Title: BLADDER VS. TYMPANIC CORE TEMPERATURE MEASUREMENT DURING CESAREAN SECTION.
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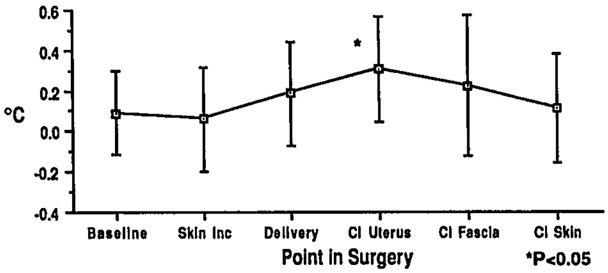
Hypothermia occurs commonly during cesarean section performed under epidural anesthesia.[1,2] Cork reported that an accurate and precise estimate of core temperature can be obtained in surgical patients by using tympanic, nasopharyngeal, esophageal, or bladder temperature measurement sites.[3] Discomfort is a potential problem with nasopharyngeal, esophageal, and tympanic membrane temperature probes in awake cesarean section patients. The bladder may therefore be a preferable site to measure core temperature in these patients. However, during cesarean section, close apposition of the bladder to the surgical site may interfere with accurate determination of core temperature. For accuracy of core temperature measurement, we compared the bladder and the tympanic membrane as measurement sites in patients undergoing cesarean section with epidural anesthesia.

After approval from the local Institutional Review Board, written informed consent was obtained from 20 healthy patients undergoing elective cesarean section with epidural anesthesia. Core temperature was measured at the tympanic membrane with a cotton-tipped tympanic probe (Mon-a-Therm®) and in the bladder with a thermocouple at the distal end of a urinary catheter (Mon-a-Therm®). Following prehydration with 1.5-2 liters of lactated ringers, a T2-4 level of epidural anesthesia was achieved with 2% lidocaine with epinephrine. Core temperatures were recorded just prior to the induction of anesthesia (control) and then every 10 minutes. The differences between tympanic and bladder temperature were compared to control temperature differences at skin incision, delivery of the fetus, uterine closure, fascial closure, and skin closure using repeated measures analysis of variance. Maximal changes in core temperature during surgery were compared using Student's unpaired t-test. $P<0.05$ was considered significant.

Bladder temperature was usually lower than tympanic temperature so that the mean differences between tympanic and bladder temperatures were always positive. Bladder temperature was significantly lower than tympanic temperature during uterine closure ($P=0.006$) (Fig). At the other points in surgery, however, the differences between tympanic and bladder temperature were approximately 0.2°C, a clinically insignificant difference. Further, the maximum changes in core temperature recorded for both measurement sites were not different (tympanic: -1.1±0.6°C; bladder: -1.4±0.6°C; ($P=0.23$).

We conclude that bladder temperature will reflect tympanic temperature in patients undergoing cesarean delivery except during manipulation of the bladder.

Tympanic - Bladder Temp Differences



1. Regional Anesthesia 14:48-52, 1988
2. Anesthesiology, 71:A838, 1989
3. Anesth Analg 62:211-214, 1983

A961

TITLE: COMPARISON OF TENSILE STRENGTHS OF SEVEN TYPES OF EPIDURAL CATHETERS
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One complication of continuous epidural anesthesia is separation of the catheter tip in the epidural space when the catheter is removed. To determine the force that causes separation, we tested the tensile strength of commonly used catheters.

Seven types of catheters representing different materials and gauges were studied: nylon, Teflon, and polyurethane catheters with 19- and 20-ga lumens (table). Five 3-cm samples of each catheter were evaluated by means of a tester that enabled load and elongation to be measured (Model #1124 Universal Testing Instrument, Instrom). For testing, 1 cm of the catheter was held between the grips of the tester. When the machine was activated, the catheter segment ends were separated at 200 mm/min. This developed an increasing load (kg) on the catheter that was reported by the instrument sensor. The test was applied until the catheter broke. The catheter length at the time of catheter separation was recorded as mm increase above original length. Data were analyzed by ANOVA and Tukey tests.

As gauge increased, load to catheter separation decreased (table). Elongation at catheter separation was least for 20-ga and Teflon catheters.

The Pharmaseal 19-ga epidural catheter has the highest tensile load tolerance and elongation before failure. Therefore, this catheter may be less prone to in-vitro separation during removal.

TABLE. Tensile Strength and Elongation of Epidural Catheters

	Gauge of Catheter		
	19-ga	20-ga	20-ga
		Nylon	
	Pharmaseal	Kendall	Burron
Load to failure (kg)	3.66 ± 0.5	2.68 ± 0.3	2.85 ± 0.3
Elongation (mm)	112 ± 26	58 ± 12	38 ± 15
Tukey groups*	A/A	B/C	B/D
		Teflon	
	Deseret	Deseret	Kendall
Load to failure (kg)	2.05 ± 0.1	1.71 ± 0.1	1.91 ± 0.1
Elongation (mm)	27 ± 5	35 ± 7	40 ± 4
Tukey groups*	C/D	D/D	CD/D
		Polyurethane	
	Arrow		
Load to failure (kg)	2.56 ± 0.5	--	--
Elongation (mm)	92 ± 15	--	--
Tukey groups*	B/B		

Values are means ± SD.
*Tukey group refers to tensile strength/elongation; catheters with the same letter group do not differ by that characteristic ($P > 0.05$).