

TITLE: EPIDURAL VERSUS SPINAL ANESTHESIA FOR ELECTIVE CESAREAN SECTION. EFFECTS ON NEONATES.

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Regional anesthesia is more efficient than general anesthesia for cesarean section (CS) with regard to neonatal outcome (1). Spinal anesthesia (SA) is superior to epidural anesthesia (EA) in terms of neonatal motor activity (2). The aim of our study was to compare these two techniques of local anesthesia on metabolic and neurologic status of the newborn. After institutional approval and informed consent 24 pregnant women were randomly assigned to receive either EA (group E n = 10) or SA (group S n = 14). EA was performed with bupivacaine 0,5 % - etidocaine 1 % ; SA with hyperbaric bupivacaine 0,5 %. Punctures were performed at L2-3 or L3-4. At delivery, umbilical venous blood samples were collected. AMIEL-TISON's neurological and adaptive capacity scores (NACS) were assessed at 2, 6 and 24 hours of age. Comparison between groups were made using the WILCOXON 2 sample test - $p < 0,05$ was considered significant. Both groups were comparable with regard to weight, blood pressure, pulse, gravida number and gestational age. Results are summarized in the table below. APGAR scores, blood gases, pH in the newborn and interval between hysterotomy and first breath were comparable in the two groups. Intervals between injection of local anesthetic and skin incision were shorter in the group S, 944s (420, 1680), versus 1918s (1290, 2460).

TABLE : mean (max - min)

	EA group (n = 10)	SA group (n = 14)	SIGNIF
Epinephrine (pg/ml)	49 (12 - 82)	70,93 (18 - 215)	NS
Norepinephrine	522,30 (180 - 1254)	701,79 (270 - 2000)	NS
Lactates (mg/l)	182,20 (127 - 253)	189,43 (155 - 293)	NS
Glycemia (g/l)	0,85 (0,45 - 1,30)	0,77 (0,45 - 0,90)	NS
NACS 2 h	33,5 (22 - 38)	33,57 (27 - 40)	NS
6 h	35,5 (31 - 39)	36,86 (30 - 40)	NS
24 h	37,4 (32 - 40)	38,29 (33 - 40)	NS

Shorter intervals between injection and skin incision were observed with SA. However, no advantage was found for the metabolic and neurologic status for SA when compared with EA.

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TITLE: CLINICAL SENSITIVITY AND SPECIFICITY OF EPIDURAL TEST DOSE IN OBSTETRICS AS A MARKER OF INTRAVASCULAR INJECTION

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INTRODUCTION: Fifteen mcg of epinephrine i.v. causes a predictable increase in heart rate (HR) in pregnant (1) volunteers. The pattern of epinephrine induced tachycardia has been shown to be very specific in male volunteers (2). However heart rate variability in laboring patients (3) may reduce the ability to detect epinephrine induced tachycardia. This single-blinded prospective study evaluates sensitivity and specificity of an epidural test dose (ETD) as a marker of intravascular injection in laboring patients. Symptoms that may be induced by intravascular injection of a ETD were also evaluated.

METHODS: After institutional approval 30 laboring patients gave informed consent. Pulse oximetry monitored maternal heart rate (MHR) continuously. A "dry" epidural catheter was placed with the patient in sitting position. By sequential randomization 15 laboring patients entered the study group (SG) and 15 the control group (CG). The SG received an i.v. injection of epinephrine 15 mcg plus lidocaine 45 mg (ETD) diluted to 3 ml while the CG received 3 ml of normal saline i.v. Each injection was made in absence of uterine contractions and in the presence of a stable MHR (no variability for 4-5 beats). Subsequent variations in MHR were observed via pulse oximetry. A blinded observer recorded the pre-injection MHR and the peak MHR within the first minute after the injection and questioned the patient about four other symptoms (tinnitus, dizziness, metallic taste, palpitations). He then recorded his opinion whether or not the patient had received ETD or saline.

RESULTS: In the SG peak MHR reached 29 ± 8.8 bpm (mean \pm SD) above the baseline. In the CG the increase was 8 ± 10 bpm ($P = 0.001$). Using the lower bound of the 95% confidence interval in the SG data,

we accepted a > 10 bpm as the discriminant between the two groups. Sensitivity and specificity of peak MHR were then calculated. Table 1 shows the sensitivity and specificity of each symptom as a marker of intravascular injection as well as the results of the observer's clinical evaluation of ETD.

DISCUSSION: Epinephrine induced tachycardia is considered the marker of intravascular injection in epidural anesthesia. It follows a very specific pattern: a rapidly developing, short-lived peak in MHR that follows the injection and returns to the pre-injection value within 25-35 sec (1). Our study shows that ETD is a reliable marker of intravascular injection with 100% sensitivity (15/15 true positive by the observer). While the analysis of peak MHR reached only a 73% specificity (4/15 false positive) the observer's clinical evaluation demonstrated a 93% specificity of ETD (1/15 false positive). In addition, all the other symptoms analyzed (alone or in combination) exhibited low sensitivity ($< 67\%$). This suggests that the pattern of epinephrine induced tachycardia may be clinically differentiated from tachycardia from other sources.

This study shows that an intravascular injection of ETD is always detected (100% sensitivity) by a blinded observer. It also shows that 7% of epidural catheters might be unnecessarily removed (93% specificity).

Table 1

	Sensitivity	Specificity
Metallic or funny taste	13%	80%
Dizziness	33%	86%
Palpitations	46%	93%
Tinnitus	26%	100%
Peak MHR	100%	73%
Observer's clinical evaluation	100%	93%

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