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Title: EPIDURAL VERSUS SPINAL BLOCK FOR REPEAT CESAREAN SECTION

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Introduction. Several studies of women undergoing repeat cesarean section have evaluated the effects of either spinal¹⁻³ or epidural block⁴⁻⁶ on fetal acid-base status. However, no report from the same institution has compared the two methods. The purposes of our prospective study were 1) to compare spinal with epidural block; 2) to determine the influence of fluid preload.

Methods. The Human Research Committee of the hospital approved the protocol and the patient's consent was obtained. One hundred and eleven unselected full-term healthy parturients undergoing elective cesarean section were studied. The mothers were allowed to choose either epidural (n=47) or spinal block (n=64). The epidural group (group I) as well as 40 patients in the spinal group (group III) received 1000-1500 ml lactated Ringer's solution within 20 minutes of induction of anesthesia while 24 patients in the spinal group (group II) received 500-1000 ml of the same solution. The baseline maternal blood pressure was measured with the patient in the left lateral position. Following the block, the uterus was displaced laterally using a left uterine displacement device, and oxygen was administered by facemask. Maternal hypotension was considered when the systolic blood pressure reached 80% of the original level. Mephentermine or ephedrine increments of 15 mg was injected intravenously to correct maternal hypotension when required. Maternal arterial, umbilical venous, and umbilical arterial blood samples were collected at the time of delivery. Chi-square analysis was used for proportional data. Analysis of variance and Newman-Keuls test were used for comparison among group means. For all statistical analysis, a value of $p < 0.05$ was considered significant.

Results. There was no significant difference between the 3 groups in regard to maternal age, gravidity, parity, gestational age, original blood pressure level, or maternal arterial blood gases. The cumulative reduction in systolic blood pressure during the 15-minute period following induction of the block and the dose of vasopressor required to restore the systolic blood pressure to above 80% of the original level were higher in group II than in the other two groups. Although Apgar scores were similar, umbilical venous and arterial blood samples showed more fetal acidemia in group II than in the other two groups (see table).

Discussion. In healthy parturients, the fetal outcome as evaluated by Apgar scores, and acid-base status was similar in epidural and spinal groups who had been infused intravenously with more than 1000 ml of fluid within 20 minutes of the block. On the other hand, maternal hypotension was difficult to control and fetal acidosis increased in severity and frequency when the fluid infusion had been restricted

to less than 1000 ml prior to the block. It is our recommendation that a normal parturient should receive at least 1000 ml of electrolyte solution within 20 minutes of induction of spinal or epidural block for elective cesarean section. The choice between the two forms of anesthesia should be based on the patient's or physician's preference rather than fetal outcome.

Table
Comparison of Umbilical Acid-Base State and Apgar Scores
According to Anesthetic And Fluid Load In Patients
Undergoing Repeat Cesarean Section

	Epidural Group I (1000-1500 ml)	Spinal Group II (500-999 ml)	Spinal Group III (1000-1500 ml)
	n=47	n=40	n=24
Umbilical venous			
pH	7.35 ± 0.05	7.32 ± 0.06*	7.32 ± 0.03*
Base deficit	5.5 ± 2.8	7.0 ± 2.4*	6.5 ± 1.7
Umbilical arterial			
pH	7.27 ± 0.05	7.24 ± 0.05*	7.25 ± 0.04
Base deficit	6.9 ± 2.8	8.6 ± 3.0*	8.0 ± 2.5
Cases (%) with umbilical acidemia**	2 (4)	8 (20)†	2 (8)
Cases (%) with one minute Apgar score <6	2 (4)	3 (8)	1 (4)

* $p < 0.05$ by analysis of variance compared with epidural group

† $p < 0.05$ by χ^2 analysis compared with epidural group

** Umbilical venous pH < 7.25 or umbilical arterial pH < 7.20

References.

- Marx GF., Cosmi EV., Wollman SB.: Biochemical status and clinical condition of mother and infant at cesarean section. *Anesth Analg* 48: 986-994, 1969.
- Cosmi EV., Marx GF.: Acid-base status of the fetus and clinical condition of the newborn following cesarean section. *Am J Obstet Gynecol* 102: 378-382, 1969.
- Datta S., Brown WJ.: Acid-base status in diabetic mothers and infants following general or spinal anesthesia for cesarean section. *Anesthesiology* 47: 272-276, 1977.
- James FM., Crawford JS., Hopkinson R., et al: A comparison of general anesthesia and lumbar epidural analgesia for elective cesarean section. *Anesth Analg* 56: 228-235, 1977.
- Downing JW., Houlton PC., Barclay A.: Extra-dural analgesia for Caesarean section; a comparison with general anaesthesia. *Br J Anaesth* 51: 367-374, 1979.
- Palahniuk RJ., Scatliff J., Biehl D., et al: Maternal and neonatal effects of methoxyflurane, nitrous oxide and lumbar epidural anaesthesia for Caesarean section. *Can Anaesth Soc J* 24: 586-596, 1977.