1 (2.8, 6.7)	3.0 (1.8, 6.4)	0.46

Conclusions**:** Buprenorphine use was associated with decreased efficacy of intrapartum PCEA, increased pain following cesarean delivery, but reduced oxycodone use following vaginal delivery. We speculate that the antagonistic effect of buprenorphine may impair the efficacy of low dose infusates containing fentanyl and postoperative pain control in the setting of moderate to severe pain.

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Anesthesiology
2007; 106, Supp 1

POSTER AND RESIDENT 1

A-87.

WHERE DO WOMEN GET THEIR INFORMATION ABOUT LABOR EPIDURALS?

AUTHORS: J. L. Harkins, B. Carvalho, A. Evers, S. Mehta, E. Riley;
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Background**:** The source of information parturients receive about labor epidural analgesia may influence whether they choose to receive epidural analgesia during labor. Studies have shown that women who receive epidurals are more informed through childbirth classes or books.[1] The aims of this study were to determine the primary source of information that mothers in our hospital receive concerning epidural analgesia and to evaluate primary concerns that may prevent mothers requesting labor analgesia.
METHODOLOGY**:** We interviewed all patients who labored at our institution over a one-month period between September and October 2006. Patients were approached on the first post-delivery day with an IRB approved survey. Following written informed consent, patients answered questions that included their desire to obtain an epidural prior to their admission, their primary source of information, and their primary concerns related to epidural analgesia. During the study period, we surveyed all patients who underwent labor and excluded patients who had scheduled cesarean sections and multiple gestation pregnancies. We conducted the study at Lucile Packard Children's Hospital, a busy (approximately 5200 deliveries per year) academic hospital with an epidural rate of 75% and cesarean section rate of approximately 28%.
Results: 320 women who fit enrollment criteria delivered during the study period. A total of 302 patients completed the study and 18 eligible patients were lost to follow-up. Of the 302 patients interviewed, 80% received an epidural for labor. The main source of information on epidurals prior to labor was provided by a physician (34%), followed by a family member or friend (21%), personal experience (18%), and others (27%) including childbirth class, book/video/TV, midwife and internet. The sources of information were not different between the groups of women that received epidurals versus those that did not (P>0.05). The main reason why the patients wanted an epidural was pain control (77%), previous experience (6%), family/friend encouragement (6%) and others (11%). The main reason why the patients wanted to avoid an epidural was potential maternal risk (back pain, headache etc.) (48%), desire for natural childbirth (14%), possible increase in risk of cesarean section (13%) and others (25%).
Conclusion: Parturients get their information about epidural analgesia from a variety of sources with physicians being one of the most significant. Given this variety, women are probably presented with a wide range of opinion and potential misinformation. Efforts should be made to educate women more systematically prior to their delivery. Clinicians should take a lead in educating parturients about labor analgesia with particular attention directed to patients' concerns about potential maternal risks and the perceived effects of epidurals on the mode of delivery that may lead to unnecessary avoidance of epidural analgesia during labor.
References:
1. Beilin Y et al. Int J Obstet Anesth 1996;5:145-51

A-88.

ASSESSMENT OF SLEEP DISORDERED BREATHING IN PARTURIENTS

AUTHORS: N. Higgins, E. Leong, C. Park, R. McCarthy, C. A. Wong;
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Introduction: The incidence of obstructive sleep apnea (OSA) in the adult female population is approximately 2%[1] but the incidence of OSA in pregnancy is unknown. Pregnancy may precipitate or exacerbate this condition.[2] There may also be an association between OSA and intrauterine fetal growth retardation and maternal preeclampsia.[3] The Berlin Questionnaire, developed in 1996, includes a series of questions regarding risk factors for OSA and is validated as a means of identifying patients at higher likelihood of having sleep apnea.[4] We hypothesized that pregnant women are more likely to have a positive Berlin Questionnaire as compared to their nonpregnant counterparts.
Methods: Pregnant females ages 18-45 (n=3308) presenting for delivery and 79 nonpregnant females ages 18-45 (n=79) presenting for outpatient surgery gave informed, verbal consent to participate in this IRB-approved study. Study participants provided demographic information and completed the Berlin Questionnaire evaluating self-reported snoring and daytime sleepiness. For pregnant patients, the infant's birthweight and Apgar scores were also recorded.
Results: Of the 962 patients with a positive Berlin Questionnaire, 12 were in the control population versus 950 in the pregnant population (15.2% vs. 28.7% respectively, P=0.01); Odds Ratio (OR)=2.25 (95% CI**:** 1.21 to 4.18). There was a significant positive correlation between infant weight and a positive Berlin Questionnaire and a significant negative correlation between 1-minute Apgar score and a positive Berlin Questionnaire. The incidence of preeclampsia was greater (OR=2.7, 95% CI**:** 1.67 to 4.42) in the pregnant patients with a positive Berlin Questionnaire. Maternal and infant characteristics of patients with positive Berlin Questionnaires are presented in the Table.

	(+) Berlin Questionnaire (n=950)	(-) Berlin Questionnaire (n=2358)	P
Maternal age (y)[a]	32±5	32±5	0.08
Height (cm)[a]	165±7	166±7	0.02
Pre-pregnancy weight[a] (kg)	73±17	62±11	<0.01
Pregnancy weight (kg)[a]	90±31	76±12	<0.01
BMI[a]	33±12	28±4	<0.01
Gestational age (days)[a]	274±14	275±11	0.62
Infant weight (g)[a]	3478±506	3364±487	<0.01
1-minute Apgar[b]	8 (1-9)	9 (1-9)	<0.01
5-minute Apgar[b]	9 (5-10)	9 (1-10)	0.18

a. Mean ± SD
b. Median (range)

Discussion: OSA is a condition characterized by obstruction of the upper airway and episodes of apnea and hypopnea during sleep. It is associated with significant adverse health effects. In addition, there are several anesthetic implications that are of concern for the patient with OSA. We conclude that pregnant women are more likely to have a positive Berlin Questionnaire, indicating an increased likelihood of sleep disordered breathing. Further research is needed to determine whether a positive Berlin Questionnaire in pregnancy is associated with a diagnosis of OSA.
References:
1. JABFP 2004; 17:292-294.
2. Am J Respir Crit Care Med 2002;165:1217-1239.
3. Sleep Med 2004; 5:43-51
4. Ann Intern Med 1999; 131:485-491.

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POSTER AND RESIDENT 1

A-89.

DOES THE ADDITION OF ONDANSETRON TO IV-PATIENT CONTROLLED NALOXONE FURTHER IMPROVE POST C/S EPIDURAL-FENTANYL-INDUCED PRURITUS TREATMENT?

AUTHORS: S. Cohen, S. Shah, A. Shorshstein, J. Nezgoda, Y. Asulin, A. Solina, C. W. Hunter;
AFFILIATION: UMDNJ-Robert Wood Johnson Medical School, New Brunswick, NJ.

Introduction: Patient-administered IV naloxone has been applied routinely for the treatment of epidural-fentanyl-induced pruritus after C/S. Ondansetron is effective to treat epidural opioid-induced pruritus [1]. We determine whether the addition of ondansetron to our IV-patient controlled naloxone solution can further improve the treatment of post C/S pruritus.
Methods: Fifty women scheduled for elective C/S under epidural lidocaine 2%, fentanyl 5 mcg/ml and epinephrine 5 mcg/ml without parentral opioids were studied. Upon arrival at PACU, patients received epidural-PCA fental-ropivacaine-epinephrine and were randomized to one of two groups. Group I**:** (n=25) received patient-administered IV naloxone via PCA device (Abbott Life-Care, Abbott Laboratories, Chicago IL). Each patient could receive naloxone IV-patient controlled dose of 0.04 mg (in 5 ml) and a lockout time interval of 5 min. Group II**:** (n=25) received patient-administered IV naloxone mixed with ondansetron via PCA device (Abbott Life-Care, Abbott Laboratories, Chicago IL). Each patient could receive naloxone IV-patient controlled dose of 0.04 mg mixed with 0.5 mg ondansetron (in 5 ml) and a lockout time interval of 5 min. Patients were evaluated at 1, 2, and 4 hrs, then every 4 hrs or sooner, if needed, for a total of 48 hrs for the following**:** fentanyl, naloxone total doses, fentanyl side effects, VAS pain scores, itching scores, overall satisfaction and satisfaction from the pruritus treatment. Pain intensity at rest and the incidence and type of side effects were assessed by using a 10-point scale (0 = none, 10 = worst ever experience). Overall satisfaction with the infusion was assessed by using a 10-point scale (0 = no satisfaction, 10 = best satisfaction). Data is expressed as mean $\pm$ SD or % incidence. $P < 0.05$ was considered significant.
Results: There were no differences among the groups with respect to age, height, parity, pain scores, incidence of sedation, nausea, or vomiting, and satisfaction from itching treatments.

	I:Naloxone	II:Naloxone/Odensetron
Itching	21(84%)	20(80%)
Vomiting	3(12%)	0(0%)
Max Pain	3.9±2.6	3.5±2.6
Max Itching Score	4.2±3.3* *p<0.05	5.9±2.5
Total naloxone dose (mg)	9.1±11.1* *p<0.05	6.5±7.5
Max Sedation Score	0.9±1.7	0.9±2.1
Max Nausea Score	0.9±2.5	0.2±1.2
Overall Satisfaction	8.7±1.2** **p<0.003	9.7±0.5
Overall Pruritus Treatment Satisfaction	9.5±1.0	9.6±0.6

Conclusions**:** The addition of ondansetron to our IV-patient controlled naloxone solution for the treatment of post C/S pruritus, reduced the maximum pruritus scores and increased the overall satisfaction from this treatment.
Reference**:**
1. Borgeat et al. Anesthesiology 1999; 90**:** 432-6

A-90.

A COST-ANALYSIS OF NEURAXIAL ANALGESIA TO FACILITATE EXTERNAL CEPHALIC VERSION

AUTHORS: J. M. Tan[1], A. Macario[2], Y. El-Sayed[3], B. Carvalho[2];
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INTRODUCTION**:** Neuraxial analgesia is often administered to facilitate external cephalic version (ECV). Two recent meta-analysis and previous studies suggest that neuraxial analgesia especially epidural blocks may increase the probability of successfully rotating the fetus from breech to vertex.[1,2] The aim of this study was to determine if the increased costs associated with providing neuraxial analgesia are offset by the higher probability of rotating the fetus to vertex and avoiding a cesarean section.
METHODS**:** ECV success rates with and without epidural and spinal analgesia were obtained from five randomized, prospective, controlled studies involving 456 subjects that met the inclusion criteria for two recent meta-analysis.[1,2] These success rates were computed into a computer-based decision model (TreeAge Pro 2006,Tree Age Software, Inc.) that we recently developed to calculate cost-effectiveness for ECV. Two scenarios were simulated:
1. ECV success rates with the use of epidural analgesia (63% vs. 33% in the controls).[1,2]
2. ECV success rates with spinal analgesia (43% vs. 39% in the controls).[1,2]
The primary outcome of interest was the total expected hospital cost of delivery for each scenario. The probabilities of spontaneous reversion, mode of delivery, and need for unanticipated emergency cesarean section were based on previously published studies.[3-5]
RESULTS**:** Epidural analgesia for ECV resulted in an overall cost savings of $271 compared to controls, whereas spinal analgesia increased the expected cost of delivery by $115. The expected hospital cost of delivery with ECV facilitated with epidural and spinal analgesia was higher ($7472 and $7858 respectively) compared to $7244 for a scheduled cesarean section for breech presentation. This is due to the low ECV success rates assumed in both scenarios.
DISCUSSION: Epidural analgesia, but not spinal analgesia, to facilitate ECV results in a modest overall decrease in the hospital costs of delivery for breech presentations compared to not receiving any neuraxial analgesia. These lower costs are attributed to the increase in success of ECV and the decrease in cesarean rates that offset the cost of providing anesthesia. Using this computer-based decision model, neuraxial analgesic techniques to facilitate ECV must increase the absolute version success rate by at least 12% (for example from 37% to 49%) to demonstrate cost savings when compared to ECV without neuraxial analgesia.
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POSTER REVIEW 2

A-91.

SYNCHRONISATION OF MATERNITY UNIT WALL CLOCKS

AUTHORS: M. A. Rafi, U. Misra;
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Introduction: Anaesthesia and obstetrics are both time critical specialities. For clinical, medico-legal and audit purposes it is very important that the documentation of time keeping is accurate. This is critical for grade 1 caesarean sections (CS), with the aim of safe delivery of the baby usually within 30 minutes[1]. To assess the synchronisation of the wall clocks in our maternity unit, we carried out the following audit. The proposed standard was for 100% agreement between clocks.
Method**:** The theatre wall clock was used as the reference clock. Data was recorded for location of wall clock, time displayed and concurrent time on the reference clock, and the difference between GMT and the theatre clock.
Results: Time differences of up to 10 minutes were found between clocks. Only 6 out of 26 clocks (23.1%) displayed the same time as the theatre clock. This increased to 17 out of 26 (65.4%) when allowing one minute's leeway between clocks. The theatre clock was found to be 2 minutes behind GMT.
Discussion: Accurate time keeping is a very simple, but important aspect of the care of our patients. All clocks should be synchronised for accuracy of documentation. This audit shows that only about two-thirds of the clocks in our maternity unit are synchronised to within 1 minute. This can lead to error in documentation. It is possible that even when decision-to-delivery is recorded as within 30 minutes, some emergency CS may in fact take longer. In other cases where the room clock is slower than in theatre, there may be undue pressure to expedite delivery. This may potentially lead to unnecessary administration of a general anaesthetic when a regional technique would have been adequate. Any audits of patient care within the maternity unit that rely on timings may not represent the true standards of care. There are obvious medico-legal implications with the recording of times in patients' notes.
Conclusion: We recommend that the theatre wall clock is set to GMT and is used as the reference clock to set all other maternity unit wall clocks. A monthly check of synchronisation should also be performed. Serious consideration should be made to purchase radio-controlled wall clocks, which are relatively inexpensive (<£8 each). Only the wall clocks should be used when documenting in patients' notes. The audit should be repeated in six months time, and include other important equipment e.g. monitors, epidural pumps. Other units may wish to check the accuracy of their own maternity unit's clocks.
Reference
1. National Collaborating Centre for Women's and Children's Health. Caesarean section. Clinical Guideline. NICE 2004

A-92.

INCIDENCE OF SEVERE RESPIRATORY DEPRESSION ASSOCIATED WITH 0.15 MG OF INTRATHECAL MORPHINE FOR CESAREAN SECTION: A REVIEW OF 1915 CASES

AUTHORS: R. Kato[1], K. Terui[2], K. Yokota[2], H. Miyao[3], S. Takeda[4];
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Introduction: Small dose of intrathecal morphine is a very effective postoperative analgesic technique and widely used in cesarean section. Delayed respiratory depression is the most feared side effect of this technique. There have been only two reports of mild decrease in respiratory rate (RR) by intrathecal morphine in cesarean section.(1,2) Abouleish et al.(3) found no cases of decreased RR out of 856 postcesarean women. Our aim of the study was to investigate the incidence of severe respiratory depression by intrathecal morphine in cesarean section.
Methods: We conducted an observational study in Saitama Medical Center from 2000 to 2006, after obtaining institutional review board approval. The subjects were patients who were given 0.15 mg of intrathecal morphine hydrochloride for cesarean section. They underwent either spinal or combined spinal-epidural anesthesia. A local anesthetic with 10 μg of fentanyl was injected to the subarachnoid space with morphine. Sedative(s) and/or analgesic(s) were given during and after surgery at the discretion of the anesthesiologist/obstetrician. Postoperative monitoring included continuous arterial oxygen saturation by pulse oximetry (SpO_2) and RR. These were recorded hourly for 24 hours after the intrathecal injection of morphine. Our ward routine was to give supplemental oxygen when $SpO_2 < 95\%$ or RR ≤ 10 breaths/min. We listed patients who developed postoperative bradypnea (RR ≤ 10 breaths/min) within 24 hours after the intrathecal injection.
Results: Intrathecal morphine was administered to 1915 parturients. Four patients developed mild bradypnea. One woman had repeated episodes of 30-sec apnea and $SpO_2 < 80\%$ despite of supplemental oxygen. Naloxone was required twice in this patient. Another patient presented 15-30-sec obstructive apnea. None of six women was given analgesic agents in the postoperative period before exhibiting bradypnea.
Discussion: SpO_2 decrease was excluded from the definition of respiratory depression in our study. This was because our routine in the ward was to give oxygen when $SpO_2 < 95\%$ and about one fifth of postoperative patients were within the criterion. In addition, it was often difficult to distinguish mild oxygen desaturation caused by opioid from that by other causes, such as mild pulmonary edema and pulmonary embolism. However, patients can be hypoxic with normal respiratory rate when respiration is depressed by morphine. This is the reason why we also monitor SpO_2 continuously not to overlook respiratory depression by intrathecal morphine.
In conclusion, one out of 1915 postcesarean patients exhibited severe respiratory depression associated with 0.15 mg of intrathecal morphine. Four patients developed mild respiratory depression.
References:
1. Anaesthesia 52:373-7, 1997
2. Br J Anaesth 91:690-4, 2003
3. Reg Anesth 16:137-40, 1991

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POSTER REVIEW 2

A-93.

ACUTE RENAL FAILURE IN OBSTETRICS INTENSIVE CARE UNIT: RISK FACTORS AND OUTCOME EVALUATED BY ORGAN DYSFUNCTION SCORES

AUTHORS: C. Kaddour[1], Z. Haddad[2], R. Souissi[1], N. Baffoun[1], J. L. Golmard[3], K. Baccar[1], L. Skandrani[1];
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Introduction**:** Acute Renal Failure (ARF) is a mortality risk factor. Identifying risk factors for ARF could help reduce mortality. We'll try describe them in critically ill obstetric patients, and explain ARF association with multiple organ failure (MOF) and outcome using the sequential organ failure assessment (SOFA) score and logistic organ dysfunction (LOD) score.
Methods**:** Open prospective observational cohort analysis in a multidisciplinary ICU. All critically ill obstetric patients were analysed unless with Chronic renal failure or kidney transplant. ARF was defined as serum creatinine ≥100µmol/L and/or urine output ≤500 ml/Day and/or doubling of baseline serum creatinine levels.
Results**:** 640 patients reviewed (mortality rate 13,3%). ARF diagnosed in 223 patients. Main risk factors present on admission were**:** Acute circulatory failure, transfusion and presence of haemolysis elevated liver enzyme and low platelet count (HELLP) syndrome. ARF patients with HELLP syndrome on admission were most likely to develop MOF. ICU mortality was 1,5 times higher in case of ARF. Anuria and serum creatinine > 300 µmol/L were independent risk factors for mortality (OR 2 and 7 respectively). ICU mortality of ARF patients increased with the number of failing organs on admission, especially persistent circulatory failure overtime. LOD score is at least as good as SOFA score in evaluating the association MOF-ARF with mortality. In fact, LOD cut-off values defining cardiovascular, respiratory hepatic and hematologic organ failures fit particularly our obstetric population.
Conclusion**:** Most important risk factors for ARF or mortality from ARF are often present on admission. During the ICU stay, other organ failures (especially cardiovascular) are important risk factors. In obstetrics, HELLP syndrome increased the contribution to mortality by association with MOF. The severity and persistence of circulatory shock was the most important factor influencing outcome in ARF patients.

A-94.

ED95 OF PHENYLEPHRINE TO PREVENT HYPOTENSION AND NAUSEA/VOMITING AFTER SPINAL ANESTHESIA FOR CESAREAN SECTION

AUTHORS: M. Tanaka, M. Balki, R. Parkes, J. Carvalho;
AFFILIATION: Department of Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada.

Introduction: Phenylephrine has become the drug of choice to prevent spinal-induced hypotension in CS(1). There is no dose-response curve of phenylephrine in the literature. The purpose of this study is to determine the bolus ED95 of phenylephrine to prevent post-spinal hypotension and nausea/vomiting in CS.
Methods: With REB approval, a double-blinded trial was conducted in 50 healthy patients undergoing elective CS under spinal anesthesia. The study was conducted as per up-down sequential allocation, modified by the Narayana rule to determine ED95 of phenylephrine (2). Patients were co-loaded with 10ml/kg of lactated Ringer's. Spinal anesthesia was performed in the sitting position using 12mg of 0.75% hyperbaric bupivacaine mixed with fentanyl 10mcg and morphine 0.1mg. Immediately after the spinal, 1ml of the study solution (phenylephrine at different doses) was given intravenously. The patient was then positioned supine, with a wedge under the right hip. Systolic blood pressure (SBP) and HR were assessed every minute until uterine incision. One ml of the study solution was administered every time SBP was ≤ baseline. The first patient was assigned a dose of 40mcg/ml. The dose to the subsequent patients varied by increments of 10mcg, depending on the response of all previous patients. An adequate response was defined as the absence of hypotension (SBP < 80% of baseline), bradycardia (HR < 50 bpm after 2 subsequent assessments) and nausea/vomiting during the period from induction of spinal anesthesia to uterine incision. In case of inadequate response, the study solution was immediately switched to a syringe containing phenylephrine 100mcg/ml. ED95 was determined by a logistic model with non-log-transformed doses, fit using Firths's penalized maximum likelihood approach. Confidence interval was based on the profile likelihood approach.
Results: The ED95 of phenylephrine was159mcg (95% CI 122-371mcg). Maternal hypertension (SBP >120 % of baseline) was observed in 14 cases, all of them occurring after administration of phenylephrine immediately after spinal.

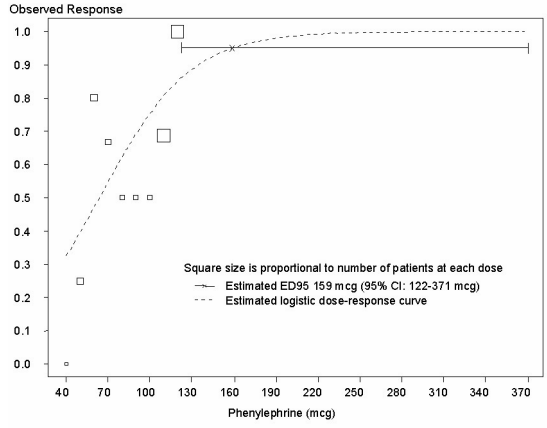

Figure 1. Dose-response curve of Phenylephrine in Cesarean Sections

Discussion: The ED95 of phenylephrine is higher than our standard of practice, which is currently 100 mcg. We recommend this dose should be increased to 150mcg. Prophylactic administration of phenylephrine immediately after spinal may lead to transient hypertension and should be used with caution, with prior assessment of SBP.
References:1. Curr Opin Anaesthesiol 2006; 19**:** 238-43; 2. Statist Med 2003; 22**:** 69-82.

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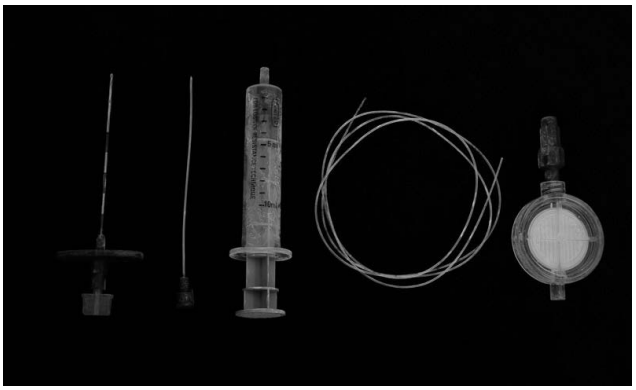
POSTER REVIEW 2

A-95.

CONTAMINATION OF EPIDURAL CATHETERS: A PREVENTABLE COMPLICATION?

AUTHORS: M. J. McNeill, K. N. Litchfield;
AFFILIATION: Glasgow Royal Infirmary, Glasgow, United Kingdom.

Introduction: Epidural abscess is a rare, but serious complication of regional anaesthesia. However bacterial contamination of epidural catheters has been recorded in up to 28% of catheters removed from the epidural space[1]. Other studies have shown that anaesthetists are poorly compliant with strict aseptic protocols[2]. The purpose of this study was to identify the degree to which epidural needles and catheters were handled before cannulation of the epidural space. We propose that such handling of epidural catheters and needles will be a potential source of contamination if there is any failure in the aseptic technique. We suggest that contamination of epidural catheters could be reduced by strict adherence to aseptic technique and the elimination of handling of the needle and catheter before insertion.
Methods: Five trainees in Obstetric Anaesthesia at our hospital were asked to perform epidural cannulation on a training device. They used the standard Portex Epidural Minipack (Smiths Medical), and performed the cannulation as they normally would in a patient. Before starting the procedure, they rubbed their gloved hand with GlitterBug lotion (Brevis Corp). This solution fluoresces when exposed to UV light and identifies the degree to which the Epidural Minipack is handled before the epidural space is cannulated.
Results: The UV light confirmed that all components of the epidural minipack had been handled. In all cases, both the epidural catheter and hub and shaft of the needle showed evidence of being handled. The photograph (Fig.1) shows the degree of contamination that was typically found.



Discussion: The study has confirmed our theory that the components of the epidural minipack are handled before cannulation is complete. Strict adherence to aseptic protocols will minimize the risk of contamination. However, we believe that the packaging of the epidural packs should be redesigned in such a way that those components which will be introduced into the epidural space (the needle and the catheter) cannot be touched, and therefore cannot become contaminated.
References**:**

1.Simpson RS, MacIntyre PE, Shaw D, Norton A, McCann JR, Tham EJ. Epidural catheter tip cultures**:** results of a 4-year audit and implications for clinical practice. Reg Anesth Pain Med 2000; 25:360-367.
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A-96.

THE EFFECT OF PREEMPTIVE EPIDURAL ANALGESIA ON CYTOKINE PRODUCTION DURING LABOR

AUTHORS: S. Orbach-Zinger[1], R. Arnavetzky[1], R. Bardin[1], E. Levin[1], H. Bessler[2], D. Peleg[1], L. A. Eidelman[1];
AFFILIATION: [1]Rabin Medical Center/Beilinson Hospital, Petach-Tikva, Israel, [2]Rabin Medical Center/Hasharon Hospital, Petach-Tikva, Israel.

Introduction: Vaginal labor is an inflammatory state. The goal of our study was to compare the effect of preemptive (PEA) vs. regular epidural analgesia (REA) on cytokine production in laboring mother and neonate.
Methods: After IRB approval, healthy parturients with singleton uncomplicated term pregnancies with initial VAS <30 were enrolled. Parturients were randomized into 2 groups**:** PEA group (PEAg) - parturients who would receive epidural analgesia before onset of pain (VAS <30) and REA group (REAg) - parturients who would receive epidural analgesia after onset of pain (VAS >50). Women were excluded from analysis if there was**:** ineffective epidural analgesia, fever, abnormal fetal monitor, instrumental delivery or Cesarean section. Interleukin-1 (IL-1), interleukin-1ra (IL-1ra), interleukin-2 (IL-2), interleukin-6 (IL-6), interleukin-10 (IL-10), TNF-alpha (TNFa), and interferon were measured in maternal blood at randomization (VAS <30) and 24 hours after labor, and in cord blood at birth. Student's t- test, Wilcoxon test or Chi-square test, were performed as appropriate. $p<0.005$ was considered significant.
Results: Fifty-one women were enrolled and 10 excluded. Epidural was performed in PEAg when VAS was 22.8± 9.8 and in REAg when VAS was 76.7 ± 9.8 ($p<0.0001$). Data on demography, labor and delivery were similar except for ruptured membranes at admission (PEAg - 15%, REAg- 46.6%, p=0.03), transit hypotension (PEAg - 20%, REAg 0%, p=0.03) and meconium in amniotic fluid (PEAg -25%, REAg -0%, p=0.01). Cytokine values are presented in table 1. No significant differences were found between two groups at each time. Maternal IL-1 significantly increased during labor in both groups (p=0.009, p=0.042, respectively). IL-6 levels changed significantly only in the control group (p=0.046). There was significant correlation between baseline maternal cytokine and cord blood levels in proinflammatory cytokines (IL-1, IL-2, TNF), while no such correlation existed in anti-inflammatory cytokines (IL-1ra, IL-10) in both groups. There was significant correlation between baseline maternal IL-6 level and cord blood level in REAg (r= 0.59, p=0.005), while no significant correlation existed in PEAg (r= 0.33, p=0.16).

	Baseline PEAg (n=20)	Baseline REAg (n=21)	24 hours PEAg (n=20)	24 hours after REAg (n=21)	Cord blood PEAg (n=20	Cord blood REAg (n=21)
IL- 1 (mean ± SD) ng	12.7 ± 4.5	14.2 ± 7.0	15.2± 5.64	16.1 ± 7.0	13.5±5.5	14.1±6.48
IL1-ra (mean ± SD) ng	5.4± 4.5	7.3 ±5.9	6.4 ±5.4	6.2 ± 4.9	3.5±3.1	5.3±5.2
IL-2 (mean ± SD) ng	2.6± 1.6	2.8± 1.8	2.5 ± 1.7	2.7± 1.7	3.8±2.0	4.0±2.2
IL- 6 (mean ± SD) ng	27.6 ± 10.8	32.5± 16.3	29.9 ±13.4	35.6± 18.1	24.8±12.8	26.2±18.0
IL-10 (mean ± SD) ng	2.6 ±1.50	2.8 ± 2.3	1.97 ±1.32	2.34 ± 1.58	1.03±0.63	1.49±1.33
TNF (mean ± SD) ng	787.5 ±435.3	815.7 ±446.0	739.5± 462.7	712.0 ± 473.6	378.9 ±222.63	416.21 ± 278.89
Interferon (mean ± SD) pg	17.0 ± 8.6	14.2 ± 7.0	16.9± 7.7	15.4± 7.7	7.72 ±5.30	6.93 ±2.98

Discussion: Whereas there was no significant difference in cytokine levels between the two groups, PEA prevented the significant increase in IL-6 during labor and interrupted IL-6 fetal-maternal dependency.

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POSTER REVIEW 2

A-97.

A 20 YEAR RETROSPECTIVE DATABASE REVIEW OF OBSTETRIC AIRWAY MANAGEMENT AT A TERTIARY CARE HOSPITAL

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Introduction: The incidence of failed intubation (FI) is approximately 1:2230 in the general population but is thought to be significantly higher, 1:280, in the obstetrical population (1). Inability to manage the obstetric airway is a leading cause of morbidity and mortality (2). Our goal was to determine the incidence of difficult airway management (DA) and FI with general anesthesia (GA) administered to the obstetric population (EGA >20 weeks) during birth related admissions to a tertiary care obstetrical hospital and to use this data to look for associations of obstetrical and maternal variables with DA and FI's.
Methods: During 1984-2003 there were 104,051 deliveries. There were 3107 GA's identified. Maternal demographics, co-morbidities and obstetrical variables were extracted from the provincial Perinatal Database (PD), which contains validated maternal and neonatal demographic variables, procedures and interventions for all pregnancies and births occurring in our provincial hospitals since 1980. Multiple anesthetic variables such as difficulty of airway management, laryngoscopy grade, cricoid pressure and airway adjuncts used were determined by thorough chart review.
Results: There were 2986 of the 3107 charts available and reviewed (3.9% not found). Of these, 2633 GA's with attempted ETT placement were included (353 were excluded**:** 254 were electively mask ventilated, 88 received neuroleptic sedation only). Of these 2633 GA's, 125 were considered DA (4.7%) and 2 FI were discovered (0.08%). Both FI's occurred during postpartum tubal ligations within 48 hours of delivery. No FI's occurred during cesarean deliveries (CD). There were 3 maternal mortalities unrelated to anesthesia management. Maternal age and weight were associated with increased risk of DA, but the presence of PIH, maternal disease, oxytocin usage and failed regional were not associated with higher risk of DA (Table 1). Over the twenty years the CD rate increase from 19% to 26% and the GA rate per pregnancy decreased from 0.06% to 0.01%. Despite increased CD rate and decreased GA use, the rate of DA did not change over time.

Table 1. Comparison of Maternal and Obstetric Variables Between Difficult and Non-Difficult Airways

Variable	Difficult Airways (n=125)	Non-Difficult Airways (n=2508)	p
Maternal Age (years)	30.9	28.8 (n=2507)	< 0.001
Maternal Weight (kg)	81.0 (n=105)	77.7 (n=2045)	0.04
EGA (weeks)	38.1 (n=123)	38.1 (n=2457)	0.84
Nulliparous	31 (24.8%)	551 (22%)	0.44
Maternal Disease (including PIH)	35 (28%)	598 (23.8%)	0.29
PIH	22 (17.6%)	346 (13.9%)	0.24
Oxytocin Induced / Augmented Labor	10 (8.0%)	241 (9.6%)	0.64
Attempted use of regional anesthesia prior to GA	10 (8.0%)	207 (8.3%)	1.0

Discussion: The incidence of DA in parturients is approximately 1:20. Factors associated with DA included maternal age and weight. Co-morbidities, including PIH, did not increase DA. The incidence of FI for GA's administered during a delivery admission was approximately 1:1316, lower than previous reports.
References**:**
1)Anaesthesia 1985;40:759-762
2).Anesthesiology 86(2):277-284

A-98.

INTRAVENOUS ERGOT DOES NOT REDUCE BLOOD LOSS IN WOMEN RECEIVING OXYTOCIN AT CESAREAN SECTION FOR LABOR ARREST

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Introduction: Oxytocin is used to decrease blood loss after delivery. Laboring patients receiving oxytocin augmentation undergo desensitization of myometrial oxytocin receptors, such that oxytocin may become less effective as a uterotonic agent following delivery.[1] The purpose of our study was to determine if a combination of intravenous oxytocin and ergot is better than oxytocin alone to decrease blood loss during CS for labor arrest.
Methods: With REB approval, a double-blinded trial was conducted in 48 patients undergoing CS for labor arrest under epidural anesthesia. All patients had > 4 hours of labor augmentation with oxytocin. Exclusion criteria**:** cardiac disease, hypertension, multiple gestation, placenta previa, fibroids, bleeding diathesis. The study drug, diluted in 1 L of LR, was administered immediately following delivery of the infant. Study drugs**:** A) 0.25 mg of ergonovine maleate and 20 units of oxytocin; B) 20 units of oxytocin. Patients received an initial bolus of 150 ml of the study solution, followed by maintenance of 120 ml/h for 6 hours. Obstetricians were requested to A) perform assisted delivery of the placenta, as opposed to manual extraction; B) assess uterine contractility every minute until satisfactory contraction was obtained. Unsatisfactory contractility was treated with additional 25ml boluses of study solution. The Obstetrician could request carboprost 250 mcg IM as rescue medication if needed. Granisetron 1 mg IV was administered to all patients upon delivery of the infant. Primary outcome was the estimated blood loss, calculated as per change in hematocrit before and 24 hours after delivery. Secondary outcomes included**:** number of additional boluses of uterotonics, nausea/vomiting, hyper/ hypotension.
Results: 48 patients completed the study, 24 in each group. Estimated blood loss was similar in both groups, 1218 ±716 ml vs. 1299 ±774 ml in groups ergot + oxytocin vs oxytocin respectively. Significantly fewer women required additional boluses of study drug in the ergot + oxytocin group (21% vs. 57%; p=0.01). Rates of hypotension (21% vs. 26%) and hypertension (4% vs. 17%) were similar. Nausea (42% vs. 9%; p=0.01) and vomiting (25% vs. 4%; p=0.05) were significantly more common in the ergot + oxytocin group.
Discussion: In women undergoing CS for labor arrest after > 4 hours of oxytocin augmentation, the additional co-administration of ergot does not reduce intra-operative blood loss, despite a significant increase in nausea/vomiting. Attempts to reduce this level of blood loss should focus on intra-operative techniques, including**:** use of multiple Green-Armitage clamps on bleeding sinuses in the uterine incision, and delayed removal of the placenta until the uterus has responded to intravenous oxytocin. We suggest that ergot should be reserved for situations where uterine contractility is poor following oxytocin infusion.[2]
References**:**
1. Obstet Gynecol 2006; 107**:** 45-50;
2. The Cochrane Library 2005, Volume 1.

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POSTER REVIEW 2

A-99.

PROPHYLACTIC GLYCOPYRROLATE PREVENTS BRADYCARDIA AFTER SPINAL ANESTHESIA FOR CESAREAN SECTION

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Introduction: Bradycardia occurs commonly after spinal anesthesia; 1.3 to 18 in 10,000 cases progresses to cardiac arrest[1]. Can prophylactic glycopyrrolate prevent post-spinal bradycardia? A previous report indicates it cannot[2].We compared heart rate (HR) and heart rate variability (HRV) in parturients after prophylactic glycopyrrolate or saline administration, prior to spinal anesthesia.
Methods: After ethics committee approval, consenting parturients for elective Caesarean section, supine with left uterine displacement, had a 10-min ECG recording, then either glycopyrrolate 0.4 mg or saline in double-blind randomized fashion, followed by a repeat 10-min ECG recording. Then each parturient received intrathecal bupivicaine (12 to 14 mg) with morphine sulfate (0.15 to 0.2 mg). Continuous heart rate (HR) and blood pressure monitoring occurred for 20 min. HR≤60/min defined bradycardia. HRV analyses via 13 parameters measured beat-to-beat variations in RR-intervals. We compared post-spinal HRV parameters by t-test; Fisher's exact test compared groups for bradycardia incidence.
Results: 26 of 57 patients received glycopyrrolate (G) and 31 saline (S). Baseline HR and blood pressure did not differ between groups. Post spinal blood pressure did not differ between groups; HR in G group was significantly faster. 9 parturients from S group had bradycardia, but none in group G (p=0.002). HR and HRV indexes differed after glycopyrrolate administration as shown in the table.

HR and HRV indexes in glycopyrrolate and saline groups after study drug administration

	HR	SD1/SD2	HF%	LF/HF	RMSSD	Entropy
Saline	88.6(13.1)	0.30(0.08)	20.93(10.9)	3.13(2.1)	28.2(15.7)	1.49(0.35)
Glyco	104.5(16.3)	0.16(0.14)	9.10(15.0)	9.79(8.6)	9.2(14.9)	0.66(0.13)
P value	0.0002	0.00007	0.003	0.002	0.00005	0.00001

SD1/SD2 - ratio produced by Poincaré analysis; HF% - high frequency of spectral analysis in %; LF/HF - low frequency to high frequency ratio of frequency spectral analysis, RMSSD - root mean square standard deviation; Entropy - embedded spectral entropy index; Data are mean (SD);

Discussion: Bradycardia after spinal anesthesia occurs commonly (29% in this cohort). Unopposed parasympathetic activity after spinal anesthesia may foster bradycardia. These preliminary data, collected in a prospective double blind randomized study, suggests that prophylactic glycopyrrolate prevents post-spinal bradycardia in parturients undergoing elective cesarean section. The differences in HRV may reflect tachycardia or other autonomic changes from muscarinic blockade. HRV changes with glycopyrrolate administration might come from decreased parasympathetic activity (decreased HF, RMSSD; increased LF/HF ratio). Further analyses of HRV may uncover autonomic factors that cause bradycardia to progress to cardiac arrest.
References:
1. Kopp SL., et al. Cardiac Arrest During Neuraxial Anesthesia: Frequency and Predisposing Factors Associated with Survival. Anesth Analg 2005 100: 855-865
2. Carpenter RL, Mackey DC. Glycopyrrolate does not prevent bradycardia during spinal anesthesia. Anesth Analg 1990; 70: S51

A-100.

DEVELOPMENT AND USABILITY OF A BEHAVIORAL MARKING SYSTEM USING HIGH-FIDELITY SIMULATION - AN ASSESSMENT TOOL FOR NON-TECHNICAL SKILLS IN OBSTETRICAL TEAMS

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INTRODUCTION: The National Confidential Enquiry into Maternal Deaths identified 'lack of communication and teamwork' as a leading cause of substandard obstetrical care. Safety Organizations in Canada have recommended professional curricula development for multidisciplinary teams. To implement team training and assess curricular efficacy, valid, reliable markers of team performance are needed. Our objective was to develop a behavioral marking tool to assess obstetrical teams.
METHODS: In a previous study, obstetrical teams were videotaped managing simulated emergency obstetrical scenarios, which were used as a template for behavioral marking system development. Participants identified behavioural items (BI) they felt contributed to teams' management. After REB approval, 13 healthcare professionals and lay public viewed the taped performances and generated lists of behaviors which positively or negatively affected team performance. Qualitative analysis using research team consensus and NVivo, generated themes and subthemes. Research team members developed poor and excellent performance descriptors on each of the BIs, thus forming the Assessment of Obstetric Team Performance (AOTP). A Global Assessment of Obstetric Team Performance (GAOTP) was developed using only the themes and descriptors.
Twelve reviewers evaluated teams' videotaped performances using the AOTP and their opinions sought regarding its usability.
RESULTS: In total, 1294 behavioural items were described by 34 simulation session participants and 13 video reviewers. After reviewing a sampling of narratives, the research team identified 8 themes. An NVivo analysis of narratives sorted the 1294 items into the 8 themes. After re-review, only 6 themes were used. Additionally, 18 subthemes were identified and poor and excellent team performance descriptors determined. A GAOTP used only 6 themes and subtheme descriptors summary.Usability data is found in Table 1.

Table 1: Usability Questionnaire

(N=12)	Agree (%)	Disagree (%)
1. Too many behavioural items (BI)	25.00	75.00
2. Too few BI	8.44	91.56
3. BI too specific	9.09	90.91
4. BI accurate reflection of team assessment	81.82	18.18
5. Themes/subthemes easily understood	91.67	8.33

The median amount of time participants spent completing the AOTP was 7.5 minutes (range= 1.5-50 minutes), and 75% thought the time requirement was moderate and manageable. Participants expressed an average comfort level of 7.54/10 (S.D.±2.35) using the AOTP.
DISCUSSION: While the validity and reliability of the AOTP still need to be determined, initial feedback regarding AOTP usability suggests that it allows for an accurate reflection of raters' assessments, is comprehensive, quick and easy to use. Future studies will utilize the AOTP to investigate the effect of obstetrical team training in non-behavioral skills, specifically comparing the effects of high-fidelity simulation team training to other education methodologies.

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POSTER REVIEW 2

A-101.

POSTPARTUM CHANGES OF TRANSCUTANEOUS PCO2 AND SPO2 IN PARTURIENTS DELIVERED UNDER LUMBER EPIDURAL ANALGESIA

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Introduction: It is well known that PaCO2 decreases at term pregnancy. Since previous studies have demonstrated that the respiratory change recovers to the nonpregnant level within a few days, PaCO2 may return to a nonpregnant value within the days[1-3]. As continuous transcutaneous blood gas monitoring could recently address the issue, we analyzed the transcutaneous PCO2 (PtcCO2) and SpO2 for 48 hrs after delivery in the women who delivered under labor analgesia.
Methods: With the approval of our hospital's investigation committee, 15 consenting ASA I-II parturients were enrolled in this study. Following the administration of 10-12ml ropivacaine 0.1% with fentanyl 0.00025% through a lumbar epidural catheter, we checked the block height for cold, using an alcohol soaked cotton. If the hypesthesia to cold did not reach to T10 dermatome, 6ml of the same solution was added epidurally. Once epidural hypesthesia at least below T10 was established, the same solution was infused continuousuly at 4ml/hr through the catheter. If patients requested additional analgesia, we added 6ml of the same solution epidurally. Prior to the onset of labor, the probe for continuous transcutaneous blood gas monitoring (TOSCA, Linde Medical Sensors, Switzerland) was attached on her ear lobe. Data of PtcCO2 and SpO2 were collected at the onset of the labor (control), 2, 4, 6, 8, 10 12, 24 and 48 hrs after delivery. All data were analyzed using repeated one-way ANOVA and Bonferroni tests as post-hoc comparison. $P < 0.05$ was considered significant.
Results: SpO2 and PtcCO2 prior to the onset of labor were 98.9±0.5 % and 29.6±2.3 mmHg, respectively. Epidural analgesia did not significantly change these values. SpO2 did not change for 48 hrs after delivery and did not differ from the control value, while PtcCO2 significantly increased 8 hours (31.2±1.9 mmHg) after delivery compared with the control value. The PtcCO2 value reached 34.4±12 mmHg 48 hours after delivery.
Discussion: A previous studies has reported that the alveolar ventilation falls so that PaCO2 significantly rises during the first days after delivery [1]. Another studies demonstrated that the minimum alveolar concentration of isoflurane decreased in 24-36 h postpartum and gradually increased to normal values by 72 hrs postpartum [2.3]. However, these biphasic changes were not seen on PtcCO2 in our study. Since we did not collect the data for the patients without labor analgesia, we could not clarify from our study whether epidural analgesia contribute the change of the respiratory system. We concluded that the respiratory changes have been recovering toward nonpregnant value at least 8 hrs after delivery.
References**:**
[1] Respiration 46**:** 145, 1984,
[2] Anesthesiology 82**:** 1360, 1995,
[3] Anesthesiology 82**:** 1364, 1995

A-102.

MINIMUM EFFECTIVE DOSE OF SPINAL ROPIVACAINE FOR POST PARTUM TUBAL LIGATION SURGERY

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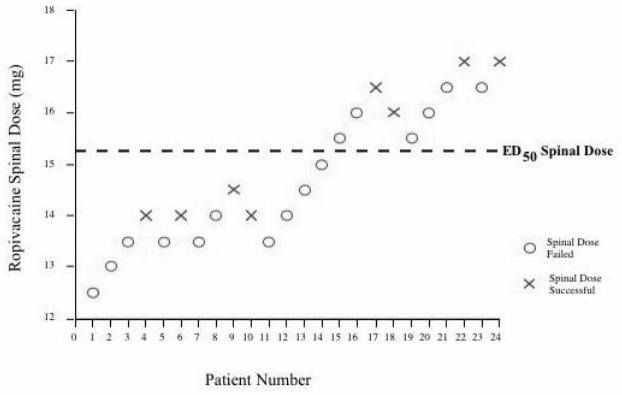
Introduction: Post partum bilateral tubal ligation (BTL) surgery is one of the most common procedures undertaken for sterilization. It is commonly carried out under spinal anesthesia. An ideal spinal anesthetic for this surgery would be one of medium duration, with a low incidence of side effects (e.g. transient neurological symptoms) and a low probability of prolonged post-operative care unit (PACU) stay. Ropivacaine may be such an agent, however to date there are no dosing studies of spinal ropivacaine for BTL surgery.
Methods: We performed a prospective up down sequential study using hyperbaric spinal ropivacaine for patients undergoing BTL surgery using a CSE technique. Epidural lidocaine supplementation was used if anesthesia was insufficient for the surgery. We started the study using a spinal dose of 12.5mg. The need to supplement the block with any IV or epidural agents was defined as failure. Midazolam up to 2 mg was used for anxiolysis as needed.
Results: 24 patients completed the study. The up down sequence is shown in Figure 1. A T8 block was not achieved in 4 of the patients. 82% of patients who did not receive epidural local anesthetic had no motor block at 60 min following PACU admission and 18% had a bromage score of 1. 73% patients who did not receive epidural local anesthetics had no sensory block at 60 min following PACU admission.



Discussion: There has been a reluctance to use hyperbaric lidocaine for spinal anesthesia due to a potentially high incidence of transient neurological symptoms. The search for an alternative agent to replace lidocaine has not yielded an ideal replacement. Bupivacaine is now routinely used for spinal anesthesia for BTL surgery; however, it has a long duration of action that may result in prolonged PACU stay. Spinal ropivacaine may be an alternative local anesthetic that can be used. There are no studies reported to date that have looked into the dose of spinal ropivacaine that may be appropriate for this surgery. Our data suggests that if spinal ropivacaine were used for post partum BTL surgery a dose of 25mg should be chosen.

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POSTER REVIEW 2

A-103.

MANAGEMENT OF POST DURAL PUNCTURE HEADACHE: A CONTINUOUS QUALITY IMPROVEMENT STUDY

AUTHORS: B. Kaul, D. Sines, J. DeRenzo, M. Vallejo, J. Waters;
AFFILIATION: Magee Women's Hospital & Univ. of Pittsburgh, Pittsburgh, PA.

Introduction: Inadvertent dural punctures are probably the most common complication of epidural placement for obstetric analgesia. Intrathecal catheter placement after and inadvertent dural punctures has been said to reduce the incidence of postdural puncture headache (PDPH) (1). We present some results for the incidence and management of PDPH from our quality assurance (QA) database

Methods: Our institution is a tertiary OB center with > 8000 deliveries per annum and an epidural rate of >80%. We have had an active QA program, which in 2005 was integrated with the electronic OB anesthesia charting system as a part of continuous quality improvement program. Every contact with the patient generates an entry into the computerized database at the time of contact. The data is then collected and collated by a dedicated database coordinator (DS). If there is an inadvertent dural puncture, we enter the data at the time of the contact with the patient. The management of the dural puncture is at the discretion of the attending anesthesiologist. Some anesthesiologists choose to insert an intrathecal catheter (I/T Cath) at the site of puncture and administer continuous intrathecal analgesia with either and infusion or intermittent boluses of local anesthetic with fentanyl. Other anesthesiologists re-insert an epidural at a different site. The management of PDPH is also either conservative or with a Prophylactic Epidural blood patch (PEBP) or a therapeutic EBP, depending on anesthesiologist preference. I/T Catheters are left in situ for 24 hours.

Results: Data is from March 2002 to September 2006 excluding the first three months of 2005 during the transition to electronic charting. There were 311 documented wet taps in 22,792 patients who had labor analgesia for vaginal delivery (1.3%).

Group	Total	No PDPH (%)	PDPH (%)	Therapeutic EBP (% of PDPH)	Multiple EBP (2)
No treatment	150	72 (48)	78 (52)	50 (72)	11
PEBP	111	75 (68%)	36 (32)	25 (69)	2
I/T Cath	50	24 (48)	26 (52)	16 (62)	2

Discussion: The incidence of PDPH appears to be reduced by a PEBP as compared to "No treatment" and the "I/T Catheter" groups. Further collection of data and analysis is on-going and will be presented at the meeting. Preliminary data seems to indicate a similar outcome with either prophylactic blood patch and intrathecal catheter

Reference**:**
CAN J ANAESTH 1998, 45**:** 1,42-5

A-104.

A NEW TOOL TO MONITOR INFLAMMATION DURING PREECLAMPSIA

AUTHORS: Y. Villiger, R. Landau, C. Kern;
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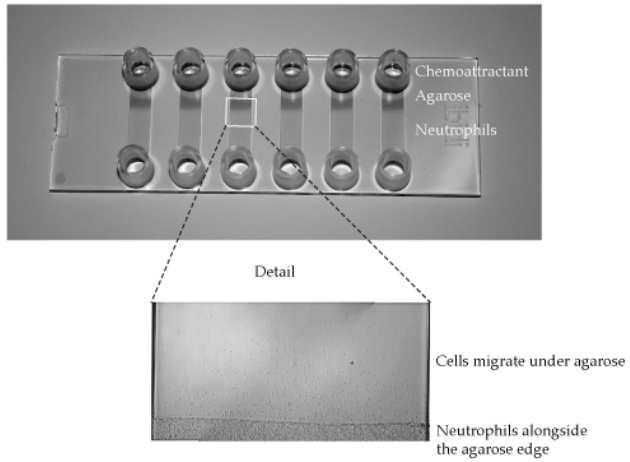
Background and Goals: Unbalanced inflammation combined with neutrophil activation are involved in the pathogenesis of pre-eclampsia (PEC) [1,2,3]. A new method to evaluate granulocyte chemotaxis in inflammation is currently being validated (real-time optical computerized measure of leukocyte migration, see figure). The goal of this study is to evaluate chemotaxis in PEC and set-up a bedside test to evaluate neutrophil activity in PEC.

Materials and Methods: After IRB approval, the chemotactic response in PEC and healthy pregnant controls was assessed with our method. Blood samples were gathered prior delivery. Neutrophils were challenged by neutrophil chemoattractant (fMLP). Chemotaxis index (migrated cells/random migration) and chemokinesis (absolute nb of migrated cells with no chemoattractant) were calculated for each case.

Picture of the μslide filled with agarose and cells



Results: In this ongoing study, we observed in PEC (n=3) an increased chemotactic response compared to controls (n=3) (chemotaxis index 4.6±0.6 vs 3.7±0.7). Chemokinesis was also elevated in PEC (1378±145 vs 883±23).

Conclusions**:** First, we have now demonstrated the feasibility of this assay in women diagnosed with PEC. Second, our results seem to indicate increased neutrophil activity and chemotaxis in PEC consistent with previous ex vivo studies 1. Third, since chemotaxis is easily monitored with this test, it could become a potential marker and a valuable tool to evaluate novel anti-inflammatory therapies targeting neutrophil activation.

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1) Krysiak O, Circ Res 2005;97:1253-61.
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POSTER REVIEW 2

A-105.

ADMISSION AND WORST 24-HOUR ACUTE PHYSIOLOGY AND CHRONIC HEALTH EVALUATION II (APACHE II) SCORES IN PREDICTING INTENSIVE CARE UNIT (ICU) MORTALITY IN OBSTETRICS

AUTHORS: Z. Haddad[1], C. Kaddour[2], R. Souissi[2], N. Baffoun[2], J. L. Golmard[3], K. Baccar[2], L. Skandrani[2];
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Introduction**:** APACHE II is wide spread used in ICU's for research and benchmarking.Physiological data for calculation of the APACHE II score derive from worst values in the first 24 hours after admission to the ICU. Mortality prediction by APACHE II system depends on data sampling. Use of ICU admission data could be accurate to predict mortality.
Methods**:** Retrospective study of prospectively collected data. All critically ill obstetric patients with ICU length of stay ≥24 hours included.The admission (H1)(first hour worst physiological data) and worst 24-hour physiological variables (H24) were used to generate the admission APACHE II score, and the corresponding predicted mortality, respectively.
Results**:** Included n=541 (10,5% mortality). Mean H1 and H24 APACHE II scores**:** 7,6±6,1 and 8,6±7, with derived predicted mortality estimates:8,63% and 9,86% respectively. H24 APACHE II score was higher than H1 APACHE II score in 25% of the cases (n=135), among them 23,7% died (n=32) vs 6,16% if H1=H24(p<0,01).Running a multiple logistic regression with mortality as the dependent parameter, we found that worsening of the APACHE II score over time is not significantly associated with mortality (p=0,791). Whereas H1 APACHE II score and Delta APACHE II score (H24 minus H1 APACHE II score) are correlated with mortality (p<0,001 and p=0,04, OR 1,28 and 1,45 respectively). The overall discrimination ability as assessed by the area under the receiving operator characteristic curve, of H1 APACHE II mortality prediction score (0,779, 95% confidence interval**:** 0,695-0,863) and H24 APACHE II mortality prediction (0,784, 95% confidence interval**:** 0,7-0,868) was good for both models and was not significantly different.
Conclusion**:** In the critically ill obstetric patient, substitution of the worst 24-hour physiological variables with the admission physiological variables maintains the overall discrimination ability of the traditional APACHE II model in mortality prediction.

A-106.

HYPERBARIC BUPIVACAINE 12MG WITH OPIOID FOR SPINAL ANESTHESIA IN CESAREAN SECTION-ED95 CONFIRMATION STUDY

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Introduction: Adjusting the dose of subarachnoid local anesthetic according to the patient's height is commonly practiced in Japan, However, the spread of spinal anesthesia has been shown not to correlate with the patient's height in cesarean section[1)], and Norris suggested fixed dose spinal anesthesia. Ginosar recently showed that ED95 for hyperbaric bupivacaine with opioid for cesarean section to be 11.2mg[2)]. We have routinely administered hyperbaric bupivacaine 12mg with opioid for cesarean section for the last 4 years. Thus, we conducted this study to validate the efficacy and document the safety of fixed dose of local anesthetic that is slightly higher than ED95 for spinal anesthesia in cesarean section.
Methods: After IRB approval, we retrospectively reviewed our obstetric anesthesia database from November 2002 to October 2005, which revealed 1,143 patients with regional anesthesia for C/S. Of these, 76 received either epidural anesthesia or sequential spinal-epidural anesthesia, due to the extremely short statue (<140cm) or co-existing cardiovascular or cerebrovascular disease. Remaining 1,076 consecutive patients received subarachnoid hyperbaric bupivacaine 12mg with fentanyl 10μg and morphine 0.15mg. Supplemental analgesic, sedative, or antiemetic was administered upon patient's complaint. Sensory level was assessed to cold stimuli. Newborn Apgar scores at 1 and 5min, and umbilical arterial (UA) pH were also evaluated.
Results: The patients' height was 157.8±5.5cm(mean±SD), with the range of 142cm to 179cm, and the body weight was 63.8±10.9kg(range:40~128kg). The highest intraoperative level of sensory blockade ranged from C2 to T10, and 84.3% of them between T1 and T4. Supplemental analgesic (fentanyl) was administered in 8.1% of the patients, sedative (diazepam) in 1.1%, and antiemetic (droperidol) in 1.1%. Conversion to general anesthesia was required in 0.6% of patients. Overall, 91.3% of the patients underwent cesarean section without supplemental analgesic or general anesthetic. There was no incidence of total spinal anesthesia. In 294 singleton neonates born at full term by elective C/S, Apgar score at 1min<7 was noted in 6 cases, but none had 5min score<7. UA pH was less than 7.2 in 4 cases, but none with UA pH<7.0.
Discussion: Hyperbaric bupivacaine 12mg with opioid was shown to be safe in 1,076 consecutive patients with no detrimental effect on the mothers and neonates. Also, this dose was adequate as the sole anesthetic agent in 91.3% of the patients. We did not achieve 95% success rate, although we used slightly larger dose than ED95. This discrepancy may be due to the technical error, such as losing some of the anesthetic agent when handling the syringe, or imperfect needle position. Considering these practical issues, this study validated the reported ED95 of hyperbaric bupivacaine in C/S.
References:
1) Norris MC, et al. Anesth Analg 1998; 67:5552 Ginosar Y, et al. Anesthesiology 2004; 100:676

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POSTER REVIEW 2

A-107.

LABOR ANALGESIA IN JAPAN: 50 YEARS OF CHANGE AND RECENT TRENDS

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Introduction: The cultural heritage of ancient Japan, believed that women should endure the pain of labor as it served to establish a close bond of mother and child. With respect to spiritual and religious beliefs, labor analgesia was thought of an undesirable interference with this natural bond. With the expansion of obstetric services more women have gained access to labor analgesia. The aim of this study was to compare the utilization of labor analgesia over the 50 years and to determine the current options availed to women in Japan.
Methods: We conducted a nationwide survey of university, primary and secondary hospital obstetric units. We requested delivery rate, analgesia options and utilization data from 1958 onwards. Indications for not using labor analgesia were requested from the current directors. Our criteria did include analgesia/anesthesia for operative delivery.
Results: From 1958-77, we found that parenteral analgesia with opiates and/or sedative agents had been mainly used[1)] (70% of university hospitals, 50% of primary and secondary facilities). Regional analgesia was introduced to Japan in the 1970's, and epidural analgesia (LEA) was the preferred method of labor analgesia in 50% of hospitals by 1986[2)]. From 1986 onwards, we observed a slight decrease in the utilization of labor analgesia. By 2002, labor analgesia was offered and performed in 50% of university hospitals. Maternal request was a low indicator for regional analgesia options[3)4)]. The main use of LEA was limited to cases where there was an obstetric or maternal medical indication. 2002 data revealed that LEA was the first choice method in all facilities. Very few hospitals that have introduced combined spinal epidural analgesia and/or patient-controlled epidural analgesia techniques. Currently, obstetricians perform most of labor analgesia, but the rate of utility is low. The reasons stated on why labor analgesia was not actively offered were as follows**:** "the patients dose not desire it"(24%), "the number of staff to do it is insufficient"(23%), "obstetrician policy is natural birth"(14%), and obstetrician dose not recommend labor analgesia"(10%).
Discussion: Maternal demand for a safe and pleasant childbirth experience has shown an increase in hospitals offering labor analgesia. LEA is the primary form of labor analgesia. However, the current obstetric units in Japan are experiencing a decrease in the number of obstetricians and neonatologists, resulting in staffing difficulties. Increasing the workload, by offering a 24/7 LEA service may overburden the status. Additionally, population report, fertility rate forecast for 2005 are hit record lows (1.25 babies per woman). The latest population report, fertility rate forecast for 2050 are 1.2 babies per woman, down from a previous projection of 1.39 in 2002.
Reference**:** 1)J. Obstet. Anesth.54,55;159-174:1980 2)J. Obstet. Anesth.62;11-19:1987 3)J. Obstet. Anesth 75;6:1995 4) Nihon Ijisinhou 4116;25:2003

A-108.

CONTINUOUS CARDIAC OUTPUT MEASURED BY ARTERIAL PRESSURE ANALYSIS DURING SPINAL ANESTHESIA FOR C-SECTION

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INTRODUCTION**:** A new method for arterial pressure-based continuous cardiac output (APCO) measurement that requires only standard radial artery catheterization was described and showed to be a reliable method to measure the cardiac output (CO) during and after surgery. The minimally invasive approach and the independency of need to calibration are its major advantages. This ongoing study evaluates the hemodynamic variations in women undergoing C-section under spinal anesthesia.
METHODS**:** After Intitution's Ethical Committee approval and patient's written informed consent, 7 healthy pregnant patients scheduled for elective c-section under spinal anesthesia were studied. The radial artery was catheterized and then baseline values of the cardiac output (CO), cardiac index (CI), systolic volume (SV), systolic volume index (SVI), heart rate (HR) and invasive systolic, diastolic and mean arterial pressures were obtained with the patients in supine position. The same variables were measured at the following moments**:** full lateral position, after the end of the preload (10ml/kg of Ringer Lactate,) immediately after the spinal anesthesia and then every two minutes until the end of the procedure. Spinal anesthesia was performed with 15 mg of hyperbaric bupivacaine and 60mcg of morphine. Blood pressure was checked every two minutes and hypotension defined as a 10% reduction of the baseline systolic blood pressure was treated with 0.2 mg of metaraminol. For reductions greater than 20% of the systolic baseline value, patients received a 0.4mg bolus of the same drug.
RESULTS**:** A total of seven patients were evaluated. The hemodynamic variations associated with spinal anesthesia for c-section are shown in table 1. Peak reductions on systolic volume and on systolic volume index occur 4 minutes following spinal anesthesia and peak reductions on mean arterial pressure occur 4 minutes later
Table 1.Hemodynamic variables during spinal anesthesia for C-section.

	Base-line	Lat-eral tilt	Pre-load	Spinal anesthe-sia (0min)	Mome nt (2min)	Mome nt (4min)	Mome nt (6min)	Mome nt (8min)	Moment (10min)	Moment (12min)	Moment (14min)	Moment (16min)	Moment (18min)	Deliv-ery	Oxyto-cin
CO (M/ SD)	5.3 0.8	6.2 1.6	6.4 1.2	6.4 1.2	5.6 1.0	5.4 0.7	5 0.5	4.6 1.2	4.7 1.8	4.7 0.5	4.7 0.4	6.2 0.6	5.2 0.7	5.5 1.4	6.0 0.9
CI (M/ SD)	3.2 0.5	3.8 1.1	4.4 0.7	3.9 0.7	3.4 0.6	3.3 0.4	3.0 0.4	2.0 0.7	2.8 0.4	2.9 0.3	2.8 0.2	3.8 0.4	3.2 0.3	3.4 0.9	3.6 0.5
SV (M/ SD)	63 8.3	70 15.1	70 11.8	67 9.7	58 7.0	52 8.5	54 8.0	51 14.5	59 18.1	61 8.5	62 14.9	78 21.8	75 10.5	74 17.1	66 4.6
SVI (M/ SD)	38 5.8	43 10.3	43 6.8	41 5.7	35 4.2	32 5.1	33 5.4	33 8.8	36 10.8	37 5.4	38 8.6	48 14.4	43 7.1	46 6.7	41 6.9
HR (M/ SD)	84 9.6	84 12.4	86 11.1	90 14.1	89 22.3	100 18.3	103 18.5	92 22.2	82 23.2	78 15.0	77 11.1	74 11.4	71 19.9	75 11.7	85 16.5
SAP (M/ SD)	117 21.1	118 32.6	120 13.8	136 13.0	130 18.4	127 7.6	118 14.4	110 14.9	128 10.8	114 11.4	122 18.7	116 25.1	119 24.2	123 18.1	111 10.5
MAP (M/ SD)	87 9.8	81 23.6	89 10.1	100 16.6	102 12.8	92 5.8	79 9.4	75 11.2	96 16.5	83 15.3	87 11.5	83 18.8	87 16.0	75 14.3	77 37.1
DAP (M/ SD)	64 10.1	67 19.1	68 13.0	73 15.0	75 16.6	68 10.2	57 8.6	54 9.4	71 10.6	60 15.0	59 9.8	59 13.6	63 10.3	58 17.0	55 14.0

DISCUSSION: Spinal anesthesia for c-section is associated with significant hemodynamic changes. Peak reduction on systolic volume precedes the peak reduction on mean arterial blood pressure. Therapies that rapidly increase the systolic volume should be started immediately following spinal anesthesia.
References**:**
Crit. Care Méd.32,A43(2004)

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POSTER REVIEW 2

A-109.

INCIDENCE OF BACTERIURIA IN WOMEN RECEIVING LABOR EPIDURAL ANALGESIA

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Introduction: During pregnancy, structural and functional changes place women at risk for asymptomatic bacteriuia (ASB) and urinary tract infections (UTIs). During delivery changes result in a more flaccid and hypotonic bladder, predisposing to urinary retention.[1] Certain factors may make parturients susceptible to ASB and UTIs; including labor epidural analgesia (LEA), longer duration of labor, urinary catheterizations, and perhaps morbid obesity.[2] The cause effect relationship of these factors is unclear. Many women receive prophylactic antibiotics for group B Streptococcal vaginal infections. The UTIs incidence in our patient population was unclear, by retrospective analysis. We studied prospectively the incidence of bacteriuria in women 24 hours after vaginal delivery and the relationship to these three factors.
Methods: Study protocol received IRB approval. Eligible women met the inclusion criteria, received labor epidural analgesia, and delivered vaginally. 88 evaluable patients were necessary based on earlier studies that found an incidence of ASB of 6.1%, so as to estimate our current UTI incidence with 95% confidence. Demographics were obtained, and day 1 after delivery the women answered a questionnaire about urinary tract infection symptoms, LEA satisfaction, and agreed to review of their labor and delivery records. The women supplied a clean-catch midstream urine sample that was analyzed and considered significant for 100,000 cfu's. Results were analyzed by descriptive statistics, 2 groups divided based on patients' body mass index, and the groups compared by Chi-Square analysis.
Results: The study yielded a 6.6% incidence of significant bacteriuria on day 1 postpartum. A very high incidence of clean catch samples (18.9%) reported mixed flora; but had negative cultures. 48 women had a BMI < 30 kg/m^2 (1 + UTI), 43 had a BMI > 30 kg/m^2 (5 + UTIs); X^2 p=0.16. Results of stratification of the 2 BMI groups according to length of labor and number of urinary catheterizations is in Table 1. All 6 UTIs occurred in the group B negative women who did not receive antibiotics.

Positive UTIs	Length of labor minutes	Number catheterizations	X^2 Significance:
BMI < 30 1 UTI	442 +/- 35	1.2 +/- 0.2	p = 0.31
BMI > 30 5 UTIs	490 +/- 39	1.3 +/- 0.2	p = 0.36

mean +/- standard deviation
Discussion: A non-statistical tendency exists for peripartum women who receive labor analgesia with BMI's > 30 kg/m^2 to develop UTIs. Logistically this type of study is difficult utilizing clean-catch urine cultures due to contamination.
References**:**
1. Am J Obstet Gynecol 187 (2) p431, 2002 2. The Annals of Pharmacotherapy 38 p1692, 2004

A-110.

ASSESSMENT OF PNEUMONIA SEVERITY IN PREGNANCY

AUTHORS: A. J. Macfarlane, E. McGrady;
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Introduction: Both the British (BTS) and American (ATS) Thoracic Societies have proposed criteria to assess the severity of pneumonia in non pregnant patients.[1,2] We decided to retrospectively apply these criteria to pregnant patients with pneumonia in our unit who had required High Dependency (HD) Care or Invasive Ventilatory support.
Methods: The labour suite HD admission records were retrospectively examined for diagnoses of pneumonia over a 3 year period commencing January 2004. Case notes were then reviewed. If pneumonia was the diagnosis, features of the case matching the BTS or ATS criteria (shown in table below) were sought.
Results: During the three year period there were 16297 deliveries. 8 potential patients were identified from HD records. Notes were available for 6. 5 of the 6 patients reviewed had pneumonia requiring admission to HD. The other had acute respiratory distress syndrome secondary to gram negative sepsis and was excluded. The frequency with which BTS and ATS criteria were fulfilled by each of the 5 patients is shown in the table.

BTS	Criteria met	ATS	Criteria met
Confusion	0/5	Major criteria	
Diastolic BP<60mmHg	2/5	Septic shock	1/5
Respiratory rate>30min^{-1}	3/5	Mechanical ventilation	2/5
Urea >7mmoll^{-1}	0/5	Minor criteria	
Additional prognostic factors		Systolic BP<90mmHg	2/5
Bilateral CXR changes	2/5	Multilobar CXR changes	2/5
SpO_2<92%/pO_2<8kPa	5/5	PaO_2(mmHg)/FiO_2<250	4/5

2 of the 5 patients required invasive ventilation. Both had 3 BTS, and 2 minor and 1 major ATS criteria. The other 3 patients had 1, 2 and 3 BTS and 0, 1 and 3 ATS minor criteria respectively.
DISCUSSION: In this small sample of pregnant patients with pneumonia requiring HD admission it appears that the most frequently occurring indicators of severity are SpO_2<92%/ pO_2<8kPa and PaO_2(mmHg)/FiO_2<250. Baseline respiratory rate, blood pressure and urea change in pregnancy and perhaps the stated criteria are less sensitive markers of pneumonia severity during pregnancy. In our sample the need for mechanical ventilation did not always correlate with the presence of an increased number of ATS or BTS criteria.
References:
1. British Thoracic Society. Guidelines for the management of community acquired pneumonia in adults. Thorax, 56**:** suppl 4 (2004).
2. American Thoracic Society. Guidelines for the management of Adults with Community Acquired Pneumonia. Am J. Respir Crit Care Med, 163**:** 1730-54 (2001).

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POSTER REVIEW 2

A-111.

DO YOU GET WHAT YOU PAY FOR? A COMPARISON OF A RADIOLOGISTS' ULTRASOUND MACHINE WITH A STANDARD OBSTETRIC ULTRASOUND FOR ASSISTANCE WITH EPIDURAL PLACEMENT

AUTHORS: B. S. Saltzman, M. A. Soens, J. S. Ranasinghe, D. H. Penning, D. J. Birnbach;
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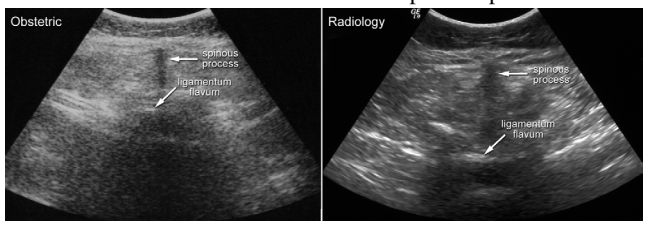
Introduction: The use of ultrasound has been shown to facilitate the placement of neuraxial anesthetic blocks.[1] However, the visibility of the ligamentum flavum, dura, and epidural space decreases significantly during pregnancy[2]. Therefore, it has been our experience that the efficacy of ultrasound imaging for epidural placement is sometimes suboptimal in this patient population. To assess whether a higher quality ultrasound machine, as used by the radiologists, could improve the visibility of the epidural space in parturients, we compared images obtained with an ultrasound machine used by the obstetricians in their every day practice (Phillips Ultramark 400C), with the images obtained with an ultrasound machine used by the radiologists/ultrasonographers (GE logic 9) at our institution.
Methods: Both short- and long axis views of the lumbar spine of a 26 year old patient at 32 weeks of gestation, with a history of difficult epidural placement, were obtained with two different ultrasound machines. The obstetric ultrasound (Phillips Ultramark 400C, software level 20403, convex 3.5 MHz used at 2.2 MHz) was compared with the radiologist's ultrasound (GE logic 9, convex 3.5 MHz, used at 4 MHz.).
Results: As illustrated, the use of a higher quality machine provided us with a better appreciation of the ligamentum flavum, dura, vascular structures and bony landmarks compared to the images obtained with the obstetric ultrasound. Additionally, we found that the long axis view obtained with the obstetric ultrasound was very hard to interpret, while the same view obtained with the radiologist's machine provided us with valuable information such as identification of interspinous spaces.



Discussion: In most cases the standard ultrasound equipment available in obstetric suites is adequate for identification of the gross anatomy of the back; allowing visualization of midline, spinous processes, paraspinous muscles and ligamentum flavum. Depth to the ligamentum flavum can also be assessed, thus allowing more information to the anesthesiologist attempting a difficult epidural. However, in cases in which the resolution of these machines is inadequate, consulting a radiologist may result in better images allowing enhanced visualization of the epidural space and potentially improving block success.
References:
1. J Clin Anaesth 2002;14:169-175
2. Br J Anaesth 2001;86:798-804

A-112.

A RANDOMIZED, DOUBLE-BLIND, PLACEBO CONTROLLED TRIAL OF ILIOINGUINAL-ILIOHYPOGASTRIC (IGIH) NERVE BLOCKS AND NEURAXIAL MORPHINE FOR POST-CESAREAN (C/S) ANALGESIA

AUTHORS: A. Wolfson[1], R. Wong[1], D. Penning[2];
AFFILIATION: [1]Johns Hopkins Hospital, Baltimore, MD, [2]University of Miami, Miami, FL.

Introduction: A study of IGIH demonstrated decreased systemic opioid requirements in the first 24 hours following C/S (1). However, that study failed to show any decrease in opioid related side-effects. The use of neuraxial morphine for post Cesarean analgesia has become standard. However, the high incidence of narcotic-related side-effects, especially respiratory depression, limits the patients' ability to receive further narcotic supplementation. In this study we proposed that IGIH nerve blocks in conjunction with neuraxial morphine will decrease the need for opioid supplementation in the first 24 hours after C/S. Secondarily, we hypothesize a reduction in pruritis and nausea.
Methods: After Institutional Review Board approval, informed consent was obtained from women presenting for non-emergent Cesarean delivery. Patients were randomly assigned to IGIH blocks with 0.5% bupivicaine or saline and the assessors and persons performing the block were blinded to the assignment. Power analysis has shown we will need to recruit 22 patients per randomized arm to have 90% power and a two-tailed error of less than 0.025. Anesthesia for Cesarean delivery was induced with either a standardized spinal (12 mg of 0.75% Bupivacaine, 10 mcg Fentanyl, and 200 mcg preservative-free Morphine) or epidural (400 mg of 2% Lidocaine with 5 mcg/ml Epinephrine and 3.5 mg of preservative-free Morphine) at the discretion of the attending anesthesiologist. The IGIH nerve blocks were performed by a standardized method using a multi-injection technique. The total number of injections was 6 per side (2 mL per injection) leading to 24 mL per patient. Adequacy of the block was not accessed in the recovery room to preserve the double blind nature of the study. Post-operative pain rescue consisted of intravenous Ketorolac 30 mg at first request for pain relief. If the patient did not report an improvement she was offered 1 to 2 Tylox tablets every 4 to 6 hours upon request. If this did not alleviate the pain, a Morphine IV-PCA was initiated without a continuous infusion and an initial setting of 2 mg every 10 minutes. Post-operative assessment consisted of VAS measurements at 0, 6, 12, 18, and 24 hours after arrival in the recovery room. 24-hour Ketorolac, Tylox, and Morphine usage via IV-PCA was recorded. We also tracked each participant's perception of nausea, vomiting, level of exhaustion, and overall satisfaction with her pain management at each of the time intervals.
Results: This study is presently ongoing.
Conclusion: No conclusions can be drawn at this time.
References:
1. Bell EA, Jones BP, Olufolabi AJ, et al. Iliohypogastric-ilioinguinal peripheral nerve block for post-Cesarean delivery analgesia decreases morphine use but not opioid-related side effects. Can J Anaesth. 2002 Aug-Sep;49(7):694-700.

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POSTER REVIEW 2

A-113.

PRESSURE DISPLACEMENT COMPARING CONTINUOUS VS INTERMITTENT TECHNIQUE

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INTRODUCTION: Epidural is the most common technique in obstetrics. Epidural puncture is typically done using landmarks and the loss-of-resistance technique.The objective of this research is to accurately measure and relate the physical quantities**:** applied force, fluid pressure and plunger displacement.
METHODS: A small one-axis force sensor fitted between the thumb and plunger was used to measure the applied force against the plunger. A displacement sensor fitted along the cylinder and the plunger was used to measure the relative displacement. A pressure sensor attached at the needle-cylinder interface was used to measure the fluid pressure. The epidural was done, by an anesthesiologist on porcine spine while a computer operator monitored and captured all three sensor data. The anestheologist performed two methods of detecting loss-of-resistance**:** applying continuous force to the plunger and continually "bouncing" the plunger
RESULTS: A static model takes into account applied force and static friction forces. A dynamic model extends the static model by incorporating pressure variations and velocity of incompressible, non-viscous fluids. The dynamic model did not take into consideration continual leakage of fluid with continuous pressure. An exponential decay model incorporated fluid leakage into the tissue and along the plunger-cylinder interface. All the models relate pressure with the applied force and/or displacement. The error (or the difference of the theoretical pressure and measured pressure squared) E for typical experiments for both "smooth" and "bouncing" technique are shown in Table.TABLE. The error between theoretical and measured pressure, E and standard deviation, SD for epidural procedure.

Technique	$E_{dynamic}$	$SD_{dynamic}$	E_{decay}	SD_{decay}
Smooth	2.1	0.8	1.2	0.7
Bouncing	1.4	0.7	2.1	0.6

DISCUSSION: Depending on the technique, the data fitted more accurately over different models. The dynamic model was more accurate for the bouncing technique because the pressure depended more significantly on the applied force than leakage. The bouncing causes significant movement of the plunger and applying pressure on the fluid without allowing enough time for the leakage to significantly change the pressure. The decay model was more accurate for the smooth technique since a relatively constant applied force makes pressure loss due to leakage much more significant. The loss-of-resistance felt by the anestheologist was always reflected by the significant drop in the pressure, drop in force and change in displacement in a short period of time and rapid injection of fluid.
REFERENCES**:**
Anesth Anal. 1998;86(3):635-9.

A-114.

STERILE TECHNIQUE PRACTICES (STP) FOR OBSTETRIC NEURAXIAL ANALGESIA AND ANESTHESIA (ONAA): A NATIONAL SURVEY IN ISRAEL

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Introduction: Wide variations in STP for ONAA still exist. The Israel Association of Obstetric Anesthesia (IAOA) coordinated a national survey of STP for ONAA among anesthesiologists. We present preliminary data from hospitals affiliated to all four Israeli medical sculls (Beer-Sheva, Jerusalem, Tel-Aviv and Hayfa). The national survey when completed is intended as preparation for national guidelines in Israel and will constitute the reference to assess their impact.
Methods: Between October and December 2006, questionnaires were sent to staff meetings of anesthesiologists working in the target hospitals. Forms were field anonymously and collected immediately.
Results: The responds rate was in excesses of 80% in each hospital sample. In total 135 forms were fill and return, which represent 18.9% of the 711 anesthesiologists (1) working in Israel. Not all questions were answered, so the denominator is not constant throughout. There were 35/131 females and 96/131 males. The average age was 45(29-74). 67/135(45.5%) were specialists, 56/135(41.5%) residents and 12/135(9%) neither. 48/123(39%) reported >10000 deliveries/year in the hospital. 56/123(45.5%) between 5-10000 deliveries/year and 18/123(14.5%) < 5000 deliveries/year. Date for masks, gowns and handwashing appeared in the table. Of anesthesiologists who regularly wash the hands before ONAA, 38/85(45%) use soap, 13/85(15%) alcohol, 18/85(21%) both soap and alcohol, 10/85(12%) surgical protocol and 6/85(7%) reported another handwashing practice. For skin preparation 124/130(95.3%) use chlorexidine-alcohol, 4/130(3%) use povidine-iodine and 2/130(1.5%) use a combination of both. 69% apply 3 layers of antiseptic solution, and 26.9% apply 4 layers. 93/106(87.7%) use reusable sterile drapes, 13/106(12.3%) use disposable drapes. 55/130(42.3%) report written local guidelines for STP, while 56.6% either have no knowledge of the existence of these guidelines (37/130) or report that these guidelines do not exist (38/130). 95/124(76.6%) report no change in STP in the labor ward from their practice in the OR. 99/124(79.8%) confider their practice to be adequate, 12/124(9.7%) >adequate and 13/124(10.5%) <adequate. 16/135(11.8%) reported direct personal experience of serious infectious complication of ONAA, either in their patients or in those of a colleague.

Question	Number of respondents	Always	Usually	Rare	Never
Remove of jewelry	126	67(53%)	14(11%)	10(8%)	35(28%)
Hands washing	129	59(45.7%)	38(29.5%)	14(10.9%)	17(13.9%)
Mask using (anesthesist)	130	90(69.2%)	16(12.3%)	14(10.7%)	10(7.8%)
Mask changing	130	43(33%)	38(29.3%)	32(24.7%)	17(13%)
Mask using (nurse)	130	15(11.5%)	9(7%)	26(20%)	80(61.5%)
Hat/Cap	130	80(61.5%)	28(21.5%)	17(13%)	5(4%)
Sterile gown	129	55(42.6%)	3(2.3%)	19(14.7%)	52(40.3%)
Sterile Tegaderm	128	118(92%)	8(6.3%)	-	2(1.7%)

DISCUSSION: These results highlight the differences in policy and practice between different hospitals and anesthesiologists. While serious complications are rare, there is a growing need for an accepted standard for STP for ONAA.
1-Isr Med Assoc J. 2006;8:255-60

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POSTER REVIEW 2

A-115.

POSTOPERATIVE ANALGESIA IN LOWER SEGMENT CAESEREAN SECTION: RANDOMISED CONTROLLED DOUBLE BLIND CLINICAL TRIAL COMPARING INTRATHECAL MIDAZOLAM AND INTRATHECAL TRAMADOL

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Introduction: Intrathecal opioid administration has been demonstrated to provide effective postoperative analgesia[1]. It becomes difficult to provide pain relief in a small hospital setting in a developing world where opioid adjuncts are not available and where postoperative analgesia is restricted to parenteral and oral opioids and/or NSAIDS[2]. We wished to investigate the feasibility of using tramadol and midazolam as intrathecal adjuncts for postoperative analgesia.
Methods: After institutional ethics committee approval, 108 pregnant females (ASA grade I, II) scheduled for elective lower segment caesarean section, gave written consent and were randomized to receive 0.5% heavy bupivicaine 2.3 mls (group I, n=36) or 0.5% heavy bupivicaine 2.3mls + midazolam 2mg (gpII, n=36) or 0.5% heavy bupivicaine 2.3ml +tramadol 25 mg (Gp III, n=36) and evaluated for postoperative pain relief. Postoperative pain was assessed by visual analogue scale (1-10).Postoperative parameters measured were time to first pain, postoperative duration of analgesia and time interval from first pain to significant pain. The statistical difference in duration of analgesia, time to first pain was evaluated using One way analysis of variance followed by Bonferroni "t" to evaluate differences among the groups. A p value of <0.05 was considered as statistically significant except for Bonferroni't' where a p value of <0.006 was used.
Results: It was seen that the postoperative duration of analgesia, time to first pain, time latency from first pain to significant pain (VAS at rest 5 and 8 on induced cough) was prolonged in group II & III as compared to group I. The mean time for first pain was 2.2 ± 0.7 hours in groupI, 3.2 ± 0.6 in groupII and 4.0 ± 0.4 in group III. The time taken from first pain to distressing pain was 1.4 ± 0.2 hours in group I, 2.7 ± 1.0 hours in group II, and 3.0 ± 0.5 in group III. The total duration of postoperative analgesia was 3.8 ± 0.5 hours in group I, 6.1 ± 1.0 in group II and 6.5 ± 0.5 in group III. Side effects observed were not statistically significant between groups
Conclusion: We conclude that addition of tramadol and midazolam potentiates analgesic effects of intrathecal bupivicaine with minimal side effects and can serve as effective adjuncts to subarachnoid block.
References:
1. Br J Anaesth 2003 Oct; 91(4):536-40. Effect of intrathecal tramadol administration on postoperative pain after transurethral resection of prostate. Alhashemi JA, Kaki A.
2. J Indian Medical assoc. 2001 Dec; 99(12):683-4,686.Intrathecal midazolam for postoperative pain relief in caesarean section delivery. Sen A, Rudra A, Sarkar SK, Biswas B.
3. Reg Anesth Pain Med, 2006 May-Jun; 31(30):221-6.Analgesic efficacy of two doses of intrathecal midazolam with bupivicaine in patients undergoing cesarean delivery. Prakash S, Joshi N, Gogia R, Singh R.

A-116.

A COMPARISON BETWEEN THE GLASS SYRINGE AND THE EPISURE AUTODETECT SYRINGE FOR IDENTIFYING THE EPIDURAL SPACE USING THE LOSS OF RESISTANCE TECHNIQUE

AUTHORS: A. S. Habib, R. B. George, T. K. Allen, A. J. Olufolabi;
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INTRODUCTION: The loss of resistance (LOR) technique is commonly used to identify the epidural space (ES). The Episure AutoDetect syringe (EAS) is a new LOR syringe with an internal compression spring that applies constant pressure on the plunger. This obviates the need to apply pressure on the plunger and allows the operator to use both hands while continuously advancing the epidural needle. The plunger of the syringe automatically depresses when the needle enters the ES. This study compares the performance of the EAS with that of the glass syringe (B.Braun Medical Inc, Bethlehem, PA) when used to identify the ES in laboring women in a teaching institution.
METHODS: After IRB approval, laboring women requesting epidural analgesia were enrolled. All epidurals were inserted in the sitting or lateral position using an 18 G Tuohy needle. The blocks were performed by 7 residents and 2 attendings. The residents alternated the use of the glass syringe and EAS during their 4 weeks rotation. Each syringe was used for a week before switching to the other syringe. Data recorded included patient demographics, cervical dilatation, depth to the ES, number of attempts, time to locate the ES, the occurrence of false LOR, inadvertent dural puncture, intravascular placement, and failed blocks.
RESULTS: 278 women were enrolled in this study. The residents performed 258 blocks and the attendings 20. Four residents were second year residents on their second obstetric anesthesia rotation, while three were first year on their first rotation. The results are summarized in the table. There were 4 failed blocks requiring catheter replacement in the glass syringe group and none in the EAS group (p=0.053). There were 3 inadvertent dural punctures with the glass syringe. The time needed to identify the ES was quicker with EAS (p=0.04). On 4 occasions, the residents switched from the EAS to the glass syringe due to loss of saline from the EAS on 3 occasions, and the need for frequent redirection during placement of a difficult epidural on one occasion.

Data are mean ± SD, median (range), or number (%), *p<0.05.

	Age, yrs	Height, cm	Weight, kg	Cervical Dilatation, cm	Depth to the space, cm	Number of attempts	Inadvertent dural puncture	Failed blocks	Intravascular catheter	False loss of resistance	Time to identify the epidural space, sec
Glass (n=134)	28 ± 7	163 ± 8	86 ± 21	4 ± 2	6 ± 2	1 (1-6)	3 (2.2 %)	4 (3 %)	6 (4.5 %)	5 (3.7 %)	52 ± 8
Episure AutoDetect (n=144)	26 ± 6*	162 ± 8	82 ± 16	4 ± 2	6 ± 1	1 (1-3)	0 (0 %)	0 (0 %)	9 (6.3 %)	3 (2 %)	32 ± 6*

CONCLUSION: The EAS reliably and quickly identified the epidural space in laboring women. Further larger studies are required to confirm whether the use of this syringe will be associated with a significantly lower incidence of inadvertent dural punctures.

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POSTER REVIEW 2

A-117.

OBSTETRICAL CRISIS SIMULATION TRAINING IN GENERAL ANESTHESIA FOR MATERNAL CONDITION "O" EMERGENCY EVENTS

AUTHORS: P. L. Dalby, J. Sadler, J. Waters, H. Simhan, G. Gosman;
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Introduction: Anesthesia practices in labor and delivery at Magee-Womens Hospital (MWH) utilize predominantly regional anesthesia techniques with only 2-3% of cesarean sections employing general anesthesia (GA). Anesthesia residents rotate for two month rotations in the labor and delivery suite. Some of these trainees may never give GA to a parturient. GA is employed primarily for emergent operations, thus there is concern in the anesthesia community about trainees achieving competence in this area. (1) In 2005 MWH developed a crisis team management response to obstetrical and fetal emergencies called "Condition O". A preexisting high fidelity simulation center (the Peter M. Winter Institute for Simulation, Education and Research, called WISER) at our institution allowed development of a multidisciplinary Obstetric Crisis Team Training Course (OCTT). This course allows trainees to practice the performance of urgent GA for parturients.
Methods: The OCTT is a full scale simulation course that focuses on team function in the setting of obstetric crises. The course was designed to train the obstetric crisis team responders at MWH. Thus, the course trains a multidisciplinary group of practitioners and trainees, including anesthesiologists, obstetricians, and obstetric nurses. One of the core scenarios is a fetal bradycardia leading to emergency cesarean section. Anesthesia residents who had participated in the course were surveyed from 1 to 10 months after the course about the impact of the course on their competence and confidence with emergent GA and other obstetric crisis skills. This was a 10-item survey utilizing a 4 point Likert scale. Results are presented as mean with interquartile ranges and also as mode values.
Results: To date, 10 anesthesia trainees have participated in the course. 8 of 10 responded. Participants have voiced appreciation of the logistical power of "Condition O", different disciplines problems, and crisis team dynamics appear enhanced immediately after the course. Survey results demonstrate that respondents perceived moderate to significant improvement in confidence and skill with urgent obstetric GA and other obstetric crises after participating in the course. Results are in Table 1.

Question on OCTT Survey 1-9 Graded Scale 1 = not at all; 2 = somewhat; 3 = moderate; 4 = significant	Median Answer &Hi -Lo (IQR) Interquartile range (Mode)
1. My communication skills have improved at work	3 IQR 2 - 3.25 (3)
2. My level of awareness of team needs has improved	3.5 IQR 3-4 (4)
3. I feel more confident about my ability to provide general anesthesia for an emergency c-section	3 IQR 3-3.25 (3)
4. I have a better understanding of communication issues involved in 3.	4 IQR 2.75-4 (4)
5. My skill in administering a general anesthetic to a parturient for an emergency c-section has improved	3 IQR 3-4 (3)
6. The amount my confidence has increased during an obstetrical crisis	3 IQR 2.75-4 (3)
7. The time it takes me to identify a maternal/ fetal crisis and execute a procedure has improved since OCTT	3.5 IQR 2-4 (4)
8. My ability to assume a clear role during an obstetrical crisis has improved	3 IQR 2.75 -4 (3)
9. The amount I learned from participants during OCTT from other specialties than me	3.5 IQR 3-4 (4)
10. I have had additional opportunities to administer general anesthesia for an emergency c-section since OCTT	Yes 4 No 4 Average # times 1

Conclusions**:** A multidisciplinary team training course using full scale human simulation can improve anesthesia residents' perceptions of their confidence and skill in performing emergency obstetric GA and dealing with other obstetric crisis situations.
References**:** (1) Anaesthesia 55 p63-183; 2000

A-118.

DURAL PUNCTURE WITH A 25-GAUGE WHITACRE NEEDLE ENHANCES EPIDURAL LABOR ANALGESIA

AUTHORS: L. C. Tsen, E. Cappiello, N. O'Rourke, S. Segal;
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Introduction: The combined spinal epidural technique (CSE) provides rapid onset labor analgesia, verification of epidural proximity, and augmentation of the progress of labor. Risks associated with the technique, however, include hemodynamic instability, fetal bradycardia, and the inability to confirm the functional status of the epidural catheter. Attempts to improve the risk/benefit ratio include performing the CSE technique, but placing medications only in the epidural space. Using this method, Suzuki et al (1) demonstrated that faster onset and improved sacral distribution of surgical anesthesia could be obtained with a 26G spinal needle. By contrast, Thomas et al (2) observed that the provision and quality of labor analgesia was not improved with a 27G spinal needle. We hypothesized that a larger 25G spinal needle would allow increased subarachnoid transfer of epidurally administered drugs, thus improving labor analgesia.
Methods: Following IRB approval, 80 nulliparous parturients less than 5cm dilated, were randomized in a double-blind fashion to receive a standardized epidural technique with or without a single 25G Whitacre dural puncture. Following successful placement of the needle(s) and the epidural catheter, the catheter was dosed with 12 mL of 0.25% bupivacaine (B) and followed with a PCEA infusion of 0.125%B + 0.2mcg/mL fentanyl. Onset of analgesia, sensory and motor level, number of interventions, drug use, and side effects (hypotension, pruritis, nausea, and fetal heart rate changes) were recorded.
Results: In demographically similar groups, parturients with the dural puncture had a reduced incidence of one-sided block (absolute risk difference [95% CI] 17.3% [1.5, 33.1]) and an increased frequency of achieving a VAS score less than 10 (absolute risk difference 19.6% [1.0, 38.2]), and of blocking the S1 dermatome (absolute risk difference 22.3% [5.8, 38.8]). The median highest dermatome blocked was T10 in both groups, and the time to achieving the highest level did not differ between groups (mean [95% CI] difference dural puncture vs. control, -13.2 [-32.0, 5.5] minutes). The incidence of S2 block, the incidence of unilateral sacral block of ether S1 or S2, and the times to achieving S1 or S2 blocks did not differ between the groups. There was a trend towards longer total epidural time in the dural puncture group (mean difference 82.3 [-9.7, 174.2] minutes, P=.08). There was no difference in the incidence of cesarean section, but among vaginal deliveries, 83.3% were spontaneous in the control group, versus 55.6% in the dural puncture group (P=0.04).
Discussion: The addition of a 25G Whitacre dural puncture to the epidural technique improves the quality, bilateral nature, and sacral spread of labor analgesia but results in more instrumental vaginal deliveries and possibly longer labor.
References**:**
1.Suzuki et al. Anesth Analg 1996;82:1040-2.
2.Thomas et al. Anesthesiology 2005;103:1046-51.

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POSTER REVIEW 2

A-119.

CLINICAL COMPARISON OF TWO STYLET ANGLES FOR INTUBATION WITH THE GLIDESCOPE® VIDEOLARYNGOSCOPE

AUTHORS: M. Dupanovic, S. A. Isaacson, S. Jain, Z. Borovcanin, S. Karan, S. P. Messing, S. Korten;
AFFILIATION: University of Rochester, Rochester, NY.

Introduction: Tracheal intubation with the GlideScope® Videolaryngoscope (GVL, Verathon Inc., Bothell, WA, USA) can fail even with complete glottic visualization. The most optimal configuration of a styletted endotracheal tube (s-ETT) that allows reliable completion of the GVL assisted intubation is unknown. In this prospective clinical trial we compared the success of orotracheal intubation and time to intubation (TTI) utilizing the GVL and 60º vs. 90º angled stylets.
Methods: Four attending anesthesiologists, blinded to the particular stylet angle, were randomly assigned to intubate 120 adult patients (n = 60 for each group) using the GlideScope®. Each ETT was mounted over a malleable stylet such that the concave tube surface faced backward (opposite to the stylet bend) to facilitate tracheal tube placement. The primary outcome was intubation success using the assigned stylet within 62-s. The secondary outcome was the actual TTI.
Results: The odds ratio for intubation success was significantly higher in the 90º group (OR = 10.41, p = 0.029). There were nine failures in the 60º group and only one in the 90º group. Inability to deliver the tip of the ETT to the glottic opening caused seven failures in the 60º group. TTI>62-s was a cause of two failures in the 60º group and one failure in the 90º group. The mean TTI was lower using the 90º stylet (31.27 ± 11.51) vs. 60^0 stylet (34.05 ± 28.14). However, the median TTI was lower using the 60º stylet (26 seconds for the 90º stylet vs. 24 seconds for the 60º stylet, p = 0.041). Application of ELM had an inverse effect on intubation success within 62-s (OR=0.08, p < 0.001).
DISCUSSION: A reliable delivery of the ETT tip to the glottic opening was critical for higher intubation success in the 90º group. Differences in TTI were not clinically significant. Adoption of the described technique may help to maximize the success of the GVL assisted tracheal intubation. Further clinical studies are warranted to learn more about intubation with this novel device, and to define the advantages and the limitations of the GVL in difficult airway management.
References:
1. GlideScope Video Intubation System. System Operation & Service Manual, Saturn Biomedical Systems Inc., Burnaby, BC, Canada, 2003; pages 17-9.

A-120.

EMERGENCY EPIDURAL IN LABOUR: CAN IT IMPROVE DELIVERIES?

AUTHORS: L. D'Andrea[1], A. Moretto[1], S. Baglioni[1], A. Cavaleri[1], L. Lampati[1], M. Gili[1], A. Pesenti[2];
AFFILIATION: [1]Perioperative Medicine and ICU Dept. - S. Gerardo Hospital, Monza, Italy, [2]University of Milano-Bicocca, Milano, Italy.

INTRODUCTION: The labour ward our hospital is a unit with 2800 deliveries/year. It is also a tertiary referral centre for complicated pregnancies in a large area (about 1,000,000 people). For more than 25 years our obstetric department has promoted non medicalised deliveries and doesn't accept maternal Epidural Analgesia (EA) request before labour. In this setting, we usually insert Epidural Catheter in case of pre-existing maternal pathology. About three years ago (March 2004) we began to perform EA if there is evidence of complicated labour. These interventions are carried out in an emergency situation in not-scheduled not-preassessed exausted women at any stage of labour. Our aim was to relief the strong pain experienced by women in these labours. Is there a reduction in the incidence of Cesarean Sections (CS) and Instrumental Deliveries (ID) in these cases? What about complications?
METHODS: Our indications to Emergency EA are**:** prolonged latent phase, oxytocin use for induction or augmentation of labour at less than 5 cm, uterine hypercinesia, dystocia, secondary arrest of cervical dilation, strong urge to push in the 1st stage of labour, pain not responsive to non pharmacological methods of pain relief. EA execution**:** Epidural Catheter placement using LOR to saline technique, top-up analgesia management with Ropivacaine 0.1% to 0.15% (15 to 20 mL) according with labour stage plus low dose Fentanyl (max 75γ total for each partirient).
RESULTS:

Emergency EA	2004	2005	2006	Total
Epidural Analgesia (n.)	63	114	245	422
Cesarean sections (n.)	22 (34.9%)	35 (30.7%)	57 (23.3%)	114 (27.0%)
Instrumental deliveries.	7 (11.1%)	10 (8.8%)	16 (6.5%)	33 (7.8%)

From a rectrospective analysis of women with same labour abnormalities but not treated with EA, we observed a CS incidence of 37.2% and an ID incidence of 7.6%. The overall incidence of CS in labouring women (usually around 10% in our institution) was 8.6% in 2006. We had one unintended dural punture (with mild PDPH of 28 hours, no blood patch needed) and one epidural vascular catheter placement (prompt recognition, no injection) as unique technical complications. The efficacy was good**:** VAS= 9.1±1.3 (before I dose) and 1.7± 1.5 (30 min later). Maternal satisfaction was**:** Good (79%), Sufficient (19%), Inadeguate (2%). Neonatal outcome was similar with or without EA.
DISCUSSION: The use of Emergency EA shows a very good efficacy on the strong pain women experience during these disfunctional labours. Moreover our experience suggests an improvement in these complicated labours and deliveries without increase of complications.

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POSTER REVIEW 2

A-121.

IS MATERNAL ARM BLOOD PRESSURE MONITORING A SUFFICIENT INDEX OF FETAL WELL-BEING FOLLOWING SPINAL ANESTHESIA FOR CESAREAN SECTION?

AUTHORS: S. Irikoma;
AFFILIATION: Seirei Hamamatsu General Hospital, Hamamatsu, Japan.

Introduction: In our clinical practice we routinely monitor fetal heart rate (FHR) during the placement of spinal anesthesia for all patients undergoing cesarean section (CS). The aim of our study was to determine the frequency and significance of FHR deceleration without persistent maternal hypotension.
Methods: After IRB approval we reviewed the charts of 465 women from January 2005 to December 2006 with term singleton pregnancy for elective CS. All parturients received a combined spinal-epidural anesthesia in the lateral position using intrathecal 0.5% bupivacaine or 2% lidocaine with preservative-free morphine. External FHR monitoring was performed using TOITU MT320 and non-invasive maternal blood pressure was monitored using COLIN BP-508 every 2 minutes. FHR monitoring continued until just prior to surgical preparation. All patients received intravenous fluid during the placement of the spinal block. When the maternal systolic blood pressure decreased to less than 100 mmHg, standard maneuvers of rapid intravenous crystalloid administration, supplemental maternal oxygen administration and immediate intravenous bolus of ephedrine were carried out. We defined persistent maternal hypotension as maternal blood pressure less than 80 mmHg lasting for 5 minutes and FHR deceleration as less than 100 beats per minute.
Results: FHR deceleration occurred in 5 cases (1.1%) without persistent maternal hypotension. There was no demographic difference in these patients as compared with the normal FHR group. In 3 out of these 5 cases, concurrent uterine contraction was confirmed. In all these cases, nitroglycerin for rapid tocolysis was intravenously administered. There were no fetal abnormalities and newborn scores were all normal. FHR deceleration occurred in two cases with persistent maternal hypotension.
Discussion: FHR deceleration can occur without persistent maternal hypotension following spinal anesthesia in CS. Uterine contraction secondary to spinal anesthesia, maternal anxiety and intrathecal opiate use may contribute to sudden changes in FHR. Maternal arm blood pressure monitoring determines perfusion pressure in the upper extremity but spinal anesthesia causes venous and arteriolar dilation in the lower body that may lead to iliac artery hypotension and a decrease placental perfusion with aortocaval compression. Our study supports the clinical practice of FHR monitoring during elective CS as maternal arm blood pressure is not a sufficient index of fetal well-being.
References**:**
1) Hughes SC, Levinson G, Rosen MA**:** Anesthesia for cesarean section. In**:** Shnider and Levinson's Anesthesia for Obstetrics (4th ed). Edited by Hughes SC, Levinson G, Rosen MA, Philadelphia, Lippincott Williams & Wilkins, 2001; 201-236
2) Birnbach DJ, Browne IM**:** Anesthesia for obstetrics. In**:** Miller's Anesthesia (6th ed). Edited by Miller RD, New York, Churchill Livingstone, 2003; 2307-2344

A-122.

A METHOD FOR QUANTIFICATION OF LABOR PAIN AS A DYNAMIC PROCESS

AUTHORS: P. Flood[1], J. B. Evans[1], J. S. Conell-Price[1], S. L. Shafer[2];
AFFILIATION: [1]Columbia University, New York, NY, [2]Stanford University, Palo Alto, CA.

Pain in labor is poorly understood and inadequately described. We know it is a dynamic process that starts near zero at low cervical dilatation and increases to near maximal in many women. In order to quantify this dynamic process we developed a function of numerical analog score for pain (NAS) versus cervical dilatation using a retrospective data set. With IRB approval, our data were derived from 50 sequential nulliparous parturients at term (37-42 weeks) who delivered a baby between 2.5 and 4.0 Kg. NAS scores and cervical exams were recorded by obstetricians and nurses contemporaneously per routine. When a cervical exam was not recorded at the exact time of a NAS score, the cervical exam closest in time was used. All data was taken before or without analgesia. The relationship between NAS and cervical dilation was modeled as NAS= NAS0 + (NASMAX-NAS0)*(1-EXP(-Slope*CM)), where NAS0 is baseline pain, NASMAX is peak pain, CM is cervical dilation, and Slope is the rate at which pain increases with increasing cervical dilation. We tested the hypothesis that labor is more painful when induced or augmented by oxytocin. Because many women have oxytocin started later in labor, there may be data points from the same women represented in both the oxytocin and no-oxytocin groups.

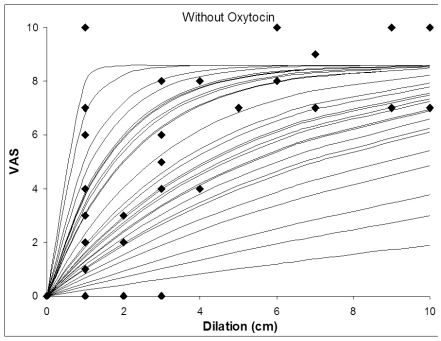

Figure 1a contains data from women who were not being treated with oxytocin.

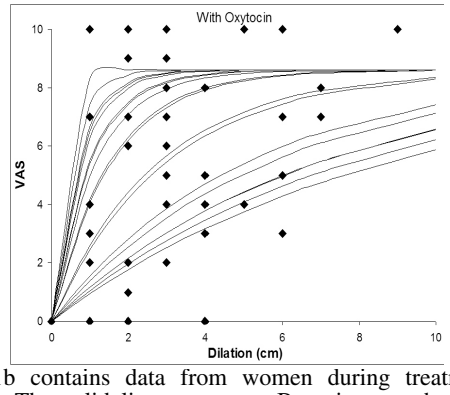

Figure 1b contains data from women during treatment with oxytocin. The solid lines represent Bayesian post-hoc fits of a slope for each subject. The maximum VAS was 8.6 in both cases. The slope was significantly different between groups with median slope in the no oxytocin group 0.21 and in the oxytocin group 0.65 ($P<0.001$). There was no difference in the size of the infants, gestational age. We plan to validate this relationship with prospectively gathered data from an additional 150 patients. If validated, this may be a sensitive method with which to study a variety of different things that may influence the pain of labor including genetic and pharmacological variables.

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POSTER REVIEW 2

A-123.

CORRELATION OF VERBAL RESPONSE AND VISUAL ANALOG WITH MCGILL PAIN QUESTIONNAIRE IN LABORING PARTURIENTS

AUTHORS: R. B. George[1], E. M. Lockhart[2], A. S. Habib[1], T. K. Allen[1], H. A. Muir[1];
AFFILIATION: [1]Department of Anesthesiology, Duke University Medical Center, Durham, NC, [2]Department of Anesthesiology, Vanderbilt University Medical Center, Nashville, TN.

Introduction: Labor pain ranks among the most intense pains (1). The McGill Pain Questionnaire (MPQ) provides an alternative approach from the widely used verbal response (VRS) and visual analog scales (VAS) for the measure of labor pain (2). The MPQ consists of 20 sets of words to describe the sensory, affective, and evaluative dimensions of pain.
Methods: After obtain IRB approval, parturients were recruited in the antenatal clinic. Informed, consenting subjects completed an antenatal questionnaire, which explored the parturients expectations for labor pain and analgesia. Subjects were excluded if they had complicated pregnancies or a history of repeated abortions. Pain score data (VAS, VRS, & MPQ) was collected on two separate occasions once patients were in labor; 1) on admission and 2) prior to initiation of epidural analgesia. Twenty-four hours after delivery, pain scores (VAS, VRS & MPQ) describing the maximum and average pain during labor were collected. Maternal demographic data was collected prospectively. Data analysis was completed with t-test and spearman correlation coefficients.
Results: One hundred ninety-one patients were enrolled and asked to complete the pain scores at various points in their labor. Average MPQ scores and 95% confidence intervals on admission and initiation of epidural analgesia are 14.7 (12.5, 16.9) and 27.1 (24.4, 29.8). The significant increase in MPQ scores is equally made up of sensory and affective pain descriptors. The MPQ was strongly correlated to VAS (rho=0.812) and VRS (rho=0.772) data on admission. However this correlation was not as strong when epidural analgesia was needed (MPQ vs VAS [rho=0.561], MPQ vs VRS [rho=0.544]). The VRS and VAS scores were strongly correlated at both data collection points (admission rho=0.96, epidural rho=0.91).

Variable 1	Variable 2	Correlation Coefficient (rho)
MPQ (admit)	VAS (admit)	0.812
MPQ (admit)	VRS (admit)	0.772
Sensory MPQ (admit)	VAS (admit)	0.809
Sensory MPQ (admit)	VRS (admit)	0.764
Affective MPQ (admit)	VAS (admit)	0.581
Affective MPQ (admit)	VRS (admit)	0.515
MPQ (epidural)	VAS (epidural)	0.544
MPQ (epidural)	VRS (epidural)	0.561
Sensory MPQ (epidural)	VAS (epidural)	0.416
Sensory MPQ (epidural)	VRS (epidural)	0.452
Affective MPQ (epidural)	VAS (epidural)	0.511
Affective MPQ (epidural)	VRS (epidural)	0.604
VAS (admit)	VRS (admit)	0.960
VAS (epidural)	VRS (epidural)	0.907

Discussion: Both physical (sensory)and psychological factors play a significant role in labor pain. Our data shows that the average level of pain experienced by laboring women is significant. The inability of the VAS and VRS to differentiate the affective & psychological aspect of labor pain may explain why they do not correlate with the MPQ as labor progresses and epidural analgesia is necessary.
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A-124.

INVASIVE HAEMODYNAMIC MONITORING WITH PULMONARY ARTERY CATHETER IN OBSTETRIC PATIENTS WITH COMPLICATIONS OF SEVERE PREECLAMPSIA

AUTHORS: G. A. Monsalve, T. Castrillon, G. Arango, A. Osorio, J. Arango, J. Gonzalez, M. Vasco;
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INTRODUCTION: Preeclampsia-Eclampsia syndrome is a multisystemic disorder, with a high rate of complications in developing countries. Strict preload control is important in the management of patients with cardiopulmonary and renal compromise.
METHODS: Retrospective evaluation of patients with severe preeclampsia that required monitoring with a pulmonary artery catheter during their hospitalization in the Obstetric high dependency unit from October 2005 to September 2006.
RESULTS: Of the 83 patients admitted in the unit with diagnosis of severe preeclampsia, 10 patients (12%) required monitoring with a pulmonary artery catheter due to hipoxemia, pulmonary edema or persistent oliguria despite of standard treatment. The average age was 29.2 years old and the average gestational age at delivery was 33.6 weeks. The average stay at the unit and APACHE II were 3.5 days and 10.7 respectively. 70% of the patients developed HELLP syndrome (hemolysis, elevated liver enzymes, and low platelets). Seven patients required monitoring with a pulmonary artery catheter during their immediate postpartum period. Pulmonary edema was diagnosed in 8 cases and acute renal failure in 2 (one patient required continuous veno-venous hemofiltration). The average central venous pressure (CVP)/ pulmonary capillary wedge pressure (PCWP) gradient was 8.6 mmHg. The most frequent haemodynamic profile in 9 patients was high cardiac output (average 6.2 L/min [5.2 - 11.1]) with high systemic vascular resistance (average 1.950 dyn·s/cm^5 [1.415 - 2.720]). Only 1 patient had a haemodynamic profile compatible with left ventricular dysfunction (cardiac output 1.8 L/ min - SVR 3.200 dyn·s/cm^5). In all patients, the results from the central haemodynamics monitoring lead to interventions that were useful to change therapeutic regimen (use of diuretics, vasodilators, intravenous fluid boluses). There were no serious complications for the invasive monitoring. There was no maternal mortality
DISCUSSION: We found a poor correlation between the central venous pressure (CVP) readings and the pulmonary capillary wedge pressure (PCWP). In the severe preeclamptic patients with hipoxemia, pulmonary edema or persistent oliguria, specially associated with HELLP syndrome, the pulmonary capillary wedge pressure monitoring leads to important therapeutic interventions.
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POSTER REVIEW 2

A-125.

PATIENT'S OPINIONS REGARDING PRE-ANESTHESIA EVALUATION PRIOR TO CESAREAN SECTION: A SURVEY AT OUR INSTITUTION

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INTRODUCTION: In our institution, patients scheduled for elective cesarean section (C/S) are not routinely evaluated by an anesthesiologist until the day of surgery, often immediately prior to being brought into the operating room. We desired to obtain patients' opinions regarding the current pre-anesthesia evaluation practice.
METHODS: We surveyed 75 consecutive patients who presented for elective C/S, cervical cerclage, or egg retrieval. The survey was distributed after arrival into the post-anesthesia care unit (PACU). The anesthesiologist distributing the survey explained the reason for the survey and requested the patient's cooperation in completing it anonymously. There were no patient identifying factors in the survey. The completed survey was collected by the PACU nurse and placed in a file. The completed surveys were collected weekly and compiled in a folder kept in a locked office.
RESULTS: Seventy-five surveys were completed and compiled. Sixty-one patients underwent C/S, three patients underwent cervical cerclage, and eleven patients underwent egg retrieval. Twelve patients (16%) were seen by an anesthesiologist prior to the day of their procedure. Of these twelve patients, eight (67%) would have preferred not to have been seen prior to the day of their procedure, six stating it was not necessary, one stating it was not convenient, and one patient not anwering the question. Sixty-three patients (84%) were not seen by an anesthesiologist prior to the day of their procedure. Of these patients, twelve (16%) would have preferred to have been seen by an anesthesiologist prior to the day of surgery and fifty (67%) would not have preferred to have been seen prior to the day of surgery. One patient did not answer the question. Of those not wanting to be seen prior to the day of surgery, nine (10%) stated it was inconvenient to come in for an appointment, forty (80%) stated they didn't feel it was necessary, three (6%) stated it wasn't offered to them, and zero patients stated other reasons. Seventy-four patients (99%) were satisfied with their anesthetic.
DISCUSSION: The only survey found in a literature search relating to postoperative satisfaction addressed preoperative anxiety,[1] a factor that may be alleviated with adequate preoperative evaluation and discussion. We were quite surprised to discover patients overwhelmingly did not feel it was necessary to be evaluated by an anesthesiologist and have their anesthesia options discussed prior to the day of surgery. As a specialty, we understand the importance of preoperative anesthesia evaluations, but it appears public opinion differs. These results may be due to the fact the survey was completed post-operatively, after a successful anesthetic. A follow-up survey is planned and will be distributed pre-operatively, to see if patient's opinions differ.
References**:**
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A-126.

PUBLIC HEALTH POLICY & THE ANESTHESIA HUMAN RESOURCE CRISIS: IMPACT ON PROVISION OF MATERNITY ANESTHESIA SERVICES IN COMMUNITY, RURAL & RURAL REMOTE HOSPITALS IN ONTARIO

AUTHORS: P. J. Angle[1], C. KurtzLandy[2], Y. Murthy[1], P. Cino[3];
AFFILIATION: [1]Sunnybrook & Women's College HSC, Toronto, ON, Canada, [2]McMaster University, Hamilton, ON, Canada, [3]Headwaters Health Care Center, Orangeville, ON, Canada.

Introduction: Health Services Research is virtually non-existent in Obstetric Anesthesia, yet health policy and the availability of Anesthesia care providers drives patient access and the quality of Anesthesia services delivered to women in Canada. We describe the first Canadian study to evaluate the impact of the anesthesia human resource crisis on maternity care in large and small community and rural and rural remote hospitals. This qualitative research was conducted to identify key issues and barriers to maternity anesthesia services provision throughout the province of Ontario as well as to explore potential solutions to the issues identified. This work was sponsored in part by the Ontario Women's Health Council Secretariat, an advisory body to the Ontario Ministry of Health and Long Term Care.
Methods: Anesthesiologists and Family Physician Anesthetists (FPA) leaders providing maternity anesthesia care in hospitals spanning urban teaching to rural remote hospitals participated in 5 focus groups. The first 4 groups examined key issues/barriers to maternity anesthesia service provision in small and rural/remote (3 different focus groups) and large community (1 focus group) hospitals. A fifth focus group, comprised of University-based academic obstetric anesthesia leaders and a mixed group of community anesthesia providers from the previous 4 sessions, was conducted to explore potential solutions to previously identified issues. All sessions were taped and transcribed verbatim. Thematic content analysis was performed using NVivo QSR 2.0.
Results: Fourteen Family Physician Anesthetists and 10 Anesthesiologists were recruited representing all geographic areas in Ontario. Key issues and barriers identified related to lack of**:** 1) Human resources (difficulties in recruitment/retention related to workplace isolation, heavy call schedules, lack of respite relief, and lack of a professional voice for FPA); 2)Barriers to provision of "Best Practices" Maternity Anesthesia Care (lack of access to formal continuing education events(CME) or CME relevant to small community/rural remote practice, lack of access to "experts" and mechanisms for skills updating/retraining); 3)Support for the necessary interdisciplinary team training required to sustain/update practices; and, 4) Medico-legal issues related to non-physician primary care providers. Potential solutions were proposed by participants and in essence, constitute more broadly applicable methods of health care reform.
Discussion: A number of community hospitals have already closed their doors to maternity services in Ontario. Others have threatened to do the same. Our findings indicate that the anesthesia human resources shortage has reached a critical level in small, rural and rural remote hospitals in Ontario and constitutes a “burning platform” that requires immediate attention to ensure future access to maternity services in communities across the province.
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POSTER REVIEW 2

A-127.

PATIENT-CONTROLLED INTRAVENOUS ANALGESIA USING REMIFENTANIL IN PARTURIENTS WITH COAGULATION DISTURBANCES THAT CONTRAINDICATE REGIONAL TECHNIQUES

AUTHORS: M. Vasco, A. Osorio, G. Arango, J. Gonzalez, E. Holguin, J. Marin, G. Monsalve;
AFFILIATION: Clinica del Prado, Medellin, Colombia.

INTRODUCTION: Epidural analgesia is the standard in labour pain management. Nevertheless some coagulation disturbances contraindicate its use. In these cases, intravenous analgesia with opioids is a suitable alternative.
METHODS: Retrospective evaluation of labour patients with coagulation disturbances that contraindicate neuroaxial analgesia during their hospitalization in the high dependency unit from October 2005 to October 2006.
RESULTS: Of the 220 patients admitted to the unit, 11 required remifentanil for labour analgesia. The average age was 26.7 years old and the average gestational age was 32.1 weeks. Their diagnoses were HELLP syndrome (hemolysis, elevated liver enzymes, and low platelets) (5/11), need to anticoagulation for medical diseases [confirmed pulmonary thromboembolism (1/11), deep venous thrombosis (1/11), nephrotic syndrome with proteinuria of 10 Gr / 24 hours (1/11)], plasmodium vivax malaria complicated with thrombocytopenia (1/11), idiopathic thrombocytopenic purpura (1/11) and gallbladder stone liver disease with coagulation disturbances (1/11). In patients with thrombocytopenia the average platelet count was 45.760/mm3. (24.400 - 60.000). The patients received 1 µg/kg PCA IV bolus dose (APM/AIM Pump, Hospira), with a 5 minute lockout interval and a basal dose of 0.05 µg/kg /min. Oxygen by nasal cannula 3 lt/ min and broncoaspiration prophylaxis was given to all patients. In addition, all the patients were monitoring with pulse oximeter, EKG and single those of HELLP syndrome with invasive arterial pressure. A significant impact in the perception of the pain from the beginning the contraction was observed to the completion of the same one (initial VAS 7, final 2). In the final stage of labour, the control of pain was insufficient due to the necessity of an interval of blockade smaller to five minutes but our pumps do not allow it. Specifically in the patients with HELLP syndrome, the use of remifentanil helped, along with anti hypertensive drugs, to obtain a better control of the raise of arterial pressure. One patient with HELLP syndrome had several hipoxemia episodes (88 -92%), but ventilatory support was not required. Average APGAR score at 1 minute was 7.5 (3 - 9) and 5 minute 9.8 (9 - 10). There were no neonatal severe adverse effects.
CONCLUSIONS: In patients with coagulation compromise that contraindicate epidural analgesia, remifentanil IV use is a suitable alternative for labour pain management. PCA pumps require a shorter lockout interval (3 minutes) in order to provide appropriate analgesia. In this case series, minimal adverse effects was observed.
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A-128.

PRE-ESTIMATE DISTANCE FROM SKIN-TO-EPIDURAL SPACE USING ULTRASOUND CAN BE HELPFUL

AUTHORS: A. A. Kamani;
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Introduction: Epidural anesthesia can be a difficult procedure in certain patients and may lead to headaches, or more serious complications [1].

- Currently, epidural is performed “blindly” by the anesthesiologist inserting the needle into the patient’s spine and by using loss of resistance technique to assess if the needle has reached the epidural space.
- Predicting the skin-to-epidural depth prior to the procedure can be helpful [2], especially for inexperienced anesthesiologists and difficult patients, where landmarks are not easily detected by palpation.

Methods: We present a method of predicting the skin-to-epidural depth based on ultrasound images of the patient’s lumbar region. Ultrasound images were obtained by using paramedian approach and to identify Ligamentum flavum (3). Thus depth was measured providing an estimate to epidural space. The anesthesiologist then performed the epidural using median approach and noted the depth at which epidural space was entered.
Results: There is a correlation between the skin to ligamentum flavum distance on the ultrasound images and the skin to epidural distance obtained from the actual procedure. In most cases, the actual depth is slightly deeper than the one obtained from the Ultrasound image by 2-5 mm.
Discussion**:** The skin-to-epidural depth as measured using the ultrasound image usually is an underestimate of the actual skin-to-epidural depth measured from the needle insertion procedure. Possible causes are the paramedian approach used to obtain ultrasound images versus midline approach when performing epidural needle insertion, different pressures applied to acquire images, distance on ultrasound images was measured from skin to ligamentum flavum (which can be as thick as 5mm [4]), and finally, ultrasound travels at different speeds in different tissues [5], making the image slightly unmatched when compared to the actual dimensions.
References:
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POSTER REVIEW 2

A-129.

THE IMPACT OF ANALGESIC DOSING STRATEGY ON MOTOR BLOCKADE AND MODE OF DELIVERY FOR WOMEN IN LABOR

AUTHORS: D. T. Peskin[1], E. Goodman[1], B. Peskin[2];
AFFILIATION: [1]University Hospital/CWRU, Cleveland, OH, [2]Cleveland Clinic Foundation, Cleveland, OH.

Introduction: Epidural analgesia has long been criticized as contributing to the rise of assisted vaginal deliveries and cesarean births. The purpose of this study was to explore the potential relationship between two dosing strategies that provide maintenance epidural analgesia for women in labor, patient controlled epidural analgesia (PCEA) and continuous infusion epidural analgesia (CIEA), and their effect on motor blockade and mode of delivery.
Method: In this double blind, randomized clinical trial, 118 parturients with a singleton, vertex pregnancy were randomly assigned to receive PCEA or CIEA as their maintenance anesthetic. After epidural placement, a test dose of a 10 mL solution containing 0.125% bupivacaine + 50 mcg fentanyl + 1:600,000 epinephrine was administered. An ultra dilute solution of 0.044% bupivacaine + 0.000125% fentanyl (200 mcg) + 1:800,000 epinephrine (200 mcg) was the maintenance epidural anesthetic provided to both groups. PCEA and CIEA settings were as follows:
PCEA**:** 10 mL bolus; 10 min lockout; no background infusion
CIEA**:** 10 mL bolus; 10 min lockout; 14mL/hr background infusion
The power of the rectus abdominalis muscle (RAM) is called upon to facilitate a vaginal delivery. The RAM test[1] measures the power of this muscle, from 100% to 0% in increments of 20%. Motor blockade was assessed by measuring the change in the power of the RAM from baseline (prior to epidural placement) to the end of the first stage of labor (RAM block 1) and from baseline to the end of the third stage of labor (RAM block 2).
Results: The analysis demonstrated a statistically significant difference between motor block at the end of the first and third stages of labor, the hourly anesthetic consumption in the first stage of labor (dose sparing), the incidence of side effects, and in the cephalad spread of sensory blockade between the groups, all favoring PCEA. An 80% spontaneous delivery rate precluded any discernable difference in the mode of delivery to be detected between the two groups.
Discussion: While using an ultra dilute local anesthetic solution, women who controlled their own analgesia with PCEA during labor experienced less motor blockade, less sensory blockade and an equivalent degree of analgesia. A statistically significant difference between groups was not achieved in terms of supplemental analgesic dosing requirements, incidence of untoward side effects, delivery outcome and degree of patient satisfaction. This study concluded that an ultra dilute epidural maintenance anesthetic solution provided by a PCEA modality has secured a permanent place in the repertoire of labor analgesia, offering a personalized anesthetic regimen that is immediately available to manage labor pain without the unnecessary administration of epidural analgesia at times when it may not be warranted.
References**:**
1. Anesth Analg 1986; 65**:** 333-336.

A-130.

DO REUSABLE AND DISPOSABLE TUOHY NEEDLES PERFORM EQUALLY AS WELL?

AUTHORS: E. J. Goodman, D. Allen;
AFFILIATION: University Hospitals Case Medical Center, Cleveland Heights, OH.

Introduction: Reusable Tuohy needles were used long before their disposable counterparts became available, and they continue to be used at selected hospitals. This study examines the clinical performance of these needles at our hospital.
Methods: Anesthesia records for all the vaginal deliveries during a 3-month period (10/05-12/05) were reviewed. If the type of Tuohy needle used was not specified, the patient was excluded. Using our Quality Assurance forms that are filled out for each patient, data were collected as to whether blood was seen in the epidural needle or catheter during the needle placement, whether an unintentional spinal tap occurred, whether the Tuohy needle was placed at multiple vertebral levels and whether the patient reported a paresthesia during the epidural procedure. The number of failed or one-sided blocks was also recorded. From the data collected on the first postpartum day, we noted the number of people with back pain, any type of neurological deficit and any symptoms of headache suggestive of a spinal tap. Statistical significance was determined using the chi square test, and P>0.05 was considered significant.
Results: There were 369 vaginal deliveries during the 3 month period where epidural analgesia was used and the type of Tuohy needle was specified. Of the 202 instances where a reusable needle was used, there was 1 report of blood return, 2 unintentional taps, 4 reports of paresthesias during needle placement and 27 instances when multiple levels were attempted. With the 167 epidural procedures using a disposable Tuohy needle, there was 1 instance of blood return, 1 wet tap, 2 reports of paresthesias and 24 patients where multiple levels were attempted. There was no report of one-sided or failed blocks in either group. There was one complaint of a neurological deficit in each group in the postpartum period. The woman who had a wet tap with a disposable needle did not have symptoms of a spinal headache the next day, while one of the women in the reusable group who had had a tap was symptomatic the next day. The number of patients complaining of back pain the day after delivery was 13 in the reusable group and 9 in the disposable group. None of the differences between the 2 groups reached statistical significance.
Conclusion: The two types of epidural needles performed equally well based on the criteria that we tabulated. Surprisingly, the sharper tip of the disposable needle did not increase the likelihood of an unintentional spinal tap ocurring, and the duller tips of the reusable needles did not increase the risk of postpaartum back aches. Those who performed the epidural procedures were not likely to have to try multiple levels depending on the type of needle they used.

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POSTER REVIEW 2

A-131.

PATIENT CONTROLLED EPIDURAL ANALGESIA (PCEA) VS. CONTINUOUS EPIDURAL INFUSION FOR LABOR ANALGESIA: IS THERE A DIFFERENCE?

AUTHORS: M. C. Vallejo, V. Ramesh, J. E. Chavez, N. Sah, R. C. Romeo, J. H. Waters;
AFFILIATION: Magee-Womens Hospital of UPMC, Pittsburgh, PA.

Introduction: The purpose of this study is to compare the efficacy of three common epidural analgesia delivery modalities.
Methods: After local IRB approval, 195 parturients were randomized by computer program into one of three groups**:** Group 1 - Continuous Epidural Infusion (CEI); Group 2 - Patient Controlled Epidural Analgesia (PCEA); Group 3 - Continuous Epidural Infusion with Patient Controlled Epidural Analgesia. (CEI+PCEA). All patients received an initial bolus of 0.1% ropivacaine (10 cc) and fentanyl (100 mcg). Maintenance of labor analgesia consisted of**:** Group 1 (CEI) - ropivacaine 0.1% with fentanyl 2mcg/ml continuous infusion at 10 cc/hr; Group 2 (CEI+PCEA) - ropivacaine 0.1% with fentanyl 2mcg/ml continuous infusion of 5cc/hr with a demand dose of 5cc every 20 minutes with a 20cc/hr lockout; Group 3 (PCEA) - ropivacaine 0.1% with fentanyl 2mcg/ml demand dose only (5cc every 15 minutes with a 20cc/hr lockout). Measured variables included; pain VAS scores (0-100) at complete cervical dilatation (CCD), modified Bromage score at CCD (0 - 4; 0 = complete motor block, 4 = no motor block), total dose delivered, total number of bolus doses requested and bolus doses delivered, stage I and II duration, number of staff interventions, delivery outcome, and maternal satisfaction (0-100; 0 = totally dissatisfied, 100 = totally satisfied). Results are reported as mean ± SD or median with range in parenthesis. Interval data was analyzed using ANOVA, with intergroup comparison using the t-test, and nominal data using Chi-square. A $p < 0.05$ is significant.
Results: No differences were noted with respect to pain VAS scores at CCD, modified Bromage score at CCD, stage I and II duration, number of staff interventions, delivery outcome, and maternal satisfaction. Total dose of local anesthetic was significantly lower for group 3 compared to groups 1 and 2 (Table).

Maternal Outcome Data

Variables	Group 1 (n=62)	Group 2 (n=64)	Group 3 (n=63)	P value
Pain VAS @ CCD (0-100)	23.6 ± 27.2	28.6 ± 27.6	29.1 ± 31.0	0.55
Bromage score at CCD	4 (4)	4 (4)	4 (3-4)	0.31
Total delivered dose (ml)	69.6 ± 48.0	58.6 ± 35.2	46.0 ± 31.7 *#	< 0.01
Total bolus requests (n)	0	19.9 ± 23.6	20.1 ± 22.4	-
Total boluses delivered (n)	0	5.7 ± 4.4	7.2 ± 5.4	-
Staff interventions (n)	1.5 ± 1.9	1.1 ± 1.6	1.1 ± 1.5	0.32
Vaginal delivery (%)	49 (79%)	52 (81%)	51 (81%)	1.00
Cesarean section (%)	9 (15%)	9 (14%)	9 (14%)	0.99

Legend**:** * = $p < 0.05$ compared to Group 1, # = $p < 0.05$ compared to group 2.

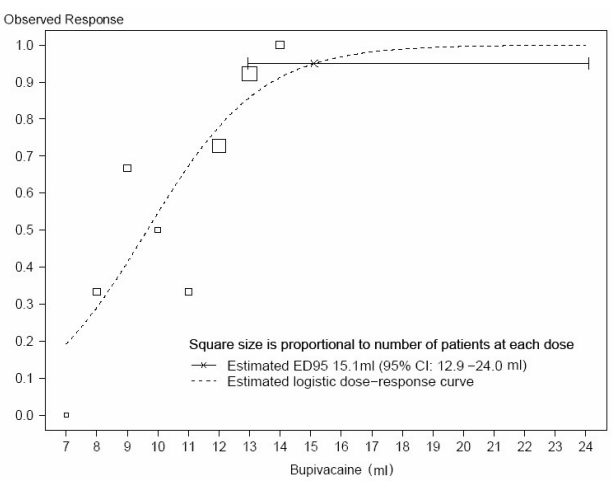
Discussion: Despite the many reported advantages of PCEA, we found no definite advantage of using PCEA over CEI for labor analgesia. It appears the mode of analgesic delivery is not as important as the local anesthetic concentration.

A-132.

EFFECTIVE VOLUME 95 (EV95) OF 0.125% BUPIVACAINE FOR LABOR EPIDURALS

AUTHORS: H. Ibrahim, E. Goldszmidt, R. Parkes, J. Carvalho;
AFFILIATION: Department of Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada.

Introduction: The ED95 of bupivacaine for labor epidurals, estimated from minimum local anesthetic concentration (MLAC) studies, is 0.129% (1). MLAC studies have been conducted with fixed volumes of 20 ml of LA. Commonsense indicates that the least effective dose should be used. As a consequence, the concept of Minimum Local AnestheticVolume (MVLA) for a certain concentration of LA becomes the next key parameter in the equation. The purpose of this study was to determine the effective volume 95 (EV95) of bupivacaine 0.125% for labor analgesia.
Methods: After REB approval, a randomized up-down sequential allocation study using the Narayana rule to cluster doses around EV95 (2) was conducted. 40 patients were given a volume of bupivacaine 0.125% determined by a computer generated table, which considered the response of all previous patients. The epidural insertion followed the regular institution protocols. No test dose was administered. The starting volume was 8 ml and doses varied up or down in increments of 1 ml. Verbal numeric rating scale (VNRS, 0-10) was used to assess patient response and hence the epidural volume of LA for the subsequent patient. A successful response was determined as a VNRS ≤ 2 at 20 minutes after loading dose. Estimate of EV95 was based on a logistic model with non-log-transformed doses, fit using Firth's penalized maximum likelihood approach for small sample bias correction. Confidence intervals were based on the profile likelihood approach.
Results: The estimated ED95 was 15 ml (95% CI 13 -24 ml). The non-parametric 95% confidence interval for the response rate at the dose of 14 ml was 72 -100 %.



discussion: We suggest that the clinically effective volume of bupivacaine 0.125% can be reduced by 25%, as compared to the results of the first MLAC studies (1). The establishment of EV95 for different concentrations of bupivacaine will allow a better comparison of the clinical efficacy and safety of this drug in labor analgesia.
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POSTER REVIEW 2

A-133.

PREDICTIVE FACTORS FOR CHRONIC PAIN AT 8 WEEKS AFTER VAGINAL OR CESAREAN DELIVERIES

AUTHORS: P. H. Pan[1], R. Smiley[2], T. Houle[1], R. Landau[3], P. Lavand'Homme[4], L. Harris[1], J. Eisenach[1];
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Introduction: Carvalho reported pain during and after cesarean section was the greatest concern of patients. Individual variability in severity of post vaginal or operative delivery pain is influenced by multiple factors. As part of a larger multi-center, prospective-cohort study on pain after delivery, we report here predictive factors for chronic pain postpartum.
Methods: After IRB approval and informed consent, women were enrolled during their hospitalization for delivery at 4 medical institutions located in NC and NY, USA, Brussels, Belgium and Geneva, Switzerland. After delivery while in the hospital, an extensive questionnaire and interview were conducted to assess pre-existing pain syndromes, psychological and sensory perception and sensitivity, and obstetric/anesthetic course. Patients were followed up (by telephone-interview for USA sites, by postal-survey for European sites) at 8th-week postpartum to assess for the presence of delivery-related pain, its severity, location and impact on daily living and clinical depression. Those with pain at 8th-week were re-interviewed/re-surveyed at 6 and 12 months to determine if pain continued. Pain at 8 weeks postpartum was defined as pain which began at delivery and was rated above zero for the past week prior to interview.
Results: 2518 patients were enrolled. Excluding those lost to follow-up, 1863 (74%; n=972 USA, n=891 Europe) evaluable patients were included. This abstract presents only the results from USA sites (668 vaginal 304 Cesarean deliveries) for predicting the presence of pain at 8 weeks postpartum. Incidence of pain at 8th-week postdelivery was 10.0% and 9.2% for vaginal and cesarean delivery respectively. Using principal component factor analysis to reduce predictive variables into smaller meaningful subgroups, the final independent predictive (predelivery, delivery and postdelivery) variables were entered into a logistic regression model to predict chronic pain at 8th-week postdelivery (Table 1) . Evaluated by a receiver operating characteristic curve, this model's utility to predict presence of chronic pain at 8th-week postpartum yielded an optimal sensitivity and specificity of 0.81 and 0.65, and 0.77 and 0.79 for vaginal and cesarean deliveries, respectively.

Table 1. Independent Predictive Variables for Chronic Pain at 8 weeks Post Delivery

	Vaginal Delivery (n=662)		Cesarean Delivery (n=304)	
	Probability for Presence of Pain at 8 weeks Post Delivery			
	OR	95% CI	OR	95% CI
Predelivery Variables:				
Age(yr)	1.01	1.001, 1.01		
Cigarette Smoking	2.5	1.1, 5.4		
Somatization Score			0.82	0.68, 0.99
Pain with Menstruation			4.3	1.6, 11.6
State of Health			0.13	0.02, 0.95
Delivery Variables:				
Cesarean for Dystocia			87.0	1.4, 5800
Spinal Anes for C/S versus Labor Epid/CSE for C/S			0.13	0.09, 0.33
Post Delivery Variables:				
Rate Tx of Pain after Delivery	0.64	0.43, 0.95		
Oral Opioid	2.1	1.04, 4.2		

OR - Odds Ratio; *B - For every unit change in the predictive variable, OR is the corresponding odds ratio for the probability of pain at 8 weeks post delivery.

Conclusion: These data suggest patients at risk for chronic postpartum pain can be predicted with predelivery, delivery and postdelivery information. These findings may have significant implications to tailor treatment for patients-at-risk to improve outcomes and quality of care.
Supported in part from a grant from the Sceptor Pain Foundation, Winston-Salem, NC

POSTER AND RESIDENT 2

A-134.

OBSTETRIC HEMORRHAGE & RESOURCE ALLOCATION: HOW MANY, HOW LONG AND HOW GOOD?

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Introduction: Postpartum hemorrhage (PPH) is one of the most common causes of maternal mortality in the USA (1,2). Massive PPH occurs in 1/1000 deliveries and more complicated deliveries are accompanied by greater degrees of blood loss (3,4). In anticipation of transfusion needs, hospital vary in their preparation; practices range from a type and screening approach of all obstetrical patients to performing a cross match and reserving units of blood. These variations in practice likely exist because excessive blood loss requiring transfusion occurs in ~ 4% of vaginal and 6% of cesarean deliveries (5). Such infrequent and variable transfusion requirements in this patient population may result in hospitals being unprepared. However the corollary of "over prepared" leads to waste and excessive costs. The aim of this descriptive study was to examine the resource allocation efficiency of the blood bank at an urban major university hospital.
Method**:** A retrospective review of the blood bank data base and the obstetric population at a major Midwestern medical center.
Results: This major medical center has 12- 14,000 deliveries/year with a cesarean section rate of 27%. All admitted laboring patients are routinely type and screened. Approximately 3,000 units of packed red blood cells (PRBCs) have been transfused to obstetrical patients over the past five years. The blood bank does not specifically hold O negative PRBCs for OB but is able to respond to a potentially catastrophic OB hemorrhage utilizing the same protocol that exists for a level 1 trauma, i.e. activation of the rapid transfusion protocol (RTP).
Discussion: In 1990 the CDC reported that of the 1,459 pregnancy-related deaths in the United States, 29% were related to PPH (1). Practicing anesthesiologists and hospitals need to be prepared to deal with these infrequent but massive transfusion events. In 2005, the Department of Anesthesiology in conjunction with a multidisciplinary team instituted RTP. RTP enables physicians and the blood bank to cope with patients requiring unanticipated major transfusions. RTP dictates that six units of PRBCs, four units of FFP and one unit of platelets will arrive every 30 minutes until it is revised by the anesthesiologist or operating room personnel. The first units of uncross-matched O negative or type-specific blood will arrive within 15 minutes of activation of RTP. Outcomes are reviewed monthly in a joint conference for continued quality assurance. Since inception RTP has been activated approximately four times a month most often in response to major trauma.
Conclusion: Obstetric hemorrhage is associated with excessive morbidity and mortality. The establishment of a RTP maximizes resource allocation for these rare events.
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POSTER AND RESIDENT 2

A-135.

OUTCOME OF REGIONAL ANESTHESIA FOR DELIVERY IN WOMEN WITH THROMBOCYTOPENIA

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Introduction: For otherwise healthy obstetric patients with thrombocytopenia at delivery, the choice of anesthesia for pain during labor is a non-trivial matter to the partruient, and is increasingly recognized as of importance to the obstetric staff as well. To date there have been few studies assessing outcome of anesthesia for pain relief at delivery to mother and infant in the presence of maternal thrombocytopenia.
Methods: All obstetric charts from June 2004 to June 2005 were reviewed; searches for women with thrombocytes <150,000/mm^3 at delivery were included.
Results: Of 10,369 births, 166 births (1.6%) were recorded in women with thombocytes <150,000/mm^3 at birth. For the purpose of analysis, parturients with >150,000/mm^3 at Week 36 were separated (n=35; 21%). The remaining parturients were divided according to thrombocytes at birth**:** 70,000-100,000/mm^3 (n=30; 18%) and 101,000-150,000/mm^3(n=101; 60.5%). There was no significant difference in mode of delivery among groups. There was a statistically significant difference (p=.003) in type of anesthesia because among (126) women receiving anesthesia, 50% with <100,000/mm^3 (n=24) received non-epidural options while 65% parturients with ≥101,000/mm^3 (n=102) received epidurals. The majority of parturients (85.9%) required no blood products; however, there was a significant difference (p=.037) because 13/14 women requiring blood products were women with ≥101,000/mm^3 and because among parturients undergoing cesarean sections, 10/23 (43.5%) required blood products (p=.000). There was no statistically significant difference in hemoglobin levels. There was a statistically significant difference for thrombocytes when categorized by type of anesthesia (p=.005) because of higher mean thrombocytes in parturients receiving epidural versus spinal, other, or no anesthesia. There were no adverse neurological events related to anesthesia. There was a statistically significant difference (p=.009) among groups because a greater percentage (15.4%) of babies with Apgar scores of ≤7 at one minute were born to women with thrombocytes <100,000/mm^3. There was a statistically significant difference (p=.006) among groups because none of the mothers of babies born ≤Week 36 had normal thrombocytes at Week 36. There were no statistically significant differences in mean birthweights of babies categorized by maternal thrombocytes. There was a statistically significant difference (p=.001) when comparing numbers of previous births because women with thrombocytes <150,000/mm^3 at birth but within the normal range at a Week 36, had significantly more previous deliveries.
Discussion: Based on the current study, it appears that hemodilution in the vast majority of parturients does not result in platelet counts <150,000/mm^3 at birth. For the small percentage who have consistently abnormally low counts throughout the last trimester, there does seem to be added risks to themselves and their babies. The putative cause for these adverse events is thrombocytopenia rather than the type of anesthesia or mode of delivery, although these latter two variables are consequent to the degree of thrombocytopenia.

A-136.

PREDICTING DIFFICULT INTUBATION IN THE OBSTETRIC PATIENT: A REVIEW OF 1868 PATIENTS FOR URGENT CESAREAN SECTION

AUTHORS: B. P. Woods, S. Sharma;
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INTRODUCTION: In recent years increasing attention has been levied on predicting the difficult intubation in obstetrical patients.[1,3,4] In 2005 Shiga et al [2] performed meta-analysis of >50,000 patients seeking the predictive value of five common bedside screening tests. They concluded a combination of Mallampati score and thyromental distance was most successful in predicting difficult intubation. Based on these findings in general anesthesia patients we sought to assess the obstetric population with known risk factors that complicate airway management.[4] Our desire was to evaluate common screening exams and their correlation to difficult or failed intubations in the parturient undergoing urgent cesarean section.
METHODS: Airway assessment data was collected on 1,868 patients who underwent urgent CS under GA from 2000-2005 in a busy OB anesthesia unit at a teaching institution. Airway assessment included Mallampati classification, Atlanto-occipital joint extension, mouth opening, sternomental distance, thyromental distance, mandible-hyoid distance, horizontal length of mandible, width of mandible, short neck, neck thickness, receding mandible, and protruding/missing/broken incisors. The laryngoscopic view during intubation, number of attempts at intubation, and failed intubation were also recorded. Patients with difficult or failed intubation were followed into the postoperative period with subsequent examination, and photographic documentation of physical findings obtained by faculty providers. Pearson Correlations were used to determine correlations between difficult/failed intubations and our screening exams.
RESULTS: Of the 1868 patients 22 patients required >3 attempts at successful intubation (difficult intubation) and 6 patients had failed intubation. The difficult intubation significantly correlated only with Mallampati classification (r=0.203; p<0.001), short neck(r= -0.106; p<0.001), protruding/broken incisors (r= -0.170; p<0.001), and strongly correlated with receding mandible (r= -0.370; p<0.001), and laryngoscopic view(r=0.595; p<0.001).

	Difficult Airway Raw Data						
Parameter	1	2	3	4	>3	No	Yes
MP Score	524	1160	179	5			
Laryngoscopic View	1390	409	58	11			
No. of attempts	1682	164			22		
Failed Intubation						1862	6

DISCUSSION: This study indicates the risk of difficult intubation in patients for urgent CS is 1:85, and failed intubation is 1:300. Of the more modern measurements employed, none appear to have significant predictive value for difficult intubation in this study. Mallampati classification continues to fall short on predictive correlation to difficult airway and only 1 of 6 failed intubations had MP>2. Receding mandible appeared to have a much stronger correlation to difficult or failed intubation. Further evaluation with Multifactoral Linear Regression Analysis and Relative Risk Ratio comparison for cluster affect may aid in predicting the difficult airway in the obstetric patient.

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POSTER AND RESIDENT 2

A-137.

IS EPIDURAL-PCA ANALGESIA REQUIREMENT FOR LABOR PAIN REDUCED DURING THE NIGHT?

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INTRODUCTION**:** We speculated that epidural analgesic requirement is reduced during the night due to reduced patient alertness. Furthermore, C/S rate peaks in the evening [1]. We compared patients in labor during the day with those in labor at night to determine whether epidural PCA requirement and the incidence of C/S are reduced at night.
METHODS**:** 210 parturients requested epidural for labor were randomized**:** Group I (n=105)**:** required epidural from 11:00 to 13 :00. Group II (n=105) required epidural from 23:00 to 01:00. All patients received 15 ml solution of epidural ropivacaine (R) 0.1% + sufentanil 1 mcg/ml + epinephrine 2 mcg/ml, followed by 6 ml/hr infusion, PCA dose 4ml, lockout 10min. Following loading dose (time = 0min), patients were queried with each contraction as to their analgesia satisfaction. If at time = 20min, VAS>3, patients were given a 5-10ml bolus of the solution every 10min for a max of 20ml as needed until VAS≤3. If analgesia was still inadequate (VAS>3), patients were rescued with 5ml of 0.25% R every 10min as needed to a max of 20ml. For each intervention the inf. rate was increased by 2ml/hr to a maximum of 12ml/hr. IV oxytocin was ordered by the obstetricians when needed. Pain, nausea, pruritus, sedation, and motor block were evaluated hourly, or sooner as required. Patients were asked to rate their satisfaction for 1st stage, 2nd stage, and overall. Data were expressed as mean ± SD. $p < 0.05$ was significant.
RESULTS**:** There were no differences among the groups with respect to age, weight, height, initial Cx dilation, 1st stage & ROM to delivery durations, initial pain scores, nausea, vomiting, 2nd stage satisfaction, APGAR scores & baby's weight. There were 54 & 71 ($p<0.03$) primiparae for GI & II respectively. First stage satisfactions were 9.4±1.1 & 9.9±1.2 ($p<0.001$) for GI&II respectively. Overall satisfactions were 9.5±1 & 9.8±0.7 ($p<0.02$) for GI&II respectively.

	Infusion Time (h)	Infusion Total vol/ duration (ml/h)	PCA vol/ duration (ml/hr)	Extra Bolus vol (ml)	Rescue Ropiv .25% n(%)	Tot Rescue Ropiv 0.25% (mg)	Time to Full Satis (min)	2nd Stage duration (min)	IV Oxytocin (%)	Pruritus (n)	Motor block <5 n(%)	IV Naloxone mg/h	Urinary Retention(%)	Type of Del (n) 1=VD 2=Vac 3=Forc 4=C/S
Gr I N=105 Day	4±3* (*p<0.001)	13±6	0.05±0.05** (**p<0.03)	9.3±11** (**p<0.03)	25**(24) (**p<0.03)	2.5±5** (**p<0.03)	16±8** (**p<0.03)	55±60# (#p<0.03)	75##(71) (##p<0.05)	54##(%)(51) (##p<0.05)	14**(13) (**p<0.03)	0.012±0.03** (**p<0.03)	41##(39) (##p<0.05)	1: 85 2: 5 3: 2 4:13
Gr II N=105 Night	8±5	12 ±14	0.03±0.03	5.2±10	6 (6)	0.6±2	12±3	82±93	57 (54)	67(66)	53(50.5)	0.004±0.02	61(60)	1: 86 2: 4 3: 1 4:14

CONCLUSION**:** The hourly dose of analgesia for the Night Group was not different from that of the Day Group.The greater total infusion volume in the Night Group was due to the longer duration of the second stage of labor, which probably resulted from decrease use of oxytocin. The incidence of operative delivery was not greater at night.
REF**.:** 1.Neuhoff et al., Obstet Gynecol 73:915, 1989

A-138.

OPTIMAL EPIDURAL CATHETER LENGTH FOR OBESE PARTURIENTS

AUTHORS: W. L. Corbett, A. S. Habib;
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Introduction: Obesity is increasing at an alarming rate. As body mass index (BMI) increases there is an increased rate of epidural failure and need for cesarean section (1). Previous studies suggested that 5 cm may be the optimal length of epidural catheter to be left in the epidural space (2). It is not known if these findings also apply to obese and morbidly obese women. Some suggest that a greater length of catheter should be left in obese parturients. However, there are no studies to determine the optimal epidural catheter insertion depth specifically in women with a BMI>30. The aim of this study was to determine the optimal catheter insertion depth in women with obesity (BMI ≥ 30) and morbid obesity (BMI ≥ 40). Another aim of the study was to compare the incidence of failed blocks in obese versus non-obese parturients.
Methods: Following IRB approval, we reviewed the database for parturients who had epidural labor analgesia from November 2003-July 2005. We collected information on BMI, length of the epidural catheter left in the epidural space, the incidence of asymmetric analgesia, intravascular catheters and failed blocks as defined by the need for resiting the epidural catheter. Statistical analysis was performed using the Fisher exact test. Bonferroni correction was used to adjust for multiple comparisons.
Results: Data from 2618 women were included in this analysis. Of those 1401 had a BMI < 30 and 1217 a BMI ≥ 30. Obese women had a higher incidence of failed epidurals when compared to nonobese patients ($p=0.0002$). Compared with an insertion depth of 5-5.5cm, obese parturients (BMI 30-40) had a higher incidence of asymmetric analgesia if epidural catheters were inserted ≥ 6cm ($p=0.016$). There was no difference among the catheter length subgroups with regards to intravenous catheters or failed blocks among obese or morbidly obese women. There was also no difference among the insertion length subgroups in asymmetric analgesia for morbidly obese women.

Epidural outcomes and in obese and morbidly obese women

	3,3.5cm	4,4.5cm	5,5.5cm	6cm
BMI 30-40	n=21	n=332	n=574	n=37
Asymmetric analgesia	3 (14.3%)	30 (9.0%)	30 (5.2%)	6 (16.2%)*
Failed blocks	1 (4.8%)	20 (6.0%)	25 (4.4%)	1 (2.7%)
Intravascular catheter	2 (9.5%)	11 (3.3%)	26 (4.5%)	2 (5.4%)
BMI 40	n=2	n=56	n=150	n=45
Asymmetric analgesia	0	2 (3.6%)	16 (10.7%)	4 (8.9%)
Failed blocks	1 (50%)	4 (7.1%)	8 (5.3%)	3 (6.7%)
Intravascular catheter location	1 (50%)	3 (5.4%)	8 (5.3%)	0

* $p=0.016$

Conclusion: Obese women are at a greater risk of epidural failure. For obese women, there is a higher incidence of asymmetric blocks if ≥ 6 cm of epidural catheter is left in the space. This was not the case for women with morbid obesity.
References**:**
1. BJOG 2006; 113:1178-1181.
2. Anesth Analg 1995; 81(2)**:** 301-4.

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POSTER AND RESIDENT 2

A-139.

PROSPECTIVE EVALUATION OF DELIVERY OUTCOMES IN PARTURIENTS WITH BIRTH PLANS

AUTHORS: A. Pennell, K. Fecho, F. Spielman, A. H. Herring, V. Salo-Coombs;
AFFILIATION: University of North Carolina, Chapel Hill, NC.

Introduction: Birth plans are utilized to facilitate communication between parturients and their care providers during labor and delivery, and to allow women to incorporate their wishes into the health care plan. This study is the first to determine whether labor and delivery outcomes differ in parturients with and without birth plans, and whether birth plan preferences are fulfilled during labor and delivery.
Methods: Sixty three parturients with birth plans and 63 parturients without were enrolled in this institutional review board-approved, prospective, cohort study. Enrollment criteria required a gestational age greater than 34 weeks without plans for cesarean delivery. Demographic data were collected on maternal age, ethnicity, education level and gravidity. The primary outcome variables included the use of pitocin, epidural analgesia, vacuum or forceps-assisted delivery, cesarean delivery, and labor and delivery complications (defined as one or more of the following**:** second degree or greater perineal laceration, uterine atony, premature rupture of membranes, chorioamnionitis, postpartum hemorrhage, arrest of dilation or descent, meconium, fetal decelerations, and macrosomia). Data were analyzed using Student's t test or Fisher's Exact Test and the significance level was set at $\alpha<0.05$.
Results: Compared to parturients without birth plans, those with birth plans were older (30.5 ± 4.4 SD vs. 27.7 ± 6.3 SD, $p<.01$) and more likely to be non-hispanic white (84.1% vs. 60.3%, $p<.05$) and college-educated (90.5% vs. 34.6%, $p<.01$), but equally likely to be primigravida. Parturients with birth plans were less likely to receive pitocin (69.8% vs. 87.3%, $p<.05$) or epidural analgesia (65.1% vs. 79.4%, $p<.01$). Rates of vacuum and forceps and cesarean delivery were similar in both groups. Overall labor and delivery complications were more common in parturients with birth plans (88.9% vs. 65.1%, $p<.01$); specifically, higher rates of perineal lacerations (39.1% vs. 30.2%), uterine atony (14.3% vs. 6.3%), premature rupture of membranes (7.9% vs. 4.8%), chorioamnionitis (7.9% vs. 1.6%), postpartum hemorrhage (9.5% vs. 4.8%), arrest of dilation or descent (27.0% vs. 9.5%), meconium (22.2% vs. 7.9%) and macrosomia (22.2% vs. 14.3%). A majority of parturients with birth plans did not fulfill their preferences. Of 23 parturients with birth plans stating that they did not desire pitocin and of 33 not desiring an epidural, 13 (56.5%) were administered pitocin and 18 (54.5%) were administered an epidural during labor.
Discussion: Results suggest that parturients with birth plans have lower rates of certain interventions (pitocin and cesarean delivery), but higher rates of complications during labor and delivery. Important birth plan preferences (pitocin and epidural analgesia) are not fulfilled during labor and delivery. The etiology of the higher complication rate in parturients with birth plans is unclear. Possible explanations include antagonism either between the nursing staff and parturient or the parturient and her support group.

A-140.

MANAGEMENT OF PARTURIENTS WITH PLACENTA PREVIA AND ACCRETA: A SURVEY OF SOAP MEMBERS

AUTHORS: K. A. Smith, F. J. Spielman, K. Fecho, D. C. Mayer, G. P. Mounce, W. Kim;
AFFILIATION: UNC Chapel Hill, Durham, NC.

Introduction: Maternal hemorrhage is a major cause of maternal morbidity and mortality. These complications may be preventable via recognition of risk factors, use of large bore intravenous catheters, readily available blood products, and proactive interventions by obstetricians and radiologists. The aim of this study was to determine current anesthesia practices for the management of patients with placenta previa and placenta accreta.
Methods: A survey was mailed to members of SOAP. The questionnaire asked respondents to answer questions about their standard management in treating parturients with four diagnoses**:** (1) placenta previa without active bleeding; (2) placenta previa with active bleeding but hemodynamic stability; (3) placenta previa with active bleeding and hemodynamic instability; and (4) placenta accreta without active bleeding. Questions about patient management included the need for antepartum type and screen (T&S), type and cross-match (T&C), intravenous access (quantity, gauge), invasive monitoring, use of regional and general anesthesia, and interventional radiological procedures.
Results: Completed surveys were returned by 465 (53%) of the 882 SOAP members. During the antepartum period 68% of anesthesiologists would require a T&S and only one IV for a patient with a previa who is not bleeding, but 84% would require a T&C and 57% more than one IV if the parturient was bleeding but stable; 93% would mandate a T&C if the patient with a previa was bleeding and unstable. During a cesarean delivery, the majority (76%) of the anesthesiologists would employ more than one IV for a patient without active bleeding, 85% for a patient with active bleeding but stable, and 90% if the patient was bleeding and hypotensive. Regional anesthesia was widely used for patients with placenta previa and accreta if they were stable, but 44% of those answering the survey opposed this anesthetic technique if the patient was hypotensive. Peripheral inserted central catheters (PICC) are almost never used (1%) in order to maintain vascular access in a parturient with a placenta previa while hospitalized but not bleeding in the antepartum period. Arterial (A-line) and central venous catheters (CVC) are seldom inserted in patients who are stable, but commonly (CVC 33%, A-Line 55%) in hypotensive patients undergoing cesarean delivery. Twenty-six percent of the respondents stated that in their institution, prior to cesarean delivery, a patient with a placenta accreta would go to interventional radiology for a uterine artery embolization or balloon placement.
Discussion: The planning and treatment of parturients who are bleeding and at jeopardy for hemorrhage are individualized. The vast majority of pregnant women at risk or already unstable are aggressively managed with multiple peripheral intravenous catheters, invasive monitoring, readily available blood, and many with vascular interventional radiological procedures.

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POSTER AND RESIDENT 2

A-141.

A COMPARISON OF CONTINUOUS EPIDURAL AND CONTINUOUS SPINAL ANALGESIA FOR PAIN RELIEF IN LABOR FOLLOWING UNINTENTIONAL DURAL PUNCTURE

AUTHORS: H. Richter, E. Lockhart, Y. Yohannes, C. Baysinger;
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Introduction: Unintentional dural puncture (UDP) occurs in 1-3% of parturients who undergo neuraxial analgesia for labor (1). Effective analgesia can be obtained with either intrathecal (ITA) or epidural (EA) analgesia, but few reports (2,3) compare the safety and effects of one technique to the other for labor analgesia, as most focus on dural puncture headache (DPHA). We retrospectively reviewed our labor analgesia experience in patients who received either ITA or EA following UDP.
Methods: Following IRB approval, the charts of 78 patients in labor who received UDP from November 2003 until November 2006 were identified. EA or ITA was by attending preference. Charts were divided into ITA or EA groups. The EA group had an epidural catheter placed after UDP followed by a 10ml bolus of 0.125% bupivacaine with 5ug/ml fentanyl and infusion of 0.1% bupivacaine and 2ug/ml fentanyl at 8-12ml/hr with patient controlled analgesia (PCA) of 5ml q 10-12 minutes. The IT group had a 1-2ml bolus after IT catheter placement followed by a continuous infusion at 1-2ml/hr with 0.5ml bolus q 30 minutes via PCA with the same solutions as EA. Additional boluses were administered by anesthesia personnel. Demographic and obstetrical variables, threading difficulty during catheter placement, paresthesias, blood pressure changes during initial bolus dosing, pressor administration, Apgar scores, length of both stages of labor, number of cesarean sections (C/S), blood loss at delivery, rate of DPHA and epidural blood patch, neurological deficits, backache, number of top up doses, and an overall post delivery labor pain score were recorded in both groups.
Results: 33 charts have been analyzed in this ongoing review. 18 Patients received EA, 15 ITA. 4 patients underwent C/S after a period of labor. BMI, gestational age, blood pressure changes, duration of first and second stages of labor, back pain complaints, presentation at delivery, blood loss, and Apgar scores were similar between groups. There were no neurological deficits. Pain relief was reported excellent in both groups. See Table 1 for other results.

Table 1**:** Intrathecal vs. epidural catheters for labor

	Epidural Catheter (N=18)	Intrathecal Catheter (N=15)
Difficult Catheter Placement	1	6
Paresthesia	0	6
Number of Top Ups	None - 9 One - 4 Two - 5	None- 12 One - 2 Two - 1
Post Dural Puncture headache	13	6
Epidural Blood Patch	9	4

Discussion: An apparent trend toward difficulty in catheter placement, more paresthesias, fewer anesthesia provider top ups and fewer DPHA's with ITA versus EA will be confirmed or refuted following full statistical analysis of data from all 78 charts.
References:
1.Reg Anesth(15):285,1990.
2.Int J Obstet Anesth(4):219,1995.
3.Br J Anaesth(69):634,1992

A-142.

RESUSCITATION OF THE PREGNANT PATIENT

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INTRODUCTION: At a gestational age of twenty weeks and beyond, the pregnant uterus can press against the inferior vena cava and the aorta, impeding venous return and cardiac output which can result in shock and, in the critically ill patient, cardiac arrest. All attempts at resuscitation of both mother and foetus will be futile unless the compression is relieved. This is achieved either by placing the patient in an inclined lateral position by using a wedge or by displacing the uterus manually. The need for an emergency caesarean section should be considered as soon as a pregnant woman develops cardiac arrest. The best survival rate for infants greater than twenty four to twenty five weeks in gestation occurs when the delivery of the infant occurs no more than five minutes after the mother's heart stops beating. This study aimed to ascertain awareness of these guidelines in staff who would be expected to institute these measures appropriately.
METHOD: A scenario based questionnaire was completed by twelve health care professionals who would be involved in the resuscitation of a potentially unwell pregnant patient in two city hospitals. Six Accident & Emergency doctors of different grades, two anaesthetic doctors, two obstetric doctors and two senior nurses completed the questionnaires.
RESULTS: 17% of staff did not give oxygen immediately. Only 42% of staff applied lateral tilt prior to obtaining intravenous access in the presence of hypotension or before commencing CPR. After two minutes of CPR , 42% of staff would perform a caesarean section whereas 75% would after five minutes. Both obstetric doctors performed caesarean section at two minutes.
DISCUSSION: Two people did not administer oxygen as part of an ABC approach which is disconcerting. Although performing a lateral tilt is simple and non invasive and could be administered by anyone, less than half of the staff had applied it prior to commencing CPR. A greater proportion of staff performed caesarean section after five minutes as opposed to two minutes, although some chose not to even at this stage which is unlikely to result in survival of mother or foetus. This is most likely to be due to hesitancy from lack of surgical skill in this field. Both obstetric doctors correctly performed caesarean section although chose to perform this very early on.
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POSTER AND RESIDENT 2

A-143.

AUTONOMIC NERVOUS SYSTEM TESTING USING CONTINUOUS WAVELET

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Introduction: Studies of autonomic nervous system (ANS) activity using spectral heart rate variability (HRV) analysis during pregnancy suggest that autonomic balance shifts towards lower sympathetic balance in the first trimester and that high resting sympathetic balance predominates in the third trimester (1). Responses to autonomic stimuli in term pregnant women suggest a reduction in baroreflex gain (2). Spectral analysis of respiratory sinus arrhythmia (RSA) signal provides an indication of where in the frequency domain the vagus nerve is influencing the heart (3). Using continuous wavelet transforms (CWT) of both RSA and HRV allows spectral monitoring of both autonomic branches. The purpose of this study was to evaluate ANS activity at rest and in response to autonomic stimuli using CWT in healthy term parturients.
Methods: IRB approval and written consent were obtained. Testing was performed using the ANX 3.0 testing system (Ansar Group, Inc Philadelphia, PA). The testing sequence consisted of a 5-min baseline rest period followed by 1-min of deep breathing. After a 1-min rest period the subject performed 4 valsalva maneuvers within 90 seconds. Following a 2-min rest, the subject stood for 5-min. Data were analyzed by evaluating the low frequency (LFa) and respiratory frequency (RFa) domains of the HRV spectrum and the ratio of LFa/RFa at rest and during autonomic stimuli and compared with normal responses developed from more than 10,000 patient studies.
Results: Twenty-three parturients were studied. The mean age was 35±4 years. Sympathetic dominance at rest was evident in 6 subjects and 1 subject demonstrated sympathetic activity consistent with cardiovascular stress. An additional patient had a LFa/RFa ratio at rest consistent with depleted autonomic control. 15 subjects had a blunted response to deep breathing (parasympathetic), and 11 subjects demonstrated hypoactivity to a sympathetic challenge (Valsalva maneuver). The stand response demonstrated vagal excitation in 16 subjects, and 2 subjects demonstrated sympathetic withdrawal (orthostasis). A paradoxical parasympathetic response to sympathetic challenge was observed in 7 subjects. Only one subject had a normal response to all maneuvers.
Discussion: The findings of this study agree with previous studies suggesting ANS imbalance with blunting of the baroreceptor reflex in parturients (1,4). We observed a lower rate of resting sympathetic dominance, but our finding of reduced response to autonomic nervous system challenges is similar to previous studies. The number of subjects that demonstrated sympathetic withdrawal or a paradoxical response to sympathetic challenge was an unexpected finding. A better understanding of the ANS balance and response to challenges may help guide appropriate therapeutic interventions in parturients.
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A-144.

FACTORS ASSOCIATED WITH WOMEN RECEIVING EPIDURAL ANALGESIA IN LABOR

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Introduction: Although epidural analgesia provides effective pain relief in labor, there are women who choose not to receive the procedure during childbirth. The aim of this study was to identify important factors associated with women receiving labor epidural analgesia and to develop a predictive model based on these factors.
Methodology: We interviewed all patients who labored over a one-month period between September and October 2006. Patients were approached on the first post-delivery day with an IRB approved survey. We conducted the study at Lucile Packard Children's Hospital, a busy academic hospital with a labor epidural rate of approximately 80%. During the study period, we surveyed all patients who underwent labor and excluded patients who had scheduled cesarean sections and multiple gestation pregnancies. Factors we selected to study a priori that we felt were predictive of a woman receiving an epidural included**:** partner preference, parity, prior epidural, ethnicity, language, education level, religion, insurance, obstetric group, scheduled induction, age, BMI, labor duration, pitocin use, delivery mode, baby weight, admission and delivery time. After initial statistical testing with Chi-squared and Student t-tests, we used multiple logistic regression to analyze these independent variables identified as potential predictive factors.
Results: Of the 320 women who met enrollment criteria, 302 completed the study and 18 were lost to follow-up. Eighty percent of the 302 patients interviewed received an epidural for labor. Univariate analysis showed the following variables to be statistically significant (P<0.01)**:** partner preference, prior epidural, language, education, insurance, age, labor duration and pitocin use. Partner preference and a prior epidural were the only factors identified in the logistic regression model to be associated with whether women received an epidural. (Table 1) The influence of partner preference on whether women received an epidural were most prevalent among the Hispanic patients (P<0.05).

Table 1: Factors Associated With Patients Receiving Epidural Analgesia During Labor

Variable	Odds Ratio	95% CI	*P*-value
Partner preference			
Yes	25.1	5.2 – 122.0	< 0.0001
Undecided	11.4	22.9 – 45.6	0.001
Prior Epidural (yes/no)	9.0	2.5 – 32.5	0.001
Language*	2.2	0.6 – 8.5	0.264
Education†	0.9	0.6 – 1.4	0.654
Insurance type**	0.7	0.1 – 4.0	0.718
Age (years)‡	0.8	0.2 – 2.8	0.752
Duration (hours)††	2.6	0.6 – 10.9	0.192
Pitocin use (yes/no)	2.3	0.5 – 9.4	0.263

Results derived from a multiple logistic regression analyses comparing 243 patients who received a labor epidural to 59 patients that did not. * Language (primary language English yes/no); † Education (primary, junior high, high school, university, post graduate); ** Insurance type (Medical / Private); ‡ Age (? or < 35 years); †† Duration (<6 or ? 6 hours)

Conclusion: Only a previous epidural and partner preference influenced whether women received an epidural. Although it is understandable that having had a previous epidural would be a strong predictor of a patient getting an epidural, the strong association with epidural use and partner preference was an unexpected finding. Understanding the importance of partner preferences, especially among Hispanic patients, is important when counseling pregnant women with regard to their decision to have a labor epidural.

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POSTER AND RESIDENT 2

A-145.

COAGULATION STATUS FOLLOWING CESAREAN HYSTERECTOMY

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Introduction: Non-obstetric surgical blood loss is associated with increased coagulation activity, as demonstrated by an increased risk of postoperative thrombosis and in vitro evidence of hypercoagulation (1). During normal pregnancy, the hemostatic balance tips toward hypercoagulation (2). However, we have observed clinical coagulopathy associated with excessive fibrinolysis and/or a consumptive coagulopathy following emergency postpartum hysterectomies. The purpose of this study was to determine if patients undergoing postpartum hysterectomies become coagulopathic secondary to disseminated intravascular coagulation (DIC) and/or excessive fibrinolysis.
Methods: We received IRB approval and written informed consent from each subject. Ten patients requiring postpartum hysterectomies had blood samples drawn at the decision to perform a hysterectomy, and at 2, 4, 24, and 48 hours after delivery. CBC, PT, aPTT, fibrinogen, D-dimer, antithrombin III (AT-III), thrombin-antithrombin complex (TAT), plasminogen, plasminogen-antiplasminogen complex (PAP) and platelet counts were performed. Data were compared using ANOVA for repeated measures in time and corrected for multiple comparisons. Post hoc comparisons were made against the time to decision to perform hysterectomy. A $P < 0.05$ was required to reject the null hypothesis.
Results: Estimated blood loss was 2900 ± 1150 mL. Six subjects received general and 4, neuraxial anesthesia. D-dimer levels were greater than normal and AT-III levels were greater than normal in 9 and 6 of 10 patients at decision to perform a hysterectomy, respectively. Fibrinogen and plasminogen decreased by 2 h after delivery. Fibrinogen levels recovered to the normal range by 48 hours post delivery.

			Time after delivery			
	Normal Range	Decision	2hr	4hr	24hr	48hr
Plasminogen (%)	70-120	89±26	66±24‡	74±24	83±17	97±15
PAP (ng/ml)	0-514	772±772	924±835	798±684	561±520	691±395
Fibrinogen (mg%)	175-433	326±121	198±83‡	232±95‡	342±119	462±100‡
TAT (g/L)	1-4.1	25±24	26±22	19±20	23±22	17±18
D-dimer (g/ml)	<0.5	3.6±4.2	4.5±4.3	4.1±4.3	2.2±0.9	3.3±2.4
AT-III (%)	>70	67±22	50±24	56±18	71±18	83±16‡
Platelets (10^3)	>150	151±49	119±26	129±45	141±39	171±58

‡Different than Decision time.

Discussion: The findings of this study support our clinical observations and suggest a coagulopathic state involving fibrinolysis and characteristics of DIC following postpartum hysterectomy. Uterine and placental tissue contain both tissue plasminogen activator (t-PA) and urokinase plasminogen activator (u-PA) and the plasma levels of these factors and their inhibitors increase during pregnancy (1,3). Obstetric complications such as placental abruption can excessively activate the coagulation cascade and lead to DIC (4). Further study is required to delineate the optimal treatment of this coagulopathy.
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A-146.

COMBINED SPINAL-EPIDURAL ANESTHESIA WITH EITHER HYPERBARIC OR ISOBARIC BUPIVACAINE AND ROPIVACAINE FOR ELECTIVE CESAREAN SECTION

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Introduction: Hyperbaric local anesthetics used for combined spinal epidural (CSE) anesthesia might affect quality of the block[1]. We aimed to compare block characteristics, complications, side effects and efficacy of bupivacaine or ropivacaine administered as either isobaric or hyperbaric solutions.
Methods: After approval of ethics committee and patient consent, parturients were randomly assigned to have CSE initiated by one of four anesthetics**:** Group Bh, 10 mg hyperbaric bupivacaine (Marcaine heavy® 0.5%); Group Bi, 10 mg isobaric bupivacaine (Marcaine plain® 0.5%); Group Rh, 15 mg hyperbaric ropivacaine (Naropin® 7.5 mg/mL prepared with 0.5 mL 30% dextrose); Group Ri, 15 mg isobaric ropivacaine (Naropin® 7.5 mg/mL). Fentanyl 20 μg and saline were added to all solutions to reach a total volume of 3 mL. Specific gravity was measured (Combi-screen®, Biotechnologies AG). Mean arterial pressure (MAP); heart rate; hypotension (<20% decrease from baseline MAP); sensory level to pinprick and cold sensations; motor block (modified Bromage scale); time to T6 sensory level; maximum cephalic spread; time to regression to T10 and L1, time to maximum motor block and duration of motor block were recorded until recovery. Postoperative analgesia was provided with 10 mL epidural bolus dose of 0.125% bupivacaine in Groups Bh and Bi and with 0.2% ropivacaine in Groups Rh and Ri including morphine 2 mg. Neonatal outcome, maternal complications and side effects were noted. Data were analyzed using Mann Whitney U, chi square and Kruskall Wallis. $P<0.05$ was considered significant.
Results: There were no differences in demographic properties, duration of surgery, block failures, Apgar scores, complications and side effects among groups. Block characteristics are summarized in Table 1. Specific gravity was Bh=1.024, Bi=1.005, Rh=1.024, Ri=1.007, CSF=1.005. Baricity at 37°C was Bh=1.018, Bi=1.000, Rh=1.018, Ri=1.001. Use of ephedrine was significantly less in Groups Rh and Ri. 2 subjects in the Group Bi and 1 subject in the Group Ri required epidural top-up before onset of surgery.

Table 1. Block characteristics (mean ± sd).

	Group Bh (n=28)	Group Bi (n=25)	Group Rh(n=25)	Group Ri(n=25)
Maximum cephalic spread of sensory block (median, range)	T3 (T9-T1)	T3 (C7-T1)	T2 (T9-T1)	T3 (T11-T1)
Time to maximum cephalic spread of sensory block (min)	13.7±4.7	13.2±4.9	15.5± 5.6	20.0±6.8*#
Time to sensory block at T6 (min)	4.5±1.6	5.5 ±2.1	4.6±1.1ψ	7.5±5.5*
Time to regression of sensory block	192.6 ± 42.1	184.1 ± 42.8	166.0 ± 36.3	188.9 ± 41.8
to T10 and L1(min)	207.9 ± 39.5	213.4 ± 38.4	184.2 ± 40.0	215.0 ± 41.2
Postop. 1st analgesic requirement (min)	224.1±47.9	227.9±43.5	218.0 ± 48.2	239.3±44.1
Time to maximum motor block (min)	7.6± 3.5	9.4±4.1	11.7±6.5ψ	15.6±5.8*#
Duration of motor block (min)	140.2±33.3	149.7±46.0	90.6±17.3*#ψ	121.6±33.7*#
Amount of ephedrine used (mg)	30.0±14.9	27.8±15.4	20.0±11.9*#	18.3±12.4*#

*:P<0.05 vs Group Bh, #:P<0.05 vs Group Bi, ψ:P<0.05 vs Group Ri

Discussion: CSE with Ri takes longer than using either Rh or Bh. Ropivacaine reduces ephedrine use and does have a faster motor recovery. Our results provide benefit of using ropivacaine where early block recovery leading to faster patient discharge is anticipated in busy labor units.
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POSTER AND RESIDENT 2

A-147.

ULTRASOUND GUIDED SACROILIAC JOINT INJECTION IN PREGNANCY

AUTHORS: R. McHugh, W. Schwendemann, M. Hurdle;
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Introduction: Increased sacroiliac (SI) joint laxity in pregnant women may present as pelvic or lower back pain[1-4]. Intra-articular SI joint injections have been well described using fluoroscopy guided imaging. However, this procedure during pregnancy exposes the parturient and fetus to radiation and exposes the patient to the additional risk of contrast reactions. Ultrasound (US) technology is commonly used to image the fetus. This technique has been successfully used in a variety of guided injections[5-9]. We present a case series of parturients who successfully underwent US guided SI joint injections.
Cases**:** 4 parturients who failed conservative management (warm/ cold compresses, NSAIDS, bedrest, and physical therapy) were referred to the pain clinic. All were greater than 14 weeks gestation, had a BMI < 35, and had no contraindications to intra-articular injections. After obtaining informed consent, all patients were positioned in the lateral decubitus position with their unaffected side down. The posterior superior iliac spine (PSIS) was scanned initially by palpating it then placing the transducer horizontally across the PSIS. The lateral sacrum was visualized medially and the posterior inferior iliac spine (PIIS) laterally. Slight inferior movement below the level of the PIIS brought the SI joint into view. Standard sterile protocol was followed including sterile US gel and sleeve. The SI block was performed using a 2.5 inch 22 gauge cutting edge needle inserted in the joint space with 1% lidocaine and 6mg betamethasone in 2 mL volume. Pain scores decreased by greater than 3 points by the 4th week and no analgesic supplementation was needed. None of the parturients had delivered at time of submission.
Discussion: About 50 % of women will suffer from some form of pelvic pain during pregnancy. SI joint laxity has been reported to account for 77% of reported pelvic pain[10]. The severity of pain has been shown to be related to increased gestational and maternal age. Our case series shows that SI joint injections can greatly benefit the patient for up to one month. Corticosteroids have long been used in the obstetric population particularly with comorbidities of asthma, inflammatory bowel disease, and systemic lupus erythematosus without fetal abnormalities[11]. US is an effective and safe method for SI joint injection. The technology is an excellent alternative to fluoroscopy or unguided SI joint injections in pregnant women. Additional studies to evaluate the efficacy of SI joint injection are currently underway.
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A-148.

PROSPECTIVE AUDITS OVER FOUR YEARS (2003-2006) OF GENERAL ANAESTHESIA AND THE CONVERSION OF REGIONAL TO GENERAL ANAESTHESIA FOR CAESAREAN SECTIONS

AUTHORS: M. A. Rafi, D. McIntosh, Z. Arfeen, U. Misra;
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Introduction: Direct anaesthetic related maternal deaths have largely been attributed to general anaesthesia (GA). Since the mid-1980s there has been an improvement in the maternal mortality figures, mainly from an increase in the use of regional anaesthesia (RA). A six-year (1997-2002) retrospective audit in our unit showed a 9.4% conversion rate to GA, for women having emergency (EM) caesarean sections (CS). The recommended standards[1] for conversion are <1% for elective (EL) and <3% for EM cases (Grades 1-3). To improve our conversion rate we undertook a prospective audit for all CS requiring general anaesthesia (2003-2006).
Method**:** Data collected**:** grade/reason for CS, details of the epidural in-situ (insertion level, catheter length in space, function in labour), anaesthesia given (technique, details of top-up drugs, was the top-up started in room/theatre), block height & testing modality, time of GA and whether given before/after delivery. The last two audits included data on foetal resuscitation measures when appropriate (use of tilt, oxygen, fluids, terbutaline).
Results: For the audit periods a total of 1722 CS were carried out. Of these 1147 were grades 1/2 (66.6%), 1531 under RA (88.9%)**:** 886 spinals (51.5%), 34 epidurals (2%), 101 CSEs (5.9%), 510 labour epidural top-ups (29.6%), 134 GA (7.8%) and 57 RA to GA conversions (3.3%).

		2003	2004	2005	2006
RA %	EL	93.9	94.7	96.9	98.5
	EM	82.4	84.1	87.9	88.3
RA to GA %	EL	0.0	1.6	2.5	0.0
	EM	7.7	5.3	3.6	2.9

The reasons for conversion included**:** inadequate catheter length in epidural space, known poorly functioning labour epidural which were not re-sited, inadequate local anaesthetic (LA) top-up dose/ time for onset/ block testing, and not using an opiate with the LA top-up. These issues were highlighted with each audit presentation. Foetal resuscitation measures were either poorly recorded or not performed for grade 1 CS.
Conclusion: The RA rates in our unit meet the recommended standards[1] of >95% for elective and >85% for emergency cases. We have shown an improvement in our conversion rates to GA in emergency cases. Our conversion rates are close to the standards of <1% for elective and <3% for emergency cases. Foetal resuscitation appears to be inadequate and may reduce the time available for RA in difficult cases.
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POSTER AND RESIDENT 2

A-149.

WHAT IS PAIN WITH EPIDURAL INJECTION/INFUSION (PWEI)?

AUTHORS: S. Lee, W. Doty, V. Ross, P. H. Pan;
AFFILIATION: Wake Forest University, Winston-Salem, NC.

INTRODUCTION: What is pain with epidural injection/infusion (POEI)? Our institution has about 7000 deliveries per year with approximately 80+% labor neuraxial analgesia rate. Our quality assurance program collects information on any unusual complains during and after the anesthesia/analgesia. Over the years, we have experienced repeatedly some patients complaining of pain typically localized to upper back, neck or shoulder after epidural analgesia had been infused for a duration and often worsen with bolus epidural injection to the extent that hinders bolus dosing for C/S. In search literature, we found no description of such problem . Therefore, our quality assurance program prospectively collected data on this problem to estimate its incidence, characteristics and long term sequelae.
METHOD: Definition of pain with epidural injection/infusion included constant pain in back (upper or lower), scapula, neck and shoulder started after and during labor neuraxial analgesia and worsen with bolus epidural injection. As part of the quality assurance program, information on pain with epidural injection or during epidural infusion was collected prospectively on all patients. The providers reported the event on the QA-form and the associated information on the anesthetic-record. A dedicated QA anesthesiologist reviewed all anesthestic records to identify/clarify any unclear documentation. The data collected between June 2004 to May 2006 on pain with epidural injection were analyzed.
RESULTS: For the study period, there were 9515 SVD, and 9056 labor neuraxial analgesia (6029 Epidural and 3027 CSE) performed. There were 44 cases of pain with epidural injection/ infusion yielding an overall incidence of 0.46% (95% CI**:** 0.32%, 0.60%) for all neuraxial analgesia. Prevalence were 0.17% (95% CI **:** 0.21%, 0.31%) and 0.63% (95%CI**:** 0.43%, 0.83%) after CSE or standard epidural labor analgesia respectively. 66% (29/44) of those having pain with epidural injection/infusion eventually had cesarean delivery in contrast to our 26% overall cesarean delivery rate. Use of air vs saline for loss of resistance technique did not seem to affect the occurrence rate. The location of pain were typically upper and lower back, neck, scapular and shoulder and worsen on epidural injection. There was no long term neurological sequeale in all patients. Pain gradually resolved in all over time, and improved in most with removal of epidural catheter, slowing or stopping the infusion rate, adminstration of epidural fentanyl bolus, IV opioids or pulling the epidural catheter back 1 to 2 cm, but no one method seemed to resolve the pain completely and consistently.
CONCLUSION: Pain with epidural injection/infusion occurred in 0.46% of labor neuraxial analgesia and could be potentially difficult to manage. Further investigations are needed to identify successful management for pain with epidural injection/infusion.

A-150.

DIFFERENT WORLDS, SAME PROTOCOLS? EVALUATION OF THE IMPACT OF APPLYING MAIN OPERATING ROOM PROTOCOLS TO OBSTETRICS

AUTHORS: M. A. Soens, D. J. Birnbach, J. S. Ranasinghe, D. H. Penning, D. A. Lubarsky;
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Introduction: Retained surgical sponges or instruments may result in major morbidity. It has been estimated that these preventable errors occur in 1 of every 1500 intra-abdominal operations.[1-3] This risk significantly increases in emergencies and with higher body-mass-index (BMI).[1] Sponge counts may not always be sufficient in high risk settings and it has been suggested that radiographic screening should be considered, even when counts are correct.[1] Current radiographic screening varies widely from one institution to another. [1] A recently instituted main OR policy at our institution requires an X-ray prior to leaving the operating room for a BMI of $\geq$35. The aim of this QA study was to evaluate the ramifications of this policy in obstetrics.
Methods: We retrospectively reviewed the charts of all patients who underwent cesarean delivery during 2006, observing use of intraoperative x-ray, BMI, delays and costs.
Results: Of the 2616 patients who underwent cesarean delivery at our institution in the year 2006, 773 (30%) had a BMI $\geq$ 35. This number is higher in OB patients (due to weight gain during pregnancy) as compared to non pregnant patients. Radiologic verification necessitated intraoperative delays. These varied depending on several factors, most notably time of the day. To date, the shortest delay for intraoperative x-ray was 22 minutes, the longest was 75 minutes, and the average delay was approximately 38 minutes. Patient charge for OR time is $3599 per hour for the first hour and $1238 for each additional half hour. The charges for an intraoperative abdominal x-ray is $501. The anesthetic charge is $100 for each 15 minutes. The average total increase in charges was calculated at $2322. Other costs such as decreased productivity/ efficiency and intangible costs such as poor morale were not factored in, but are important variables for consideration.
Discussion: To date, despite a hospital-wide policy requiring intraoperative abdominal flat plate x-ray in all patients with a BMI $\geq$ 35, the compliance on Labor and Delivery has been suboptimal. If the protocol were actually followed on each of our patients with a BMI >35, the annual cost (approximately $2300 per patient X approximately 800 patients) would be approximately 2 million dollars. As the number of morbidly obese patients in our practice increases, as is occurring in the US[4], so will this cost. While patient safety is of utmost importance, one must ask if this policy is buying us 2 million dollars of increased safety. Other potentially more cost effective means to verify surgical counts should be evaluated. Protocols for the main operating room may not necessarily be appropriate for the obstetric suite.
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POSTER AND RESIDENT 2

A-151.

THE GERTIE MARX NEEDLE: MIT ABSICHT VERBESSERN

AUTHORS: K. Jani[1], G. M. Vasdev[2], E. Rho[2], D. Bacon[2];
AFFILIATION: [1]Mayo Medical School, Rochester, MN, [2]Mayo Clinic College of Medicine, Rochester, MN.

The evolution of our current pencil point needle**:** a key design concept was developed by Dr. Gertie Marx. The following abstract is dedicated to her ingenuity and design (with intention to improve).[1] The concept of a pencil point needle with a lateral orifice was introduced by Hart and Whitacre in 1951.[2] Prior, spinal needles with cutting tips were used. There was significant trauma to the dura, and accompanying complication of postdural puncture headache. Atraumatic needles were designed as the tip would separate the longitudinal dural fibers thus allowing reapproximation and reduced leakage upon removal. The Whitacre needle was an advancement, but was limited by design issues such as a small port that hindered CSF flow, aspiration or injection. The medical metallurgical industry was unable to create an orifice of sufficient size, whilst maintaining the structural integrity of the tip. Thirty-nine years later Sprotte modified the Whitacre by widening the orifice, elongating the tip, and changing from a cylindrical to olive-shaped design.[3] These modifications were due to improvements in the austenitic stainless-steel industry. Decreasing the amount of carbon, as well as introducing molybdenum and nitrogen to the alloy resulted in increased mechanical strength. For the first time, a closed-tip needle had flow rates comparable to cutting needles. Advances in technology may have drawbacks. Larger ports allowed higher flow rates, but were prone to incomplete blocks and tip breakage due to stress fracturing along the distal planes. The Gertie Marx was designed to overcome the drawbacks of its predecessors. Fluid analysis revealed the optimal side port size was 1.5 x internal diameter; the port should be located 1.5 x external diameter from the tip. Hence the orifice is fully immersed within the CSF, and tip is shallow enough to avoid injury. Flow rates were not compromised due to laser machining of a rectangular port that favored fluid movement over the previous ovoid structure, without creating the "jet effect". The tip was rounder and blunter, which aided in the "dural pop", as well as reducing trauma. A steel stylet that strengthened the needle and also created a vacuum upon removal was included. This latter feature aided when CSF pressures were low. In addition, a magnifying hub and a tangible sideport indicator were included; both are useful in sub-optimal light conditions.
The pioneering work of Gertie Marx translated into good clinical practice.[4] Other designers followed suit, the Sprotte needle was re-tooled for a smaller side port, the Whitacre was modified with a thin wall and the Braun developed the Pencan® spinal needle with similar design features to the Gertie Marx Needle.®

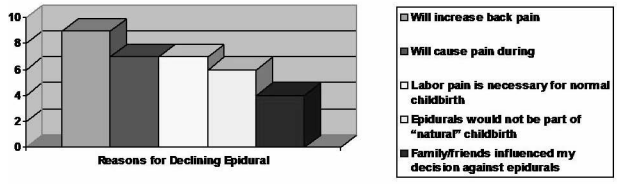
References:
1) US patent office**:** www.uspto.gov
2) Anaesthesia 59:1341-1241, 2004.
3) Anesthesia Analgesia 93:215-220, 2001.
4) Anesthesia Analgesia 91:916-920, 2000.

A-152.

BELIEFS ABOUT THE USE OF EPIDURALS DURING LABOR AND DELIVERY

AUTHORS: D. S. Kim, M. Neumann, J. Southerland;
AFFILIATION: Loma Linda University Medical Center, Loma Linda, CA.

Introduction: Of approximately 4 million women who give birth in America, an estimated 1.6 million females request an epidural for labor analgesia (1). However, in the Inland Empire of California, a significant number of parturients decline an epidural for labor analgesia. Their reasons might be related to parity, socioeconomic class, ethnicity, and maternal age (2). This study was created to determine the most common reasons for refusing an epidural during labor and delivery in the Inland Empire. It is anticipated that the study will help determine what specific perceptions might need to be addressed during perinatal education. Most importantly, improved patient care for peripartum analgesia will be the ultimate objective.
Methods: This study was approved by the IRB. Following delivery, parturients who refused epidural analgesia were given a survey of fourteen questions. These questions were derived from common beliefs regarding epidurals taken from patients, nurses, and physicians. Patients were given the option of answering "yes", "no", or "not sure". Lastly, they were asked to identify their ethnicity.
Results: The most frequent reason in declining labor epidural analgesia was that epidurals could cause chronic back pain. The next two most common reasons were that epidurals will cause pain during placement and that labor pain is necessary for normal childbirth. The subsequent reasons were that epidurals would not be part of "natural" childbirth and that family/friends influenced their decision against epidurals.



Discussion: Ironically, parturients believed epidurals would not only cause chronic back pain but cause pain during placement. Moreover, they believed labor pain is necessary for normal childbirth. These beliefs reveal the need for further perinatal education concerning options for labor analgesia, including epidurals. With better understanding of the parturient's concerns, health care providers can direct the educational process to improve the birth experience.

References**:**
1.The Journal of Prenatal Education. Spring, 2003, 12(2):16-21.
2.Obstetrics & Gynecology. 1994; 84:579-582.

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POSTER CASE REPORTS 1

A-153.

PULMONARY ARTERY CATHETER INDUCED HYPOTENSION IN A PARTURIENT WITH SEVERE PULMONARY HYPERTENSION

AUTHORS: R. B. George, A. J. Olufolabi, T. K. Allen, H. A. Muir;
AFFILIATION: Duke University Medical Center, Durham, NC.

Introduction: Parturients with pulmonary hypertension (PHTN) have a maternal mortality of 30 - 36% (1). Recent advances in treatment include PDE-5 specific inhibitors (sildenafil) and aerosol administered prostacyclin (iloprost). We present the successful management of a parturient with severe PHTN for a cesarean delivery (CD) under regional anesthesia after medical optimization with such agents. The use of pulmonary artery catheters (PAC) for monitoring these patients intraoperatively is a controversial issue (2,3). This case illustrates the potential detrimental effects of PAC monitoring for CD under regional anesthesia.

Case**:** A 27 year-old G2P1 parturient presented at 28 weeks gestation with 2 weeks of worsening dyspnea. A CT was negative for pulmonary embolism but revealed a dilated pulmonary artery and right ventricle. Right heart catheterization showed a probable sinus venosus ASD (PAP = 82/34, PVR = 600 dyne s/cm^5). Medical optimization prior to delivery was achieved with sildenafil and inhaled iloprost. Elective CD occurred at 32 weeks gestation. Following the introduction of a right internal jugular sheath, a PAC was uneventfully inserted. The patient was then sat up for placement of a CSE. She received 1 ml of 0.75% bupivacaine intrathecally. The patient was laid supine with left uterine displacement and prepared for placement of femoral arterial and venous introducer catheters. Approximately 9 minutes after the spinal dose, the ECG revealed a supraventricular tachycardia with multiple premature ventricular complexes associated with a blood pressure measuring 60 mmHg systolic. Her blood pressure recovered with epinephrine and cautious fluid boluses but the atrial arrhythmia remained. It became evident that the PAC was no longer in the pulmonary artery and may have initiated the arrhythmia, which lead to the profound hypotension. The PAC was withdrawn, at which time the atrial arrhythmia halted. The CD was uneventful and a premature infant was born with Apgar scores of 5 and 7 (wt = 1910 grams).

Discussion: Intraoperative management of pulmonary hypertension requires prevention of sympathetic responses to anesthesia and surgical stimuli. Aortocaval compression, regional anesthesia, hypovolemia, and drugs such as oxytocin can abruptly affect a parturients hemodynamic status. Newer agents such as sildenafil and inhaled iloprost allow for medical optimization with minimal side effects and without interfering with the use of regional anesthesia. The use of a PAC is not without risk and clinicians need to assess the risk benefits of such invasive monitors especially in the face of irreversible pulmonary arterial hypertension and a fixed PVR. PAC position can be altered with the movement of patients under regional anesthesia. Therefore, it may be prudent to place the PAC once the regional anesthesia procedure is complete.

References:
1. J Am Coll Cardiol 1998; 31**:** 1650-7
2. Anesth Analg 1990; 70**:** 212-5
3. Can J Anaesth 1994; 41**:** 502-12

A-154.

REPEAT AORTIC VALVE REPLACEMENT DURING PREGNANCY TO CORRECT PATIENT-PROSTHESIS MISMATCH

AUTHORS: W. Hartman, K. Rehfeldt;
AFFILIATION: Mayo Clinic, Rochester, MN.

Introduction. Patient-prosthesis mismatch (PPM) occurs when too small a prosthesis is inserted in too large a patient. Here, a morbidly obese woman underwent repeat aortic valve replacement during pregnancy because of worsening heart failure secondary to PPM. Surgery for prosthetic valve dysfunction during pregnancy has been previously described though we are unaware of any cases of cardiac surgery during pregnancy to correct PPM. In fact, a review of the literature revealed no reported surgical or non-surgical cases of PPM occurring during pregnancy.

Case**:** A 33 year-old G4P0 morbidly obese woman (BMI = 49 kg/m^2) presented at 16 weeks gestation with symptoms of worsening heart failure. At 25, she had undergone aortic valve replacement (AVR) with a 19 mm St. Jude prosthesis for a bicuspid aortic valve. A preoperative echocardiogram showed concentric left ventricular hypertrophy (LVH) with normal systolic function. The aortic prosthesis appeared structurally normal yet the mean transvalvular gradient was 53 mmHg with an effective orifice area indexed to body size (EOAI) of 0.26 cm^2/m^2, consistent with severe PPM. Because of the risk of progressive heart failure to both the patient and fetus, she was referred for surgery. In the operating room, the finding of a normal St. Jude prosthesis supported the diagnosis of PPM. Aortic root enlargement performed during normothermic cardiopulmonary bypass (CPB) allowed for insertion of a 23 mm tissue valve. The patient was weaned from CPB without the need for inotropic support. Fetal heart rate monitoring was performed throughout the postoperative period and was reassuring. Following discharge, she returned home and followup regarding the remainder of her pregnancy was not available.

Discussion: PPM occurs when too small a prosthesis is placed in too large a patient. Thus, even with normal prosthetic function, the effective orifice remains essentially stenotic. In this case, a small (19 mm) aortic prosthesis was used in a woman, who at the time of presentation, was morbidly obese. The normal changes of pregnancy, including increased blood volume, increased cardiac output, and LVH, probably exacerbated her symptoms. Even moderate degrees of PPM (EOAI 0.6 - 0.9 cm^2/m^2) are associated with less favorable clinical outcomes after AVR with studies showing increased short- and long-term mortality (1, 2). Our patient presented with severe PPM (EOAI < 0.6 cm^2/m^2) and marked symptoms of CHF. Data indicate modest fetal mortality during cardiac surgery (12.5%) in recent series (3) and low rates of maternal mortality that do not differ from non-pregnant patients (3, 4). Thus cardiac surgery during pregnancy can be considered for select patients who are likely to benefit from operative intervention.

References:
1. J Heart Valve Disease 2004;13(Suppl 1):S59-62
2. Eur J Cardiothor Surg 2006;30:15-9
3. Ann Thor Surg 1996;61:259-68
4. Ann Thor Surg 2003;76:1605-8

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POSTER CASE REPORTS 1

A-155.

IDIOPATHIC PULMONARY HEMOSIDEROSIS AND CONTINOUS SPINAL ANALGESIA FOR VAGINAL DELIVERY

AUTHORS: T. K. Allen, R. B. George, C. Peterson-Layne, A. S. Habib;
AFFILIATION: Duke University Medical Center, Durham, NC.

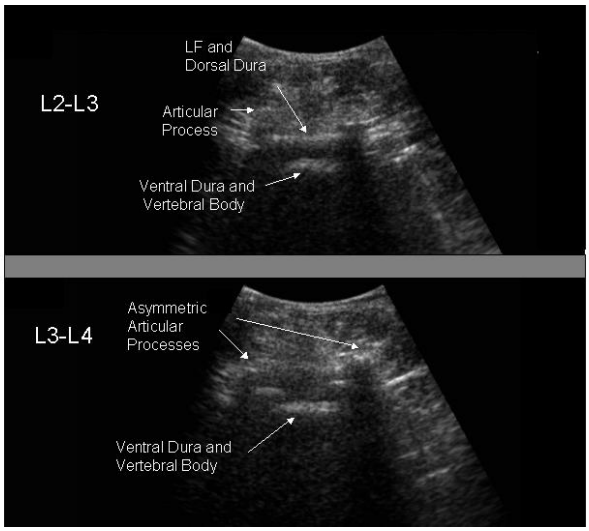
INTRODUCTION: Idiopathic pulmonary hemosiderosis (iph) is a rare disorder characterized by remitting and relapsing episodes of intraalveolar bleeding, which over time leads to progressive secondary pulmonary fibrosis, pulmonary hypertension and cor pulmonale(1). Patients with iph rarely survive to childbearing age or are unable to become pregnant. We report the successful management of a parturient with iph for a vaginal delivery with continuous spinal analgesia.
Case Report: A 19 year old primigravida at 34 weeks gestation, presented with an exacerbation of IPH. She weighed 56kg and was 160 cm tall and had a history of severe thoracolumbar scoliosis corrected surgically with posterior spinal fusion and instrumentation from T5 to L2. Lung function testing performed after resolution of this acute episode was consistent with severe restrictive lung disease. An echocardiogram reported mildly elevated right ventricular peak pressures. Fetal ultrasonography revealed severe fetal intrauterine growth restriction. Induction of labor was therefore planned at 34 weeks and 4 days to expedite delivery. Anesthetic management included the placement of an arterial line to allow for frequent blood sampling and monitoring of her ABGs and a 20 gauge spinal catheter placed at the L4/L5 interspace under ultrasound guidance. Labor analgesia was successfully initiated with 2 mls of 0.1% bupivacaine and 2mcg/ml fentanyl solution and maintained with 1 ml boluses of the same solution at 45 minute intervals via the spinal catheter which achieved a sensory block to cold at T10. Noninvasive ventilation with bi-level positive airway pressure (BIPAP) and oxygen therapy (FiO_2 0.4) was administered intermittently to maintain arterial partial pressures of oxygen between 70-100mmHg during labor. Continuous cardiac output was monitored using the lithium dilution for cardiac output (LIDCO®). Hemodynamically she remained stable during labor and immediately postpartum. The spinal catheter was removed after 24 hours and bolus of normal saline was injected immediately prior to this. Respiratory symptoms improved significantly postpartum and she was discharged home on day 4 on 1.5L/min of oxygen at night and immunosuppressants. On postpartum day 8 she developed a postdural puncture headache which resolved 4 days later with conservative management.
DISCUSSION: Idiopathic pulmonary hemosiderosis is associated with both serious maternal and fetal complications. Exacerbation of symptoms in pregnancy occur in the 2nd and 3rd trimesters(1). The use of a carefully titrated neuraxial block for analgesia, in conjunction with BIPAP, is associated with minimal hemodynamic and respiratory compromise during labor. Because of the unpredictable nature of epidurals in patients who have had extensive scoliosis surgery a spinal catheter was electively placed for labor analgesia.
Reference
1. Respirology 2003;8:398-400.

A-156.

PUNCTURE IT, PUNCTURE IT NOT...PICKING THE BEST LUMBAR INTERSPACE OF A SCOLIOTIC SPINE

AUTHORS: Y. Lee, M. Tanaka, M. Hayter, J. Carvalho;
AFFILIATION: Department of Anesthesia and Pain Management, Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada.

Introduction: Epidural and spinal anesthesia, in the presence of anatomical abnormalities, represent a challenge not only to beginners, but also to experienced professionals. Ultrasound (US) has recently been incorporated into clinical practice to facilitate central blocks (1). We present the lumbar spine sonoanatomy of a female volunteer with severe scoliosis.
Methods: A healthy female, 29 yo, with diagnosis of thoraco-lumbar scoliosis, volunteered to have her lumbar spine scanned. According to her last X-rays, at the age of 20, there were two curves of approximately 40-50°, one dextro-convex in the thoracic region and the other levo-convex in the lumbar region. A portable ultrasound with a 3-5 MHz curved probe was used. In the sitting position, the spine was scanned from the sacrum, with a longitudinal paramedian approach, to determine the site of lumbar interspaces (L1-2 to L5-S1). At each interspace, a transverse approach was used to identify the sonographic landmarks used in epidural/spinal anesthesia**:** spinous process, articular processes, transverse processes, vertebral body, ligamentum flavum and dura mater (dorsal and ventral). At each interspace, the optimal insertion point determined by ultrasound was compared to that determined by palpation.
Results: At L5-S1, L4-L5 and L3-L4, articular processes were asymmetrical and although the vertebral body was visible, the ligamentum flavum and anterior dura were not. Symmetry was much better at L2-L3 and L1-L2, where articular processes were similar and the ligamentum flavum was clearly seen. There was considerable discrepancy between optimal insertion points determined by palpation and ultrasound.



Discussion: In theory, if the ultrasound beam can see, the epidural/ spinal needle can find its way through. Our experience has been that one of the indications of spine ultrasound is to determine the best interspace to be punctured. If the anatomy shows asymmetry and the ligamentum flavum is not seen, that level should be best avoided. In this particular subject, punctures are more likely to be successful at L1-L2 and L2-L3. In addition, the optimal puncture site in a scoliotic spine may not be the one determined by palpation. Although we have yet to document our experience in a systematic way, we suggest that ultrasound can be a valuable tool to improve efficacy of the procedure and patient satisfaction when scoliosis is present.
References**:**
Anesthesiology 2006; 104 (Supp 1)**:** A44

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POSTER CASE REPORTS 1

A-157.

ANESTHETIC MANAGEMENT OF A PARTURIENT WITH CARCINOID DISEASE

AUTHORS: K. M. Woo, N. N. Imasogie, I. Bruni, S. I. Singh, R. J. Gratton;
AFFILIATION: University of Western Ontario, London, ON, Canada.

Introduction: Carcinoid tumors are neuroendocrine in origin and release vasoactive substances including serotonin, substance P, histamine, and bradykinin.
We present the anesthetic management of a rare case of a parturient with metastatic pancreatic carcinoid tumor. There have been no prior reports in literature of the anesthetic management of such a patient. Carcinoid tumor may be associated with the carcinoid syndrome in 2-5% of patients, and leads to multisystem involvement including carcinoid heart disease. This may result in life-threatening hemodynamic instability with hypertensive episodes, bronchospasm, hypotension, flushing, volume depletion, electrolyte imbalance, and hyperglycemia.
Case**:** A 29-yr-old parturient with a primary pancreatic, non-secreting carcinoid tumor with metastases to the liver was assessed in the Anesthetic clinic at 32 weeks gestation. She previously received chemotherapy and intravenous radioisotope treatment. Serial ultrasounds, liver function tests and tumor marker chromogranin A remained stable. After discussion with the patient and her obstetrician, oncologist, endocrinologist and pediatric clinical pharmacologist it was decided to proceed with an induction of labor at 38 weeks gestation with epidural analgesia to decrease the stress of labor. After placement of an arterial line for blood pressure monitoring and a 500mL intravenous bolus of crystalloid, epidural analgesia was established with ropivacaine 0.1% with fentanyl 2 mcg/mL totaling 15mL and an infusion of this solution was continued. Use of epinephrine and ephedrine was avoided. Octreotide as well as glyceryl trinitrate were available in the delivery room in the event of a carcinoid crisis. Labor was induced with rupture of membranes and use of oxytocin. The patient remained comfortable and stable and delivered a healthy male infant 12 hours later. She was monitored in a step-up unit and 6 weeks after discharge, she remained stable.
Discussion: The management of a patient with carcinoid syndrome focuses on blocking the production, release and effect of the mediators. Octreotide inhibits the release of peptides from the carcinoid tumor. Octreotide has been safely used in pregnancy.[1]
Epidural analgesia and anesthesia is beneficial in avoiding the stress-induced release of catecholamines during labor. Drugs which can activate the sympathetic nervous system or cause histamine release are avoided. Invasive blood pressure monitoring facilitates the careful titration of epidural blockade so as to avoid hypotension and reflex sympathetic nervous stimulation.[2]
The successful outcome in this case is attributable to the close follow-up of this patient during her pregnancy, the multidisciplinary team approach used, and use of epidural analgesia for labor and delivery.
References:
1 Boulanger C, Vezzosi D, Bennet A, Lorenzini F, Fauvel J, Caron P. Normal pregnancy in a woman with nesidioblastosis treated with somatostatin analog octreotide. Endocrinol Invest 2004; 27(5)**:** 465-70.
2 Graham GW, Unger BP, Coursin DB. Perioperative management of selected endocrine disorders. Int Anesthesiol Clin 2000; 38**:** 31-67.

A-158.

AIRWAY MANAGEMENT FOR CESAREAN SECTION UTILIZING THE GLIDESCOPE® VIDEOLARYNGOSCOPE: A REPORT OF TWO CASES

AUTHORS: M. Dupanovic, R. Wissler;
AFFILIATION: University of Rochester, School of Medicine and Dentistry, Rochester, NY.

Introduction: Despite efforts to popularize regional anesthesia for cesarean section, general anesthesia may be necessary when regional anesthesia is contraindicated. These two cases illustrate safe airway management with the Glidescope® videolaryngoscope (GVL) for both elective and emergency cesarean sections.
Cases: 1. A 35 y.o. woman, G3P2, presented at term for elective repeat cesarean section. She was healthy except for a chronic sensory deficit in her right leg, with the neurologic diagnosis of "idiopathic lumbar plexopathy". The patient was NPO for 8 hours, refused regional anesthesia for cesarean section, and accepted the higher risks of general anesthesia. She had a BMI = 30 kg/m2, and a normal airway evaluation except for a slightly small oral opening and Mallampati III without phonation. The patient reportedly had an easy intubation with a prior general anesthetic, and it appeared likely that mask ventilation would be feasible if intubation was challenging. Rapid sequence induction was followed by easy and safe oral endotracheal intubation on the first attempt using a GVL.
2. A 26 y.o. woman, G2P1, presented at 36 weeks of pregnancy with severe preeclampsia and HELLP. Her initial medical evaluation was remarkable for a BMI = 29 kg/m2, platelet count = 44,000/mcl and facial swelling. The pulmonary status was normal based on pulse oximetry and auscultation. However, the patient described "difficulty breathing" in relation to her oropharyngeal swelling. The airway examination was remarkable for severe swelling of the soft palate and uvula, with a Mallampati III classification. Based on worsening preeclampsia, the obstetricians requested anesthesia for an urgent cesarean section. The patient was NPO for > 24 hours. The anesthetic options were discussed with the patient, and she consented to a general anesthetic with awake oral intubation. After adequate topical anesthesia of the mouth and pharynx, the GVL was advanced to visualize the glottis. The panoramic view of the pharynx through the GVL allowed early identification and removal of brown fluid regurgitating from the esophagus prior to intubation. Next, the glottis and trachea were topically anesthetized with atomized 4% lidocaine under direct visualization with the GVL, and the patient was easily intubated during inspiration. The remainder of the anesthetic was uneventful. There was no clinical evidence of pulmonary aspiration in the perioperative or postoperative periods. The oropharyngeal swelling rapidly resolved after the cesarean section.
Discussion: In these two cases, the GVL provided excellent glottic visualization and intubating conditions for asleep and awake oral intubation during general anesthesia for cesarean section. The GVL may be a useful additional device for the management of challenging airways in obstetric anesthesia, although prospective studies are needed to critically evaluate this issue.
Reference:
Cooper RM, et al. Can J Anesth 52**:** 191-8, 2005.

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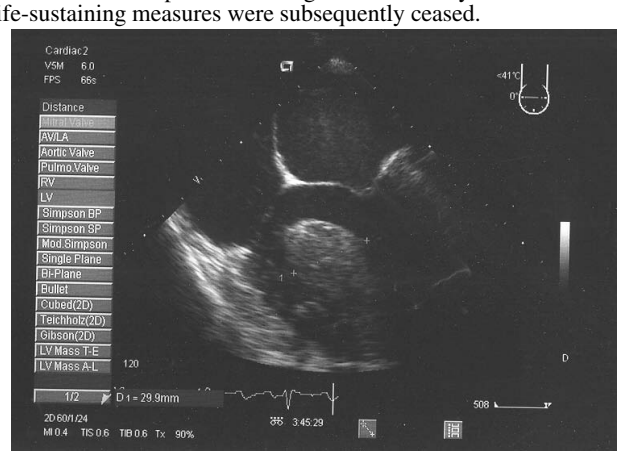
POSTER CASE REPORTS 1

A-159.

A REPEAT CESAREAN SECTION IN A WOMAN WITH NOONAN'S SYNDROME WITH DOCUMENTED SIGNIFICANT PROGRESSION OF SEPTAL HYPERTROPHY BETWEEN PREGNANCIES, REQUIRING CARDIOPULMONARY BYPASS AND LVAD PLACEMENT FOR POSTOPERATIVE HEART FAILURE

AUTHORS: L. M. Councilman-Gonzales, C. J. Burnett, J. J. Konvicka, W. C. Culp Jr., D. P. Ciceri;
AFFILIATION: Scott & White Memorial Hospital/ Texas A&M HSC College of Medicine, Temple, TX.

Introduction: A patient with Noonan's Syndrome, severe hypertrophic cardiomyopathy with massive septal hypertrophy, and thrombocytopenia presented for a repeat cesarean section 18 months after her original cesarean section (C/S), with documented significant worsening of septal hypertrophy between pregnancies. She required cardiopulmonary bypass and placement of a left ventricular-assist device (LVAD) after delivery.
Case: This 26-year-old, G_2, P_{1001} with Noonan's Syndrome, severe hypertrophic cardiomyopathy, and thrombocytopenia was scheduled for an elective repeat C/S. Her first C/S was performed emergently with general anesthesia for a nonreassuring fetal heart rate. The patient's interventricular septum thickness at that time was 2.4 cm. The surgery and recovery were uneventful. During the current pregnancy, the patient's echocardiogram revealed an increase in the interventricular septum thickness to 2.7 cm. Preoperatively, an arterial line and pulmonary artery catheter were inserted, and the patient was brought into the cardiac operating room. After induction of general anesthesia, a transesophageal echocardiogram was performed, revealing an interventricular septum thickness of greater than 3 cm. Surgery was uneventful and the patient was extubated and transported to the intensive care unit postoperatively. Within several hours the patient developed progressively worsening shortness of breath and hypoxia which required reintubation. The patient then developed profound hypotension, minimally responsive to massive doses of vasopressors. The patient was taken back to the operating room, placed on cardiopulmonary bypass, and an LVAD was inserted. The next morning, the patient was awake and responsive. The patient was transferred to await cardiac transplant. The patient suffered a catastrophic hemorrhagic stroke shortly after arrival and life-sustaining measures were subsequently ceased.



Discussion: This case demanded extensive communication and planning between multiple specialists (obstetricians, cardiologists, cardiac surgeons, intensivists, and obstetric and cardiac anesthesiologists). In spite of preparation and subsequent uneventful cesarean section, the patient decompensated postoperatively, reminding us that physiological changes after delivery may profoundly impact cardiac function and that high-risk obstetric patients may require intensive monitoring and aggressive therapies to optimize the chances of a good maternal outcome.[1]
References**:**
1) Current Opinion in Critical Care, 11:435-48, 2005.

A-160.

AMNIOTIC FLUID EMBOLISM IN A POST- CESAREAN SECTION PATIENT: A RARE, DELAYED PRESENTATION

AUTHORS: K. C. Tyagaraj;
AFFILIATION: Maimonides Medical Center, Staten Island, NY.

Introduction: Amniotic fluid embolism (AFE) is a dreadful complication of pregnancy with a high mortality rate of up to 80%. The incidence is described as 4 to 5 per 100,000 births. AFE can occur not only during pregnancy and labor but also can occur post partum. Two thirds of the mortality cases occur during the first five hours. We describe the case of a 28 years old patient who had AFE postpartum after cesarean section.
Case Report: 28 years old parturient was scheduled for elective repeat cesarean section. Review of history revealed no significant medical problems. A spinal anesthesia was planned for the C-Section. She was prehydrated with 800 ml of Lactated Ringer s solution. Spinal anesthesia was performed with 10.5 mg of 0.75% Bupivacaine, 15 mcg of fentanyl and 0.2 mg of preservative free morphine. A T6 sensory level achieved. The surgery went uneventful and a healthy, baby boy delivered. She was transferred to the floor in stable condition. On the floor, about four hours after surgery, she suddenly became short of breath and dizzy. Her blood pressure was recorded 73/53, heart rate 122/min and SpO2**:** 96%. She was noticed to have profuse bleeding from vagina, and was transferred back to operating room for abdominal reexploration. General endotracheal anesthesia was induced with etomidate and succinylcholine. Inspite of resuscitation with fluids and blood and vasopressor therapy, she continued to be hypotensive. Explorative laparotomy revealed no active source of bleeding. Intraoperative echocardiogram revealed severely dilated right atrium and ventricle with normal left ventricle (Fig.1). She progressively deteriorated with worsening respiratory acidosis. Intravenous vasopressor infusion continued, as well as resuscitation with crystalloids, blood and blood products. She was transferred to surgical intensive care unit. Inspite of all resuscitative efforts, she went into ventricular tachycardia and then fibrillation and died. Autopsy confirmed that she had massive AFE.

Discussion: AFE can neither be predicted nor prevented. Manifestations of AFE are variable, from a subclinical presentation to a rapidly fatal cardiopulmonary collapse. AFE classically occurs during labor and delivery or in the immediate postpartum period. Exceptions to the timing of onset are reported as late as 48 hrs postpartum or following C-Section, amniocentesis, removal of the placenta or with 1st and 2nd trimester abortions.
Reference**:**
CAN J ANESTH 48:1; 88-98, 2001

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POSTER CASE REPORTS 1

A-161.

THE ANESTHESTIC MANGEMENT OF A PARTURIENT WITH A SURGICALLY CORRECTED DOUBLE CHAMBERED RIGHT VENTRICLE FOR LABOR AND CESAREAN DELIVERY

AUTHORS: T. K. Allen, R. B. George, A. J. Olufolabi, H. A. Muir;
AFFILIATION: Duke University Medical Center, Durham, NC.

Introduction: We describe several parturients who developed upper back and/or neck pain during epidural analgesia/anesthesia and discuss possible etiologic mechanisms.
Case #1: A G1P0 patient received CSE labor analgesia (intrathecal bupivacaine 2.5-mg/fentanyl 15-µg, followed by a 3-mL lidocaine and epinephrine test dose, and then PCEA (bupivacaine 0.0625%/ fentanyl 2-µg/mL, basal rate 15-mL/hr, PCA dose 5-mL, lock-out 10-min, 1-hr max 30-mL)). Fifteen hours later (total epidural volume 275-mL) the patient received 20-mL lidocaine 2%/ epinephrine in 5-mL increments for CS. With each 5-mL bolus she complained of severe interscapular and neck pain that resolved over several minutes.
Case #2: A G1P0 patient received similar CSE labor analgesia for 8.5 hours (total 287-mL) and then two 5-mL manual redoses for breakthrough pain, each of which was associated with severe interscapular pain that lasted several minutes and then decreased, finally resolving completely only when the epidural catheter was discontinued after delivery.
Case #3: A G1P0 patient received CSE labor analgesia for 6 hours, during which she reported mild interscapular pain with each PCA bolus.
Case #4: A G2P0 patient received CSE labor analgesia. After 12 hours she received a 15-mL manual redose for breakthrough pain, and the basal rate was increased to 20-mL/hr. Over the next 5 hours, the patient developed excruciating interscapular pain, and requested discontinuation of her infusion. Thirty minutes later she experienced return of contraction pain, but was otherwise pain free, and was slowly given 20-mL epidural lidocaine for CS without return of back pain.
Discussion: We report interscapular and/or neck pain in several parturients undergoing epidural analgesia/anesthesia, which usually worsened during epidural redose. Epidural saline injection transiently increases epidural and intrathecal pressures.[1] There are references to interscapular pain among patients receiving epidural saline at high rates for PDPH prophylaxis/treatment.[2,3] One study measured epidural pressures and noted that those who complained of back pain seemed to have higher pressures than those who did not, but since the study involved only 4 such patients, it is difficult to draw conclusions.[4] We hypothesize that high epidural volumes increase epidural pressures and cause interscapular and/or neck pain. Patients #1, #2 and #4 were on epidural infusions for many hours and received high volumes. Patient #3 had an infusion for only 6 hours, but her pain was also milder than the others. The pain's transient nature mirrors the transient nature of the pressure increases that accompany epidural injection. We plan a prospective cohort study to note if development of this pain correlates with high epidural pressures, and if there are any other risk factors that predispose to its development in parturients receiving epidural analgesia/anesthesia.
References:
(1)*Anesth Analg* 95:423-29, 2002
(2)*Brit J Anaesth* 44:598-99, 1972
(3)*Anesth Analg* 65:1242-44, 1986 (4)*Anesth Analg* 46:293-96, 1967.

A-162.

BACK PAIN ASSOCIATED WITH EPIDURAL INJECTIONS IN PARTURIENTS

AUTHORS: B. M. Scavone, C. A. Wong, R. J. McCarthy;
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introduction: we describe several parturients who developed upper back and/or neck pain during epidural analgesia/anesthesia and discuss possible etiologic mechanisms.
Case #1: a g1p0 patient received cse labor analgesia (intrathecal bupivacaine 2.5-mg/fentanyl 15-µg, followed by a 3-ml lidocaine and epinephrine test dose, and then pcea (bupivacaine 0.0625%/ fentanyl 2-µg/ml, basal rate 15-ml/hr, pca dose 5-ml, lock-out 10-min, 1-hr max 30-ml)). fifteen hours later (total epidural volume 275-ml) the patient received 20-ml lidocaine 2%/epinephrine in 5-ml increments for cs. with each 5-ml bolus she complained of severe interscapular and neck pain that resolved over several minutes.
Case #2: A G1p0 Patient Received Similar Cse Labor Analgesia For 8.5 Hours (Total 287-ml) And Then Two 5-ml Manual Redoses For Breakthrough Pain, Each Of Which Was Associated With Severe Interscapular Pain That Lasted Several Minutes And Then Decreased, Finally Resolving Completely Only When The Epidural Catheter Was Discontinued After Delivery.
Case #3: A G1P0 patient received CSE labor analgesia for 6 hours, during which she reported mild interscapular pain with each PCA bolus.
Case #4: A G2P0 patient received CSE labor analgesia. After 12 hours she received a 15-mL manual redose for breakthrough pain, and the basal rate was increased to 20-mL/hr. Over the next 5 hours, the patient developed excruciating interscapular pain, and requested discontinuation of her infusion. Thirty minutes later she experienced return of contraction pain, but was otherwise pain free, and was slowly given 20-mL epidural lidocaine for CS without return of back pain.
Discussion: We report interscapular and/or neck pain in several parturients undergoing epidural analgesia/anesthesia, which usually worsened during epidural redose. Epidural saline injection transiently increases epidural and intrathecal pressures.[1] There are references to interscapular pain among patients receiving epidural saline at high rates for PDPH prophylaxis/treatment.[2,3] One study measured epidural pressures and noted that those who complained of back pain seemed to have higher pressures than those who did not, but since the study involved only 4 such patients, it is difficult to draw conclusions.[4] We hypothesize that high epidural volumes increase epidural pressures and cause interscapular and/or neck pain. Patients #1, #2 and #4 were on epidural infusions for many hours and received high volumes. Patient #3 had an infusion for only 6 hours, but her pain was also milder than the others. The pain's transient nature mirrors the transient nature of the pressure increases that accompany epidural injection. We plan a prospective cohort study to note if development of this pain correlates with high epidural pressures, and if there are any other risk factors that predispose to its development in parturients receiving epidural analgesia/anesthesia.
References**:** (1)Anesth Analg 95:423-29, 2002 (2)Brit J Anaesth 44:598-99, 1972 (3)Anesth Analg 65:1242-44, 1986 (4)Anesth Analg 46:293-96, 1967.

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A-163.

THE MANAGEMENT OF A PARTURIENT WITH PAROXYSMAL NOCTURNAL HEMOGLOBINURIA AND SEVERE PREECLAMSIA

AUTHORS: T. K. Allen, R. B. George, A. J. Olufulabi, A. S. Habib;
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INTRODUCTION: Paroxysmal nocturnal hemoglobinuria (PNH) is a rare cause of acquired hemolytic anemia, resulting from a single somatic mutation, associated with complement mediated intravascular hemolysis, bone marrow failure and thrombophilia (1). Pregnancies complicated by PNH are associated with a mortality of 20.8% mainly related to the increased risk of venous thromboembolism (2). We report the anesthetic and peripartum management for Cesarean delivery in a parturient with PNH and superimposed preeclampsia.

Case Report: A 35 year old primigravida was diagnosed with PNH, following a hematology consultation, at 18 weeks gestation when she presented with a new onset pancytopenia. She had a history of pulmonary vavulotomy, atrioseptal defect closure and surgically corrected thoracolumbar scoliosis in childhood. She subsequently had a pulmonary valve replacement at age 32. She was started on prophylactic anticoagulation with low molecular weight heparin (LMWH) therapy and this was increased to therapeutic doses at 22 weeks gestation and continued despite a persistent thrombocytopenia. She was transfused on one occasion at 31 weeks for symptomatic anemia (hemoglobin =5.4g/dl). At 34 weeks gestation, labor was induced after she was diagnosed with severe preeclampsia. The last dose of LMWH had been administered 20 hours previously and laboratory results on admission revealed an anemia and thrombocytopenia (Hemoglobin 7.3 g/dl; platelets $47x10^9$/L). Thromboembolic prophylaxis was then provided with 5000 units of unfractionated heparin (UFH) twice daily during labor and in the immediate postpartum period. Intrapartum, she received prophylactic magnesium sulfate and was transfused packed red cells and platelets. Labor analgesia was provided with intravenous fentanyl using a patient controlled analgesia system. She subsequently had a cesarean delivery and tubal ligation for a failed induction under general anesthesia. She was transfused one unit of packed cells and one unit of platelets intraoperatively and was transfused packed red cells on 3 separate occasions and platelets on one occasion postoperatively. An abdominal ultrasound performed on the first postoperative day to investigate right upper quadrant abdominal pain was normal. Therapeutic anticoagulation with enoxaparin was restarted 24 hours postoperatively and continued for 6 weeks. Following discharge from hospital on Day 20 she was started on oral prednisolone to treat ongoing hemolysis.

DISCUSSION: The management of parturients with PNH is multidisciplinary requiring experienced hematologists, obstetric anesthesiologists and obstetricians. Anesthetic management should be aimed at reducing the stress response to labor and surgery and maintaining acid-base homeostasis in an attempt to prevent hemolytic crises(3). Due to the risk of thrombosis in PNH and its associated mortality, maintaining therapeutic anticoagulation antenatally and prophylactic anticoagulation during labor and delivery is increasingly being recommended. The use of therapeutic anticoagulation with LMWH and the occurrence of thrombocytopenia may contraindicate neuraxial anesthesia.

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A-164.

SIMULTANEOUS CESAREAN SECTION AND AORTIC ROOT REPLACEMENT WITH A HOMOGRAFT VALVE IN A PARTURIENT WITH INFECTIVE ENDOCARDITIS

AUTHORS: C. S. Grange, F. A. Gibson;
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Although heart disease in one of the leading causes of maternal mortality in the UK, infective endocarditis is rarely encountered in parturients (1). Endocarditis is an infective and inflammatory process affecting multiple organs with high mortality. We report a parturient that developed streptococcal endocarditis requiring simultaneous cesarean section and an aortic root replacement with homograft valve.

Case**:** This 36 year old primigravida presented at 30 weeks gestation with pyrexia, increasing breathlessness and cyanosis. Blood cultures revealed streptococcal septicaemia. Urgent echocardiogram showed a large vegetation on the aortic valve with destruction of a cusp and torrential regurgitation. The left ventricle was dilated and mildly impaired. After admission to the intensive care unit, she was treated with intravenous antibiotics and pulmonary edema was managed with diuretics, vasodilatation, and non invasive respiratory support. Although there were no fetal concerns, a combined cesarean section and aortic root replacement with homograft valve was planned due to poor maternal condition at 30+5 weeks gestation. Dexamethasone was used to improve fetal pulmonary maturation and usual antacid prophylaxis was given. Large bore peripheral cannulae, arterial and internal jugular lines were inserted prior to anaesthesia. She was positioned supine with left lateral tilt and induced using a modified rapid sequence technique, (fentanyl 750µg, etomidate 10mg, suxamethonium 150 mg). Anaesthesia was maintained with isoflurane, oxygen and nitrous oxide. Neonatal Apgar scores were 6, 9 at 1 and 5 minutes respectively. After delivery an infusion of oxytocin (30 units in 0.9% sodium chloride 500 mls over 4 hours) was started and vancomycin given. The cesarean section wound was packed and aprotonin was commenced prior to full heparinisation. Abdominal suturing was delayed until completion of the cardiac procedure in case uterine hemorrhage occurred. During cardiopulmonary bypass (CPB) anaesthesia was maintained with a propofol infusion (6ml/kg/min), pancuronium and further doses of fentanyl. Following delivery, an aortic root replacement with homograft valve was performed. The patient was successfully weaned off CPB on an epinephrine infusion (0.3 - 0.8 µg/kg/min). Heparin was reversed and the abdominal wound closed. Following transfer to the cardiac intensive care unit, she was extubated uneventfully within 24 hours.

Discussion: Cardiac surgery requiring CPB was performed after the delivery of the fetus because of the detrimental effects on utero-placental perfusion. These include non-pulsatile blood flow, hemodilution, release of vasoactive substances, risk of emboli, hypotension and hypothermia. A high dose opioid anesthetic technique was used to maintain maternal hemodynamic stability. Despite this, the neonate was in good condition at delivery. A homograft valve was used thereby avoiding the need for anti-coagulation in a woman of reproductive age.

References**:**
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A-165.

ANESTHESIA FOR THE FETAL INTRAPARTUM OPERATIONS ON PLACENTAL SUPPORT

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Introduction: Fetal intrapartum operations on placental support (OOPS) also known as ex utero intrapartum treatment (EXIT) procedures are very rare (and often challenging) surgical techniques designed to allow partial delivery (Cesarean section) of the fetus with the potentially difficult airway with subsequent management of the neonatal airway (direct laryngoscopy, fiberoptic bronchoscopy, or tracheostomy) while oxygenation is continuously maintained via the placenta (on placental support). The peripartum management of pregnant women and their fetuses undergoing OOPS is very complex, multidisciplinary, and differs greatly from that of standard Cesarean sections (1).
Report of Case**:** We herein present the case of a 28 year parturient who underwent uneventful general anesthesia for the OOPS at 39 weeks gestation. Endotracheal intubation followed a routine rapid sequence induction of general anesthesia (with cricoid pressure) using propofol, 150 mg and succinylcholine, 100 mg. A radial arterial line was placed. General anesthesia was maintained with 5% sevoflurane, 50% nitrous oxide and oxygen, vecuronium, 5mg and fentanyl, 300 mcg. A nitroglycerin infusion at 30 mcg/min was initiated to ensure uterine relaxation and maternal blood pressure (BP) was maintained with 5 mcg/kg/min of dopamine along with one liter albumin 5% and 2.5 liters Lactated Ringer's solution. Systolic BPs were maintained at 120-140 mm Hg, with mean arterial BPs ranging from 75 to 100 mm Hg. The fetus was partially delivered from the head to the thorax 5 minutes after skin incision, the airway was evaluated by the pediatric anesthesiologist, the neonate was intubated after one attempt, and then delivered 18 minutes into the procedure. No complications were reported.
Discussion: By maintaining utero-placental circulation during OOPS, the fetal airway can be evaluated and secured prior to delivery. The anesthetic goals for the OOPS differ significantly from a routine Cesarean delivery and include profound uterine relaxation, fetal anesthesia and maintenance of the maternal-fetal circulation. As planning for elective Cesarean section in conjunction with the OOPS constitutes a complex and multidisciplinary effort it requires meticulous advanced planning and preparation (1).
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Ann Fr Anesth Reanim 2006; 25:638-643.

A-166.

EPIDURAL ANESTHESIA FOR ELECTIVE CESAREAN SECTION IN A PATIENT WITH MULTIPLE PULMONARY ARTERIOVENOUS FISTULAS

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Introduction: Pregnancy significantly increases the risk of rupture of pulmonary arteriovenous fistula (PAVF) , especially during the second or third trimester due to increase in blood volume and cardiac output in addition to hormonally related vascular changes[1]. Few reports have been about anesthesia for cesarean section (C-S) in a patient with PAVF. Since rupture of PAVF is life-threatening, transcatheter embolotherapy is one of the main choices for treatment of pregnant women with PAVF in spite of the risk of radiation to the fetus[2].
Case: A 20-year-old female (165cm, 55kg)known to have PAVF was scheduled for elective C-S at 32 weeks' gestational age in order to avoid rupture of PAVFs at vaginal delivery. Preoperative embolotherapy was not planned due to her history of anaphylactic shock during embolotherapy due to contrast medium. She had multiple PAVFs, and computed tomography (CT) scans confirmed more than ten PAVFs scattered in the two lungs. Results of arterial blood gas analysis(on room air)were as follows**:** pH,7.42; $PaCO_2$,31.3mmHg; PaO_2,64.5mmHg; BaseExcess-2mmol/L. Estimated fetal weight was 1477g. We planned to use epidural anesthesia only for the C-S. Before inserting the epidural catheter, 18ml of 2% lidocaine was injected in cephalad direction, and 5ml in caudad direction via an 18-gauge Touhy needle located at L2-3 level. Ten minutes after injection of lidocaine, analgesia was achieved from Th8 to L2. Systolic blood pressure was generally maintained at 120 mmHg except 15 minutes after lidocaine injection, when ephedrine 4mg was administered. Operative time was 40 minutes. Bleeding (including amniotic fluid) was 770g. Urine output was 370ml. Infusion of fluid during the surgery totaled no more than 950ml. Her respiration was stable around SpO2 95% under nasal O_2 3L per min without symptoms such as dyspnea. After the surgery, analgesia extended from Th6 to S and could be maintained by continuous infusion of a mixture of 0.2% ropivacaine 192ml and fentanyl 700μg at a rate of 4ml/h. No growth of PAVFs was found one mouth after the surgery.
Discussion: In order to prevent rupture of PAVFs during C-S, we used epidural anesthesia. General anesthesia has the risk of increasing blood pressure due to pain during the perioperative period and stimulation by intubation and extubation. Spinal anesthesia has the potential of excessive volume loading. Increase in blood pressure and excessive volume loading could increase the risk of rupture of PAVF. Our patient was managed satisfactorily during the perioperative period with epidural anesthesia alone.
[References]
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A-167.

MANAGEMENT OF A PARTURIENT WITH ARNOLD CHIARI TYPE 1 MALFORMATION, EHLERS DANLOS SYNDROME TYPE 1, SUPRAVENTRICULAR ARRHYTHMIAS AND LATEX ALLERGY

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Introduction: Serious sequelae from neuraxial anaesthesia can occur in both Arnold Chiari Type 1 malformations and Ehlers-Danlos syndrome. Both regional and general anaesthesia have been used successfully in these conditions though reports are limited. We describe the management of a lady undergoing Caesarean section (CS) with this unfortunate combination of pathology.
Case Report**:** A 34 year old G2P1 presented at 28 weeks for anaesthetic review in preparation for an elective CS at 37 weeks gestation. Prior to confirmation of the above diagnoses she had received a spinal anaesthetic for CS. Following this she had right sided weakness and foot drop for four days which only partially resolved. This occurred again following another spinal anaesthetic for revision of her wound (which took four years to fully heal). Subsequent investigations revealed Ehlers-Danlos syndrome type 1 and an Arnold Chiari type 1 malformation. She also developed recurrent supraventricular tachycardias which were well controlled by propanolol. On examination, there were no cerebellar signs but grade 3 power was present in the right leg and grade 4+ in the right arm. A multidisciplinary decision was made to proceed to elective Caesarean section to avoid precipitating further neurological deterioration. Propanolol, sodium citrate and ranitidine were administered pre-operatively. The operation was carried out in a latex free environment with left lateral tilt using a modified rapid sequence induction (alfentanil 1mg, thiopentone 500mg, suxamethonium 100mg), oxygen/nitrous oxide 50:50 and isoflurane with morphine 20mg and oxytocin 5U intraoperatively and paracetamol, morphine (patient controlled analgesia) and enoxaparin postoperatively. Care was taken not to hyperextend the neck during tracheal intubation or throughout the operation. The patient remained in sinus rhythm throughout. A live infant was delivered (Apgars 5 and 7 at 1 and 5 minutes) and the post operative period was uneventful. There was no significant haemorrhage.
Discussion: An Arnold Chiari Type 1 malformation is characterised by descent of the cerebellum through the foramen magnum and it was possible that changes in CSF pressure during previous spinal anaesthesia resulted in further herniation. Ehlers-Danlos is a heterogenous group of inherited diseases. In this case platelet count was normal and the geneticist confirmed that vessel rupture was rare in Ehlers-Danlos type 1. Epidural anaesthesia would therefore have been a safe alternative[1] although there remained the small risk of inadvertant dural puncture with a large gauge Tuohy needle. Our anaesthetic goal was to minimise further neurological deterioration and following long discussions of the risks and benefits the patient decided on general anaesthesia. We report that in this case, with the help of the multidisciplinary team, general anaesthesia provided stable haemodynamic conditions with no new neurological deficit post-operatively.
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A-168.

ANAESTHESIA FOR CAESAREAN SECTION IN A PATIENT WITH OSTEOGENESIS IMPERFECTA

AUTHORS: D. M. Dabrowska, Y. Rajakulendran, T. Dolphin, V. Ratnam;
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Introduction: Osteogenesis Imperfecta (OI) is an inherited collagen maturation disorder which results in bone fragility, musculoskeletal and metabolic abnormalities (1) and increased risk of malignant hyperthermia (2). This report discusses anaesthesia for caesarean section in a woman with OI, including epidural catheterisation with unilateral block and subsequent general anaesthesia with Target Controlled Infusion (TCI) of propofol and remifentanil.
Case**:** A 26-year-old, 40kg woman with Type IV OI was admitted at 33 weeks gestation for elective Caesarean Section. She requested regional anaesthesia, but severe kyphoscoliosis made this challenging. The epidural space was catheterised with difficulty in the lumbar area. Incremental injection of levobupivacaine 0.5% produced a loss of sensation to cold up to T5 on the left and T12 on the right after 90 minutes, unfortunately inadequate for surgery. General anaesthesia was provided by modified rapid sequence induction with thiopentone and rocuronium. Difficult anatomy made cricoid pressure awkward; laryngoscopy was uneventful. General anaesthesia was maintained by TCI propofol and remifentanil to decrease the risk of malignant hyperthermia due to volatile anaesthetics. Surgery was unremarkable with 500ml blood loss. Extubation was not delayed. Recovery was uneventful. One hour later a block to T5 was observed bilaterally, with delayed recovery of motor function. The epidural catheter was removed because of its unpredictability. The baby, weighing 2.19kg, was intubated, ventilated overnight and extubated the next day. The mother required oral morphine in addition to oral NSAIDs to control post-operative pain.
Discussion: OI is a disease that presents a few anaesthetic challenges. Successful regional and general anaesthetic techniques have been described previously (3). Regional anaesthesia is technically difficult and unpredictable because of skeletal abnormalities. General anaesthesia carries an increased risk of malignant hyperthermia, uterine atony, difficult intubation and intraoperative pathological fracture. In our patient the regional anaesthesia was inadequate due to unilateral spread of local anaesthetic. Subsequent management of general anaesthesia was designed to minimise those risks by avoidance of suxamethonium and volatiles; the maintenance of anaesthesia was provided by TCI of propofol and remifentanil. This case demonstrates another successful use of remifentanil in a high-risk obstetric patient (4).
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A-169.

BOLUS EPIDURAL CLONIDINE FOR LABOR PAIN IMPROVED BLOOD PRESSURE IN A PARTURIENT WITH PREECLAMPSIA

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Introduction: Clonidine has been used as an adjuvant drug for labor pain management and caesarean section by administering into spinal or epidural space with local anaesthetics. It has been shown in many papers[1,2,3] that adjuvant Clonidine produces prolonged analgesic effect, local anesthetic sparing effect, and less motor block. This time we used the bolus epidural clonidine for labor pain control to a parturient with preeclampsia.
Case**:** 25 years-old-nulliparous, 40 weeks gestation, 57kg, 161 cm. Blood pressures has been controlled by oral Methyldopa. Proteinuria and swollen legs were also existed. When the patient started having moderate pain, cervical dilatation was 5cm, an anaesthetist was called for epidural. Laboratory blood test was normal including coagulation test. A bolus of 20mls of the solution consisted of 0.1% bupivacaine and 2mcg/ml fentanyl was given without any problems which improved the pain and then continuous 6ml/hr of the solution was started. Cardiovascular status had been normal until Oxytocin IV was initiated, which made the patient painful. Then patient's BP increased to more than 160/110mmHg. Even though 15mls of top-up relieved the labor pain, the BP did not improve. Bolus clonidine 75mcg in saline 2mls was injected into the epidural space expecting the decrease of BP. 30 minute later of the administration of clonidine, BP improved 140/84mmHg and continued to be in the normal range throughout the delivery which occurred 140 minutes after clonidine injection. Neither maternal bradycardia nor sedation was observed. Apgar score was 8/10, and cord gas showed pH 7.34 and BE -1.2. No vasopressors were needed and there was no need of the fluid loading.
Discussion: Bolus epidural clonidine; 75mcg, improved BP in a parturient with preeclampsia without causing any adverse effects on mother's and neonate's conditions.
References**:** 1.Anesth Analg 2002;95:728-34, 2.Anesth Analg 2002;95:735-40, 3.Anesthesiology 2005;102:1205-10

A-170.

POST PARTUM LEFT LOWER EXTREMITY PLEXOPATHY AFTER LUMBAR EPIDURAL ANALGESIA FOR LABOR

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Introduction: Post-partum neurological deficits are infrequent but serious complications, occurring in up to 1% of deliveries (1). Although regional anesthesia is commonly implicated, the mechanism of injury is four fold more likely to be mechanical in nature (2). We report here one patient with a prior history of sciatica that developed a persistent left leg plexopathy.
case**:** The patient is a 30 year-old G2 P1 that presented in spontaneous labor at term without concurrent symptoms of sciatica. Following SROM the patient requested epidural analgesia. Total analgesia was obtained with a CSE performed atraumatically at the L3-L4 interspace with 10 mcg of intrathecal sufentanil followed by an infusion of 0.2% ropivacaine and 2 mcg/mL fentanyl. After a 12-hour labor she underwent an unassisted delivery of a 3250g infant. Following delivery, the patient had persistent weakness of the left quadriceps and plantar flexors and decreased sensation in a stocking glove distribution. Weakness persisted although motor improvement allowed ambulation the following day. Physical examination revealed absent knee and ankle reflexes. Neurology consultation noted symptoms consistent with left leg plexopathy. The patient underwent long term neurology follow up and physical therapy with continued symptom improvement. Eight weeks transpired before return of +1 knee and ankle reflexes. At four months, the patient experienced a recrudescence of symptoms, although less profound with subsequent improvement. Symptoms worsened with fatigue and overuse. At six months, EMG studies continued to demonstrate a persistent, mild left femoral neuropathy.
Discussion: The etiology of post-partum, post-regional neuropathy is often unclear. Over a six-month period there were reported a cluster of five cases of neurological deficits in labor patients receiving epidural analgesia at our institution. No commonality could be identified with respect to the anesthetic care of these patients. Only the patient described developed persistent neuropathy. The delivery was complicated only by a small perineal laceration and epidural placement was uneventful. Further this patient's neuropathic symptoms had a recurrent character suggesting underlying pathology. There have been case reports of possible exacerbation of underlying neural disease by periaxial anesthesia (3-6). Our supposition is that as with physiologic neurological disorders, mechanical neural impairment can be exacerbated by regional anesthesia. More follow up will be required to definitively determine the etiology.
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A-171.

COAGULATION FACTOR ACTIVITY PROFILE BEFORE AND AFTER A DOSE OF RECOMBINANT ACTIVATED FACTOR VII IN PATIENTS WITH SEVERE OBSTETRIC HAEMORRHAGE. A REPORT OF 2 CONSECUTIVE CASES

AUTHORS: A. Osorio[1], G. Monsalve[1], L. Alvarez[2], G. Arango[1], J. Marin[1], J. Gonzalez[1], M. Vasco[1];
AFFILIATION: [1]Obstetric Anesthesia Group, Sadea, Medellin, Colombia, [2]Hematologia Adultos - Universidad de Antioquia, Medellin, Colombia.

INTRODUCTION: Obstetric haemorrhage is one of the leading causes of maternal death in the world. Recombinant activated factor VII (rFVIIa-NovoSeven-Novo Nordisk) has been reported as an alternative in the management of obstetric haemorrhage. Coagulation factor activity profile has not been described in obstetric haemorrhage managed with rFVIIa.
METHODS: We report two cases of obstetric haemorrhage with associated coagulopaty and their coagulation factor activity profile before and after a therapeutic dose of rFVIIa.Coagulometric test were used to determine the activity of specific coagulation factors, ELFA technique were used to determine the D- Dimer value.
RESULTS: CASE 1**:** A multiparous patient with a term pregnancy in labour that developed bleeding from uterine atony with hemorrhagic shock. She was brought to surgery for obstetric hysterectomy; she was transfused with 15 U of packed red blood cells, 12 U of fresh frozen plasma and 20 units of platelets in a 6 hour period. She continued with uncontrollable bleeding and developed elevated intraabdominal pressure. Laboratory Resi;ts**:** Hemoglobin**:** 7.1gr/dl. PT**:** 20.9sec. INR**:** 2.2. Fibrinogen**:** 99mg/dl. PTT**:** 52 sec Platelets**:** 42000/mm3. Arterial PH**:** 7.36. HCO3**:** 20mmol/L. Coagulation profile before**:** Acivity of factors**:** Factor VII**:** 32%, V**:** 3%, X**:** 37%, II**:** 27%, D-Dimer**:** 1.166ng/ml. 8 hours after a 90 mcg/kg dose of rFVIIa the bleeding stopped completely with no need for further blood transfusions. Coagulation profile after**:** Factor VII**:** 93%, V**:** 71%, X**:** 92%, II**:** 92%, D-Dimer**:** 1.456 ng/ml. CASE 2**:** A 27 year old woman, gravid II admitted at 39 weeks of gestation. She delivered by forceps, developed uterine atony and postpartum haemorrhage. Vaginal examination revealed several vaginal lacerations, suturing was difficult and she was brought to surgery for obstetric hysterectomy and vaginal- pelvic packing, was transfused with 9U packed red blood cells, 8U fresh frozen plasma and 10U platelets. Laboratory Results**:** Hb**:** 4.8g/dl, PT 19.9sec, INR 1.83, Fibrinogen 105mg/dl, PTT 62, Platelets**:** 69000/mm3, arterial PH**:** 7.14, HCO3**:** 17.3mmol/L, PCO2**:** 51.8mmHg. Coagulation profile before**:** Acivity of factors**:** Factor VII**:** 33%, V**:** 4%, X**:** 31%, II**:** 36%, D-Dimer**:** 9.379ng/ml. 20 minutes after a 90 mcg/kg dose of rFVIIa the bleeding stopped completely. Coagulation profile after**:** Factor VII**:** 519%, V**:** 3%, X**:** 125%, II**:** 86%, D-Dimer**:** >10000 ng/ml.
DISCUSSION: The use of Recombinant activated factor VII in the management of obstetric haemorrhage and severe coagulopaty was associated with an immediate cessation of the bleeding. There was an important elevation in the activity of coagulation factors VII, X and II, and also an elevation in the fibrin degradation products (D Dimer), the clinical implications of these findings must be investigated in the future in obstetric population.
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A-172.

MANAGEMENT OF LABOR IN A PARTURIENT WITH PITUITARY ADENOMA

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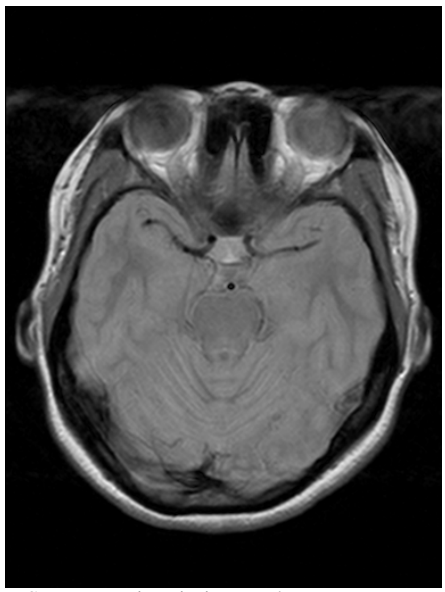
Introduction: Pituitary adenomas are fairly common (20% postmortem)and account for 7% of the brain tumors. Only a small percentage of these tumors cause symptoms. We report a parturient with a symptomatic pituitary tumor.
Case Report: 21 year old female at 35+ weeks of gestational age was admitted to L&D. Her medical history was significant for decreased vision since two months and unable to read. Her MRI of the brain showed the a 1x 1.7x 1.2 cm pituitary adenoma with supresellar extension, displacing optic chiasm. Patient didn't have any evidence of raised intracranial pressure or focal neurologic deficits. Laboratory work up showed increased levels of Prolactin and Somatomedin. Thyroid hormones, ACTH, Cortisol and Growth hormone were within normal limits. Neurosurgery consult did not indicate surgery. Endocrinology consult suggested to initiate therapy with Dexamethsone and Bromocryptine. Plan was to deliver the baby, so that the prolactin levels can be followed more reliably. At 37 weeks, labor was induced with Dinoprostone and the patient delivered vaginally uneventfully. Epidural analgesia was provided for pain management. Postpartum, patient had another MRI of the brain which revealed Pituitary macroadenoma with suprasellar extension Fig.1



Discussion: Symptomatic Pituitary adenomas may cause visual field defects, secrete Prolactin, Growth Hormone or ACTH and cause hypothalamic compression resulting in diabetes insipidus. Pituitary gland undergoes changes during normal pregnancy-gradual increase in maternal pituitary volume over the course of gestation, with a final volume approximately 136% of the pregestation volume, resulting in an upward convexity of the superior surface. The posterior pituitary is not visualized in the third trimester. These changes regress rapidly after delivery. Very high levels of circulating estrogen during pregnancy results in a similar increase in Prolactin. It is the nonglycosylated fraction which is predominantly increased. Bromocriptine provides effective therapy for prolactin-secreting adenomas. Surgery is indicated if the adenoma is large, intolerance to the medications or the tumor is invading the surrounding structures. Radiotherapy may be needed for recurring tumors. It needs to be emphasized that unintentional dural puncture during the attempted placement of an epidural may result in herniation in presence of increased ICP. It is imperative that the location, size of the tumor, midline shift needs to be assessed in each case and accordingly managed.
Reference**:** BJOG Sept. 107(9)**:** 1064-8, 2000.

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POSTER CASE REPORTS 1

A-173.

MASSIVE POSTPARTUM HAEMORRHAGE & RECOMBINANT FACTOR VIIA IN ICELAND: REPORT OF FIVE CASES

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Introduction: Our hospital is the single tertiary care facility for obstetrics in Iceland (pop. 307.000). The hospital's database includes reports of all cases of massive post-partum haemorrhage (PPH) in the entire country. Case 1**:** A 34 year old G2P1 with BOH, underwent an emergent Caesarean-section. She was admitted on POD 11 for vaginal bleeding. On POD 13 after continuing vaginal bleeding despite uterine evacuation she underwent laparotomy and total hysterectomy. Estimated blood loss (EBL) was at least 15 L. She developed diffuse bleeding despite aggressive transfusion. rFVIIa (45 mcg/ kg) was given which immediately stopped the oozing. Case 2**:** A 17 year old G1P0 delivered vaginally, complicated by vaginal laceration. Uterine atony developed and the patient went into severe hemorrhagic shock with asystole. She was resuscitated with O-negative transfusion and chest compression. Laparotomy and eventually total hysterectomy was performed, EBL was 15-20 L. The patient continued to have significant vaginal bleeding from a branch of a uterine artery. rFactor VIIA (90 mcg/ kg) was given on POD 9 with cessation of bleeding. She had an arterial embolisation of the culprit vessel the following day. Case 3**:** 34 year old G4P4 with pregnancy induced cholestasis and history of previous c-section. She delivered vaginally, uterine atony was noted that did not respond to uterotonic drugs and uterine massage. rFactor VIIa (75 mcg/kg) was given with temporary effect. Laparotomy and subtotal hysterectomy was performed. EBL was 8-10 L. The patient was transfused and a second dose of rFVIIa was given due to microvascular oozing, this time with no significant effect. Fortunately the bleeding stopped probably due to appropriate transfusion therapy. Case 4**:** 39 year old G4P2, delivered vaginally after prolonged labour. She developed uterine atony and had total hysterectomy with EBL of 5-10 L. rFactor VIIa was given twice (45 mcg/ kg and 22 mcg/ kg respectively) without apparent clinical effect. Despite this the bleeding stopped. Case 5**:** 30 year old G2P2 with history of previous c-section, underwent an elective Caesarean section due to placenta previa. Blood loss was profuse (EBL of 20 L) due to placenta accreta and continued after subtotal hysterectomy. rFVIIa (40 mcg/ kg) was given coinciding with removal of the cervix. At this time the bleeding finally stopped. Clinical effect was questionable.
Conclusion: Recombinant Factor VIIa should only be used as a part of multimodal therapy for massive PPH. Aggressive surgical intervention and appropriate transfusion therapy remains the mainstay of treatment for massive PPH in Iceland

A-174.

SUCCESSFUL MANAGEMENT OF CESAREAN SECTION IN A PATIENT WITH INTRACRANIAL HEMORRHAGE USING LANDIOLOL, A SHORT-ACTING BETA-1 RECEPTOR ANTAGONIST

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Introduction: Intracranial hemorrhage during pregnancy is rare but is associated with significant maternal as well as fetal mortality. Although vasodilators such as calcium-channel blockers are commonly used for the purpose of preventing reflex hypertension during cesarean section under general anesthesia, little is known about the use of a short-acting β1 antagonist in hemodynamics during cesarean section. We report a case of cesarean section in a patient with intracerebral bleeding whose hemodynamics during operation was successfully managed with nicardipine combined with a novel ultra short-acting β1 selective blocker landiolol.
Case: A 43-yr-old DD twin pregnant woman (145 cm, 70 kg), who accompanied by hypertension, developed abrupt right hemiparesis and mild dysarthria at 28 weeks' gestation. The CT scanning revealed cerebral hemorrhage of the left putamen. Nicardipine was administered at a rate of 5 mg/hr to treat severe hypertension (204/ 101 mmHg) and the urgent cesarean section under general anesthesia was scheduled due to fetal bradycardia. Intravenous administration of landiolol was started at a rate of $0.07 mg \cdot kg^{-1} \cdot min^{-1}$ before induction of general anesthesia with thiopental (280 mg) supplemented by succinylcholine (100 mg) to facilitate tracheal intubation. General anesthesia was maintained with sevoflurane (0.5-2.5%) in 100 % oxygen. The patient was supplemented with 50 % nitrous oxide after delivery. Using infusion of landiolol in combination with intermittent bolus dose of nicardipine (total 11 mg), the hemodynamic state of the patient was maintained stable throughout the anesthetic and surgical procedure. The first and the second babies (body weight**:** 543 g, 848 g; Apgar scores at 1/5/10min**:** 2/4/8, 3/3/6, respectively) were transferred to the NICU because of their low body weight. They had no refractory bradycardia after birth. The gravida appeared to have no problem with uterine contraction after delivery. She left the hospital uneventfully without deterioration of neurological symptom.
Discussion: β1 receptor selectivity in landiolol is reportedly much higher than that in esmolol (β1/2 ratio; landiolol 255, esmolol 33), indicating the advantage of landiolol that uterine contraction induced by β2 receptor blockade could be less.[1] Therefore landiolol combined with nicardipine may be useful for managing maternal as well as fetal circulation during cesarean section even in the case of fetal distress.
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POSTER CASE REPORTS 1

A-175.

ANESTHETIC MANAGEMENT OF LABOR IN A PATIENT WITH CONGENITALLY CORRECTED TRANSPOSITION OF THE GREAT ARTERIES

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INTRODUCTION: Congenitally corrected transposition of the great arteries (CCTGA) is a rare congenital disease occurring in 40 per 100,000 live births (1). This accounts for less than one percent of all congenital heart defects in the United States (2). The disease is characterized by two main features, left-handed looping of the heart resulting in atrioventricular discordance and failure of the aortopulmonary septum to rotate 180 degrees causing ventriculoarterial discordance (1). Life expectancy is usually the fifth or sixth decade of life due to systemic ventricular failure and dysrhythmias. Laboring patients with CCTGA present an interesting challenge to anesthesiologists due to the physiological changes that take place during pregnancy and the stress induced by labor. An extensive literature search revealed a paucity of information on the anesthetic management of laboring patients with CCTGA.
Case: We present the detailed management of a symptomatic parturient with CCTGA. She was managed with an "early epidural" with a continuous infusion of low concentration of local anesthetic and narcotic and without bolus dosing. She underwent an uneventful forceps assisted vaginal delivery.
DISCUSSION: The anesthetic management of parturients with CCTGA includes minimizing catecholamine release throughout labor and delivery. Patients with decreased cardiac function may also have a decreased tolerance for changes in their volume status. Consequently we decided to maintain the patient in a euvolumic state. The epidural was not bolused for fear of a sympathectomy and resulting decrease in preload. There were a number of options to provide pain relief for this patient. We considered a narcotic-only epidural solution or a slowly titrated continuous spinal. An epidural infusion with a low dose local anesthetic augmented with a narcotic would provide a gradual onset of anesthetic thus allowing more precise control over the patient's blood pressure while providing adequate pain relief. We opted for the later technique. Cesarean delivery for patients with CCTGA can be performed with several anesthetics. We felt that incremental dosing of the epidural to establish surgical anesthesia would provide the safest and most controlled method. A continuous spinal anesthetic would also have served well. As advances in medicine allow for the improvement in diagnosis and treatment of congenital heart conditions, the number of laboring patients with these diseases will increase. It is imperative that anesthesiologists understand the physiological aspects of these anomalies and how anesthesia will affect them. A growing body of literature will help anesthesiologists navigate through the care of these patients and help anticipate problems.
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A-176.

CESAREAN SECTION IN PARTURIENT WITH RECENT ONSET TRANSVERSE MYELITIS

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AFFILIATION: The John Radcliffe Hospital, Oxford, United Kingdom.

Introduction: Transverse myelitis (TM) is a rare inflammatory disorder of the spinal cord resulting in acute and variable motor, sensory and autonomic dysfunction. We report the management of a parturient with recent onset TM requiring a Cesarean section (CS). Further complicating factors included an ongoing history of psychosis and chronic pain syndrome.
Case: A 30 year old parturient (para 2) presented at 32 weeks gestation with paresthesia, numbness and weakness of upper and lower limbs progressing proximally over a one week period to involve the trunk. Sensory level was determined to be at C5/C6 to pinprick and temperature. All reflexes were maintained and there was no evidence of autonomic hyperreflexia. Diagnosis was made on clinical grounds, supported by a characteristic inflammatory lesion at C2 to C5 on MRI, and exclusion of autoimmune and viral diseases. Her previous medical history included psychotic depression treated with quetiapine and venlafaxine, and a right nephrectomy for loin pain haematuria syndrome. Additional problems included a raised BMI (37 at booking), poor venous access, immobility, and new onset neuropathic pain on a background of chronic pain symptoms. Two previous Cesarean sections necessitated further surgical delivery for this pregnancy, which was performed under general anesthesia at 37 weeks gestation. Following antacid prophylaxis, anesthesia was induced with thiopentone (450mg) and rocuronium (60mg), and then maintained with isoflurane, nitrous oxide and oxygen. Surgery was uneventful resulting in the delivery of a live female infant (Apgars 8, 5, 8 at 1, 5 and 10 minutes respectively). Following a period of apnea, the infant was transferred to the special baby care unit. Maternal analgesia was difficult to control after the first post-operative day, despite the use of morphine patient controlled analgesia.
Discussion: Choice of anesthesia for Cesarean section in parturients with TM is controversial [1,2] and must be individualised due to the rarity of this condition. Advantages of regional anesthesia in these patients include prevention of autonomic hyperreflexia, avoidance of maternal intubation, improved post-operative analgesia, reduced maternal hemorrhage, in addition to improved neonatal neurobehavioral scores. Our decision for general anaesthetic was based on concerns regarding recent onset of evolving neurology and potential exacerbation of symptoms. Avoidance of succinylcholine is paramount to prevent the potential risk of inducing hyperkalemia in denervated muscle.[3] Other complicating issues in this patient included the use of high dose opioid analgesics and gabapentin to control chronic and neuropathic pain pre-partum. This resulted in poor fetal neurobehavioural scores and withdrawal syndrome, in addition to the difficulties in controlling maternal post-operative pain.
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POSTER CASE REPORTS AND RESIDENT 1

A-177.

DEXMEDETOMIDINE USE FOR AWAKE FIBEROPTIC INTUBATION IN A PARTURIENT WITH SPINAL MUSCULAR ATROPHY TYPE III FOR CAESAREAN SECTION

AUTHORS: M. M. Neumann, M. B. Davio, M. R. Macknet, R. L. Applegate;
AFFILIATION: Loma Linda University Medical Center, Loma Linda, CA.

Introduction: Spinal muscular atrophy (SMA) in pregnancy is rare and poses multiple problems for the anesthesiologist.[1-2] Dexmedetomidine, a central acting selective alpha-2 agonist with minimal respiratory effects, is increasingly being utilized to facilitate awake fiber optic intubation. Although the effect of increasing plasma concentrations of dexmedetomidine in adult humans has been described, the effects of dexmedetomidine on a parturient and the neonate have not previously been reported.[3-4] There is also no in vivo data on placental transfer of dexmedetomidine. We report the hemodynamic, respiratory and sedative effects of dexmedetomidine on a parturient and the subsequent effects on the neonate. Furthermore, we report the maternal and fetal serum drug levels and discuss the available literature on placental transfer of dexmedetomidine.
Case: A 35 year old, G4 P0 A3, 41kg parturient at 35 weeks EGA with SMA needing urgent caesarean section presented to the operating room. Dexmedetomidine was administered intravenously, total dose 1.84mcg/kg over 38 minutes, followed by fiber-optic endotracheal intubation. Dexmedetomidine was then discontinued and general anesthesia induced. Delivery occurred 68 minutes after induction at which time serum levels were obtained. During the administration of dexmedetomidine maternal heart rate, blood pressure and oxygen saturation remained stable. Intermittent fetal heart tones were normal and unchanged. APGAR scores at 1 and 5 minutes were 6 and 8. The neonate's heart rate and oxygen saturation were 169 and 95% respectively at 5 minutes. Cord blood analysis was within normal limits and 15 minutes after delivery the neonate had a normal neurobehavioral and physical exams.

Discussion: After administration of 1.84mcg/kg of dexmedetomidine over 38 minutes, followed by 68 minutes of general anesthesia, the maternal venous level was 710 pcg/ml, the umbilical arterial level was 540 pcg/ml, and the umbilical venous level was 543 pcg/ml. The maternal:fetal concentration ratio of 0.76 in our study confirms the previously reported concentration ratio of 0.77+/-0.06 found when isolated perfused human placentas were studied.[5] It also indicates substantial fetal exposure to dexmedetomidine. Despite considerable placental transfer of dexmedetomidine, no adverse neonatal effects were observed.
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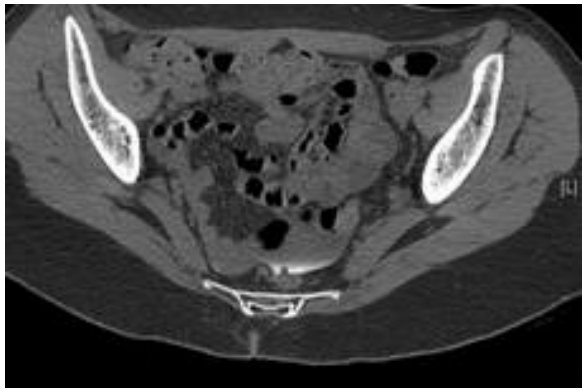
A-178.

POST-PARTUM POSTURAL HEADACHE IN G1P0 WITH MARFAN'S SYNDROME

AUTHORS: K. M. Petelenz Rubin, M. Kareti, N. Bolden;
AFFILIATION: MetroHealth Medical Center, Cleveland, OH.

INTRODUCTION: Postural headaches secondary to cerebrospinal fluid (CSF) leakage are a well recognized complication from dural puncture during epidural or spinal anesthesia [1]. We report a patient who developed a spontaneous CSF leak associated with a dural ectasia, in the immediate post-partum period, following spinal anesthesia for a caesarean section. To the best of our knowledge this is the first reported case in the peripartum population.
Case Report: This is a G1P0 with Marfan Syndrome and meningeal cysts. A Caesarean section (C/S) under spinal anesthesia at L2/3 was performed. Her perioperative course was uneventful. Months later, she returned with a postural headache, onset a few days after delivery. A head MRI indicated intracranial hypotension. Over the next month, three autologous epidural blood patches were performed under fluoroscopic guidance, with no significant clinical improvement. A CT myelogram showed large sacral meningoceles. Free fluid was found within the pelvis, that opacified with contrast. (Fig. 1) The patient was referred to neurosurgery for spontaneous intracranial hypotension secondary to leakage of CSF from her dural ectasias.



DISCUSSION: Orthostatic headache that improves rapidly in the supine position is characteristic of the intracranial hypotension syndrome. The condition usually resolves spontaneously, or after conservative therapy. Though not a first-line treatment, after conservative therapy fails or in intractable cases, epidural blood patch creates a tamponade effect of blood over the dural hole[2]. Marfan syndrome is associated with meningeal cysts which communicate with the arachnoid space, using an ostium that acts as a check valve, creating an enlarging lesion. CSF is forced into the normally obliterated perineural space [3]. The increase in thoracic epidural pressure after fetal delivery likely caused the development of the CSF leak [4]. Postural headache in the post-partum setting is often attributed to dural puncture after regional anesthesia. It is important to consider other causes of postural headache in patients with connective tissue disorders or those unresponsive to epidural blood patch therapy.
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POSTER CASE REPORTS AND RESIDENT 1

A-179.

PROLONGED EXIT PROCEDURE AND THE ANALYSIS OF UMBILICAL CORD GASES

AUTHORS: K. W. Arendt, D. T. Haile, C. H. Rose, P. A. Craigo, R. P. Flick, R. C. Chantigian;
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INTRODUCTION: Several case reports have focused on anesthetic techniques for ex utero intrapartum treatment (EXIT) procedures,[1][2][3] however none to date have reported umbilical cord gas values. We present intraoperative findings and umbilical cord gas analysis in a case of prolonged uteroplacental support.

Case: A large anterior fetal cervical teratoma, discovered during prenatal ultrasound and elucidated by MRI, required delivery via EXIT procedure of a 36 year-old patient in her seventh pregnancy. Maternal induction of general anesthesia was followed by maintenance with 3% sevoflurane and 97% FiO_2. A supplemental remifentanil drip facilitated fetal anesthesia, and vecuronium ensured adequate maternal muscle relaxation. Prior to commencing surgery, amnioreduction and aspiration of two large cystic components of the fetal neck mass were performed under ultrasound guidance. A classical hysterotomy was made, and the fetus delivered to the level of the scapulae. Rigid bronchoscopy revealed the presence of vocal cords and epiglottis but no evidence of a tracheal lumen. Consequently, a suprasternal tracheostomy was performed, and the trachea cannulated under direct visualization. Although end-tidal CO_2 was detected (5-10 torr), no sevoflurane was detected, and there was minimal fetal chest excursion despite aggressive attempts at ventilation. After ten minutes of ventilation under uteroplacental circulation, the umbilical cord was transected. Blood gas analysis revealed umbilical vein**:** pH_{uv}7.22/$P_{uv}O_2$ 146mmHg/$P_{uv}CO_2$ 41mmHg/$HCO_3$16/Base excess-10; and umbilical artery**:** pH_{ua}7.00/$P_{ua}O_2$ 41mmHg/$P_{ua}CO_2$ 80mmHg/$HCO_3$19/Base excess-11. Concordant maternal arterial blood gas demonstrated a pH of 7.37/$PO_2$407mmHg/PCO_2 37mmHg/HCO_3 20/Base excess-4. Duration of EXIT phase was 68 minutes. Immediately following separation, fetal oxygen saturation and heart rate began to inexorably decline. Resuscitation was attempted for approximately 35 minutes using a combination of epinephrine with packed red blood cell and albumin infusions. A portable chest film demonstrated a solitary air bronchogram in the left but no obvious pulmonary inflation. Soon thereafter refractory bradycardia ensued without interpretable pulse oximetry secondary to poor pulse pressure from hypoperfusion. A clinical diagnosis of pulmonary hypoplasia was made, it was decided that ECMO would be futile, and resuscitation efforts were terminated.

DISCUSSION: We describe a prolonged EXIT procedure, with an umbilical blood gas demonstrating maintenance of excellent maternal-fetal circulation. These umbilical cord gas values reflect placental gas exchange, not lung ventilation, as shown by the elevated umbilical artery CO_2 and the normal umbilical vein CO_2. In spite of adequate uteroplacental perfusion during the EXIT phase, inability to ventilate following delivery resulted in neonatal demise.

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A-180.

DRY TAP SPINAL ANESTHESIA IN A PARTURIENT SCHEDULED FOR REPEAT CESAREAN SECTION

AUTHORS: K. Butterfield, J. Spiegel;
AFFILIATION: Beth Israel Deaconess Medical Center, Boston, MA.

The ability to identify free flow of CSF through an intrathecally placed needle correlates with success of spinal blockade. Successful spinal anesthesia following no evidence of CSF has been reported once or twice within the literature. Etiologies of a dry tap include**:** technical failure, intracranial hypotension, adhesion of the caudal nerves, and spinal stenosis. A 25 y.o. G2P1 Asian female, at 39 weeks', presented for repeat C-section. Past history included a prior successful spinal anesthetic for her first c-section, and a unicornuate uterus. Height and weight were 61 inches and 122lbs, respectively. In the operating room, the patient was placed in the left lateral decubitus position, and she was sterilely prepped and draped. The L3-4 epidural space was identified using a 17g Touhy needle with loss-resistance-to-saline; a 27g Sprotte was inserted until the dural "pop" was felt. The stylet was removed but no CSF appeared. The needle was rotated but without successful CSF flow. The Touhy was removed and repositioned at L4-L5. Using the same techniques, the epidural space was found, but again yielded no CSF despite change to a 24g Sprotte needle. To increase CSF pressure, the patient was re-prepped in the sitting position. A new CSE kit was obtained, and repeated attempts at L3-L4 and L4-L5 revealed convincing loss-of-resistances within the epidural space, and repeated dural "pops", but no CSF. One gentle attempt at CSF withdrawal was performed. With minimal pressure, 0.5cc of the hyperbaric spinal solution was easily injected. The patient described immediate warmth in both legs and there was no pain on injection. The remainder of the solution (total 11.25mg bupivacaine/10mcg fentanyl/.25mg morphine) was injected, the patient was placed supine with uterine displacement, and a final sensory level to T2 was achieved. The patient regained all motor and sensory function following surgery.On post-operative day one the patient consented to routine lumbosacral MRI. This revealed no evidence of pathology. The lumbosacral CSF distribution appeared normal, and the spinal cord ended at L1.

Conclusion: Placement of intrathecal medications in the setting of a dry tap may be successful, however, the decision to proceed must be weighed carefully against other anesthetic options. In our case, crowding of the caudal nerves around the needle versus very low CSF volume or pressure were possible causes. Subdural or other placement of medications can occur following a dry tap. Attempting to withdraw CSF following a dry tap with a small syringe may be hazardous, as a subdural hematoma or cranial herniation may occur if the needle is intrathecal and pressure is excessive. If injection is difficult, or pain is encountered during dry tap injection, the procedure should be abandoned, as the needle may be intraneural.

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POSTER CASE REPORTS AND RESIDENT 1

A-181.

INTRATHECAL ANESTHESIA FOR CESAREAN SECTION VIA SUBARACHNOID DRAIN IN A PRETERM FEMALE WITH BENIGN INTRACRANIAL HYPERTENSION

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INTRODUCTION: Benign intracranial hypertension is a rare entity in pregnancy. It is characterized by elevated intracranial pressure (> 200 mm H_2O) in the absence of other demonstrable cause.[1] This diagnosis of exclusion is most often noted in obese females of childbearing age and typically presents with headache, nausea, dizziness, and visual changes. Symptoms are often exacerbated by pregnancy and decline with parturition.[1,2]
Case: A 26 year old G_1P_0, 65 kg female was admitted at $30^{3/7}$ weeks gestation for evaluation of persistent headache, nausea, and vomiting refractory to outpatient therapy. Gestational history included dichorionic/diamniotic twin pregnancy with oligohydramnios, preterm labor, and early signs of discordant growth. Multispecialty inpatient evaluation revealed no significant laboratory or imaging abnormalities. Lumbar puncture revealed an intracranial pressure of 270 mm H_2O and normal CSF indices. Funduscopic exam remained without papilledema. Medical therapy for benign intracranial hypertension to include a carbonic anhydrase inhibitor, steroids, and serial lumbar punctures failed to provide significant relief. Placement of a lumboperitoneal shunt was felt to potentially compromise the pregnancy. A subarachnoid drain was placed at L4-5, and intracranial pressure was reduced to 130 mm H_2O with resolution of symptoms. Fetal decline at $33^{1/7}$ weeks necessitated urgent cesarean delivery at which time the catheter tip was withdrawn to 15 cm at the skin. Intrathecal anesthesia was then administered under sterile conditions via the preexisting subarachnoid drain with 11.25 mg of 0.75% hyperbaric bupivacaine, 10 mcg of fentanyl, and 300 mcg morphine. The catheter was subsequently flushed with 2 ml of saline and capped. Adequate surgical anesthesia was achieved followed by cesarean delivery of twins.
DISCUSSION: Intrathecal, epidural, and general anesthesia have been performed with success in this rare disease.[2] This case illustrates the successful administration of intrathecal anesthesia employing a preexisting subarachnoid drain and represents the first documented delivery via this route in a patient with benign intracranial hypertension. Means of more accurate catheter tip localization would be advisable with future repetition of this technique. In this case, catheter level was based on clinical estimation given the urgent nature of the patient's delivery. Increased likelihood of difficult intubation, potentially unreliable intrathecal anesthesia with lumboperitoneal shunt, and potential injury to preexisting shunts with epidural placement necessitate careful development of labor analgesia and anesthetic plans.[2,3,4]
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A-182.

COMBINED CESAREAN-SECTION AND SPLENECTOMY INDICATED BY SPLENIC ABSCESS

AUTHORS: K. Ferguson, V. Soskin, H. Marsh, H. Marsh;
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Introduction: Splenectomy combined with a Cesarean-section is an uncommon event indicated for idiopathic thrombocytopenic purpura (ITP). After an extensive literature review, we believe this is the first case describing the anesthetic management of a patient for a Cesarean-section combined with splenectomy performed secondary to a splenic abscess. The possibility of maternal bacteremia presents an increased risk to the mother and the fetus.
Case: A 32 year old patient (G_4P_2) at 35 weeks of gestation was referred for anesthetic management. At 24 weeks gestation, a splenic abscess diagnosed by ultrasound-guided aspiration was drained and treated empirically with vancomycin and piperacillin/tazobactam. MRI revealed splenomegaly with multiple low attenuation areas. Blood cultures and culture from splenic drainage fluids were negative. Infective endocarditis was ruled out by TEE and the patient's antibiotics regimen was changed to ampicillin/sublactam. With continued negative blood cultures, the patient was discharged home. At 26 weeks gestation the patient was hospitalized and received clindamycin/ceftriaxone therapy via a peripherally inserted central catheter (PICC line). At the time of current admission the patient's WBC was elevated ($13.7x10^3\mu l$) and T was 37.6°C. The patient was started on intravenous ceftriaxone/vancomycine and at the time of the anesthesia consult both WBC and T were within normal limits and blood cultures remained negative. Our initial anesthetic plan was to perform the procedure under thoracic epidural anesthesia. On the day of the surgery, the patient became anxious and requested general anesthesia. A thoracic epidural catheter was placed at T11-T12. After preoxygenation, 250mg of thiopental and 100mg of succinylcholine were used for rapid sequence induction. For maintenance, sevoflurane and an epidural infusion of 0.25% marcaine were used before baby delivery and vecuronium and fentanyl were added after baby delivery. The newborn had APGAR scores of 9/9 at 1/5 minutes. Both the Cesarean-section and the following splenectomy proceeded without complications. The post operative epidural infusion was continued until post operative day 4 with excellent pain control. Splenic fluids and the tissue culture remained negative and standard post-splenectomy immunizations were administered on day 7. The patient was discharged home on day 8 without any complications.
Discussion: The cause of the abscess was never determined. The risk of bacteremia and seeding at the catheter site was considered minimal, as the patient was afebrile with a normal WBC and a negative culture 3 days prior to the epidural placement. The possibility of thrombocytosis and deep vein thrombosis was anticipated and prophylactic subcutaneous heparin (5,000 units q8h) was given. The thoracic epidural infusion helped maintain a stable anesthetic course during the combined procedure, provided excellent pain control post-operatively, and helped with regaining lung function and early ambulation. It would be interesting to consider the outcome had the case proceeded without general anesthesia.

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A-183.

CARDIAC ARREST AFTER INDUCTION OF GENERAL ANESTHESIA FOR URGENT CAESAREAN SECTION SECONDARY TO PERIPARTUM CARIOMYOPATHY; THE ROLE OF INTRAOPERTIVE TEE

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Introduction: Cardiac arrest during c/s under general anesthesia is a life threatening situation. Final outcome for mother and fetus depend on prompt perioperative management skills of ob/gyn and anesthesia teams.
Case Report: 30 yr -old white woman ht 70" weight 137 kg was transferred to our hospital from another tertiary care center. Patient was complaining of dysnea for several days. Upon arrival the patient was uncomfortable, tachypnic, tachycardic, and diaphoretic. Chest X-ray showed cardiomegaly and complete white out and initial labs were stable, however, coags, liver enzymes, and clinical picture continued to deteriorate following admission. The decision wad made by the OB team that she needed to have urgent c/s. The anesthesia examination found cold/clammy extremities, tachypnea and tachycardia. Soon thereafter, a nurse was unable to attain BP in either upper extremity. Pt was then rushed to the OR in the sitting position. Standard ASA monitors were placed in the OR, and the decision was made to go with awake fiberoptic intubation. Following intubation, lines were placed and TEE performed which showed global hypokinesia, EF 15%, and 3+ MR. The patient went into rapid cardiac arrest following delivery and ACLS protocol was initiated and cardiac massage was maintained for 8 minutes. Spontaneous sinus rhythm and blood pressure maintained with norepi and epi infusions.
Discussion: The sequence of events which occurred to our patient illustrated the worst case scenario of cardiac arrest of peripartum cardiomyopathy following induction of anesthesia for the emergency Caesarean section during the early hours of the morning. The quick fiberoptic intubation with positive end tidal co2 and invasive monitors in place gave us an initial sense of comfort at the start of the case. However, this did not prepare us completely for the impending hemodynamic instability once the baby was delivered. The question is why the patient arrested. It appears the causes were mulifactorial and include acute failing heart, the major hemodynamic shifts of late pregnancy, and concomitant blood loss during c/s. Prompt diagnosis of hypotension and bradycardia from the invasive lines and the TEE was an asset. Familiarity of ACLS protocol in pregnant women helped in making this resuscitation successful. We believe that TEE will be instrumental in assisting diagnosis and guide patient management in the future in cases similar to this one.

A-184.

TRANSIENT CARDIAC DECOMPENSATION IN A PATIENT WITH PERSISTENT PERIPARTUM CARDIOMYOPATHY UNDERGOING CESAREAN SECTION AFTER INTRAUTERINE METHERGINE ADMINISTRATION

AUTHORS: P. J. Balestrieri[1], R. S. Blank[2];
AFFILIATION: [1]University of Virginia Medical Center, Charlottesville, VA, [2]Fredrick Memorial Hospital, Fredrick, MD.

Case Report: We present the case of a parturient with persistent peripartum cardiomyopathy (PPCM) who experienced transient, severe cardiac decompensation immediately following intrauterine methergine administration during cesarean secton.
Case: An 18 y/o gravida 2, para 1 with a history of PPCM with persistent global LV dysfunction presented at 37 weeks gestation with worsening symptoms. Evaluation revealed dilated cardiomyopathy with an EF of 20-30%. Cesarean section and bilateral tubal ligation were planned. After placement of an arterial catheter, a femoral venous catheter and pulmonary artery catheter were introduced. After application of electrodes for external pacing, rapid sequence induction with placement of a 7.0 ETT followed administration of 16mg of etomidate, 10mg of ephedrine and 100mg of succinylcholine. The patient tolerated the induction well and a high dose narcotic technique with muscle relaxants was used for maintenance. A transesophageal echocardiography (TEE) probe was positioned to give a long axis view of both ventricles and was continuously monitored by an anesthesiologist trained in TEE interpretation. The patient was stable until shortly after delivery of a viable infant. Due to persistent uterine atony, methergine 0.2mg was injected into the myometrium. Within 60 seconds of methergine injection, the patient developed tachycardia and profound ST segment depression. TEE showed severe global hypokinesis with anterior septal wall motion dyskinesis associated with only mild elevation in blood pressure. Treatment consisted of dobutamine infusion at a rate of 5 microgms/kg/min. Almost immediately wall motion abnormalities disappeared and ST segments normalized. Lab studies revealed elevated troponin I. She recovered uneventfully except for the development of a pneumothorax.
Discussion: PPCM is a rare form of dilated cardiomyopathy of unknown etiology associated with a mortality rate of up to 60% and an incidence of from 1 in 1,300 to 1 in 15,000 deliveries (1). Diagnostic criteria are onset of heart failure in the last month of pregnancy or in the first 5 months postpartum and absence of a determinable cause for cardiac failure. To our knowledge this is the first reported case of the administration of intrauterine methergine causing severe cardiac dysfunction in a patient with PPCM undergoing cesarean section. General endotracheal anesthesia (GETA) allowed the optimization of oxygen delivery and permitted continuous TEE monitoring. Intravenous administration of methergine is usually avoided because of concerns regarding profound vasoconstriction . We suggest that patients with PPCM undergoing cesarean section may benefit from GETA with continuous TEE monitoring and that methergine should be administered only as a last resort and not given via an intrauterine route.
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A-185.

ANESTHETIC MANAGEMENT OF CESAREAN DELIVERY IN A PATIENT WITH ANDERSEN-TAWIL SYNDROME

AUTHORS: R. D. Toledano, P. J. Balestrieri, M. Tiouririne;
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Introduction: Andersen-Tawil syndrome (ATS) is a rare autosomal dominant or sporadic disorder caused by gene mutation of the inward rectifying potassium ion channel Kir2.1and marked by cardiac arrhythmias, periodic muscle paralysis, and dysmorphic features. Management of the parturient with ATS poses significant anesthetic challenges and, to our knowledge, has not been described previously in the literature.

Case: A 31 year old G2P1001 with ATS presented at 38 weeks gestation for repeat Cesarean section. Her first pregnancy was complicated by nonreassuring fetal heart tracing that resulted in uneventful primary Cesarean section under spinal anesthesia. The newborn developed failure to thrive, and both mother and child were diagnosed with ATS upon genetic testing.

At presentation, the patient's cardiac status was stable. Her electrocardiogram, which previously showed polymorphic ventricular tachycardia, had normalized somewhat during pregnancy. She reported bouts of muscle weakness, unrelieved by acetazolamide and potassium supplements, both of which she had discontinued. On physical exam, she exhibited no evidence of micrognathia or other features associated with ATS. Initial serum potassium was 4.27 mmol/L. We elected to proceed with spinal anesthesia after placement of an arterial catheter and defibrillator pads. Potassium levels were monitored and repleted, with a target range of 4-5 mmol/L. We avoided all drugs known to contribute to QT prolongation and reserved general anesthesia (GA) as a back-up in the event of failed spinal or severe ventricular dysrhythmia. The surgery was uneventful, although the patient remained in a bigeminal rhythm throughout. An internal defibrillator was placed under monitored anesthesia care one month postpartum.

Discussion: ATS is unique among ion channelopathies due to its combination of cardiac and skeletal muscle clinical manifestations. Most KCNJ2 mutations result in dominant-negative suppression and loss of function of the inward potassium rectifier current, I_{K1}. Cardiac manifestations, often refractory to treatment, include asymptomatic premature ventricular contractions, QT prolongation, polymorphic ventricular tachycardia and other ventricular tachyarrhythmias, and sudden cardiac arrest, usually in association with low serum potassium levels. Episodes of periodic paralysis result from failed propagation of action potentials and appear unrelated to serum potassium levels. Regional anesthesia in our patient permitted us to avoid rapid sequence induction (RSI) in a parturient at risk for aspiration, defer manipulation of a potentially difficult airway, ensure appropriate malignant hyperthermia (MH) precautions in a condition with a theoretic risk for MH, and minimize potassium fluctuations and any potential confounding weakness related to the use of muscle relaxants. In the event of severe dysrhythmias, we were prepared to convert to GA with RSI immediately prior to defibrillation. However, there is some evidence that verapamil and, in a select subgroup of patients, amiodarone may be effective alternatives to defibrillation and should be considered in this clinical scenario.

A-186.

CASE REPORT OF INTERNAL CAROTID ARTERY DISSECTION: AN UNUSUAL CAUSE OF POSTPARTUM HEADACHE

AUTHORS: J. M. Waidelich, K. K. Wilkins, A. S. Bullough, J. M. Mhyre;
AFFILIATION: University of Michigan, Ann Arbor, MI.

Introduction: We report a case of postpartum headache caused by internal carotid artery dissection following uneventful spontaneous vaginal delivery under epidural analgesia. Internal carotid artery dissection should be added to the anethesiologist's differential diagnosis for postpartum headache.

Case: A previously healthy 36yo G3P1 woman presented at term with spontaneous onset of labor. An epidural catheter was inserted at L3/4 using loss of resistance to saline. Following catheter insertion with 3 cm in the epidural space, catheter aspiration and a pharmacologic test dose with 3mL of 1.5% lidocaine with 5 μg/mL epinepherine were negative. The epidural was secured and dosed with 20 mL of 0.05% bupivacaine with 3 mcg/mL fentanyl, followed by an infusion of the same solution at 12 mL/hour. Five hours later, the patient delivered a healthy 3.8 kg infant after 20 minutes of pushing. The catheter was removed with the tip intact and the patient was discharged home in good health. The patient returned 4 days postpartum with a "pounding" frontal headache radiating to the back of the neck. There was no associated fever, nausea, photophobia, or neurologic deficits. Over the subsequent four days, rest, acetaminophen, ibuprofen, and caffeinated beverages provided some relief, however the intensity of the cephalgia increased to a pain score of 8/10 on PPD#8. At that time, neurologic examination was normal. The probability of a PDPH was felt to be low given the non-positional nature of the headache and the lack of a recognized dural puncture. An MRI to evaluate for venous sinus thrombosis revealed normal sinuses, but an absent flow-void pattern in the left internal carotid artery. Subsequent dedicated magnetic resonance angiogram (MRA) revealed a narrowing of the left carotid artery 2 cm distal to the bifurcation, consistent with a left internal carotid artery dissection. The patient received coumadin anticoagulation for 8 months until the dissection resolved, at which time she transitioned to long-term aspirin therapy. She suffered no permanent neurologic defecits, but does continue to experience periodic intermittent complex migranous headaches, a syndrome that is thought to have been triggered by the carotid artery dissection.

Discussion: Although most postpartum headaches may be attributed to post-dural puncture, pneumocephalous, migraine, or nonspecific causes, other potentially serious etiologies should also be considered. There have been 8 previously reported cases of postpartum internal carotid artery dissection reported in the literature.[1] Embolic or ischemic cerebrovascular accident complicates up to 95% of cases,[2] including at least 6 of the 8 postpartum cases. The anesthesiologist who considers carotid artery dissection in the differential diagnosis of postpartum headache may facilitate a timely diagnosis with early anticoagulation and positive patient outcome.

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A-187.

MANAGEMENT AND IMPLICATIONS OF A VAGAL NERVE STIMULATOR IN A PARTURIENT

AUTHORS: T. S. Su, M. M. Sedensky;
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INTRODUCTION: Vagal nerve stimulators (VNSs) are increasingly used to treat patients with intractable seizures, as well as depression unresponsive to medication. Electrodes are surgically implanted on the left midcervical vagus nerve, and a programmable generator is inserted in the left chest wall. Currently, over 45,000 devices have been implanted; anesthesia providers are increasingly likely to encounter a VNS during their practice. We present management of a laboring patient with a VNS, and discuss potential implications of such a device in the parturient.

Case: A 22 year-old G_2P_0 presented at 37 weeks gestation for consultation with the Obstetric Anesthesia Division prior to her delivery. Past medical history was significant for asthma, sickle cell trait, and depression. In addition, a bilateral motor strip astrocytoma was diagnosed in 1999; a subsequent stroke resulted in residual right sided weakness. The patient developed intractable complex partial seizures following radiation and chemotherapy treatment of her tumor. A VNS was implanted in 2003. Consultation with her team of caregivers resulted in detailed guidelines for her anesthetic management at delivery. Three weeks later, the patient was admitted in active labor; a lumbar epidural was placed uneventfully. The patient spontaneously delivered a girl with Apgars of 8 and 9. Function of the VNS continued without interruption throughout her labor and delivery.

DISCUSSION: VNSs are programmable devices that ameliorate seizure activity by an unknown mechanism. It is assumed that retrograde conduction along the vagus nerve suppresses epileptic foci within the brain. VNSs are associated with multiple long term side effects, some of which are of special note to anesthesiologists. Symptoms are most commonly related to stimulation of laryngeal nerves; they include hoarseness, coughing, voice change, dysphagia, and aspiration.[1] Under general anesthesia, cyclic airway obstruction has been reported. Obstruction coincided in frequency with the programmed cycle of the VNS; the left arytenoid and aryepiglottic fold were observed to almost completely obstruct the glottis under apparent tetanic contraction.[2] It is not clear what effects deep sedation might have on such a patient. Potential contraction of the vocal cords against an endotracheal tube is of concern. Our team advised turning off the VNS by taping a magnet over the generator if the patient required general anesthesia. Since this would be generally under emergency conditions in a laboring patient, it would be most prudent to have the necessary magnet immediately available. A clear plan for all who might be involved in a parturient's care can ensure that well-informed decisions be made in an emergency.

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A-188.

MANAGEMENT OF A PARTURIENT WITH MECHANICAL AORTIC AND MITRAL VALVES

AUTHORS: Y. Yamamura, K. Ramin;
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Introduction: The management of women with mechanical heart valves during pregnancy poses unique challenges, as there is a breadth of maternal and fetal considerations. The understanding of the physiologic hypercoagulable state during pregnancy and the need for life-long anticoagulation in these patients is paramount. In addition, fetal considerations must be addressed concurrently. We present the case of a parturient with two high risk mechanical heart valves managed with a combination of low-molecular weight heparin, unfractionated heparin and warfarin during her pregnancy.

Case**:** A 31 year old gravida 3 para 2002 presented for prenatal care at 6 weeks gestation. Her history was significant for rheumatic heart disease involving both the mitral and aortic valves. Both of her prior pregnancies occurred prior to this diagnosis and were without complication. She underwent replacement of both heart valves with mechanical valves approximately 1 year prior to conception and had been fully anticoagulated with warfarin. At the time of pregnancy diagnosis, her anticoagulation regimen was changed to full anticoagulation with low molecular weight heparin through the first trimester to minimize the occurrence of warfarin-induced embryopathy. At 12 weeks gestation, full anticoagulation was then resumed with warfarin to maintain an INR between 2.5 and 3.5. The patient remained normotensive and serial echocardiography did not demonstrate any valvular clot or dysfunction. At 36 weeks gestation, the patient was hospitalized and the warfarin was discontinued to allow for both maternal and fetal INR normalization prior to delivery. Intravenous unfractionated heparin was initiated to maintain the aPTT at 2 to 2.5 times normal for 5 days until the INR normalized. Induction of labor was then undertaken and the patient received intravenous narcotics for pain control. The intravenous heparin was then decreased in active labor for a goal aPTT of 1.5 times normal. She underwent a normal vaginal delivery without maternal or fetal complications. The intravenous heparin was increased to antepartum levels and her warfarin was re-initiated on the day of delivery. The remainder of her post-partum course was unremarkable.

Discussion: There is a paucity of reliable data on the safety of anticoagulation regimens for pregnant women with mechanical heart valves. While low-molecular weight heparin has been associated with adverse maternal outcomes in these high-risk women, this may be due to inappropriate dosing. Though concern for warfarin embryopathy persists, some advocate its continued use during all trimesters of pregnancy due to maternal risks. The need for intrapartum anticoagulation did preclude the use of regional analgesia. Through a multi-disciplinary approach, maternal and fetal outcomes can be optimized.

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A-189.

LUMBAR SUBDURAL HEMATOMA FOLLOWING EPIDURAL BLOOD PATCH FOR POST-DURAL PUNCTURE HEADACHE: A RARE BUT SERIOUS COMPLICATION

AUTHORS: C. Riley, S. Pratt, J. Spiegel;
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Lumbar epidural blood patch (LEBP) is considered a safe and effective treatment for post-dural puncture headache. Complications include**:** repeat dural puncture, back discomfort, radicular pain, meningitis, arachnoiditis, subdural hematoma, cauda equina syndrome, and others. We report a case whereafter a parturient suffered a lumbar subdural hematoma causing persistent right-sided sciatica after LEBP. Case report**:** A 39 y.o. G4P3 presented for external cephalic version for fetal transverse lie presentation, at term. A 17-gauge Touhy needle was used to locate the epidural space at the L3-L4 interspace. The procedure was complicated by a dural puncture. A repeat epidural attempt at the same interspace was successful. The version was performed, and a healthy infant was delivered vaginally 12 hours later. On postpartum day 1, the patient developed a severe PDPH not relieved by conservative therapy. During LEBP, in the lateral position, 58mls of blood was injected slowly into the L3-L4 epidural space until the patient felt mild lumbosacral pressure, and the needle was removed. Immediately after the procedure there was improvement in the patient's headache. She was discharged to home on PP day#3 without complaints. One week following her blood patch, the patient complained of persistent back and leg pain consistent with sciatic pain relieved somewhat by NSAIDs. She was evaluated by a neurologist and underwent MR imaging. The MRI revealed a small subdural hematoma that spanned from T12-L3 which displaced a number of nerve roots on the right and elevated the conus medullaris slightly; there was a smaller, separate subdural hematoma at the L5-S1 level. Surgical intervention was deemed unnecessary. Approximately 2 weeks after diagnosis, physical therapy, and analgesics, the patient noted resolution of her symptoms.
Conclusion: While EBP remains the most effective method of resolving a PDPH, and is regarded as very safe, the procedure is not absolutely benign. Complications, although rare, are not limited to**:** repeat dural puncture, back discomfort, radicular pain, meningitis, arachnoiditis, (cranial) subdural hematoma, and cauda equina syndrome. Spinal subdural hematoma is extremely rare following LEBP. Ironically, performing LEBP following large bore dural puncture may prevent the formation of a subdural cranial hematoma. The optimal volume for LEBP is debatable. Some advocate no more than 15-20 mls of blood, while others suggest the volume be determined by the onset of symptoms. A case report of cauda equina syndrome using 30mls of blood following LEBP suggests, but may not prove, that higher EBP volumes increase the risk of serious complications. Severe persistent radicular pain following EBP requires prompt attention and imaging to exclude a subdural hematoma and other serious etiologies.
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A-190.

POSTPARTUM POSTERIOR REVERSIBLE ENCEPHALOPATHY SYNDROME AFTER POST-DURAL PUNCTURE HEADACHE

AUTHORS: V. M. Barodka, W. Grodecki, H. Huffnagle, S. Huffnagle, E. Elia;
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INTRODUCTION: Peripartum cortical blindness associated with preeclampsia/eclampsia is rare, but exists. It is now called Posterior Reversible Encephalopathy Syndrome (PRES). We present the case of a woman with post-dural puncture headache (PDPH) who presented on postpartum day 5 with new onset seizures, mental status changes and visual loss.
Case: A healthy 24 year old female, G1P0, in labor, had an epidural successfully placed after an accidental dural puncture. On postdelivery day 1 (PDD1), she complained of a mild positional headache. She was treated conservatively, improved, and was discharged. The severe headache returned, and she was to undergo an epidural blood patch on PPD5. At home, she developed a tonic-clonic seizure, was transported to a hospital, developed another seizure, received midazolam, and was transferred to our hospital. On arrival she was mildly hypertensive (BP 132/94) and tachycardic (HR 110/min), no proteinuria. She complained of a severe, non-positional headache and visual disturbances that progressed to almost complete visual loss. She was alert but confused. Fundoscopic eye exam was normal. MRI of the brain was consistent with PRES. Magnesium sulfate was started for presumed eclampsia. BP was well controlled with hydralazine and labetalol. The visual loss resolved in 24 hours and she was seizure free. Twenty four hours later the headache disappeared and she was discharged. After two weeks she remained symptom free and a subsequent MRI showed resolution of PRES.
Discussion: PRES is a radiologic syndrome including a variety of pathologic entities grouped together because of similar findings on brain MRI T2 Flair images (bilateral parieto-occipital abnormalities representing vasogenic edema mostly of white matter). Clinical presentation includes an insidious onset headache, confusion or decreased level of consciousness, visual changes, and seizures. Medical conditions associated with PRES include hypertensive encephalopathy, eclampsia, renal failure and use of cytotoxic and immunosuppressive drugs. The pathogenesis of PRES is vasogenic edema resulting from leakage of fluid into brain interstitium. In preeclampsia, markers of endothelial cell dysfunction arise prior to clinical symptoms and correlate better with extent of cerebral edema than BP changes do. Interestingly, our case lacks typical markers of eclampsia. Did the dural puncture contribute to the development of seizures and PRES? A CSF leak may lead to decreased intracranial pressure, increasing cerebral perfusion pressure (CPP) and progressing to cerebral edema and seizures. By lowering the BP, CPP is lowered, and the symptoms resolved. Perhaps there is a place for antihypertensive therapy in the treatment of PDPH?
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A-191.

MODIFIED RAPID-SEQUENCE INTUBATION AND TOTAL INTRAVENOUS ANESTHESIA FOR BREECH CESAREAN DELIVERY IN AN ACHONDROPLASTIC DWARF WITH MALIGNANT HYPERTHERMIA

AUTHORS: R. W. Hong, E. B. Payne, J. Knipfer, G. Sharih;
AFFILIATION: University of Michigan Health System, Ann Arbor, MI.

Introduction: Achondroplasia and malignant hyperthermia present uncommon challenges for the anesthesiologist. We discuss a case where these and other comorbities coincided in a multigravida at term refusing regional anesthesia for elective breech cesarean delivery. To our knowledge, there are no similar reports in the literature where a similar set of patient considerations invited a modified rapid-sequence intubation (RSI) and total intravenous anesthesia (TIVA) for a cesarean delivery.
Case: A 21 year-old multigravid achondroplastic dwarf presented at 38 weeks gestation for elective repeat breech cesarean delivery. Her medical history was notable for achondroplasia, malignant hyperthermia (MH), Ehlers-Danlos syndrome type III, asthma, lumbar spinal stenosis, and fibromyalgia. She refused regional anesthesia, noting discomfort during her previous cesarean section under epidural anesthesia, followed by bilateral lower extremity paresthesias persisting for months. Given the patient's multiple comorbidities and her disinterest in regional anesthesia, the plan became TIVA with a modified RSI. The anesthesia machine was prepared to avoid MH triggers, numerous airway and MH supplies were kept on-hand as a precaution, and a modified rapid-sequence induction featured propofol, remifentanil, and high-dose rocuronium in lieu of succinylcholine for RSI. The patient's head and neck were kept in a neutral position throughout. Following uneventful RSI with straightforward placement of a 5.5 mm cuffed endotracheal tube, a propofol infusion maintained TIVA for the duration of the procedure. All other preparations and patient management for general anesthesia for cesearean delivery were as usual. The obstetricians delivered a 3000 g boy with Apgars of 2 and 7 and no phenotypical abnormalities. The mother was extubated successfully at the end of the procedure. Neither mother nor baby required intensive care admission, and both were discharged on hospital day three.
Discussion: This patient presented several rare anesthetic challenges that have never before been reported to coincide in a single case. Commonly, a history of MH in a gravid patient would dissuade an anesthesiologist from choosing general anesthesia (1,2). Achondroplasia may further complicate airway management for general anesthesia (3,4). Regional anesthesia is usually the preferred anesthetic for parturients, and a reasonable plan for achondroplastic patients (5,6,7,8), particularly in the context of this patient's MH history. But the patient's refusal of regional anesthesia necessitated an uncommon obstetric anesthesia technique, namely TIVA with a modified RSI. Under these circumstances, the anesthetic choice was both reasonable and effective, respecting both patient safety and preference.
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A-192.

LABOR EPIDURAL PLACEMENT IN A WOMAN WITH AN INTRATHECAL BACLOFEN PUMP FOR SPASTICITY SECONDARY TO CEREBRAL PALSY

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Introduction: Intrathecal baclofen (ITB) pumps are within the scope of anesthesia practice today. However many anesthesiologists are unfamiliar with the additional technical considerations involved in the anesthetic management of these patients.
Case: A 28-year-old female, gravida 2, para 0, at 38 weeks gestation, with an ITB pump for spasticity secondary to cerebral palsy, presented for labor epidural analgesia. Her ITB Medtronic infusion catheter entered the L3-L4 interspace and was secured on the fascia lateral to the L4 space and tunneled through to the left costal margin where the Synchromed II pump was placed in the abdominal subcutaneous tissue. The patient was seen one month before her expected delivery date by a Staff anesthesiologist who recommended a lumbar X-ray, which showed the catheter to be 4cm lateral to L3-L4 interspace. It was therefore felt safe to plan for labor epidural analgesia. The epidural was placed under strict sterile conditions with the patient in the sitting position at the L4-L5 interspace using a standard 17-gauge tuhoy needle using loss resistance to saline. The epidural catheter was successfully threaded, and the test dose was negative. The patient had complete labor analgesia within 30 minutes after giving bupivacaine 0.125% and fentanyl 2 mcg/ml in divided doses. The patient had an uneventful vaginal delivery four hours later.
Discussion: ITB administration (via the Synchromed pump) was approved by the United States Food and Drug Administration to treat intractable spasticity of cerebral origin in 1996 (1). We had several concerns about providing epidural analgesia in a patient with an ITB pump. First, the neurosurgeon who placed the ITB pump was concerned about the remote risk for communication between epidural and spinal spaces related to the ITB catheter, which is why we dosed the epidural in divided doses and were prepared for unintentional subarachnoid injection. Second, we were afraid that insertion of the epidural needle might damage the ITB catheter, which is why a lumbar X-ray was performed, and helped us to choose the L4-L5 interspace for insertion of the epidural catheter. We were also concerned about the potential for an increased risk of infection via direct inoculation or transient bacteremia in a patient with a pre-existing foreign body. Finally, we were worried about the possibility of an unintentional dural puncture and the subsequent need for a blood patch. Multidisciplinary approach and excellent communication between anesthesiologist, obstetrician, surgeon, pharmacist and the patient are essential for providing labor epidural analgesia to a parturient who has ITB pump in place.
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POSTER CASE REPORTS AND RESIDENT 1

A-193.

FULMINANT HEPATIC FAILURE DUE TO HEPATITIS B REACTIVATION IN PREGNANCY

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Introduction: Reactivation of hepatitis B (HBV) can lead to severe hepatic dysfunction and fulminant hepatic failure (FHF) in pregnancy. In developing countries, >50% of cases of FHF are caused by hepatitis viruses.[1] In the US, a recent study suggests that the prevalence of positive HBs-Ag in pregnancy is approximately 0.95%, and is highest in Asian-American subpopulations (5.8%).[2] We report a case of maternal FHF secondary to HBV requiring intensive care support, and general anesthesia for dilatation and evacuation (D&E) and post-partum orthoptic liver transplantation (OLT).

Case**:** A 38-year-old female (G1P0) of Vietnamese descent presented at 22 weeks with a 10-year history of chronic HBV. She was transferred to our institution from an outside hospital with vaginal bleeding, marked transaminitis (AST=3400; ALT=1900) initially treated with lamivudine, pulmonary edema and coagulopathy. After admission, an ultrasound was performed confirming intrauterine fetal demise. Her labs on admission were**:** WBC 28.8, Hematocrit 36, PLT 316, INR 2.9, PT 35, PTT 76, bilirubin 6.5, AST 531, ALT 1540, AlkPhos 141, fibrinogen 144, sodium 124, potassium 4.1, and normal renal function. Positive HBs-Ag, HBc-antibody and HBe-Ag were consistent with reactivated HBV infection. The patient was electively intubated in the ICU due to worsening respiratory failure secondary to pulmonary edema. She received 4U FFP and 2U packed red blood cells (PRBC) to correct the coagulopathy and anemia prior to the D&E. Intraoperatively, intramuscular methergine with IV oxytocin was necessary to treat uterine atony. Plus, an intrauterine balloon catheter and vaginal packs were placed to reduce surgical bleeding. The patient also received an additional 5U FFP, 3U PRBC and 2U cryoprecipitate. Post-operatively the patient's status continued to deteriorate with FHF, encephalopathy, refractory coagulopathy, thrombocytopenia, hypoglycemia and respiratory failure (pulmonary edema) requiring mechanical ventilation. The patient remained obtunded, and a CT head scan was performed which showed no intracranial hemorrhage. Due to the severity of her liver dysfunction (with rising INR and bilirubin), the patient underwent an OLT 9 days after initial hospital admission. Following OLT, the patient had a successful recovery and was extubated 5 days after surgery. Histology of the resected liver revealed micronodular cirrhosis, consistent with chronic HBV. She received physical rehabilitation after uneventful ICU discharge.

Discussion: Pregnancy outcomes for the vast majority of patients with HBV are generally uncomplicated in developed countries.[1] However reactivation of HBV in pregnancy may cause severe, progressive liver dysfunction resulting in hepatic encephalopathy, coagulopathy, hepato-renal syndrome, preterm labor and neonatal asphyxia. We recommend close surveillance for obstetric patients with positive HBs-Ag and hepatic dysfunction in a tertiary care center. Early referral for liver transplantation may be necessary for severe refractory FHF.[3]

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A-194.

GENERALIZED SEIZURE FOLLOWING ONDANSETRON ADMINISTRATION DURING CESAREAN SECTION

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INTRODUCTION: Ondansetron is a selective serotonin type 3 (5-HT3) antagonist commonly used for postoperative nausea and vomiting (PONV) prophylaxis. Ondansetron is generally regarded as a safe drug with a small incidence of adverse effects. We report occurrence of a generalized tonic-clonic seizure shortly after ondansetron administration during cesarean section.

Case: A 26-year-old G_2P_1 term parturient presented to labor and delivery suite in active labor. An epidural was placed for pain control when she was 4cm dilated. She was comfortable for six hours but then received incremental doses of 0.25% bupivacaine for discomfort. Her clinical course was remarkable for epidural catheter dislodgement and replacement. Cesarean section was performed for failure to progress. A T4 surgical level was achieved with 3% chloroprocaine (15 cc). A healthy infant was delivered and oxytocin given. Persistent uterine atony required administration of methylergonovine 0.2 mg intramuscularly. Ondansetron 4 mg was given intravenously to prevent PONV. Four minutes later, the patient had a generalized tonic-clonic seizure which ceased spontaneously. Cricoid pressure was applied. Face mask oxygen was delivered. Spontaneous ventilations and oxygen saturation remained 100%. Postoperatively, the patient was in a post-ictal state. CT of the brain was normal along with electrolytes, blood glucose, and urinalysis. The patient underwent unremarkable recovery and was discharged home on postoperative day #3.

Discussion: Ondansetron is used in the prevention and treatment of PONV. The recommended dose for prophylaxis is 4-8 mg intravenously in adults. Its efficacy has not been extensively studied in pregnancy. Ondansetron has a relatively small incidence of adverse effects. There have been case reports of extrapyramidal side effects during ondansetron therapy. [(1,2,3)] Sargent and colleagues described seizure occurrence in an ondansetron-treated patient who did not have malignancy or other substantial risk factors for seizure development. [(4)] Sharma and Raina described tonic-clonic seizures in a 55 year old woman with metastatic breast cancer on the second day of ondansetron therapy. [(5)]

This patient was healthy and without risk factors for seizures. Imaging and laboratory studies were normal. The last drug given prior to witnessing seizure activity was ondansetron. We believe ondansetron was the causative agent. This conclusion is based on the occurrence of the seizure shortly after ondansetron administration.

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POSTER CASE REPORTS AND RESIDENT 1

A-195.

AMNIOTIC FLUID EMBOLUS? A CASE PRESENTATION

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Introduction: Amniotic fluid embolus (AFE) is a devastating condition unique to pregnancy. It usually occurs acutely during labor and delivery or immediately postpartum, but has been reported as late as 48 hours(1). We present a case of fever, postpartum hemorrhage (PPH) and uterine atony possibly representing an atypical presentation of AFE.
Case: A 23 y/o G4P1 female presented in labor for an uncomplicated vaginal delivery under CSE analgesia. After delivery, she developed a fever (103.9°F), and was treated with Tylenol®. Two hours later she complained of vaginal bleeding and was brought to the OR for evaluation. Before induction of GA, she received PRBCs, IV fluids and phenylephrine for significant hypotension. After intubation, additional IVs and an arterial line were placed. She remained hypotensive (systolic BP- 50s) for 45 minutes despite resuscitative efforts including pressors. Her first lab results showed a hemoglobin of 7.7, pH 7.11, PT 72.6, PTT >200, INR 8.14, fibrinogen <60. Ten units PRBCs, 12 units FFP, cryoprecipitate, and 8 units of platelets were transfused. Systolic BP rose (90s), but ventilation became difficult and she was placed on ARDs protocol. Manual exploration of the uterus revealed no retained products or cause for uterine atony; no cervical lacerations were found. Upon transport to the ICU, she was placed on nitric oxide and phenylephrine and epinephrine infusions. Eventually she required oscillating ventilation and a TTE showed an EF of 20%. Her remaining hospital course was complicated by uterine artery embolization, continued bleeding requiring NovoSeven® (Recombinant Coagulation Factor VIIa) , hysterectomy, dialysis (CVVHD), tracheostomy and PEG tube placement. She was discharged 44 days later with no neurological sequelae.
Discussion: Differential diagnoses include delayed treatment of PPH with uterine atony, unrecognized massive sepsis with uterine atony, and AFE. Although AFE usually presents with respiratory compromise and right heart failure, fever and bleeding may occur first. No site of sepsis was found, and because resuscitative measures were minimally effective without pressors, combined with massive coagulopathy, left ventricular compromise, renal and ventilatory failure, we suspect AFE. An unpublished case series of atypical AFE presentations (all died) suggests that all patients had elevated tumor necrosis factor (TNF), and perhaps increased levels of other anaphylactoid mediators. Because the trophoblast can deactivate macrophages (2), the syndrome does not trigger at the beginning of pregnancy (in response to the trophoblast), but waits until the trophoblast is disrupted (placental separation). Massive macrophage activation now causes an anaphylactoid cascade in these patients. We await our patient's TNF value. In the future, the presence of a common, easily detected anaphylactoid mediator early in pregnancy may help identify parturients at risk.
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A-196.

GENERAL ANESTHESIA FOR CESAREAN SECTION IN A PATIENT WITH NOONAN SYNDROME

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IINTRODUCTION: Noonan syndrome is a rare congenital disorder characterized by abnormalities of the craniofacial, cardiovascular, and skeletal systems. Parturients with Noonan syndrome present potential significant challenges to anesthesia providers - namely difficult tracheal intubation, limited cardiorespiratory reserves, and technical problems in performing regional anesthesia due to short stature and skeletal anomalies[1]. This case report illustrates the perioperative management of a parturient with Noonan syndrome undergoing general anesthesia for cesarean section.
Case: A 19-year-old term G_2P_{0010} patient with Noonan syndrome presented for cesarean section secondary to cephalopelvic disproportion. The patient exhibited characteristic features of Noonan syndrome i.e., short stature, webbed neck, pectus excavatum, and significant kyphoscoliosis. Despite kyphosolicosis, she was without symptoms of restrictive pulmonary disease or other pulmonary problems. Cardiac evaluation revealed sinus tachycardia and right atrial enlargement. The patient, however, was NYHA Class I. Hematology studies and thromboelastography were normal. Airway examination was remarkable for marginal mouth opening, Mallampati IV classification, protruding incisors, a high, arched palate, and thyromental distance <6.5cm. Preparations were made for safe performance of general anesthesia that included awake intubation since the patient's examination indicated a potentially difficult airway. Regional anesthesia was excluded because of anticipated technical problems related to the patient's kyphoscoliosis. Adequate intravenous access was established. Standard ASA and left radial arterial invasive monitoring were applied. The airway was anesthesized via local anesthetic nebulizers and blockade of the glossopharyngeal, superior laryngeal, and recurrent laryngeal nerves. Oxygen was administered via nasal cannula during topicalization. Tracheal intubation was successfully achieved via awake fiberoptic technique and cesarean section proceeded uneventfully.
DISCUSSION: Noonan syndrome is a rare disorder occurring in approximately 1 in 1000-2500 individuals. Inheritance is usually autosomal dominant, although many cases occur because of mutations involving the PTPN11 and KRAS genes. Diagnosis is made mostly on clinical grounds[1]. Characteristic features include short stature; ocular hypertelorism, low nasal bridge, micrognathia; webbed neck; abnormal chest shape; congenital heart defect; abnormal spine curvature; and developmental delay. Varied coagulation defects and lymphatic dysplasias are frequently observed. Congenital heart defects -namely pulmonary valve stenosis and/or hypertrophic cardiomyopathy- are found in 20 to 50% of individuals[2]. The provision of anesthesia for parturients with Noonan syndrome requires extensive preparation, effective communication amongst caregivers, and early assessment with special attention to the airway, cardiorespiratory, and musculoskeletal systems. Depending upon the patient's condition, it may be possible to administer either regional or general anesthesia. In this case, an anesthetic plan of care was carefully formulated and executed as described previously after thorough overall evaluation and risks-to-benefits discussion with the patient, her family, and the obstetrics team.
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POSTER CASE REPORTS AND RESIDENT 1

A-197.

RUPTURE OF HEPATIC HEMANGIOMA DURING PREGNANCY

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Introduction: Cavernous hemangiomas are the most common benign tumors in the liver, most of which are small sized and asymptomatic. However, they can induce severe abdominal pain or fatal hemorrhage with spontaneous rupture. We report a case of twin pregnancy with spontaneous rupture of liver hemangioma treated by embolization after cesarean section.
Case Report: A 36-year old woman was presented at 34-week twin pregnancy with left lower chest pain. Chest pain had begun about a week ago and aggravated 10 hours before her admission and severe shortness of breath was accompanied. Blood examination showed hemoglobin 7.8 g/dl, AST/ALT 191/151 IU/L and γGT 97 IU/L. There were no abnormal findings in chest PA, ECG and echocardiogram. Blood pressure was 104/77 mmHg and pulse was 96 beat/min. Respiration rate was 30 breaths/min with oxygen saturation of 95-96% on room air. Under the impression of pulmonary embolism, lung perfusion scan and lower extremity vein were performed but they did not show abnormal findings. Although fetal condition was good, an emergency cesarean section was determined. Under the spinal anesthesia, the peritoneum was incised and a large amount of hematoma was noted in the abdominal cavity. However, precise focus of active bleeding was not seen within abdomino-pelvic cavity. Chest pain and dyspnea subsided with the peritoneal incision and she remained hemodynamically stable during the operation. After the operation, a hepatic angiography demonstrated a round vascular mass 8 cm in diameter occupying left hepatic lobe accompanying subcapsular hematoma and selective catheterization and embolization were performed. The patient and both babies were discharged without any complication. The lesion was observed with monthly ultrasound and regressed to about 60 % of the original size.
Discussion: This case of spontaneous hemorrhage of hepatic hemangioma during prengnancy suggests several important features of this disease**:** (1) atypical and vague symptoms as a result of radiating pain and pressure on adjacent organs; (2) the difficulty in diagnosis due to the gravid uterus and the limitation of exposure to radiation and contrast media; (3) the possible association between pregnancy and the development of these tumors; (4) management of the patient should be tailored on the conditions of the fetus and the mother.
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A-198.

PERIPARTUM SPONTANEOUS VERTEBRAL ARTERY DISSECTION

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A 29 year old Caucasian female, gravida 1 para 0, presented to the labor and delivery unit at 35 5/7 weeks gestation in active labor. Eight months prior to presentation, the parturient was diagnosed with left side vertebral artery dissection. Symptoms included facial numbness and upper extremity weakness. Cerebral angiogram, MRI and CT scan confirmed the diagnosis. There were no other significant medical or surgical histories, and no other complications during gestation. Treatment of the dissection included aspirin 81 mg daily at the time of admission, the patient having had recently discontinued Lovenox 70 mg BID.
The annual incidence of spontaneous vertebral artery dissection is estimated to be 1-1.5 per 100,000 (1).This condition is believed to be less prevalent in the obstetric population. Moreover, a review of the literature reveals few case reports of spontaneous vertebral artery dissection during pregnancy. We describe induction of anesthesia for c-section in a patient with unilateral spontaneous vertebral artery dissection, utilizing an intrathecal approach.
Though rare, spontaneous vertebral artery dissection during pregnancy is of importance to the anesthetic provider. First, risk of redissection in the parturient is increased, particularly during expulsive efforts of the labor process. Second, patients with dissection often present during treatment with anticoagulation therapy. This provides additional considerations in the timing and management of neuraxial anesthetic techniques.

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A-199.

RECURRENT PDPH AND EPIDURAL BLOOD PATCH WITH ARTERIAL BLOOD SAMPLE

AUTHORS: A. S. Madamangalam, J. C. Koch, S. W. Heimbach, A. Walia;
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Introduction: Epidural blood patch(EBP) is used to treat postdural puncture headache (PDPH). We report a patient with primary antiphospholipid syndrome(PAPS) and PDPH with very difficult IV access successfully treated with EBP from an arterial blood draw. We were unable to find a case report of such a procedure being performed in this patient population.
Case Report: KS was a 33y G12,T0,2,9,2; Caucasian female with history of PAPS, eight spontaneous abortions and episodes of TIA and pulmonary embolism with Greenfield filter placement and left subcalvian venous thrombosis requiring stenting two years prior to this presentation. The patient was admitted for preterm labor at 30 weeks gestation and maintained on magnesium sulfate & adequate anticoagulation with heparin infusion. Heparin was discontinued a day prior to planned amniocentesis and labor induction at 34 weeks gestational age[2]. Unintentional dural puncture occurred at L4-5 during epidural catheter placement for labor analgesia and was redone at interspace L2-3. Labor analgesia was achieved with 0.2% Ropivacaine after a negative test dose. Spontaneous delivery occurred in five hours. Six hours after delivery the patient developed characteristic PDPH with neck stiffness. Blood draw was from the only accessible right external jugular(EJ) vein with patient in left lateral position and EBP was placed at interspace L3-4 with 20 ml of blood 24 hours after dural puncture. Patient reported significant improvement in headache. Lovenox anticoagulation was resumed at 80mg q12hrs SQ following the procedure. PDPH recurred with neck stiffness in 24 hours. A second EBP was placed at L2-3 with 25 ml of blood taken from the left radial artery at 24 hours after the last dose of Lovenox[3]. Her right external jugular vein was thrombosed and could not be accessed. Headache completely resolved and she was discharged home on Lovenox. Patient was comfortable at follow-up a week later.
Discussion: PAPS is characterized by vascular thrombosis in association with high titers of antibodies to plasma proteins that are often bound to phospholipids[1]. Thrombosis in PAPS appears to result from procoagulant actions of these antibodies on protein C, annexin V, platelets, and inhibition of fibrinolysis. PAPS manifests in the form of fetal loss, DVT, thrombocytopenia, stroke and organ failure due to thrombotic microangiopathy or thromboembolism. Particularly interesting was this rare instance of the need for arterial puncture for blood draw for repeat EBP in recurrent PDPH in this patient.
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A-200.

INSTITUTIONAL REVIEW OF GENERAL ANESTHESIA FOR CESAREAN SECTION IN 2006

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Introduction. Although regional anesthesia, by subarachnoid or epidural blockade, is considered optimal for surgical delivery of the mother and baby (1), at times it may be inappropriate. We reviewed all patients having cesarean sections in Virginia Commonwealth University Medical Center, during a 12 month period, looking in detail at the use of general anesthesia (GA). In particular we evaluated the indication for cesarean, the urgency and timing of delivery, anesthetic techniques and the availability of an obstetric anesthesiologist.
Methods. Electronic anesthesia records created contemporaneously by Innovian (Drager Medical Systems, Inc) were scrutinized and exported to Microsoft Excel for validation and analysis.
Results. 2,176 mothers delivered that year, 644 (29.6%) by cesarean section. There were 52 (8.1%) GAs. This included 17 patients (2.6%) after failed regional anesthesia**:** 12 with existing continuous epidurals and 5 with new CSEs. Only 2 mothers had GA for elective cesarean, both after attempted CSE. 23 (44.2%) of the GA patients had emergent deliveries; 37 (71.2%) had no existing regional analgesia. General anesthetic cesareans were equally distributed throughout the 24 hour daily cycle, with no bias towards the non obstetric anesthesiologists.

General Anesthesia Cesareans (52 patients)

	Existing Epidurals (15)				No Existing Epidural (37)			
	n	Urgent	Emer-gent		n	Elective	Urge nt	Emer-gent
Top-up failed	12	9	3	Not enough time *	25	0	10	15 $
Top-up not attempted	3	0	3	CSE attempt failed	5	2	3	0
				Medical contra indications	2	0	2 $	0
				Eclampsia / NRFS	2	0	2 $	0
				Bleeding Pla-centa Previa	2	0	0	2 $
				Cesarean hyster-ectomy for Ca Cervix	1	0	1	0
TOTAL	15	9	6		37	2	18	17
* Not enough time =	10 NRFS	5 Abrup-tions	3 Cord Pro-lapses	3 Malpresenta-tions	2 Preec-lampsia	2 Diffi-culty with 2nd twin		

Conclusions. General anesthesia for cesarean section occurred approximately once per week in our teaching hospital. Many of these patients came to the Operating Room soon after arrival in hospital, precluding the use of regional analgesia. Almost half of the GA cesareans were emergent. There were some regional failures despite use of 3% chloroprocaine or 2% lidocaine with 1/ 200,000 epinephrine, to rapidly extend existing blocks. Better supervision of our continuous epidurals and improved communication with our obstetricians may reduce failures. However although regional anesthesia is our preferred technique, it is unlikely that general anesthesia could have been avoidable in at least 21 (3.3%) of our patients that year($). Our findings are consistent with published data documenting general anesthesia rates of 7.2 - 3.6% (2) in a teaching hospital.
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POSTER CASE REPORTS 2

A-201.

TEACHING AN OLD DRUG NEW TRICKS: PCEA CHLOROPROCAINE, A SUITABLE ALTERNATIVE FOR PATIENTS WITH ALLERGIES TO AMIDE LOCAL ANESTHETICS

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Introduction: The incidence of allergic reactions to amide local anesthetics is extremely rare and the degree of cross reactivity among drugs in the same class is unclear. Epidural anesthesia does not have to be denied to patients with a history of allergic reaction to amide local anesthetics. Traditionally chloroprocaine has been avoided for labor analgesia because of its short duration of action and narrow motor-sensory blockade index. However, we postulate chloroprocaine can provide good labor analgesia via a patient controlled epidural infusion with minimal motor blockade.
Case**:** A 40-year-old female G1P0, with a previously uncomplicated pregnancy, presents at 37 weeks with elevated blood pressure and headache. Her history was significant for chronic hypertension, asthma, depression, and sickle cell trait. Laboratory examination confirmed pre-clampsia. Antihypertensives were administered and labor was induced. During her anesthesia consult for labor analgesia she reported a previous reaction to a local anesthetic and after consultation with an allergist and skin testing the patient was told she has an allergy to lidocaine. Records of consultation were unavailable at the time of her induction. Intrathecal tetracaine was available for cesarean delivery, if necessary. The patient elected to use a fentanyl PCA for analgesia, but as labor progressed she requested an epidural. Sodium bicarbonate was added to chloroprocaine for skin infiltration. A needle through needle CSE was performed and labor analgesia initiated with 5mcg of intrathecal sufentanil followed by epidural chloroprocaine and sufentanil. The patient received a continuous infusion of 1% chloroprocaine and 0.4mcg/ml sufentanil at 8ml/hr with a bolus of 8ml every 8 minutes on patient demand. One hour after initiation of epidural analgesia the patient had bilateral sensory blockade from S_2 to T_9, with no motor blockade (Bromage scale = 0). PCEA continued for approximately 14 hours until SVD. The sensory blockade remained consistent and the motor blockade never progress further than Bromage scale = 1. The patient had a healthy baby weighing 2665 grams, with Apgars of 9 and 9 at 1 and 5 minutes respectively.
Discussion: A reported local anesthesia allergy must be taken seriously because the ramifications of an allergic response can be fatal. Ideally, a patients history should be corroborated by consultation and testing by an allergist with follow-up by an obstetric anesthesiologist to formulate a plan for labor and delivery. The prolonged labor analgesia and sensory blockade provided by intrathecal sufentanil aided the initiation of our epidural infusion. She received excellent labor analgesia, safely, with minimal motor blockade using PCEA 1% chloroprocaine and sufentanil.
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A-202.

THE USE OF POTENT INHALATIONAL AGENTS FOR THE EX UTERO INTRAPARTUM TREATMENT (EXIT) PROCEDURES: WHAT CONCENTRATIONS?

AUTHORS: M. Saito[1], T. Okutomi[2], K. M. Kuczkowski[3];
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Introduction: The anesthetic management of a parturient undergoing ex utero intrapartum treatment (EXIT) procedures for airway control of a newborn with a potentially life-threatening difficult airway is complex, and significantly different (e.g., deep volatile anesthesia combined with intravenous infusions of dopamine) from anesthetic considerations for a standard Cesarean section (1). We herein report on the successful anesthetic management of the EXIT procedure in a parturient carrying a fetus with large cervical lymphangioma. General anesthesia was maintained with sevoflurane 2%, combined with continuous infusion of nitroglycerine (TNG). Although the use of high concentrations of potent inhalational agents (to keep the uterus fully relaxed) is currently recommended (2) we believe that the use of low concentrations of potent inhalational anesthetics with continuous infusion of TNG may be a safer anesthetic strategy for these operations.
Report Of Case: A 30-year-old primigravida carrying a fetus with a large cervical lymphangioma required Cesarean section at 34 weeks gestation (uterine contractions, polyhydramnion and steady fetal tumor growth). The fetal cervical mass consisted of multiple cystic structures with two largest lesions measuring 42 x 53 x 72 mm (left side of the neck) and 22 x 26 x 33 mm (right side of the neck), respectively. Prior to the induction of general anesthesia, lumbar epidural catheter was placed in a standard manner and fentanyl, 100 μg with morphine, 3 mg were administered through the catheter. General anesthesia was induced in a routine manner (rapid sequence induction with cricoid pressure) with intravenous sodium thiopental, 200 mg and succinylcholine, 60 mg. The anesthesia was maintained with 2% sevoflurane in oxygen. In order to relax the gravid uterus, TNG, 200 μg was administered intravenously (single bolus) prior to the uterine incision followed by continuous intravenous infusion of TNG at 0.3 μg/kg/h during the procedure. After uterine incision, the fetal head and neck were delivered while the rest of the body remained in the uterus until the fetal airway was secured (direct laryngoscopy and endotracheal intubation). The fetal heart rate and fetal blood oxygen saturation were monitored with the sterile ultrasound probe and pulse oxymeter, respectively. Total time from uterine incision to the delivery was 22 minutes. Uterine relaxation was adequately achieved and the patient's hemodynamics remained stable with 5 mg of intravenous ephedrine. Total blood loss was 1540 ml (replaced with 1000 ml of autologous blood transfusion). No complications were reported.
Discussion: In consideration of the inhibitory effects of the inhaled anesthetics on the maternal and fetal hemodynamics, we believe that the concentrations of inhalational anesthetic agent for the EXIT procedures could be reduced to those commonly used (e.g., 0.5-1.0 MAC) for routine Cesarean sections.
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A-203.

BOTOX AND OBSTETRIC ANESTHESIA: IS THERE CAUSE FOR CONCERN?

AUTHORS: K. M. Kuczkowski;
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Introduction: Botulinum toxin is a potent neurotoxin produced by the bacterium Clostridium botulinum. It produces flaccid muscle paralysis by blocking the release of acetylcholine at the neuromuscular junction. Botulinum toxin type A (BTA) (Botox; Allergan Inc., Irvine, CA) is commonly used in clinical practice (approved by US Food and Drug Administration) for the treatment of hyperfunctional facial lines resulting from repeated contractions of certain muscles (e.g., frontalis, and orbicularis oculi) (1). In anesthesia peripheral ulnar nerve stimulation of the adductor pollicis muscle and facial nerve stimulation of the orbicularis oculi muscle are most commonly monitored to access the degree of neuromuscular blockade (2). It is therefore reasonable to speculate that the cosmetic BTA injection-induced flaccid muscle (e.g., orbicularis oculi) paralysis may interfere with neuromuscular blockade monitoring under general anesthesia.
Report of Case: Indeed, in his practice of obstetric anesthesia this author has encountered a 46-year-old otherwise healthy parturient who required Cesarean section under general anesthesia for worsening severe pregnancy-induced hypertension and HELLP syndrome (Hemolysis, Elevated Liver enzymes and Low Platelet count). Following routine rapid sequence induction of general anesthesia with standard dosages of etomidate and succinylcholine and the delivery of the fetus anesthesia was maintained with fentanyl, sevoflurane in oxygen and nitrous oxide. Approximately 10 minutes after intravenous dose of succinylcholine (140 mg) an attempt to determine the recovery from the neuromuscular blockade [facial nerve stimulation (train-of-tour pattern) to detect contraction of the orbicularis oculi muscle] was made by the anesthesiologist, however, no twitches were noted. The train-of-four test was repeated at the same site (different nerve stimulator) 10-15 minutes later still yielding no twitch response. Ulnar nerve stimulation at that time confirmed full recovery (contraction of the adductor pollicis muscle) from the neuromuscular blockade. Following smooth emergence from anesthesia it was discovered (with all other causes of prolonged muscle relaxation being ruled out) that the patient had undergone multiple bilateral cosmetic facial BTA injections in the first trimester of pregnancy. To the best of my knowledge this complication of BTA injections in pregnancy has not been previously reported.
Discussion: Facial enhancement by the use of BTA has revolutionized the treatment of “the aging face”, and it is currently the most popular aesthetic procedure performed in the United States. According to the recent data (American Society of Plastic Surgery) over 3.8 million of BTA procedures were preformed in the United States in the year 2005 (1). The duration of BTA effect when used for the treatment of facial hyperfunctional lines is generally 6-11 months. As the incidence of pregnancy in older women is increasing, preoperative questioning regarding BTA injections in this group should be considered.
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A-204.

LUMBAR TATTOOS, MAGNETIC RESONANCE IMAGING AND OBSTETRIC ANESTHESIA: WHAT DO THEY HAVE IN COMMON?

AUTHORS: K. M. Kuczkowski;
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Introduction: Tattoos - ancient forms of permanent body ornamentation have today become popular fashion accessories worldwide (1). More than 50 percent of all tattoos are done on women. In recent years body tattooing in unconventional sites (e.g. lumbar and/or sacral area) has gained increasing popularity among young women (including in pregnancy). Magnetic resonance imaging (MRI) studies can reveal subtle differences between areas of dissimilar anatomy, and provide excellent soft tissue contrast and are widely popular for the diagnosis of a number of intra-abdominal conditions (2). MRI does not produce ionizing radiation, is noninvasive, and does not by itself cause any biologically deleterious effects. Placenta accreta is an abnormal adherence of the placenta to the uterine wall owing to an absent or faulty decidua basalis (3). Historically placenta accreta was an incidental finding at the time of delivery and was associated with high maternal morbidity and mortality. The development of new imaging techniques such as MRI and transvaginal color Doppler sonography has allowed antenatal diagnosis of this condition and elective preoperative planning of the obstetric and anesthetic management of these patients (elective Cesarean hysterectomy).
Report of Case: In his practice of obstetric anesthesia the author of this report encountered an otherwise healthy parturient with a working diagnosis of placenta accreta and colorful lumbar tattoos who was scheduled for MRI studies to determine the extent of placental pathology. At the conclusion of the procedure the patient reported burning pain in her tattoos consistent with the absorption of radiofrequency energy in the pigmented skin area.
Discussion: Vasold et al. (4) reported that the tattoos colorants - industrial pigments, which have never been intended (produced) by the chemical industry to be used in humans for ornamental purposes (but rather to stain consumer goods), may contain hazardous (toxic and/or carcinogenic) compounds. Wagle and Smith first reported on MRI-induced skin burns caused by permanent coloring techniques (tattooing) in a healthy young man who sustained a second-degree skin burn in two skin tattoos while undergoing diagnostic cervical spine MRI studies (2). It is believed that extremely dark tattoo ink contains a high concentration of iron oxide, and this ferrous pigment can become quite concentrated if sedimented ink is used during the tattoo process. Iron oxide is both potentially magnetic and an electrical conductor; therefore, the heating could raise intracellular water temperature in the skin, resulting in a burn (2).
Conclusion: Although no burns were diagnosed in our patient, this case adds one more piece of evidence that MRI studies should be performed with caution in patients with permanent skin coloring (tattoos).
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A-205.

ANESTHESIA FOR THE DELIVERY OF CRANIOPHAGUS MONOAMNIOTIC CONJOINED TWINS

AUTHORS: E. J. Drake, V. Gunka;
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Introduction: The incidence of conjoined twins is reported between 1 in 50 000 and 1 in 100 000. (1) There is limited information on the anesthetic management of conjoined twin deliveries, especially craniophagus monoamniotic conjoined twins.
Case Report: A multiparous woman was diagnosed with a conjoined twin pregnancy at 24 weeks. The twins were joined at the occiput giving a wide biparietal diameter. Elective cesarean delivery at 34 weeks was performed under combined spinal epidural anesthesia (CSE). Blood was cross matched and two IV lines inserted. Using a needle through needle technique the L2/3 interspace was identified and 1.5 mL 0.75% hyperbaric bupivacaine, 10 mcg fentanyl and 100 mcg morphine were injected producing a T3 block. The patient was positioned in reverse Trendelenberg with left uterine displacement. The mother was cardiovascularly stable and did not require vasopressors. Delivery was facilitated by a vertical lower midline skin incision and a large J shaped uterine incision that avoided the anterior placenta. After delivery a 5 unit bolus of oxytocin was administered followed by an infusion of 100 units in 1 litre of normal saline. Uterine tone was good and estimated blood loss was 500 mls. The twins cried, breathed spontaneously and had Apgars of 10 at 5 mins.
Discussion: There were a number of anesthetic considerations for this case:
1.Flexibility - if there were difficulties in extracting the twins from the uterus then extension of the incision would be needed. If the block was not high enough or the procedure prolonged then the epidural component of the CSE would be useful.
2.Risk of hemorrhage - there was the potential for uterine atony post delivery because of the uterine distention from the twin pregnancy. The placenta was situated anteriorly and a large J shaped incision was used to avoid it and to ensure easy delivery of the heads. The use of a regional technique avoided the reduction of uterine tone from general anesthesia. Provision was made to manage hemorrhage.
3.Good uterine relaxation for delivery. On ultrasound the widest biparietal diameter was 12 cm and so relaxation facilitated delivery. General anesthesia provides better uterine relaxation than regional but maternal preference was to be awake. We were ready to administer nitroglycerin and to induce general anaesthesia, if required. She had a reasonable airway.
4.Neonatal outcomes - Avoidance of general anesthesia reduced the placental transfer of respiratory depressant drugs to the twins. Airway management of the twins could have been problematic.
Because of its potential benefits a CSE was planned and was successfully used for this case. The successful delivery of the conjoined twins highlights the importance of a multidisciplinary approach.
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A-206.

ANESTHESIA FOR THE PREGNANT PATIENT BURNED IN METHAMPHETAMINE (CRYSTAL METH) LAB EXPLOSION

AUTHORS: H. Finegold, A. Storey, A. Aballay, C. Troianos;
AFFILIATION: The Western Pennsylvania Hospital, Pittsburgh, PA.

Introduction: Proliferation of methamphetamine manufacturing and abuse accounts for increased admission of young adults to burn units over the last 10 years. (1) This case involves the anesthetic care of a pregnant patient with chemical and thermal burn injuries. Case**:** 22 year old female at 20 weeks gestation was burned during explosion of home methamphetamine lab. After being rescued from the fire, she was found to be highly agitated and combative with 28% total body surface area burns including 2nd and 3rd degree burns to her face, neck, upper extremities, back and left foot. Patient was transferred to our hospital for care in the burn unit. Urine toxicology screen positive for methamphetamine. She was stabilized with lorazepam for agitation associated with withdrawal symptoms and with hydromorphone for pain. Though her face and mouth was burned, she did not suffer from airway compromise. She was able to maintain adequate oxygenation and ventilation without assistance. Obstetric consultation revealed fetus at 20 weeks and fetal heart tones were reactive at 130 to150 beats per minute. There were no signs of preterm labor. Upon admission she required intravenous fluids at 200 ml/hr to maintain blood pressure and 2 units of packed red blood cells to correct hemoglobin level of 7.0grams/deciliter. She remained in the burn unit for 9 days. She was treated in the operating room for split thickness skin grafting to both upper extremities and left foot as well as dressing changes under general anesthesia. Patient positioning and left uterine displacement was difficult due to burns on back. Because of burn, succinylcholine was avoided and she was induced with propofol and rocuronium using rapid sequence technique and cricoid pressure. Burn care involved topical antibiotic treatments with bacitracin ointment and silver sulfadiazine. Five months after explosion, patient suffers from abdominal and back scarring and contracture injuries in the upper extremities but was able to receive epidural anesthesia for vaginal delivery. She gave birth to full term baby with intrauterine growth retardation, birth weight 2359 grams, who is developmentally delayed.
Discussion: Anesthetic management of burn injury during pregnancy requires modification due to physiologic changes. In the operating room, the pregnant burn patient may present unique challenges and airway compromise. Fluid resuscitation needs often exceeds calculations due to hyperdynamic state of pregnancy(2). Procoagulant state of pregnancy is enhanced due to hemoconcentration and endothelial injury(2). Topical antibiotic ointments are shown to be safe during pregnancy(2). Burn scars may make placement of intravenous access and regional techniques difficult. Issues of substance abuse will affect fetal outcome with maternal methamphetamine use during pregnancy.
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A-207.

REMIFENTANIL-NITROGLICERIN COMBINATION US A ANESTHETIC SUPPORT FOR EX UTERO INTRAPARTUM TREATMENT(EXIT) PROCEDURE

AUTHORS: A. Ioscovich, Y. Lajos, D. Orkin;
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Introduction: The ex utero intrapartum (EXIT) procedure is a controlled technique that is designed to allow partial fetal delivery via cesarean section with subsequent establishment of a safe fetal airway, concurrent with keeping the feto-placental circulation. We present here a combination of remifentanil-based general anesthesia with nitroglycerine-based uterine relaxation for this procedure.
Case Report: 21-y-old healthy G2P1 86kg, 170 cm patient was admitted in her 36w pregnancy for EXIT procedure. Multiple fetal malformations were diagnosed in ultrasound evaluation at week 23 and included critical micrognatia with ,glosoptosis, abnormal ears with preauricular tags and primembranous VSD. Termination of pregnancy was refused by patient. Severe micrognatia and suspected fetal airway obstruction were a reason for EXIT-procedure. The patient was premedicated with metoclopramide 10mg and midazolam 2mg and presented in OR with blood pressure 135/70mmHg and regular pulse100/min. Standard monitoring was widened by invasive blood pressure measuring. Two big IV canules were inserted. and preloading with RL started. After 3-min preoxygenation followed by supplementationInduction with 200mg propofol, 20 µg remifentanil, 50mg rocuronium and intubation was performed. Remifentanil infusion was started at 0.03 µg/kg/min and increased up to 0.08 µg/kg/min when operation started. NTG infusion was started at 0.06 µg/kg/min and increased up to 0.3 µg/kg/min; at this point, the obstetrician diagnosed successful uterine relaxation. Patient's blood pressure was 120/60 mmHg and pulse 70-80/min. Four 50µg-pushes of phenilephrine were given during the 40-minute EXIT-procedure. Fetal heart rate was 120-140/min and tracheostomy was performed after unsuccessful attempts for intubation and bronchoscopy. NTG was discontinued after cord clamping; the mother received a single dose of 5u Pitocine IV followed by 10u/1L continous infusion. The uterus was firm almost immediately. Newborn's Apgar score was 4 and 9 after 1 and 5 min. Estimated blood loss did not exceed 400mL. The remainder of surgery and maternal recovery were uneventful. The newborn died of multiple abnormalities and infection complication one month later.
Discussion: The most serious problem of the "standard" anesthetic plan for EXIT-procedure is the high dose of inhalation agents (2-3 MAC) used to maintain uterine relaxation,(1) resulting in hemodynamic instability and excessive uterine bleeding. We used NTG as an alternative strategi for uterine relaxation. Hypotension is usually absent with continuous low dose NTG infusion (0.1-0.2 µg/kg/min). The anesthetic drug we chose was remifentanil, which combined with N2O it warrants an adequate hypnotic and easily controlled analgesic effect. Tachycardia, a side effect of NTG is neutralized by the vagotonic effect of remifentanil. Remifentanil, successfully used for cesarean section in high-risk obstetric patients, resulted in no side effects in mother and newborn.(2)Combination of these medications ensures stable intraoperative hemodynamic and fast anesthetic recovery after EXIT-procedure.
1-Journal of Pediatric Surgery 2004; 39:375-380 2- Int J Obstet Anesth 2004; 13:183-7

A-208.

CAESAREAN SECTION AND A SUBTYPE OF GUILLAIN-BARRÉ SYNDROME

AUTHORS: A. Williams, S. Thunga, C. Sadler, K. Shields, M. Razzaque;
AFFILIATION: The Royal London Hospital, London, United Kingdom.

INTRODUCTION: Guillain-Barré Syndrome (GBS) is an acute inflammatory autoimmune polyradiculoneuropathy[1] consisting of at least four subtypes[2]. These include acute inflammatory demyelinating polyradiculoneuropathy (AIDP), acute motor axonal neuropathy (AMAN), acute motor-sensory axonal neuropathy (AMSAN), and Miller Fisher syndrome[3]. Use of regional anaesthesia in the context of these subtypes has not been described.
Case: A 35 year old South-Asian lady was admitted at 31 weeks gestation with eleven days of progressive lower limb weakness. Electromyelogram studies were consistent with AMAN. An elective lower segment caesarean section (LSCS) at 38 weeks plus 4 was booked for breech presentation. She could weight-bear with support, was using a wheelchair and had decreased sensation in both legs from the knees distally. An epidural at L4-5 produced a block to T4 with just 10ml of 0.5% bupivacaine given over 20 minutes. A healthy infant was delivered 35 minutes after epidural insertion and the patient was in recovery one hour after delivery. After a further hour the motor block was resolving but a sensory block to T4 persisted. Four and a half hours later her block had regressed to her pre-epidural sensory deficit.
Examination 72 hours post epidural revealed a slight neurological improvement. This is in contrast to a report of worsening neurological function[4].
DISCUSSION: Brooks[5] and Alici[6] observed normal sensitivity to local anaesthetic in women with GBS having regional anaesthesia. Vassiliev[7] used a regional for labour, and subsequent LSCS, and no increased sensitivity to local anaesthetic was noted. McGrady[8] used an epidural for labour and then for emergency LSCS. The patient received 4mls of 0.25% bupivacaine during labour which lasted 85 -110 minutes. For LSCS only 7mls of 0.5% bupivacaine was required. In McGrady's patient, and in ours, a low dose of local anaesthetic produced a level of blockade normally seen with higher doses. Perhaps the subtypes of GBS have differing responses to regional anaesthesia.
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A-209.

COMBINED PRETERM CESAREAN DELIVERY AND EXPLORATORY LAPAROTOMY FOR RECURRENT OVARIAN SERTOLI-LEYDIG CARCINOMA

AUTHORS: C. L. Peterson-Layne, H. A. Muir;
AFFILIATION: Duke University Medical Center, Durham, NC.

INTRODUCTION: 23 year-old nulliparous female with 28-week intrauterine pregnancy underwent combined Cesarean delivery, oophorectomy and exploratory laparotomy for fulminant, recurrent ovarian Sertoli-Leydig cell carcinoma. This is the first report of a delivery of a viable fetus with this maternal diagnosis.

Case: Two years prior to this pregnancy, our patient was diagnosed with poorly differentiated Sertoli-Leydig cell carcinoma of the left ovary. Remission was achieved with left oophorectomy, chemotherapy and radiation therapy. During this pregnancy she experienced significant weight loss with normal intake. At 26 4/7 weeks gestational age, she was admitted for evaluation and treatment of nausea and severe right lower quadrant abdominal pain. Ultrasound revealed a large (20 cm) abdominal mass causing anterior uterine displacement. Neuraxial analgesia was refused; pain was treated with hydromorphone IV-PCA. When her symptoms progressed, the gynecologic oncologists elected to proceed with exploratory laparotomy for tumor debulking and possible Cesarean delivery. Additional, significant past medical history is thyroid carcinoma treated with thyroidectomy and radiation at age 16. Given a normal airway exam and the extent of planned procedure, general anesthesia was planned. Prior to induction, midazolam and fentanyl were given for maternal indications due to the high probability of intubation of the fetus after delivery. The patient underwent general anesthesia with invasive monitoring, a-line and central venous catheter. The fetal heart rate was monitored intra-operatively by the obstetrician by direct application of a sterile ultrasound probe on the uterus; the fetal heart rate remained reassuring throughout. Due to the extent of the disease and the technical challenge of debulking, the decision was made to proceed with Cesarean delivery. Apgars were 1 and 8. Pathology results reported poorly differentiated carcinoma, consistent with recurrent Sertoli-Leydig tumor. The mother was discharged to home on post-operative day 6 and received radiation therapy. Six months after delivery she had resumed her normal activities. The baby was extubated on day 2 of life, did well throughout hospitalization, and was discharged to home in good health after 2 months.

DISCUSSION: The hormonal changes of pregnancy may promote the occurrence of granulosa cell tumors, including Sertoli-Leydig.[1] Pregnancy complicated by recurrent Sertoli-Leydig carcinoma has been reported.[2] However, to our knowledge, this is the first report of a delivery of a viable fetus with this maternal diagnosis.

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A-210.

INTRACARDIAC DEVICE FOR REFRACTORY VENTRICULAR TACHYCARDIA IN A PARTURIENT

AUTHORS: G. A. Smith, E. Wang;
AFFILIATION: University of Chicago, Chicago, IL.

Introduction: Cardiac disease affects approximately 1% of all pregnancies. A small proportion of these are represented by arrhythmias. Patients can present with a wide range of symptoms, ranging from mild palpitations to life threatening arrhythmias. Pharmacologic treatment of arrhythmias during pregnancy is generally well tolerated and relatively safe, but does require careful assessment and consideration of their effect on the fetus. Life threatening cardiac arrhythmias, such as refractory ventricular tachycardia, have required the use of intracardiac device placement (ICD) in a cohort of patients. We describe the clinical course of a parturient with persistent ventricular tachycardia necessitating ICD placement and her subsequent pregnancy management.

Case: A 33 year old multiparous African American woman presented at 10 weeks gestation with a history of chronic hypertension and monomorphic ventricular tachycardia (VT) previously causing syncope and requiring cardioversion. Four months prior to presentation, she experienced refractory VT and was treated with a VT ablation procedure which was unsuccessful. She was also noted to have aneurysms in the left ventricle and was diagnosed with sarcoid cardiomyopathy. To prevent sudden cardiac death the patient received a dual chamber ICD and was placed on Sotalol 120mg twice daily and aspirin once daily. Prenatally, the patient was normotensive with a regular HR. The only prenatal complication was a single episode of ICD discharge in the first trimester. Fetal growth and well-being were reassuring throughout the pregnancy. A multidisciplinary conference was held with the patient, Maternal Fetal Medicine, Anesthesiology and Electrophysiology, given the concern for labor induced catecholamine surge-related malignant arrhythmia; the decision was made to proceed with delivery via primary cesarean section at 38 weeks gestation. The patient received epidural regional anesthesia with slow infusion to prevent hypotension. Prior to surgery, the ICD was inactivated and external defibrillator pads were placed. There were no intra-partum or post-partum cardiac events. The ICD was reactivated in the recovery room.

Conclusion: Overall, there were no device related complications attributable to the pregnancy in this patient. A series of case reports have shown that women who are clinically stable should not be routinely advised against pregnancy based on the presence of an ICD[1]. Decision for mode of delivery should be individualized based on concomitant patient factors i.e. underlying cardiac status, since the autonomic and hormonal changes associated with labor have not been clearly demonstrated to increase the incidence of malignant arrhythmias or ICD discharges.

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POSTER CASE REPORTS 2

A-211.

CONTINUOUS SPINAL ANESTHESIA IN MORBIDLY OBESE PARTURIENTS UNDERGOING CESAREAN SECTION: CASE SERIES

AUTHORS: A. L. Calimaran, G. Mychaskiw, C. Saulny;
AFFILIATION: University of Mississippi School of Medicine, Jackson, MS.

Introduction: Anesthesia for morbidly obese parturients undergoing cesarean section (c/s) is a challenging task. Continuous spinal anesthesia (CSA) is not widely used because of the risk of post dural puncture headache. This report describes the use of CSA in morbidly obese parturients undergoing c/s.
Cases: Demographic Data - See Table 1. All patients had Mallampati Class III-IV airways, short necks and large breasts. Standard ASA monitors were used, along with a radial arterial catheter. Patients were placed in a sitting position and the lower back was cleaned and draped in a sterile fashion. The skin and subcutaneous tissue over the L3-L4 levels were infiltrated with 1% lidocaine and the subarachnoid space was entered with either an 18ga. 3½-inch Tuohy or 18ga. 5-inch Weiss needle. A 20ga. soft tip epidural catheter was then inserted, with 3cm left in the subarachnoid space. Once the catheter was secured in place and the patient positioned supine with left lateral uterine displacement, a mixture of 1mL of plain bupivacaine 0.5% and 0.4mL (20 µg) of fentanyl was injected as an initial dose. Additional 0.5mL doses of plain bupivacaine 0.5% were injected every 5 minutes until the desired surgical level (T4) was achieved. One patient developed hypotension and was treated with intravenous ephedrine. Three patients needed additional doses of bupivacaine 0.5% (redosing as described above) at least an hour from the initial dose to maintain surgical anesthesia. The catheters were removed at the end of surgery. Patients were followed for an average of 14 days and no anesthetic complications were reported.

Case	Body Mass Index	Onset of Surgical Level (min)	Total Initial Dose of Bupivacaine (mg) with Fentanyl 20 micrograms	Total Dose of Bupivacaine for Entire Surgery (mg)	Duration of Surgery (min)
25 y/o, G5P2, 37 weeks gestation for repeat c/s	67	7	7.5	10	132
27 y/o, G2P1, 37 weeks gestation for c/s due to breech presentation	71	10	10	10	116
22 y/o, G2P0, 36 weeks gestation for repeat c/s	70	17	15	15	114
31 y/o, G2P1, 35 weeks gestation for c/s due to breech presentation	94	7	7.5	15	194
36 y/o, G3P0, 32 weeks gestation for c/s due to severe Pre-eclampsia	94	5	5	10	139

Discussion: Many anesthesiologists prefer regional anesthesia to general anesthesia for c/s. Single-shot spinal anesthesia has the potential of high spinal blockade (1) and insufficient duration for prolonged surgery in many morbidly obese parturients (2). Epidural anesthesia provides the ability to maintain surgical anesthesia but it has an increased potential of inadequate analgesia (3). As shown in this report, CSA is a viable alternative for c/s in morbidly obese parturients because it offers the ability to carefully titrate and maintain a dependable level of surgical anesthesia. None of our patients developed post dural puncture headache.
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A-212.

ANESTHETIC MANAGEMENT OF MULTIPLE CAESAREAN SECTIONS AND VAGINAL DELIVERY IN A PARTURIENT WITH CLEIDOCRANIAL DYSPLASIA

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Introduction: Cleidocranial dysplasia (CCD) is an uncommon autosomal (chromosome 6, band p21) dominant disorder of bone development, characterized by absent or incomplete clavicles; craniofacial abnormalities including square skull, late closure of skull sutures, delayed fontanel closure, low nasal bridge, and abnormal permanent teeth with delayed eruption; short stature; kyphosis, scoliosis or spondylolisthesis. We present the peripartum anesthetic management of five pregnancies in a patient with CCD.
Case Report: The patient was diagnosed with CCD at age 18 months due to abnormal dental development. At the age of 23 years she presented in active labor for the first time. At that time she had the following physical features**:** a large skull, open fontanels, absent left and almost completely absent right clavicle. She weighed 51 kg and was 145 cm in height. Her airway examination showed protruding teeth in overbite position, a high-arched palate and Mallampati score of III-IV. No vertebral abnormalities were diagnosed. Epidural analgesia was performed at the patient's request, and she received repeated 8 cc boluses of bupivacaine 0.25%. Six hours after epidural placement, uneventful CS was performed due to arrest of descent, using the existing epidural catheter with 18 mL of 2% lidocaine. Two years later, she underwent a VBAC with vacuum extraction due to arrest of descent, under epidural anesthesia with 10 mL boluses of 0.25% bupivacaine. Over the next four years, the patient underwent two elective CS under single-shot spinal anesthesia, with 8 mg hyperbaric bupivacaine and 150-200 µg preservative-free morphine. The fourth CS was performed under combined spinal epidural (CSE) anesthesia, because of potentially lengthy surgery due to multiple CS. The spinal component consisted of 8 mg hyperbaric bupivacaine and 150 µg preservative-free morphine. The epidural catheter was not used. All surgeries were uneventful. Three of the five children have CCD syndrome.
Discussion: Patients with CCD, as in other disorders of craniocervical development, usually have a predictably difficult airway which requires careful planning and communication with the obstetrical team. In this patient, regional anesthesia was performed successfully and uneventfully for both vaginal delivery and CS. In the first pregnancy, the existence of a functional epidural catheter helped to avoid emergency induction of general anesthesia. An additional potential problem in CCD is difficulty in locating major neck veins for percutaneous central venous access, due to anatomical abnormalities in the clavicular region. Ultrasound guidance may be useful in these patients. Kyphosis, scoliosis or spondilolystesis can affect the performance of regional anesthesia. We recommend early performance of continuous labor epidural analgesia in patients with CCD to reduce the need for general anesthesia. In the event of failed regional anesthesia, the algorithm of predictable difficult airway can be applied.
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A-213.

ANESTHETIC CONSIDERATIONS IN A PARTURIENT WITH A HISTORY OF CHRONIC GRANULOMATOUS DISEASE, UNDERGOING CESAREAN DELIVERY

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Introduction: Chronic granulomatous disease (CGD) is a rare, genetically transmitted disorder, characterized by defective oxidative bacterial killing by host phagocytes. Patients typically present with recurrent, purulent infections with catalase-positive bacteria and fungi, including (in descending order of frequency) pneumonia, skin and deep tissue abscesses, suppurative adenitis, and osteomyelitis. We report the anesthetic management of a parturient with a history of CGD.
Case Report: A 42yo G1P0 at 39 weeks gestation, with a history of bilateral congenital hip dysplasia, presented for an elective cesarean secondary to concerns regarding hip dislocation during second stage of labor. Past surgical history included multiple orthopedic procedures including three hip replacements, one of which was complicated by a wound infection. After a sibling died from the disease, CGD was diagnosed in our patient during her teenage years on the basis of 30% phagocyte oxidase activity in a nitroblue tetrazolium (NBT) test (normal>98%). Infectious history was notable for the need for two granulocyte transfusions for protracted bronchial infections during her early twenties. The patient received 2 grams IV cefazolin 30 minutes preoperatively. The anesthesiologist donned a fresh pair of scrubs, surgical cap, mask, sterile gown, and sterile gloves. The back was cleaned and allowed to dry twice - first with chlorhexidine (ChloraPrep® with ScrubTeal Tint), then with DuraPrep™. An epidural catheter was inserted at the L3/L4 interspace, and gradually dosed with 20ml 2% lidocaine with epinephrine and bicarbonate plus 100mcg fentanyl. The catheter was secured with multiple sterile polyurethane transparent dressings instead of non-sterile tape. The patient developed a T4 block to light touch, and a healthy male infant (Apgars 8/9) was delivered after an uneventful operation. During the procedure, the patient was warmed with a lower body forced-air blanket. The epidural catheter was removed immediately after closure, and the puncture site covered with a sterile bandage.
Discussion: Reports of pregnancy or cesarean delivery in the setting of CGD are sparse (1). Our case illustrates epidural anesthesia can be safely employed for parturients with mild to moderate variants of CGD. Polymorphonuclear leukocyte adherence is decreased significantly in pregnant women during the third trimester (2). Moreover, CGD is a disorder of phagocyte function, suggesting our patient may have been particularly susceptible to perioperative infectious complications. We attempted to reduce infectious risk via multiple methods, including perioperative antibiotic prophylaxis, adherence to strict aseptic technique including sterile gown use, avoidance of dural puncture, sterile dressings, attention to thermoregulation, and expeditious removal of the epidural catheter. Given her history of severe respiratory infections, we believe an epidural catheter posed a lower risk than general anesthesia.
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A-214.

CESAREAN DELIVERY FOR PLACENTA PERCRETA COMPLICATED BY PULMONARY EMBOLISM

AUTHORS: R. B. George, A. G. Styron, C. Peterson-Layne, T. K. Allen, H. A. Muir;
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Introduction: Pulmonary embolism (PE), whether venous thromboembolism (VTE) or amniotic fluid embolism (AFE) is a leading direct cause of maternal death. In this case report, the perioperative management of a parturient with placenta percreta was complicated by a suspected intraoperative PE.
Case: A 39 year-old G3P2 with two previous cesarean deliveries (CD) presented at 34 weeks with vaginal bleeding. MRI revealed a large, lobulated placenta invading the anterior uterine wall. The placenta did not move independently of the urinary bladder suggestive of placenta percreta. Once stabilized a multidisciplinary team planned for a 36-week gestation CD and tubal ligation followed by uterine artery embolization. Prior to the scheduled CD labor ensued, which was unresponsive to tocolytics. The patient was urgently taken to interventional radiology for insertion of iliac artery sheaths and internal iliac occlusion balloons under local anesthesia. For delivery, general anesthesia was chosen using standard monitors and invasive blood pressure monitoring. Cystography revealed prominent vasculature of the bladder dome. After the fundal uterine incision and rupture of membranes, while the obstetricians were trying to expel the fetus, the parturient had an episode of sudden profound hypoxia and hypotension, associated with a precipitous fall in end-tidal carbon dioxide. Our differential diagnosis included VTE, AFE, and venous air embolism. Oxygen and vasopressors resulted in normal hemodynamics 10 minutes after delivery. The uterus was closed with the placenta intact. Estimated blood loss was 1000ml. The patient was transported to the interventional radiology department under continued general anesthesia for embolization of the placental bed. During the injection of embolization gel foam the patient experienced a second episode of desaturation and a fall in end-tidal carbon dioxide, without any hypotension. No arterio-venous shunting was obvious with contrast investigations. Oxygenation improved, the case preceded and the patient was extubated uneventfully. The patient was anticoagulated during the embolization. On postoperative day 1 spiral computed tomographic pulmonary angiogram revealed multiple right pulmonary artery filling defects consistent with a diagnosis of pulmonary embolism. Compression Doppler ultrasounds of the lower extremities were negative for venous thrombus. The patient was anticoagulated, prescribed methotrexate and subsequently discharged on postoperative day 5.
Discussion: Placenta percreta can be associated with major postpartum hemorrhage. Adequate pre-operative planning and a multidisciplinary approach help to ensure a successful outcome. VTE poses serious risk to parturients and at risk patients once identified, must be aggressively investigated and treated (1). Prompt investigation did not identify a VTE source. AFE may be responsible for the filling defects reported by spiral computed tomographic pulmonary angiogram. An intact placenta with abnormal vasculature may increase the risk of AFE. This case may represent an atypical presentation in the spectrum of AFE syndrome.
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A-215.

REGIONAL ANESTHESIA FOR CESAREAN SECTION IN SEVERE MYASTHENIA GRAVIS

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Introduction: Literature review advocates general anesthesia with endotracheal intubation for myasthenic women with respiratory compromise or bulbar dysfunction requiring cesarean section[1,2]. We report the use of epidural anesthesia for cesarean section in such a parturient and highlight the unpredictable course of the disease in pregnancy.
Case: A 31 year old primip was scheduled for elective cesarean section for worsening myasthenia gravis throughout pregnancy. Past medical history included multiple ICU admissions for respiratory compromise. Symptoms included ptosis, upper limb weakness, dysphonia, dysphagia and gastroesophageal reflux. Pulmonary function tests were normal. Following multidisciplinary planning she received intravenous immunoglobulin and azothiaprine at 35 weeks gestation preparing for delivery at 38 weeks. She presented at 37 weeks with right upper quadrant pain, headache and worsening upper limb weakness. She had a falling platelet count (104 x 10-6/l) and a raised aspartate aminotransferase (55IU/l). Blood pressure remained normal. Due to her worsening myasthenia and possible HELLP syndrome, cesarean section was expedited. Azothioprine was stopped and prednisone 25mg once daily was started. Platelet count stabilized at 119. Body mass index was normal. Mallampati score was 1 with excellent mouth opening and jaw protrusion. Following aspiration prophylaxis an epidural catheter was sited using a 17G Touhy needle at the L3/4 intervertebral space. Following a negative test dose, 20mls 2% Lidocaine with 1 in 200,000 epinephrine and 100micrograms of fentanyl was incrementally administered achieving a T6 pinprick block bilaterally. Surgery proceeded uneventfully. Oxygen saturations were maintained at 96 - 99% on air throughout. She experienced no dyspnea. 3mg of epidural morphine was given for postoperative analgesia. She was monitored for 48 hours in an acute care area before discharge to a postpartum ward. Pain was well controlled on oral analgesics. On postoperative day 3 she suffered an acute exacerbation of her myasthenia experiencing excessive drooling, upper limb weakness and deterioration in pulmonary function (peak flow rate reduced from 400l/min to 130l/min). She was transferred to a neighboring hospital for plasmapheresis and following a full recovery was discharged two weeks later.
Discussion: Epidural anesthesia provided an adequate level of anesthesia required for cesarean section without compromising respiratory function in a patient with severe myasthenia gravis. This avoided using muscle relaxants, narcotics, barbiturates and inhalational anesthetics all of which can exacerbate myasthenia and result in need for postoperative ventilation. These parturients require close monitoring for signs of impending myasthenia crisis which typically occurs in either the first trimester and/or postpartum[3]. These signs include worsening bulbar dysfunction as well as frank respiratory muscle weakness. A well formulated multidisciplinary plan should be in place should this occur.
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A-216.

TIMING OF CESAREAN SECTION IN THE PATIENT OF INTRAUTERINE FETAL DEATH WITH DIC; AN UNUSUAL CASE OF GROUP A STREPTOCOCCAL TOXIC SHOCK SYNDROME

AUTHORS: K. Nakahata, S. Minami, Y. Hatano;
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Introduction: We occasionally meet the severe cases with the symptom of disseminated intravenous coagulation (DIC) during cesarean section. We experienced the survived case of intrauterine fetal death that rapidly developed severe DIC. In this case, the timing of cesarean section was very important because uterine bacterial infection was suspected to be the cause of DIC.
Case: A 28-yr-old nulliparous woman (158 cm, 59 kg) at 33 weeks' gestation suddenly presented with high fever over 39 degrees without symptom of upper respiratory infection. In a half day, she developed diarrhea and vomiting. Absence of the fetal heart rate was detected when the gravida was transferred to the hospital, although there was no problem with fetal heart rate in the clinical examination of 6 days before. In the emergency room she showed high fever of 40.8 degrees and tachypnea (34 breaths per minute). Low blood pressure (69/42 mmHg) associated with tachycardia (147 beats per minute) was observed. She had vomiting of small amount of blood and persistent nose bleeding. The laboratory examination revealed severe symptom of disseminated intravascular coagulation (APTT >200 sec, PT >100 sec, FDP 974.8 μg/ml, D-dimer 424.0 μg/ml, Platelet 13.8×10^4). The patient was admitted to the ICU in order to treat DIC as well as shock. At first we suspected that the DIC in this case was associated with fetal demise. The emergent cesarean section was scheduled for the purpose of immediate removal of dead fetus. But just before the operation, streptococcus pyogenes, which is classified into group A streptococcus (GAS), was detected from the patient's vaginal secretion. We diagnosed this patient to be struck by sepsis of GAS infection.[1] The operation was canceled and the antibiotic therapy was started with piperacillin plus tazobactam (5.0 g/day) and clindamycin (1.8 g/day). Plasma creatinine value was gradually elevated to 7.3 mg/dl, while increase of hepatic enzyme level was mild (ALT 72 IU/L). Blood pressure of the patient was maintained with dopamine and sufficient urine flow was established by using human atrial natriuretic peptide. We used danaparoid sodium, a low-molecular-weight heparin, and gabexate mesilate for treatment of DIC. After the symptom of DIC recovered, cesarean section was performed uneventfully on admission day 8. Pathological examination revealed the findings of chorioamnionitis and necrotic smooth muscle tissue of uterus, indicating that pregnant uterus would be the focus of bacterial infection. The patient was discharged from the ICU on admission day 11.
Discussion: The main goal of treatment of DIC associated with intrauterine fetal death is removal of the dead fetus occasionally by cesarean section. However, it appears to be necessary for anesthesiologists to keep their option of delaying the operation in some cases.
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A-217.

MORQUIO SYNDROM : ANESTHETIC AND OBSTETRIC MANAGEMENT OF A CASE

AUTHORS: S. E. Cerda[1], G. A. Hidalgo[1], J. D. Escobar[1], F. E. Fernandez[2], H. D. Salinas[1], C. G. Matus[3], C. G. Arzola[1];
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Introduction: Morquio Syndrome (MS) is a subtype of mucopolysaccharidoses characterized by the intracellular accumulation of keratin sulfate. Issues regarding anesthesia include distortion of airway anatomy and cervical spine (odontoid hypoplasia) with difficult or impossible endotracheal intubation and risk of atlanto-axial luxation with quadriparesis. In addition cardiac and respiratory alterations, skeletal deformities and short stature may compromise anesthetic management (1).
Case Report: A 21 years old nullipara with history of MS was referred to our hospital at 20th weeks of pregnancy. Physical exam at admission showed typical Morquio phenotype, weight 26 kg and height 83 cm. Surface echocardiogram demonstrated moderate aortic insufficiency, mild mitral and tricuspid regurgitation, pulmonary hypertension and pericardic effusion. Spirometry revealed a severe restrictive pattern. Digoxin and continuos oxygen were administered. CT , MRI and Rx showed cervical dysplasia with unstability and raquistenosis. We performed a thoracolumbar MRI at 8 mm increments to calculate CSF volume (2). The patient remains in the hospital for treatment of polihydramnios and to optimize maternal conditions for delivery. At 28th +3 weeks the patient initiate spontaneous preterm labor. The Ob team decided to perform an Urgency CS. For anesthetic management a continuous spinal (CSA) was choose. After L3/4 lumbar puncture in sitting position a 24G spinal catheter(Spinocath ®, B.BRAUN) was inserted. Titrated CSA to achieve T5 dermatome level , up to a total dose of 1.875 mg hyperbaric bupivacaine and 12.5 mcg of fentanyl was successfully performed. Invasive CVP-arterial pressure and intermittent echocardiography did not reveal significant changes in hemodynamic measurements. A female newborn weighing 1.4 kg and 45 cm height was delivered successfully. A month stay in NICU for RDS treatment was required. Genetic and biochemical tests rule out the presence of MS in the baby.
Discussion: This case report for the first time pregnancy and succesfull delivery in a MS patient . Antenatal assessment and multidisciplinary approach were pivotal for success. GA risks of difficult intubation and spinal cord damage were balanced against neuraxial anesthesia. CSA with extremely low bupivacaine dose provided adequate operating conditions with minimal hemodynamic disturbance and did not affect materno-fetal outcomes.
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A-218.

AMNIOTIC FLUID EMBOLISM UNDER GENERAL ANESTHESIA: A POSITIVE OUTCOME

AUTHORS: J. M. Cragun[1], S. C. Ellestad[2], M. K. Panni[3];
AFFILIATION: [1]Lee Moffitt Cancer Center, Tampa, FL, [2]Duke University, Durham, NC, [3]University of Texas, Houston, TX.

Introduction: Amniotic Fluid Embolism (AFE) has an estimated incidence of 1 in 8000-80,000 pregnancies. It has a high maternal morbidity and mortality, with only 15% of patients surviving neurologically intact. Primary causes of death are cardiac arrest and hemorrhage. Secondary causes include multi-organ failure, ARDS or brain death.
Case: 38 year old gravida 1 (triplets) at 26 2/7 weeks presented with mild pre-eclampsia, without significant medical history, and was maintained on in-house bed rest. On day 20, she had an emergent C-section for prolapsed membranes. C-section was performed under general endotracheal anesthesia with rapid sequence intubation. Estimated blood loss during the case was 800mL, with uterine atony resolving with oxytocin, hemabate, and rectal misoprostil. Prior to endotracheal extubation, 1000mL of clot was removed manually, followed by brisk bleeding. Aggressive fundal massage was then coincident with the patient becoming hypotensive (un-recordable) with a loss of pulse and EKG showing sinus bradycardia. CPR was performed for 2 minutes, necessitating intravenous epinephrine. Pulse and blood pressure returned two minutes following the collapse. Two units of emergency release blood were transfused. Arterial and central lines were placed and the patient was stabilized and transferred to the MICU. The patient remained intubated and sedated, but was rousable and responsive to commands. Initial labs were consistent with developing DIC. The patient received a total of 20 units packed red blood cells, 17 units fresh frozen plasma, 6 units of platelets, and 2 units of cryoprecipitate over 6 hours. Unable to resolve the uterine atony and resulting hemorrhage, a Minnesota esophageal tube was placed into the uterine cavity to achieve tamponade. Her total estimated blood loss at this time was 4800mL. 5 hours postoperatively interventional radiology performed uterine artery embolization, which resolved her bleeding. On postoperative day 2, her hematocrit stabilized at 31 and platelets at 73, and she was weaned to room air on postoperative day 5. The patient was discharged after 29 days in the hospital with normal neurological function.
Discussion: There is speculation that uterine trauma or manipulation by placement of intrauterine pressure catheter and amnioinfusion may increase the risk of AFE, however there are no documented cases of AFE from aggressive uterine massage following delivery. While cardiovascular collapse is a common presentation of AFE, this is the first case reported of such a presentation under general endotracheal anesthesia. We feel that coincident uterine manipulation may have contributed to the development of AFE. Use of Sengstaken-Blakemore tube aided hemodynamic stabilization and uterine artery embolization allowed control of the syndrome. Multidisciplinary teams with intensive care support were able to address the patient's supportive needs and limit negative sequelae. We feel prompt recognition and intervention of AFE can lead to a successful clinical outcome.

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A-219.

SUCCESSFUL USE OF RECOMBINANT FACTOR VIIA IN THE TREATMENT OF LIFE THREATENING POSTPARTUM HAEMORRHAGE IN A JEHOVAH'S WITNESS PATIENT

AUTHORS: W. J. Wight, R. Khoju;
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Introduction: Postpartum haemorrhage (PPH) is a major cause of maternal and fetal morbidity and mortality. In addition, Jehovah's Witnesses are at a 44-fold increased risk of maternal death as a result of obstetric haemorrhage(1). Several case reports now document the use of recombinant factor VIIa (rVIIa) in severe PPH where conventional treatment methods were ineffective, but this is the first report of its use in the management of life threatening PPH in a Jehovah's Witness.
Case: A 32-year old Para 5 (5 previous normal deliveries) 62 kg parturient with a 27/40-week twin pregnancy with a grade 4 placenta praevia was admitted to labour ward with painless PV bleeding of approximately 500ml. On admission her Haemoglobin was 11.8 g/dL and platelets 166 x 10^9/L with normal clotting. At this point she restated her belief as a Jehovah's Witness and as such was not willing to receive any donated blood products, even in a life-threatening situation. However, she was happy for rVIIa to be used if required. Following a 4 hour period of observation there was additional sudden haemorrhage of approximately 900 mls. After resuscitation with 2 litres of intravenous fluid she was transferred to the operating room for emergency LSCS, which was conducted under general anaesthesia with invasive blood pressure monitoring, where she was delivered of live twins. Despite the early use of oxytocin, ergometrine, misoprostol and intrauterine carbaprost, and a well-placed B-Lynch suture, the uterus remained boggy and so the decision was made to proceed to total hysterectomy. Despite this adequate haemostasis was still not achieved, with generalised pelvic ooze and an ongoing intraoperative blood loss of 2 litres. Haemoglobin was 6.0 g/dL, platelets 89 x 10^9/L, PT 15 s, APTT 39 s and fibrinogen 2 g/dL. Total intravenous fluid administration was 4,500 mls. After consultation with haematology rVIIa was administered (100 mcg/kg). Within 15 minutes haemostasis was achieved (with coagulation parameters corrected to PT 9 s and APTT 26 s) and surgical closure performed. Haemodynamic stability was present and so she was extubated 1 hour later and nursed on the delivery suite. She was discharged on oral iron at postpartum day 6.
Discussion: The numerous recent case reports in the use of rVIIa in PPH have highlighted the importance of this 'off label' treatment in instances where conventional therapy has been ineffective. However, all of these cases involved the use of some, and in most cases massive, transfusion. This case is the first reported use of rVIIa in a Jehovah's Witness patient and illustrates that it can be successfully used in severe PPH without the need for donated blood products.
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A-220.

EPIDURAL ABSCESS AS A COMPLICATION OF THORACIC EPIDURAL CATHETER (TEC) PLACEMENT IN A PARTURIENT WITH METASTATIC OSTEOSARCOMA

AUTHORS: J. A. Dolak, C. Muh;
AFFILIATION: Emory Crawford Long Hospital, Atlanta, GA.

Introduction: Malignancy may be associated with the development of an epidural abscess (EA) secondary to reduced immunocompetence (1,2). Pregnancy, a state of relative immunotolerance, may compound this risk (2).
Case: A 19 y.o. G1P0 previously diagnosed with osteosarcoma of the left humerus underwent a limb-sparing tumor excision with extensive chemotherapy in 2003. Other history included recurrent lung metastases with resultant multiple wedge resections and/or lobectomies. In March 2006, she became pregnant. A surveillance CT scan in July revealed a small soft tissue mass within the RUL. Chemotherapy was deferred in favor of surgery. She underwent a RUL lobectomy on August 21 at 24 weeks EGA. A TEC was placed for postoperative analgesia, which was removed four days later. At discharge on August 27, superficial subcutaneous purulence was noted at the TEC site. She was afebrile, without other signs of infection, and had no new neurologic deficits. She was placed on a 7-day course of Keflex and discharged home. The next day she presented to the ER suffering from severe back pain and shortness of breath. A CXR revealed a right pneumothorax, resulting in chest tube placement. Additionally, a spinal MRI was obtained showing an extensive posterior epidural mass from T3 to T10, with compression of the spinal cord between T5 and T9. This lesion was absent on the July CT. A WBC showed 13.0 x10E3/μL. Antibiotics were started empirically. Further labs included an ESR (98 mm/hr), CRP (139.6 mg/L), along with blood and urine cultures (both negative). Neurologic exam remained unchanged. Her back had 2 small, midline pinholes at T6/T7 without expressible drainage. On August 31, she underwent a T4 to T10 laminectomy, and was found to have an EA, which was cultured and evacuated. A drain was left in the wound after antibiotic irrigation. That afternoon, after two days of antibiotics, her labs included WBC (7.9 x10E3/μL), ESR (114 mm/hr) and CRP (189.0 mg/L). Postoperatively her back pain resolved, and her neurologic exam remained unchanged. The chest tube and drain were removed a few days postoperatively, and a PIC line was placed for antibiotic administration. Her cultures grew MRSA, and she received daptomycin for 6 weeks at home. At follow-up, she was without back pain, and had an unchanged neurologic exam. She delivered a viable male infant at 32 weeks EGA.
Discussion: Differential diagnoses in this patient included EA, metastasis, and hematoma. Back pain is present in 72% of patients with EA (1), whereas only 13% of patients present classically (back pain, fever, and neurologic deficit)(2). It is therefore important to maintain a high degree of suspicion for this diagnosis in potentially immunocompromized patients with back pain.
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A-221.

ANESTHESIA MANAGEMENT OF CAESAREAN SECTION FOR CHRONIC HEMODIALYSIS PATIENTS

AUTHORS: S. Takagi, K. Terada, H. Higuchi, N. Fujita, M. Ozaki;
AFFILIATION: Tokyo Women's Medical University, Tokyo, Japan.

Introduction: Recent improvements in hemodialysis techniques allow for patients on chronic hemodialysis (HD) to become pregnant and deliver to term. Unfortunately, however, the abortion and premature labor rates are high, and the management of anesthesia in pregnant HD patients during labor is difficult. We report anesthesia management in two cases of Caesarean section in chronic HD patients.
Case 1: An urgent Caesarean section due to fetal distress at 27 weeks gestation was performed in a 37-year-old woman with a 10-year history of HD. Hydramnios was present from the early gestation state. Anesthesia was induced with thiopental and succinylcholine. After endotracheal intubation, anesthesia was maintained with oxygen, nitrous oxide, and vecuronium. Neonatal body weight was 739 g, the Apgar scores were 3 (1 min) and 5 (5 min), and the neonate required respiratory care. Blood loss was 1100 ml, replacement fluid volume was 350 ml, and the duration of anesthesia was 90 minutes.
Case 2: A scheduled Caesarean section due to fetal distress was performed at 33 weeks gestation in a 33-year-old woman with hypertension and a 3-year history of HD. Hydramnios was present from early gestation. Anesthesia was induced with thiamylal and succinylcholine. After endotracheal intubation, anesthesia was maintained with oxygen, nitrous oxide, vecuronium, and isoflurane. Nitroglycerine was administered as an antihypertensive agent for massive blood pressure fluctuations. Neonatal body weight was 1430 g and the Apgar scores were 8 (1 min) and 9 (5 min). Serum potassium values did not increase during anesthesia. Blood loss was 197 ml and replacement fluid volume was 750 ml.
Discussion: The current rate of Caesarean section in chronic HD patients is 50%. In general, emergency Caesarean sections are performed prior to term for the safety of the mother and fetus as in the two cases with hydramnios presented here. Respiratory care is sometimes needed, as in Case 1. Anesthesia management is difficult in patients on HD due to platelet function degradation and bleeding tendencies. Thus, spinal anesthesia and epidural anesthesia are avoided. In addition, the cardiovascular system reserve capacity is low, there is decreased circulating blood volume, and large hypertension-induced drifts in hemodynamics, as in Case 2. The rapid infusion load and an increase in the postpartum circulating blood volume in spinal anesthesia might increase the right ventricular load and induce the development of lung edema. Therefore infusion control for bleeding is recommended. The appropriate choice of anesthesia and the administration of vasoactive agents are important for chronic HD patients.

A-222.

INITIATING AN OBSTETRIC ANESTHESIA COLLABORATION TO REDUCE MATERNAL MORBIDITY AND MORTALITY IN REPUBLIC OF GEORGIA

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Introduction: Georgia, a country with 4.6 million inhabitants, is situated between Russia to the north, and Turkey, Armenia, and Azerbaijan in the south. Georgia gained independence from Russia in 1991. Between 1990 and 2002 the maternal mortality rate in Georgia increased by almost 80% (from 28 to 51 maternal deaths per 100,000 live births).[1] Twelve physicians representing four countries visited Georgia in September 2006 to acquire information and identify opportunities for collaboration to reduce maternal morbidity and mortality. The physicians represented the SOAP international outreach committee, Kybele (a non-profit medical organization), and the Obstetric Anaesthetists' Association.
Methods: The site visits were arranged to 13 hospitals in the cities of Tbilisi, Kutaisi, and Gori, noting staffing, facilities, equipment availability, and the conduct of anesthesia. Kybele obtained Ministry of Health approval to bring medications for technical demonstrations during the hospital visits. Additionally, team members brought medical supplies, textbooks, and teaching materials for donation to the host hospitals. One-day seminars were scheduled in Tbilisi and Kutaisi to discuss a myriad of obstetric anesthesia topics and to learn the degree of interest in future collaboration.
Results: The conferences were well-attended by anesthesiologists, obstetricians, and intensivists from around the country. Presentations were translated into Georgian to facilitate communication. Extensive teaching was accomplished and there were very active discussions with local physicians and health ministry staff regarding future collaborations and needs. During hospital observations, cultural and political barriers which impact maternal healthcare were identified. Regional anesthesia was used infrequently (except in one hospital, privatized, with a labor epidural rate of 60% and an epidural rate for C/S of 18% with spinals never utilized for C/S) because of patient fears and a lack of equipment and supplies. Lidocaine is the only local anesthetic available for regional anesthesia in Georgia; bupivacaine is not approved. Equipment was minimal; cesarean section monitoring often consisted only of a manual blood pressure cuff. The ventilators were 40-year-old Russian models. Left uterine displacement and rapid sequence induction with cricoid pressure were not utilized in any of the hospitals we observed. Team members were featured on Georgian television caring for a woman who was provided labor analgesia for a painless birth.
Conclusion: Health officials in Georgia have requested our help in obtaining approval for use of bupivacaine and ropivacaine. Future on-site training missions will focus on basic obstetric anesthesia education, including safe anesthesia for cesarean section, public awareness about regional anesthesia, and labor analgesia. Efforts will be undertaken to obtain equipment and supplies for donation during future visits.
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Acknowledgement**:** Kybele

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A-223.

LARYNGEAL ATRESIA AND EXIT PROCEDURE

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Introduction: Laryngeal atresia is the most rare and most devastating of the congenital anomalies of the larynx. Failure of recanalization of the laryngotracheal tube during the third month of gestation leads to laryngeal atresia. Laryngeal atresia manifests as an acute airway obstruction in the newborn immediately after clamping the umbilical cord. Examination reveals a neonate with a severe respiratory distress marked by strong respiratory efforts and inability to inhale air or cry. Without immediate airway management with a tracheotomy (intubation is unsuccessful), Death Is Imminent (1)
Case Report: We report an experience of anesthetic management of the ex-utero intrapartum treatment (EXIT) procedure performed in a fetus with congenital high airway obstruction syndrome (CHAOS) due to laryngeal atresia at 37 weeks' gestation. A 24 year old woman G1 P0 was admitted for C-section with the diagnosis of congenital malformations of the larynx and other possible malformation. The presence of olygoamnios on prenatal sonographic control indicates the diagnosis of fetal malformation. Considering the possibility of laryngeal atresia will allow us to manage preparation prior to birth. Anesthesia for the mother was induced with rapid sequence, Sellick's maneuver, propofol 150 mg, succinicholine mg and maintained with .5% sevoflurane in Nitrous Oxide 50% and 100µg fentanyl before delivery. Sevoflurane provided excellent uterine relaxation without maternal hypotension. A low abdominal midline incision was performed followed by a low transverse incision of the uterus. The fetal head, right arm and shoulder were delivered and fentanyl was administered to the mother. Immediate fiberoptic laryngoscopy confirmed the diagnosis and therefore a fetal tracheostomy was performed. The management of laryngeal atresia involves immediate tracheotomy at birth, avoiding clamping the umbilical cord until the tracheotomy was ready for secured maximizing oxygenation of the newborn. Mother recuperation after discontinuing sevoflurane and oxytocin infusion was started after delivery. The baby is developing normally at 7 months of age with tracheostomy
Discussion: Prenatal diagnosis of laryngeal atresia allows prenatal planning for resuscitation at birth. Unless ventilation is achieved within minutes of delivery, patients with congenital laryngeal atresia will not survive. It is concluded that some fetuses with a prenatal diagnosis of congenital high airway obstruction syndrome (CHAOS) can benefit from the EXIT procedure at delivery. There are 2 settings in which survival is more likely**:** a tracheotomy may be immediately performed in the delivery room or tracheoesophageal fistula of sufficient size to permit the passage of air distal to the obstruction. This necessitates a multidisciplinary management team
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A-224.

ANESTHETIC MANAGEMENT OF A PARTURIENT WITH MARFAN SYNDROME HAVING CESAREAN DELIVERY

AUTHORS: S. I. Singh, C. Brooks;
AFFILIATION: Schulich School of Medicine, University of Western Ontario, London, ON, Canada.

Purpose: Anesthetic management of parturients with Marfan syndrome can be challenging because of cardiovascular and skeletal abnormalities (1). Parturients with aortic root dilatation are at risk for dissection (2). We describe the anesthetic management of a parturient with Marfan syndrome and aortic root dilatation having general anesthesia for Cesarean delivery.
Case: A 33 yr-old G1P0 woman at 26 wks gestation with Marfan syndrome was referred to the Anesthesia Clinic. She was known to have aortic root dilatation of 41mm and mild mitral valve prolapse/ regurgitation. She also had partial correction of severe scoliosis with Harrington rod placement from T3-L5 and total hip arthroplasty due to joint instability. Medications included metoprolol 100 mg BID. Her cardiologist advised serial echocardiograms during pregnancy and Cesarean delivery to decrease risk of aortic dissection. The patient preferred general anesthesia for delivery. We requested a multidisciplinary conference including cardiac surgery. It was decided to proceed with elective Cesarean delivery at 38 wks gestation at the local cardiac surgery centre. The patient remained stable during pregnancy and her serial echoes remained unchanged. On the morning of surgery she was treated with antibiotics, metoprolol, ranitidine, and metoclopramide and brought to the cardiac OR. The obstetrical, neonatal, and cardiac surgery teams were present. She was lightly sedated with remifentanil while the BIS monitor, radial arterial line, and central lines were placed in addition to regular monitors. After preoxygenation, she underwent a modified rapid sequence induction using remifentanil, propofol and succinylcholine. Anesthesia was maintained with remifentanil, N20, O2, sevoflurane, and rocuronium. Intraop.TEE confirmed aortic root dilatation and mild mitral regurgitation. The patient remained hemodynamically stable. After delivery of the baby, an oxytocin infusion and morphine were given. The baby's Apgar scores were 4 and 8. The baby required assisted bag-mask ventilation for the first minute only. The patient was transferred to the ICU for 24 hours and then to the CCU for the reminder of her hospital stay which was uncomplicated. Postoperative pain was managed with PCA morphine and regular acetaminophen. An echocardiogram done prior to discharge was unchanged. Both mother and baby did well.
Conclusions: The hemodynamic changes of pregnancy and delivery can be life-threatening to the parturient with Marfan syndrome. The successful outcome in this case was largely possible due to the multidisciplinary team approach used and regular follow up of the patient during her pregnancy and post-delivery. Anesthetic goals included minimizing aortic root shear forces and wall stress through invasive monitoring, intraoperative TEE, use of remifentanil, and postoperative pain management.
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A-225.

ANESTHESIA EXPERIENCE OF THREE CAESAREAN SECTION CASES AFTER THE FONTAN PROCEDURE

AUTHORS: S. Takagi, N. Fujita, H. Higuchi, K. Terada, M. Ozaki;
AFFILIATION: Tokyo Women's Medical University, Tokyo, Japan.

Introduction: Fontan circulation, resulting from the Fontan procedure developed in 1971, is more commonly encountered as the postoperative patients reach childbearing age. Non-pulsating blood flow to the lungs must be maintained during anesthesia in these patients. We report our anesthesia management experience of three cases with Fontan circulation that underwent Caesarean section.
Case 1: A 30-year-old woman underwent a scheduled Caesarean section at 38 weeks gestation. She had undergone a Fontan procedure for transposition of the great arteries. General anesthesia was induced with thiopental, fentanyl, and succinylcholine chloride, and maintained with midazolam. The patient was tachycardic (120 bpm) upon entering the surgical suite and her heart rate increased to 140 bpm after delivery. Therefore, phenylephrine and digoxin were administered.
Case 2: An emergency Caesarean section at 29 weeks gestation was performed for an imminent abortion in a 32-year-old old woman. She had undergone a Fontan procedure for tricuspid atresia and ventricular septal defect. General anesthesia was used because she was taking aspirin, and was induced with thiopental and succinylcholine chloride, and maintained with oxygen and nitrous oxide. The perioperative hemodynamics were stable.
Case 3**:** A scheduled Caesarean section was performed at 35 weeks gestation in a 35-year-old woman. She had undergone a Fontan procedure for pulmonary stenosis and tricuspid atresia. Anesthesia was managed with combined spinal-epidural anesthesia. Hypotension occurred after inducing spinal anesthesia and delivery, but was successfully treated with ephedrine. All three cases were classified as NYHA I.
Discussion: Arrhythmias are present in approximately 20% of patients that have undergone a Fontan procedure. Decreased blood pressure causes decreased pulmonary blood flow and the patient's condition can rapidly deteriorate. In addition to the adaptations in anesthesia management required for conventional Caesarean section procedures, Fontan circulation and NYHA classification are important factors in the choice of anesthesia methods. General anesthesia was selected for Cases 1 and 2 because of patient anxiety and the urgency of the operation. We chose combined spinal-epidural anesthesia for Case 3. One report suggests that general anesthesia is preferred because in epidural anesthesia venous return decreases to reduce central venous pressure (1). On the other hand, another study reported well- controlled hemodynamics with epidural anesthesia without necessitating positive pressure ventilation (2). To determine the most appropriate anesthetic method, it is necessary to determine if anticoagulants are being used, the maternal hemodynamics, fetal age and head circumference, fetal state, and the urgency of the procedure. We report anesthesia management of three cases that underwent a Caesarean section after a previous Fontan procedure. The choice of anesthesia was carefully adapted to each case. Both regional and general anesthesia were safely used for these cases.
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A-226.

ANESTHESIA FOR LABOR AND DELIVERY IN PATIENTS WITH SPINA BIFIDA

AUTHORS: J. M. Shannon, V. Zutshi, C. L. McCaul;
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Introduction: Spina Bifida (SB) describes a spectrum of congenital Neural Tube Defects with characteristic anomalies of the posterior elements of the vertebrae. The associated spectrum of musculoskeletal problems, bladder and bowel dysfunction, renal impairment, hypertension, skin breakdown, epilepsy and Chiari/ hydrosyringomyelia have implications for regional anesthesia for pain management during labor and delivery[1].
Aims: To determine the anaesthetic and analgesic outcomes outcomes for patients with SB during labour and delivery
METHODS: The records of all patients with SB who presented to the Anesthetic Preassessment Clinic during the period May 2001-May 2006 were reviewed. Setting**:** Single Center University Teaching Hospital. Medical notes to determine diagnostic category, anaesthetic/analgesia management and outcomes during labor and delivery.
Results: Eighteen patients with SB were identified (8 patients had a history of true SB, 10 had SB occulta). Three of the true SB group had elective Caesarean sections under General Anesthesia, with one patient having a spontaneous delivery. In the SB Occulta group two patients had elective Caesarean sections under General Anesthesia. Four patients had Epidural Anesthesia, with one patient progressing to Caesarean section. Three patients were offered and refused Epidural Anesthesia, and one patient was not offered Epidural Anesthesia, and was managed using a Fentanyl infusion.
Conclusion: Regional anesthesia in patients with SB is not frequently used in our institution because of perceived risk. Pre admission Anesthesia assessment is important for risk management, patient education, and for timely provision of an acceptable plan for pain relief during labor and delivery.
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A-227.

MANAGEMENT OF WORSENING AORTIC DILATATION AND CARDIAC FUNCTION IN A 34 WEEK PARTURIENT WITH MARFAN SYNDROME

AUTHORS: N. D. Jeffreys, S. L. Beltran, J. M. Mhyre;
AFFILIATION: University of Michigan Health System, Ann Arbor, MI.

Introduction: Marfan syndrome, an autosomal dominant disorder of collagen and elastin, can involve the musculoskeletal system as well as the cardiovascular system; specifically, patients can have aortic dilatation, mitral valve prolapse, and cardiomyopathy. Patients with Marfan syndrome experience an increased risk of aortic dissection, especially if further aortic root dilation occurs during pregnancy (1). In our patient, the combination of a widening aortic root and worsening cardiomyopathy presented both a danger to the patient and a challenge to the providers.
Case: A 31 year old primagravida with Marfan syndrome presented at 34 4/7 weeks for urgent cesarean section. The patient had previously been followed by a cardiologist for medical management of her aortic dilatation with beta blockade and serial surface echocardiograms. Between 32 weeks and 34 4/7 weeks gestation her aortic root dilatation increased from a diameter of 39mm to 44mm. Over the same interval, the patient also had a decrease in ejection fraction from 50% to 35%. After discussion amongst the anesthesiologist, obstetrician, and cardiothoracic surgeon, the anesthetic and surgical plan was for cesarean delivery under epidural anesthesia in the cardiothoracic operating room with the cardiothoracic surgeon and cardiopulmonary bypass circuit available. A 14-gauge intravenous catheter, arterial line, and epidural were placed. A surgical level was achieved with incremental epidural dosing with lidocaine 2%, fentanyl 5 mcg/mL, and NaHCO3 2mL/5 mL increments up to 20mL. The patient remained hemodynamically stable throughout delivery. A male infant weighing 2170 grams, with Apgars of 8 and 9 was delivered and transferred to the neonatal intensive care unit for monitoring and discharged home on day of life 10. The mother was discharged home on postoperative day 3 without postpartum complications.
Discussion: The risk of aortic dissection during pregnancy is increased particularly with acute dilatation to greater than 40mm during the third trimester of pregnancy (1,2). The anesthetic management focuses on minimizing aortic root shear forces and wall stress by using invasive monitoring, pharmacologic therapy, and anesthetic techniques to prevent peripartum pain (3). Earlier case reports of hemodynamically stable patients with both repaired aneurysms and acute aortic dissections support a minimum of large bore intravenous access, intra-arterial blood pressure monitoring, regional anesthesia, and facilities for cardiothoracic surgery (4,5). Through coordinated care amongst the anesthesiologist, obstetrician and cardiac surgeon, we optimally prepared for the threat of aortic catastrophe.
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A-228.

ANESTHETIC IMPLICATIONS OF IV ACCESS REFUSAL IN A HIGH-RISK PARTURIENT

AUTHORS: A. M. Tonidandel, R. D'Angelo;
AFFILIATION: Wake Forest University, Winston-Salem, NC.

Introduction: Conservative management of parturients at high-risk for C/S includes regional anesthesia or rapid sequence induction of general endotracheal anesthesia in emergencies. Both plans require maternal cooperation and intravenous (IV) access. We present a case of a preeclamptic with severe needle phobia who refused IV access and discuss the anesthetic options and ethical principles underlying medical decision-making.
Case: A 23 yo parturient at 39 WGA was transferred due to maternal comorbidities, including asthma, chronic hypertension (160/90), and a history of self-injurious behavior, as well as a severe needle phobia. She was recently diagnosed with mild preeclampsia and gestational diabetes. Mother and fetus were stable on admission. Anesthesia consultation reconfirmed refusal for IV access, even with oral or inhalational sedation. A psychiatric evaluation determined that the needle phobia hindered the ability to provide informed consent for an IV. Following lengthy discussions, the patient and her husband acknowledged in writing that postponing placement potentially increased risk of harm to mother and fetus. They consented to IV placement for emergencies, even if force was necessary. Fortunately, the mother delivered a healthy girl with minimal medical intervention. They were discharged home on day 3 having never received a needle stick of any kind.
Discussion: Despite the positive outcome, the refusal of IV access raised a number of clinical and ethical concerns. Anesthetic options for emergency surgery included forceful placement, inhalational induction, or refusal of care. Medical decision-making should be guided by principles of autonomy, beneficence ("do good"), nonmalficence ("do no harm"), and justice.* Forced IV placement potentially constitutes assault while refusing care could be negligence. Inhalational induction puts the mother at undue risk for pulmonary complications. When these principles come into conflict, the presiding opinion is that the mother's right to make informed choices about medical care is most important. We had sufficient time for psychiatric evaluation to document her inability to exert autonomy and provide consent. The next step is for the courts to support this opinion and declare the patient incompetent to make this medical decision. However, in emergencies, our ethics and legal departments recommended that the anesthesiologist document the inability to understand consequences to self and fetus or participate in informed consent. We were advised to take appropriate measures to reduce risk and maximize benefit, including IV placement prior to rapid sequence induction. They further suggested that honoring maternal wishes or refusing care increased medico-legal risk because the patient could later argue impaired judgment if mother or baby suffered harm. We recommend early identification, initiation of the informed consent process, and involvement of specialists, especially psychiatrists and ethicists, in cases of maternal-fetal conflict. In emergencies, careful documentation and maximization of risk-benefit ratios may be the only alternative.
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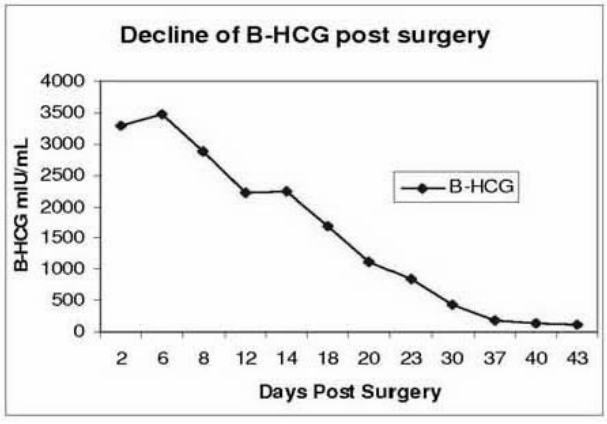
A-229.

ANESTHETIC IMPLICATIONS OF CONSERVATIVE MANAGEMENT OF PLACENTA PERCRETA

AUTHORS: C. K. Wong, I. A. Velickovic;
AFFILIATION: SUNY Downstate Medical Center, Brooklyn, NY.

Introduction: Placenta percreta is a rare and life threatening condition with mortality of about 20%[1]. Due to the danger of rapid uncontrollable bleeding, most cases of placenta percreta are performed under general anesthesia. In the past several years, some centers have adopted a new approach where the placenta is left in situ after the delivery of the baby[2]. Anesthetic management of these cases has not been described.
Case: A 34 year old female G9P3 was admitted to the department at 27 weeks of gestation for one episode of asymptomatic vaginal bleeding. MRI and ultrasound confirmed the diagnosis of placenta percreta extending into the urinary bladder. Two weeks later she was brought to the operating room emergently for NRFHT. The anesthesia team decided to proceed with combined spinal epidural anesthesia. Intrathecal bupivacaine 0.75% 1.6 ml and fentanyl 20 mcg were used. A healthy baby was delivered with APGARS of 7/8 with minimal blood loss of approximately 400 ml. The placenta was left in situ and the patient was started on metotrexate 1mg/Kg IM weekly. Bilateral uterine artery embolizations were also done. After 82 days of hospitalization, the patient was discharged with beta HCG levels down to 28 mIU/ml (fig.1) .



Discussion: Managing the placenta percreta by leaving the placenta inside the uterus and then starting chemotherapy in order to “shrink” the placental tissue is a very attractive option for obstetricians. This procedure should minimize the manipulation of the placenta and decrease the chance of excessive bleeding. With the increasing rate of Cesarean sections, we can expect more cases of abnormal placental implantation and some of these cases will have the surgical approach similar to ours. The goal of the anesthetic management is to provide for a hemodynamically stable, comfortable, normothermic, and noncoagulopathic patient. Blood bank, interventional radiology and vascular surgery should be informed and be available because even unintentional manipulation of the placenta during the case can result in uncontrolled bleeding. All necessary equipment for rapid volume replacement should be immediately available as well. Based on our experience, combined spinal-epidural anesthesia is a valuable option for Cesarean section in these patients.
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A-230.

WHAT IS THE CHOICE OF ANESTHETICS FOR EPIDURAL ANESTHESIA FOR CESAREAN SECTIONS PERFORMED SUBSEQUENTLY TO EPIDURAL ANALGESIA FOR LABOR?

AUTHORS: K. Aoyama, H. Sumikura, Y. Kondoh, Y. Suzuki, H. Sakai;
AFFILIATION: National Center for Child Health and Development, Tokyo, Japan.

Introduction: Cesarean sections may have to be performed subsequently to epidural analgesia for labor. In Japan, where 3% chloroprocaine is not available, general anesthesia is the standard choice for real emergency cases, while epidural anesthesia with 0.75% ropivacaine may generally be administered.
Methods: Clinical records of the parturients who received epidural anesthesia with 0.75% ropivacaine for cesarean sections during epidural analgesia for labor between March 2002 and October 2006 at our hospital were reviewed, and the utility of 0.75% ropivacaine was discussed.
Results: During this period 1138 parturients had epidural analgesia for labor. 102 parturients underwent cesarean sections during epidural analgesia for labor, of which 92 received epidural anesthesia with 0.75% ropivacaine. The mean dose of 0.75% ropivacaine is 17 ml. The mean time taken to obtain effective sensory block and have cesarean sections begin was 33.3 and 41.8 minutes respectively. 10 parturients required additional analgesics. There were no complications.
Discussion: Epidural anesthesia with 0.75% ropivacaine for cesarean sections seems to be effective. However, 0.75% ropivacaine may not be indicated for real emergency cases as it takes too long to obtain effective sensory block. There is a case report[1)] that 20 ml of 1% ropivacaine induced cardiac arrest during epidural anesthesia for cesarean section. Although there were no complications in our case series, the dose of 0.75% ropivacaine we used may not necessarily have been safe enough. In conclusion, 0.75% ropivacaine can be used for cesarean sections performed subsequently to epidural analgesia during labor. However, considering the cardiac toxicity, lower concentrations such as 0.5% may have to be considered. Besides, 3% chloroprocaine should be available in Japan for emergent cesarean sections.
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A-231.

SUCCESSFUL USE OF A COMBINED SPINAL EPIDURAL FOR CESAREAN SECTION IN A PARTURIENT WITH PARSONAGE-TURNER SYNDROME

AUTHORS: M. S. Hogan, P. Craigo;
AFFILIATION: Mayo Graduate School of Medicine, Rochester, MN.

Introduction: We describe regional anesthesia for cesarean birth in a woman with hemi-diaphragmatic paralysis secondary to Parsonage-Turner syndrome (PTS).
Case Report: A G2P1 woman presented at 37-6/7 weeks gestation for elective repeat cesarean delivery. Her medical history was significant for type 1 diabetes mellitus and PTS. Right arm pain, and moderate shortness of breath when recumbent or exercising were noted 21 months earlier. Chest x-ray revealed elevation of the right hemidiaphragm and PTS was diagnosed.
The patient strongly preferred a regional technique after full discussion of involved risks. She received 30 mls of Bicitra by mouth and one liter of intravenous Ringer's lactate solution . An 18 gauge Weiss needle was inserted and the epidural space identified by loss of resistance to saline. A 27 gauge Whitacre needle was inserted through the epidural needle until free flow of CSF occurred. 1.6 mls (12 mg) of isobaric 0.75% bupivacaine with 20 mcg of fentanyl and 0.1 mg of morphine was injected intrathecally. A catheter was then threaded into the epidural space. She was placed in head-up tilt and left uterine displacement. The surgical team agreed to ask for flat positioning only when absolutely required. A low transverse cesarean section resulted in a healthy 4.5 kilogram baby girl. Apgar scores were nine and nine at one and five minutes respectively. The rest of the procedure was unremarkable and she was discharged to the nursing floor 3 hours later.
Conclusion: PTS (or brachial neuritis) is an uncommon cause of respiratory compromise. It causes arm/shoulder pain with ipsilateral hemidiaphragmatic paralysis. In normal term pregnancy, the functional residual capacity (FRC) is decreased approximately 20[MSOffice1] %. For a patient intolerant of the supine position preoperatively, the additional 20% loss of FRC associated with a T-4 anesthetic level and the supine position would be expected to result in intolerable dyspnea. The single case report in the anesthesia literature describes general anesthesia for cesarean delivery in a 22 year old with PTS and worsening pregnancy-induced hypertension. Of note, significant hypoxemia upon induction and emergence was reported. The authors concluded that general anesthesia is superior to regional anesthesia for such patients. Our successful use of a CSE was facilitated by a motivated patient with a good airway exam, a cooperative surgical team, and maintenance of head-up tilt. Use of an isobaric solution permitted head-up positioning without affecting the height of the spinal block. These factors allowed us to avoid the decreases in FRC associated with both a supine position and induction of general anesthesia. We have described successful use of a neuraxial technique for cesarean birth in a patient with PTS. Each patient presents unique challenges, and the choice of anesthetic technique must be individualized.

A-232.

ANAPHYLACTIC SHOCK IN A PARTURIENT UNDERGOING A C-SECTION PROMPTS A LATEX FREE LABOR AND DELIVERY UNIT

AUTHORS: J. S. Winas, E. S. Elia, S. Huffnagle;
AFFILIATION: Thomas Jefferson University Hospital, Philadelphia, PA.

Introduction: In 1989, 0.5% of reported cases of intraoperative anaphylactic shock were the result of latex allergy. In 2003, that number increased to 16.7% (1). Today, latex allergy continues to be an important medical problem for health care workers and their patients. The prevalence in the general population ranges from 1 to 6.7% (2). We present a case of anaphylactic shock which prompted a latex free labor and delivery unit.
Case: A 26 year old G3P2002 female presented at 39 3/7weeks gestation for a repeat cesarean section. The patient denied any significant past medical history and reported no known medication, food or latex allergies. The anesthetic plan included placement of a CSE. Approximately 20 minutes into the surgery, the patient developed dysphonia. She then became hypotensive and tachycardic which was refractory to fluid boluses, ephedrine, and phenylephrine. Her blood pressure responded to intermittent boluses of epinephrine. She also developed periorbital edema, bilateral edema of the hands, and complained of intense generalized pruritis. We suspected an allergic reaction. Thus, all latex containing products were removed from the field. The patient was given 100% oxygen by mask, diphenhydramine, famotidine, and hydrocortisone. An arterial catheter was inserted, and an epinephrine infusion was started at 0.01mcg/kg/min. After 30 minutes, her vital signs stabilized. She had an uneventful postoperative recovery. The diagnosis of latex anaphylaxis was confirmed with a RAST test.
Discussion: Latex has been implicated as the inciting factor in at least 10% of the anaphylactic reactions reported under anesthesia (3). Latex allergy is currently a well-defined condition with established diagnostic criteria and rational treatment and prevention strategies. However, despite an expanding fund of knowledge on latex allergy, avoidance of latex containing products remains the only effective treatment. (4). The anesthesia circuits at our facility have been latex free for over a year, but surgeon preference for latex containing gloves continues. After examining this case and focusing on efforts to maximize patient safety, the labor and delivery suites have been converted to a completely latex free department including latex free foleys and sterile gloves. The Quality Assurance Commitee is also looking into making the entire hospital a latex free environment.
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POSTER CASE REPORTS AND RESIDENT 2

A-233.

SLIPPERY WHEN WET: IATROGENIC PSEUDO-MENINGOCELE COMPLICATING PLACEMENT OF A LUMBAR EPIDURAL FOR LABOR ANALGESIA IN A PARTURIENT WITH HARRINGTON RODS

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Introduction: Regional analgesia for patients who have had Harrington rods placed for surgical correction of idiopathic scoliosis presents several challenges[1]. An uncommon, but well described complication of spinal surgery is the formation of an iatrogenic pseudomeningocele[2]. This complication has never been described in the anesthesia literature.
Case: A 35 year-old G1P0 was admitted for labor induction at 39 weeks. She had undergone surgical correction of severe idiopathic scoliosis with Harrington rod placement and spinal fusion at age sixteen. At the L5-S1 interspace, a 17G Tuohy needle was advanced to 4.5cm where there was a loss of resistance to saline without the preceding sensation of firm ligamentum flavum. The syringe immediately filled with clear but slightly cloudy and blood-tinged fluid. An epidural catheter was passed and fluid was aspirated. However, after administering two separate doses of 2.5mg bupivicaine and 15 mcg fentanyl 10 minutes apart, the patient reported no pain relief. Hyperbaric bupivacaine (5 mg) was administered via the catheter also with no effect. The anesthesiologist, considering he had encountered a cyst-like structure, suggested another attempt to purposefully traverse the cyst. At 4.5 cm depth, the same fluid was encountered. The Tuohy (with stylet) was advanced to 5.5 cm where a pronounced resistance was perceived. The LOR syringe was replaced, and at 7 cm firm resistance typical of ligamentum flavum was encountered. An obvious loss of resistance to saline was obtained at 7.5 cm. Free-flowing, clear CSF was then obtained via a 27G Whitacre needle advanced through the Tuohy. 2.5 mg bupivacaine and 15 mcg fentanyl was injected. Within 2 minutes the patient had significant analgesia. The epidural catheter was advanced easily into the epidural space and functioned effectively for 5 hours of labor and subsequent cesarean section. She did not develop any complications and was discharged on day #4 post-partum.
Discussion: Spinal pseudomeningoceles are extradural cyst-like collections of CSF. Most iatrogenic pseudomeningoceles occur from inadvertent tears in the dural-arachnoid layer following spine surgery[3]. Published reports suggest the incidence of iatrogenic pseudo-meningoceles following operations involving laminectomy/discectomy is 0.07% to 2%[4]. We believe this entity was encountered in the above case. There are several aspects of our management worth considering:
1.Incremental "intrathecal" dosing helped establish the non-subarachnoid location of the catheter
2.Pseudomeningoceles may communicate with the subarachnoid space[3] therefore monitoring for delayed effects is critical.
3.Although we did not utilize ultrasound, it could aid in detecting a fluid collection.
4.Diagnosis is best confirmed with imaging studies[2]. MRI imaging in this patient was recommended by the senior orthopedic spine surgeon at our institution.

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A-234.

UNUSUAL CATHETER LOCATION FOLLOWING COMBINED SPINAL-EPIDURAL

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INTRODUCTION: Over the past 20 years CSE anesthesia was used in less than 10% of all labor and cesarean deliveries. [1] Complications such as knotting and difficult catheter removal are reported occasionally in the literature, but common methods of patient flexion, extension, lateral rotation, and/or placing the skin under tension, usually result in successful catheter removal. [2] We present a case where these techniques did not initially succeed and led to interesting findings regarding the location of the "stuck" catheter.
Case: A 28 y/o parturient (200 lbs, 60 in) was scheduled for repeat C-section under CSE. In the seated position the epidural space at L3/L4 was accessed at 7 cm using a 17g Touhy needle with LOR to air. Dural puncture yielded no CSF. The epidural catheter was threaded to 11cm at skin. Spinal anesthesia was then performed separately at L4/L5. Upon case completion, attempted removal of the epidural catheter met with significant resistance at 9 cm. Flexion, extension, lateral rotation, and skin tension did not help on repeated attempts several hours following delivery. After initial CT evaluation, 0.45 ml of Omnipaque dye was injected. On follow up CT, the catheter was noted to enter the left lateral epidural space at L3/L4, ascend the left epidural space one level, cross anterior to the spinal cord at L3, ascend the right lateral epidural space, and terminate at right L2 neuroforamen. Recognizing the unique catheter course the patient position was optimized for a repeat attempt at catheter removal. Under steady tension and with forward flexion plus right lateral rotation of the patient, an intact catheter was then successfully removed without subsequent neurological deficits despite previously encircling the spinal canal.
Discussion: While malpositioned catheters are often assumed to reside in the posterior or lateral epidural spaces, exit the neuroforamen, or become knotted subcutaneously, no prior reports of catheters crossing and lodging in the anterior epidural space have been reported. We hypothesis that placement of additional SAB at additional level may assist in malpositioning of catheter. Critical to our success in defining the entire catheter course was the injection of the exact catheter volume of radio-opaque dye to avoid obliterating anatomy with excess dye injection and extravasations. The following technique for catheter assessment and removal following unsuccessful initial attempts is suggested:
1. Obtain initial CT images to assess prior physical abnormalities.
2. Ensure early catheter patency with injection of preservative free saline to facilitate subsequent dye injection.
3. Inject the exact catheter volume of dye for complete catheter imaging.
4. With defined anatomical location, repeat optimal positioning to loosen anatomical binding.
4. Consider injection of 10cc normal saline to open potential spaces.
5. If unsuccessful, proceed to surgical consultation if necessary.

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POSTER CASE REPORTS AND RESIDENT 2

A-235.

CESAREAN SECTION IN A PATIENT WITH PORTAL HYPERTENSION, MASSIVE SPLENOMEGALY, AND THROMBOCYTOPENIA SECONDARY TO SCHISTOSOMIASIS

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Introduction: We present a case of a parturient with portal hypertension, massive splenomegaly, thrombocytopenia, and esophageal varices, secondary to schistosomiasis.
Case: The patient is a 26-year-old woman scheduled for cesarean section for breech presentation. She has a history of schistosomiases leading to portal hypertension, massive splenomegaly (29 cm)(graphic 1), thrombocytopenia (32,000-52,000), and esophageal varices (three sites banded in the prior month). She was evaluated the day prior to her surgery and admitted overnight for pre-operative optimization including a platelet transfusion. The anesthetic plan included preoperative laboratory evaluation of coagulation and liver functions, hepatitis panel, parasitology, and CBC, as well as abdominal doppler and ultrasound exams in preparation for general anesthesia. Bilateral 16-gauge intravenous catheters and an arterial line were inserted, a level-one rapid transfusor was primed, and four units of cross-matched blood, platelets, and fresh frozen plasma were available in the operating room in anticipation of massive hemorrhage. Standard ASA monitors, arterial blood pressure monitor, and bi-spectral monitor were applied. Left uterine displacement was established and maintained throughout the procedure. After preoxygenation, general anesthesia was induced with etomidate and succinylcholine in a rapid sequence fashion utilizing cricoid pressure. Isoflurane and nitrous oxide were used to maintain anesthesia. Fentanyl was administered for intraoperative analgesia. The patient remained hemodynamically stable throughout the procedure and the estimated blood loss was only 850 mL. The patient's recovery was uneventful.

Discussion: After extensive literature review, we found no reported cases of a patient undergoing a cesarean section with this constellation of complications from schistosomiasis. While schistosomiasis causing portal hypertension in the United States is uncommon, the goals in managing her perioperative course are the same as managing most forms of hepatic dysfunction and portal hypertension.[1] Anesthetic choices must be guided by careful consideration of potential complications including impaired hepatic metabolism of common anesthetic agents such as amide local anesthetics and morphine. Hemorrhage from coagulopathy is also a grave concern, especially when combined with thrombocytopenia. Intraoperative goals include maintaining hepatic blood flow and oxygen delivery to the fetus whole avoiding hypertension, cough, or straining which could cause variceal rupture and subsequent hemorrhage, carrying a high mortality rate.[2]
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A-236.

THROMBOELASTOGRAPH MAY DIFFERENTIATE BETWEEN HEPARIN EFFECT AND ANTIPHOSPHOLIPID SYNDROME IN THE ANTICOAGULATED PARTURIENT

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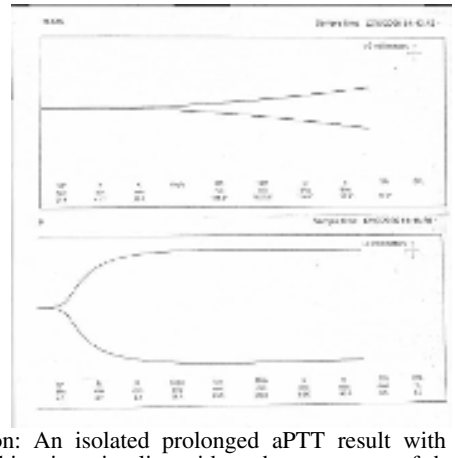
Introduction: Prolonged aPTT can be due to heparin effect[1] or anticoagulant factor[2]. We describe the anesthetic management of a patient with protein S deficiency and triplet intrauterine pregnancy suspected of having antiphospholipid syndrome (APS). Thromboelastograph (TEG (R)) with and without protamine was used to differentiate between heparin effect and APS.
Case: A 35-yr-old, gravida 4 para 0-0-3-0, with a history of protein S deficiency presented to the labor floor at 33 5/7th weeks gestation for preterm premature rupture of membranes. The diagnosis of protein S deficiency was established after work-up for three prior miscarriages. The patient received subcutaneous unfractionated heparin 10,000 units every 12 hours. Routine labs were ordered including coagulation tests. Prothrombin time and INR were normal. The aPTT results were 81, 76, 61, 41, 46 seconds at 8, 12, 24, 36, 60 hours after the last heparin dose, respectively. The TEG (R time of 41.7 min) showed improvement with protamine (R time of 6.7 min) 42 hours, and a normal profile 60 hours after the last dose of heparin (see figure). The patient underwent a cesarean section with general anesthesia with an uncomplicated delivery and postoperative period. Further work-up revealed anticardiolipin antibodies level was not high enough to diagnose APS.



Discussion: An isolated prolonged aPTT result with a normal prothrombin time implies either the presence of heparin, an inhibitor (such as in APS), or a factor deficiency in the intrinsic system. The Thromboelastograph was found to be a more sensitive device for detection of response to heparin than aPTT[3]. A normal TEG, after adding protamine, differentiates between heparin effects and APS. We concluded that general anesthesia was a safer alternative for this patient, because the TEG parameters at which it is safe to provide neuraxial anesthesia have not been established. The TEG can be used to differentiate APS from heparin effect given prolongation of aPTT.
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POSTER CASE REPORTS AND RESIDENT 2

A-237.

MANAGEMENT OF THE PARTURIENT WITH UNCORRECTED TETRALOGY OF FALLOT

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Introduction**:** Women with congenital heart defects (CHD) survive into childbearing age given advancements in pediatric cardiology and cardiac surgery. Many of these women choose to become pregnant, despite the risks associated with the hemodynamic changes of pregnancy. The most common cyanotic CHD is Tetralogy of Fallot (TOF) representing 6% of CHD lesions.[1] Significant pregnancy-related morbidity and mortality are low in women with corrected TOF;[2] however uncorrected or palliated lesions pose significant risk to mother and fetus.

Case**:** A 26-yr-old, nulliparous female with uncorrected TOF presented at 27.6 weeks gestation with room air oxygen saturation (SpO2)=82%, decreased from baseline SpO2=86%. Other history included pulmonary atresia, pneumonectomy, scoliosis, transient ischemic attacks and low posterior placenta. Medications included digoxin and aspirin. Echocardiogram showed 40% ejection fraction, depressed LV contractility, severe RV hypertrophy, large VSD, atretic right ventricular outflow tract, and patent Waterston shunt. Obstetric goals included planned induction and low outlet forceps at 32-34 weeks. At 29.6 weeks, fetal ultrasound demonstrated severe intrauterine growth restriction and the patient began to experience profound hypoxemia (SpO2 = 70%) with minimal exertion, necessitating induction of labor. Arterial and central venous pressures were monitored. Packed red cells, nitric oxide and transesophageal echocardiogram (TEE) were immediately available. An intrathecal catheter was placed for careful titration of regional analgesia/anesthesia. Shortly thereafter, significant vaginal bleeding occurred and cesarean delivery became necessary. General anesthesia (GA) was initiated in anticipation of further hemodynamic compromise from hemorrhage. Rapid sequence induction (etomidate/ succinylcholine) was conducted. Three minutes following incision, an 870 gram infant was delivered (Apgars 3 and 4). Anesthesia maintenance included 0.5 MAC Sevoflurane in 50% oxygen, midazolam and remifentanil infusion. Estimated blood loss was 1.5 liters. The patient was extubated without difficulty and had an uneventful recovery. She was discharged on postoperative day 8 at baseline status.

Discussion**:** Anesthetic management in the cyanotic CHD parturient depends on the specific lesion and its surgical correction. The primary goals, maintaining systemic vascular resistance (SVR) and avoiding increased pulmonary vascular resistance, can be achieved with regional and/or GA. Advantages of regional anesthesia include the ability to provide analgesia for vaginal delivery and avoidance of airway manipulation in the parturient. Decreased sympathetic stimulation potentially decreases cardiac oxygen consumption, although it may decrease SVR. Advantages of GA include avoidance of sympathectomy, ability to more precisely administer nitric oxide in the event of pulmonary hypertension and easier TEE examination. The number of parturients with CHD is increasing; however uncorrected TOF remains an uncommon occurrence. This case illustrates the unpredictable peripartum course for the parturient with CHD and that despite meticulous planning, the anesthesiologist must be prepared for all contingencies.

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A-238.

IS A 115 MMHG PEAK GRADIENT ACROSS A PROSTHETIC AORTIC VALVE IN AN ANTICOAGULATED PATIENT A CONTRAINDICATION TO REGIONAL ANESTHESIA FOR CEASAREAN SECTION?

AUTHORS: G. D'souza, E. Elia, J. Huffnagle;
AFFILIATION: Thomas Jefferson University, Philadelphia, PA.

Introduction: In a pregnant patient with a prosthetic aortic valve, hemodynamics may be altered due to the hyperdynamic circulation. We present the case of a patient who had a cesarean section (CS) under regional anesthesia with a prosthetic aortic valve having a peak gradient of 115 mmHg.

ACC/AHA guidelines for anticoagulation in pregnant women with mechanical valve prostheses were followed[1]. After delivery the patient had a post dural puncture headache (PDPH) while being anticoagulated. We withheld anticoagulation to perform the Epidural blood patch (EBP).

Case: A 35 old G2, P1 female underwent CS. Her past medical history was significant for a previous CS and a congenital bicuspid aortic valve which required a mechanical (St. Jude 19 mm) Aortic Valve replacement and graft 8 years ago after aortic root dissection. Serial echocardiographies showed peak (mean) gradients of 62 (30), 81 (53) and 115 (68) mmHg at first, second and third trimesters respectively with normal left ventricular and aortic valve function. Coumadin was held for 5 days before the scheduled CS. Spinal anesthesia was achieved with a spinal catheter, placed after an accidental dural puncture. Coumadin was resumed 24 hours after uneventful surgery and postoperative recovery. On postoperative day #3, the patient complained of a mild positional headache and conservative therapy was started. On day # 5, her headache was debilitating. An EBP was performed after discontinuing coumadin, with complete resolution of her headache.

Discussion: A normal prosthetic St Jude's 19 mmHg aortic valve has a peak (mean) gradient of 29±10 (16±6) mmHg respectively. The mean effective orifice area is 1.7 sq. cm ^{2}.

The mean aortic gradient is dependent on the valve area and the cardiac output according to modified Gorlin's formula[3].

The gradient is elevated in this patient with a normal aortic valve area due to the hyperdynamic circulation during pregnancy. This was our rationale for using regional anesthesia. Although the peripartum period is a hypercoagulable state, the high cardiac output and increased blood flow across the mechanical valve decreases the likelihood of her developing a thrombus. The EBP was performed after withholding coumadin.

We suggest that titrated neuraxial anesthesia is safe to perform in a high gradient normal aortic valve when due to hyperdynamic circulation. An EBP may be a reasonable option for PDPH in a patient with a prosthetic aortic valve and high cardiac output.

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POSTER CASE REPORTS AND RESIDENT 2

A-239.

A CLINICAL CHALLENGE: MANAGEMENT OF A PARTURIENT WITH GLANZMAN'S SYNDROME FOR C-SECTION

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Introduction: Inherited deficiencies of platelet surface glycoproteins(GP) can result in severe bleeding and in parturients undergoing C-Section, this can offer a real challenge. Glanzmann thrombasthenia is an autosomal recessive disorder in which platelet glycoprotein IIb/IIIa is either absent or dysfunctional. We report a parturient with this disorder undergoing C-Section.
Case Report: 26 year old female, G1P0, at 40 weeks gestational age is admitted to L&D for induction of labor. She has a family history of bleeding disorder and both she and her sister have been diagnosed to have Glanzmann's thrombasthenia. Her sister had required multiple red blood cell and platelet transfusions in the past. Her clinical history was significant for frequent episodes of gum bleeding, excessive menstrual bleeding and profuse bleeding after minor cuts. She also had history of iron deficiency anemia and and has had transfusions of intravenous iron several times in the past. There was no history of echymosis or petechiae. She is currently on iron and vitamin supplementation. On the day of her admission, her hematocrit is 26.6 and platelet count is 95,000. Hematologist advised that the patient should be transfused with HLA type specific single donor platelets and recombinant Factor VIIa (rFVIIa) available in case she developed intractable bleeding despite platelet transfusion. Patient was unresponsive to induction and elective C-section was scheduled the following morning. Patient received a single donor HLA specifc platelet transfusion the night before and a second unit immediately before the surgery. Two large bore peripheral IVs and an arterial line were placed. General endotracheal anesthesia was induced with Propofol and succinylcholine. Surgery was uneventful. Intraoperatively, patient had about 1200ml of blood loss. Post-operatively patient's heamtocrit decreased to 22 and required multiple packed red blood cell transfusions.
Discussion: Glanzmann's thrombasthenia is an autosomal recessive disorder in which GPIIb/IIIa is defective and platelets can not aggregate and no blood clot is formed. Two forms have been described: Type 1 (Severe) and Type 2 (mild). Our patient is in the belongs Type 1 category. Anesthetic considerations are to avoid central neuraxial blocks and anticipate the need for platelet transfusion. Platelet transfusion needs to be restricted to serious bleeding because of the risk of development of platelet antibodies.
Role of recombinant Factor VIIa in hemostasis: The mechanism of action of rFVIIa is presumed to be binding to the surface of activated platelets and directly activating Factor X thus, bypassing the early steps of the coagulation cascade. It has proven to be safe and efficient for patients with Glanzmann's thromboesthenia. The use of rFVIIa is reserved for refractory hemorrhage despite blood product administration. Although it is expensive, it is cost effective compared with the combined cost of large amount of blood products.

Reference:

Blood: 94: 3951-3953, 1999

A-240.

SPINAL ANESTHESIA FOR CESAREAN SECTION IN A PATIENT WITH SPONDYLOEPIPHYSEAL DYSPLASIA CONGENITA

AUTHORS: G. A. Lozada, R. Schumann, V. Steinbok;
AFFILIATION: Tufts-New England Medical Center, Boston, MA.

Introduction: Spondyloepiphyseal dysplasia congenita (SDC) is a rare form of dwarfism. Its incidence may be 1-2 per million live births[1]. Anesthetic and obstetric management of patients with SDC for labor and delivery can be challenging due to their dysmorphic and disproportional anatomic features, often affecting the airway as well as the vertebral column. Spinal anesthesia for cesarean section (CS) is controversial in patients with dwarfism and has not been described in patients with SDC. We report a case of subarachnoid anesthesia for elective CS in a patient with this condition.
Case Report: A 40-year-old woman, 49.5 kg, 3'11", G1P0, presented at 39 weeks gestation for elective CS secondary to cephalo-pelvic disproportion. She had SDC and a history of GERD. Physical exam revealed disproportionate dwarfism, a Class II Mallampati airway, and mild lumbar lordosis. Except for some flattening in the height of the thoracic and lumbar vertebrae, radiologic lumbar spine imaging was completely normal. Bupivacaine 6.75 mg with dextrose and morphine 200 mcg were injected intrathecally at the L3-4 interspace, resulting in a T6 sensory level. Ephedrine 10 mg and 900 cc of Ringers Lactate, IV, were administered during the case, and the patient remained hemodynamically stable. A healthy neonate was delivered uneventfully, with Apgar scores of 8 and 9 respectively. The patient reported excellent pain control in the PACU. Her postoperative course was unremarkable and she was discharged on POD#3.
Discussion: SDC is different from other, more frequent forms of dwarfism, such as achondroplasia and osteogenesis imperfecta. Important anesthetic implications of SDC include possible atlantoaxial instability from odontoid hypoplasia, kyphoscoliosis, laryngotracheal stenosis, and platyspondyly.[1, 3-5] In contrast to other variants of dwarfism, in this patient with SDC the preoperative radiologic and orthopedic lumbar spine evaluation revealed mild lordosis and insignificant vertebral body flattening but no other anatomic abnormality. Based on these results, we determined that our patient was an appropriate candidate for single dose spinal anesthesia. Following accepted height adjusted dosage guidelines[2], a successful subarachnoid block for her elective CS was administered with an excellent outcome. In the presence of a preoperative evaluation confirming normal lumbar spine anatomy, patients with SDC should not be precluded from the benefits of spinal anesthesia for elective or urgent cesarean section.

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POSTER CASE REPORTS AND RESIDENT 2

A-241.

ANESTHETIC MANAGEMENT OF A PARTURIENT WITH CYSTIC FIBROSIS

AUTHORS: J. Sadler, B. Kaul, M. C. Vallejo, J. Waters;
AFFILIATION: Magee Women's Hospital & Univ. of Pittsburgh, Pittsburgh, PA.

Introduction: Cystic Fibrosis (CF) is an autosomal recessive disease with an incidence of 1:3419 among Caucasian Americans(**1**) with females 60% more likely to die than males(**2**) and a maternal mortality of up to 7.7% within 6 months of delivery(**3**). We present a parturient with CF and multiple co-morbidities.
Report: A 32-year-old G1P0 female at 39 weeks gestation with CF, gestational diabetes mellitus and difficult IV access presented in active labor for labor analgesia. Evaluation revealed moderately severe tracheal stenosis below the cricoid cartilage from previous tracheostomy, an IgG deficiency requiring replacement i.v. IgG (IVIG), chronic steroid dependence, osteoporosis with thoracic compression fractures, gestational diabetes mellitus, bronchiectasis, chronic atrophic pancreatitis requiring a fentanyl patch, a class III airway with poorly demarcated spinal anatomy, and occasional rhonchi. Her echocardiogram was normal and pulmonary function testing revealed small airway disease. IVIG was administered during labor. An epidural was placed at the L2-3 level and good labor analgesia was obtained with ropivacaine 0.1% with fentanyl 0.002%. She failed to make progress with labor and a decision was made for Cesarean delivery. The epidural was dosed incrementally with 2% lidocaine with epinephrine 1:200,000 achieving a sensory level of T6. Both the anesthetic and surgery were uneventful and an infant with Apgars of 8 and 9. Epidural preservative-free morphine was used for post-operative pain control.
Discussion: In the parturient, CF presents several potential problems including decreased pulmonary reserve, chronic hypoxemia, chronic pulmonary infections, diabetes mellitus, and kyphoscoliosis. Best predictor of maternal outcome is an FEV1≥ 60% (**4**). Our patient also had a difficult airway with tracheomalacia, difficult intravenous access, chronic opioid use and IgG immunodeficiency with susceptibility to respiratory infections (RI). Her osteoporosis and vertebral fractures of the thoracic spine could have presented a challenge for regional anesthesia but a general anesthetic would have required an awake fiberoptic intubation and would have been a potential source of introducing RI. In our patient the lumbar spine was spared and regional anesthesia was placed without any complication. Finally, the patient's chronic fentanyl use potentially could present a problem both with fetal depression as well as intra-and post-operative pain control. A regional anesthetic avoided airway/ respiratory complications and also spared the use of intra-operative parenteral narcotics allowing the delivery of a healthy infant as well as good maternal postoperative pain control in the parturient without risking respiratory depression.
Conclusion: This patient had multiple co-morbidities, which complicated both her pregnancy and her anesthetic management. Anesthetic considerations in and obstetric patient with multiple medical co-morbidities are discussed and that epidural anesthesia in this case was the anesthetic modality of choice.
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A-242.

VAGINAL DELIVERY COMPLICATED BY SEVERE HEMORRHAGE REQUIRING RECOMBINANT FACTOR VIIA AND PULMONARY HYPERTENSION NECESSITATING A RIGHT VENTRICULAR ASSIST DEVICE

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We report a case of presumed amniotic fluid embolism (AFE) following a forcep assisted vaginal delivery complicated by DIC requiring Recombinant Factor VIIa, and pulmonary hypertension (PUL HTN) requiring a right ventricular assist device (RVAD).
Case Report: A 43-year-old woman, gravida 3, para 2 presented to the labor and delivery floor, at 39 weeks gestational age in labor. Labor was uncomplicated and the patient delivered a healthy female via a forcep assisted vaginal delivery. Massive hemorrhage ensued. Oxytocin and methylergonovine were administered, and the patient was taken to the OR for exploration and possible emergency hysterectomy. General anesthesia was induced and the airway was secured without difficulty. Two large bore IV lines and an arterial line were placed. Significant hemorrhage and oozing were noted at the operative and catheter sites leading to a clinical suspicion of DIC. A hysterectomy was performed during which the patient received 14 L crystalloid, 500 mL colloid, 16 units packed red blood cells,10 units fresh frozen plasma, 4 units cryoprecipitate and 12 units platelets. Coagulopathy persisted and the pelvis was packed with lap pads and taken to the ICU. While in the OR the patient was hemodynamically stable (MAP>80) although she required replacement therapy. Also, there was no problem with either oxygenation or ventilation (pH = 7.38, pCO2 =34, pO2 =340 on 1.0 FiO2). In the SICU significant bloody output was noted from the abdominal drains and her BP decreased requiring pressor agents. She was taken back to the OR for an exploratory laparotomy. Recombinant Factor VIIa, 6300 mcg was given at this time. During the procedure, difficulty with oxygenation developed (pO2=35). An intra-operative transesophageal echocardiogram (TEE) revealed massive dilation of the pulmonary vasculature, a poorly filled left ventricle and acute right ventricular failure. By the end of the surgery, bleeding was better controlled but the patient was hemodynamically unstable and required an infusion of milrinone, vasopressin and epinephrine to maintain a systolic BP of 65. The patient was taken back to the ICU where a TEE revealed RV failure and PUL HTN, and her pO2 decreased further. The patient was started on NO and taken back to the OR for placement of RVAD. Over the next few days her BP stabilized and hemodynamics improved. She was eventually weaned off the NO, the RVAD was removed, and she recovered without sequela.
Discussion: AFE is a rare and often fatal syndrome. Whereas PUL HTN has been reported with AFE it is usually short lived. The use of Recombinant Factor VIIa in this patient may have been life saving, but may have precipitated or exacerbated PUL HTN. This case also highlights the successful use of an RVAD for RV failure in the parturient.

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A-243.

MANAGEMENT OF A TERAPLEGIC WOMAN CHOOSING TO DELIVER VAGINALLY: CHALLENGES AND SURPRISES

AUTHORS: N. Mariotti, Y. Villiger, C. Kern, R. Landau;
AFFILIATION: University Hospital of Geneva, Geneva, Switzerland.

Introduction: Autonomic hyperreflexia (AH) is a common life-threatening complication of spinal cord injury above T6, resulting in uncontrolled reflex sympathetic activity in response to stimuli below the level of the lesion. We describe the obstetric and anesthetic management of a vaginal delivery in a tetraplegic nulliparous woman

Case Report: A 35 yo woman (72 kgs/173 cm) with a C5 tetraplegia after an accident in 2004 causing a fracture and dislocation of C5-C6 requiring surgery, with AH, a neurogenic bladder and diffuse neuropathic pain was admitted at the antenatal clinic. It was decided to schedule an induction of labor with an instrumental vaginal delivery at term. Medication during pregnancy included aspirin and etilephrin (BP was in the 80's/50 mmHg). At admission for delivery at 38 wks, an invasive BP monitoring (right radial arterial line) and an epidural catheter at L3-L4 were placed. Analgesia was initiated with a PCEA of bupivacaine (Bup) 0.0625% and fentanyl 2µg/ml (10ml/h, 5ml bolus, lock-out 15'). Shortly after a 1st epidural bolus, vaginal examination caused a transient rise of BP to 144/88 mmHg with substantial discomfort. An additional bolus of Bup 0.125% 5ml improved the patients' comfort, and induction of labour with misoprostol was started. Due to diffuse pain despite the PCEA infusion, an epidural bolus of 75µg clonidine was further given with a good response on the neuropathic pain. After 9 doses of misoprotol over 18h, oxytocin finally resulted in the onset of active labor, without painful contractions, discomfort or AH. Cervix was fully dilated after 2h of oxytocin, and a 4ml Bup 0.125% & 75µg fentanyl top-up was given for an uneventful forceps delivery of a healthy baby (2700g). The patient was kept in the PACU with continuous PCEA analgesia for an additional 24h. The catheter was sent for cultures upon retrieval (because it hat been inserted >72h). On post-partum day (PPD) 6, the patient had rigors and chills at 40^{0}C with no other signs other than a headache. Despite numerous blood and urine cultures, no pathogen germ was identified, and antibiotics were started empirically (gentamycine-amoxycillin). A head and thoraco-abdominal CT ruled-out all obvious sources of infection, except for a small left pulmonary consolidation. Antibiotics were stopped on PPD 9 with no recurrence of fever and the patient was discharged on PPD 11.

Discussion: In this case of an instrumented vaginal delivery in a tetraplegic nullipara, AH was effectively prevented by a PCEA of bupivacaine-fentanyl along with one bolus of clonidine. Post-partum hyperthermia occurring 6 days post-partum was most likely of central origin in association with AH triggered by the pulmonary process.

A-244.

ANESTHETIC MANAGEMENT OF CESAREAN SECTION IN A PARTURIENT WITH MARFAN'S SYNDROME AND CRITICAL AORTIC DILATION

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Introduction: Parturients with Marfan's syndrome (MFS) have a mortality of ~1%(1) associated with aortic dissection. We present a parturient with MFS critical aortic dilation who was scheduled for a Cesarean Section (C/S).

Case: A 27-year-old female, G2P1, with history of MFS, Marfanoid appearance (height 6'1", weight 80kg, arachnodactyly) and 4.8 cm dilated ascending aorta, presented for repeat C/S at 36 weeks gestation. Preoperative medications included Metoprolol. Multidisciplinary antenatal evaluation led to a consensus for elective C/S. In OR, invasive monitoring was aborted after failed attempts resulted in patient distress. An epidural catheter at L_3-L_4 failed to produce a block after 15ml of 2% lidocaine with epinephrine. Subarachnoid block (SAB) at L_3-L_4 with 12mg bupivacaine produced a bilateral T_4 sensory block and ≤15% decrease in systolic blood pressure. Ten minutes after incision, the patient complained of surgical pain. GA was induced and the patient remained hemodynamically stable until after the infant's delivery following which she had a sudden tachycardia (to 120s), which was treated with 5mg IV Labetalol. HR decreased to 80s and BP dropped from 135/50 to 70/28. BP normalized with phenylephrine+Albumin and maintained with norepinephrine infusion. At the C/S conclusion, patient extubated and transferred to the ICU. CT thorax revealed small pulmonary emboli in RUL lung and no evidence of aortic dissection. Her hospital course was complicated by PDPH on POD#1, bladder flap repair on POD#4, and anemia requiring blood transfusion. Two weeks after discharge she presented with chest pain, requiring aortic dissection repair.

Discussion: MFS (incidence 2-3:10,000) is an autosomal dominant connective tissue disorder. Parturients with aortic root dilation ≥4cm have the highest risk of dissection(**2**), Beta-blockers reduce rate of aortic dilation and protect against dissection. C/S advised because of a high risk of dissection in our patient during stress of labor. Anesthetic management emphasizes minimizing aortic root shear forces and wall stress and for these reasons regional anesthesia is advocated for these patients. In our patient, epidural analgesia failed. The SAB likely failed due to dural ectasia, which results in widened lumbosacral region(**3**).Differential diagnosis of cardiovascular collapse in our patient included aortic dissection, induction of GA plus partial SAB, hemorrhage (from bladder flap tear), and administration of pitocin following infant delivery. Post-operative CT scan diagnosed pulmonary embolism, which may have contributed to hemodynamic instability. Immediate treatment resulted in hemodynamic stability and time to rule out aortic dissection.

Conclusions: Parturients with Marfan's and aortic dilatation >4cm are at a high risk of aortic dissection. A multidisciplinary antenatal care with operative delivery in a center with facilities for major vascular surgery is recommended. A single shot SAB may often fail in these patients secondary to dural ectasia.

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POSTER CASE REPORTS AND RESIDENT 2

A-245.

CRITICAL CARE MANAGEMENT OF AN 18 Y.O. G1P0 WITH ACUTE EXACERBATION OF PULMONARY HEMOSIDEROSIS

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An 18 year-old woman presented at 28 weeks' gestation in respiratory distress. She developed a cough 2 days prior to admission with no fevers or hemoptysis. PMH was significant for idiopathic pulmonary hemosiderosis diagnosed at age 7. Her pregnancy was complicated by preterm labor treated with celestone and ampicillin. An exacerbation 1 week prior was treated with 80 mg prednisone daily.The patient appeared anxious and exhibited a rapid, shallow breathing pattern; she was unable to recline. Lung exam revealed decreased breath sounds and rales throughout. On room air her ABG was: 7.30/30/43 with an O2 saturation of 80%. On face mask FI02 0.4 her ABG was: 7.42/31/154. CXR revealed diffuse nodular opacities within both lungs. ECG revealed sinus tachycardia at a rate of 130bpm. An echocardiogram revealed a small pericardial effusion. An urgent cesarean section was planned.

The patient was rapidly induced in the sitting position using 150mcg fentanyl, 16mg of etomodate and 100mg succinylcholine and placed supine in left lateral uterine displacement. A 7.0 ETT was easily placed, and anesthesia was maintained using sevoflurane within 50% oxygen. A triple-lumen R IJ central line was placed. An intra-operative blood gas revealed: pH 7.31/CO2 40mmHg/ PO2 206 mmHg/ Total CO2 21meq/L/ base excess -5. A female infant was delivered by cesarean section with Apgars of 7 and 8, but required intubation. Blood loss was approximately 800cc. The patient was transferred to the ICU intubated. A postoperative CT scan of the chest revealed: diffuse bilateral consolidation with ground glass opacities consistent with underlying pulmonary hemosiderosis, but did not exclude superimposed ARDS, pulmonary hemorrhage, infection, or aspiration. Oxygenation deteriorated and despite an FIO2 of 1.0, paO2 was 89 (A-a difference of 473). Ventilation was initially by assist-control, TV 320, RR 22; an esophageal balloon was inserted to optimize PEEP. On postoperative day #3, there was no improvement in oxygenation, and the patient was moved to a rotoprone® bed for prone ventilation. In this bed, the patient was initially turned for 10 minutes to 45 degree angles to both sides, with 5 minutes in the prone position. The prone position time was increased as tolerated between supine time. PEEP was weaned gradually, to avoid de-recruitment of alveoli. By postoperative day #6, the patient's ABG on PEEP of 5 was: 7.47/121/44; RSBI was 70. She was extubated without incident, and her steroids were tapered. The etiology of her acute respiratory failure was likely from worsening pulmonary hemorrhage (from pulmonary hemosiderosis) secondary to hormonal changes of pregnancy, decreased FRC, and underlying poor lung reserve. Prone positioning ventilation can be useful in cases of severe lung impairment with heterogeneous injuries, i.e., ARDS, which are not amenable to routine ventilation techniques.

Reference:
Intensive Care Med 199;23: 1219-24

A-246.

ANESTHETIC MANAGEMENT OF A PARTURIENT WITH CEREBRAL AUTOSOMAL DOMINANT ARTERIOPATHY WITH SUBCORTICAL INFARCTS AND LEUCOENCEPHALOPATHY (CADASIL)

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Introduction: Cerebral Autosomal Dominant Arteriopathy with Subcortical Infarcts and Leucoencephalopathy (CADASIL) is a rare inherited neurological condition caused by microangiopathy.[1] It is characterized by lacunar infarcts resulting in clinical depression, dementing illness, and focal neurologic defects.[2] We report the anesthetic management of aparturient with CADASIL presenting for Cesarean delivery.

Case: A 28-yr-old nulliparous woman with a known history of CADASIL presented at 39 weeks gestation for elective Cesarean section, in labor and distressed. Her health was otherwise unremarkable except for a transient ischemic attack 4 years prior. The physical exam and blood work were normal. Following assessment by the obstetrical and anesthesia teams it was decided to proceed with spinal anesthesia for Cesarean delivery. A 16 gauge IV was started and the patient was connected to standard monitors. While sitting, the patient was administered bupivacaine10mg, fentanyl 15mcg and preservative free morphine 100mcg intrathecally. 2 litres of crystalloid were rapidly administered and phenylephrine 50mcg was given. She was positioned with left uterine displacement and slightly head up. A bilateral T5 block was obtained and surgery proceeded uneventfully. The patient remained hemodynamically stable. The infant was delivered with Apgar scores of 9 and 10. Oxytocin infusion was given after delivery. The patient did well post-operatively.

Discussion: Studies indicates that the gestational and puerperium period is a time of enhanced neurologic risk for CADASIL patients.[3] Maintenance of cerebral perfusion is paramount due to the arterial occlusive nature of the disease.[4] However, hypertension is also a risk factor in these patients as there is an age related risk of intracerebral microbleeds and intracranial hypertension. [5] We took the following precautions to maintain hemodynamic stability. Spinal anesthetic was administered in the sitting position to induce less hypotension that in the lateral position.[6]Crystalloid bolus was given as a co-load[7] and phenylephrine was given prophylactically.[8] She was positioned slightly head up to reduce the incidence of hypotension.[9] In conclusion, we report that spinal anesthesia may safely be used for elective C-section in a patient with CADASIL when particular attention is given to maintenance of cerebral perfusion pressures.

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POSTER CASE REPORTS AND RESIDENT 2

A-247.

SACRAL CYST AND NEUROLOGICAL DISORDER IMPACTS ASSOCIATED TO THE NEUROAXIAL BLOCK FOR THE CESAREAN SECTION

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The sacral cysts are very infrequent pathologies from spine, appear as a circumstantial find to a neuro-radiological exploration. The majority of the times deal without symptomatology, until Valsalva's marked maneuver is induced[1]. When it produces clinical manifestations, these unleash radicular pain, parestesias, paresias or sphincter dysfunction[2]. We report the anesthetic management of a patient with sacral cyst submitted to two cesarean section (CS) in a period of two years.

Case Report: A 36 year-old female patient, G2 P0 A1 with 37 weeks gestation was admitted for CS by premature rupture of membranes. Spinal anesthesic was performed at L3-L4 level with a 22-Gauge spinal needle. 7.5 mg bupivacaine 0.5% with 25 mcg fentanyl was administered. Bilateral block up to T6 to pinprick was achieved. An Alive male infant weighing 3150 grs was delivered with Apgar 8/9. The anesthetic and surgical courses were uneventful. On postoperative hrs 12 the patient presented severe headache that was longer postural with normal neurological test. A presumptive diagnosis of a postdural puncture headache (PDPH) was made. The patient was managed conservatively. One week after she returned with sensitivity decrease in both limbs and sphincter incontinence. Physical examination revealed sharp lower back pain exacerbated by raising the leg at 45° and sensitivity-temperature drecrease on lumbar and sacral areas. CT scanning was indicated revealed sacral cyst Type IB. All the symptoms disappear spontaneously after 10 days. After seventeen months, the patient consults with a 39 weeks gestation for CS by previous CS. A MRI reveals the persistence the sacral cyst. An epidural fractionated anesthesia is made with 400 mg Lidocaine 2%, 100 mcg fentanyl and epinephrine 1:200.000. An alive male infant weighing 3,450 grs was delivered with Apgar 8/9. The anesthetic and surgical courses were uneventful.The patient was discharged at the third day with no complications.

Discussion: Our patient was submitted to two Caesarean in a period of two years, in the first opportunity a subaracnoideal anesthesia unleashed a post dural puncture headache, accompanied of radiculars manifestations that involved L1 to S2 territories, a low intracranial pressure as possible mechanism that would modify the hydrodynamics of the lumbar and sacral spaces, would be that developed the symptomatology described for the first anesthesia. For the second event, a epidural anesthesia produced an excellent blockade without clinical post-anaesthetic manifestations, although this technique also could generate a maneuver of Valsalva accentuated, changing in a temporary way both the elasticity and resistance of the space epidural[3]; to do it in a progressive way do not develop neurological commitment.

Conclusion: The epidural fractionated anesthesia is the technique of election for the patients with sacral cyst.

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