Title: PROPHYLACTIC EPHEDRINE INFUSION DURING C-SECTION UNDER SPINAL ANALGESIA

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Introduction. The incidence of maternal hypotension during cesarean section under spinal analgesia is high.[1] Hypotension can impair uterine blood flow causing fetal bradycardia, asphyxia, and acidosis.[1] Several measures have been employed to prevent maternal hypotension including prehydration,[2] left uterine displacement,[3] and IM ephedrine prior to subarachnoid block.[4] In this study, we compared maternal and fetal effects of ephedrine administered prophylactically by IV drip (Group I) with those of ephedrine administered therapeutically by intermittent bolus injection (Group II).

Method. The protocol was approved by the Research Review and Human Experimentation Committee and informed consents were obtained from the patients. Fifty-four healthy parturients for elective cesarean section received IV infusion of lactated Ringer's solution (LR) 15 ml/kg within 20 minutes preceding subarachnoid block. After the intrathecal injection of 1% hyperbaric tetracaine without epinephrine, a wedge was used for left uterine tilt, and oxygen was given via face mask throughout the surgical procedure.

Group I: Fifty mg ephedrine diluted in 500 ml L/R was infused immediately after the subarachnoid block and the infusion rate was titrated to maintain systolic blood pressure (SBP) between 90-105% of the baseline.

Group II: Twenty mg increments of ephedrine were injected intravenously when SBP reached 80% of the original level.

Blood pressure and heart rate were monitored at one minute intervals using a Dinamap (Grayco Instruments, Pittsburgh) monitor and ECG. At delivery, maternal arterial, umbilical venous, and umbilical arterial blood were sampled for acid-base status and blood gas analysis. Student's t-test was used for statistical analyses.

Results. The two groups were comparable in maternal age, gestational age, preoperative blood pressure and heart rate, fetal weight, prehydration volume (ml/kg), total hydration volume (ml/kg), induction to delivery time, uterine incision to delivery time and level of block. Ephedrine dosage was similar in the two groups (30 mg vs. 26 mg). The response of SBP in Group I and II is depicted in Table 1. In Group I, blood pressure was maintained between 90-105% of baseline in 59% of cases; SBP did not exceed 105% of baseline in any case. Because of the study design, hypotension (SBP 80% of baseline) was more common (X^2, $p < 0.001$) and more severe ($t = 2.3$, $p < 0.001$) in Group II than in Group I. Heart rate (mean $\pm$ SD) increased similarly in both groups 20 $\pm$ 10 bpm in Group I and 23 $\pm$ 14 bpm in Group II. Nausea and vomiting occurred less frequently in Group I (1/22) than in Group II (9/28). Apgar scores, time for sustained respiration and cord acid-base status and blood gases were similar in the two groups. There was no correlation between the lowest SBP and umbilical venous or arterial pH or oxygen tension.

Conclusion. There was no difference in fetal outcome between the two groups (prophylactic vs. therapeutic). However, with prophylactic ephedrine, nausea and vomiting occurred infrequently and SBP was maintained close to the baseline without significant adverse side effects.

The clinical and biochemical data of fetal outcome of our study were comparable with those of general or epidural anesthesia published by others.[2,3,5]

References:

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Table 1. Lowest Systolic Arterial Blood Pressure

Lowest Systolic Arterial Blood Pressure	Group I (Drip)		Group II (Bolus)	
	No. of Pts.	Percent	No. of Pts.	Percent
90 - 105%	13	59	5	18
80 - 90%	5	23	3	14
70 - 80%	4	18	17	60
Less than 70%	0	0	3	8
	22	100	28	100

Table 2. Fetal Outcome

		Group I (Drip)	Group II (Bolus)
UV	pH	7.34 $\pm$ 0.04	7.36 $\pm$ 0.06
	P_{O_2}	28.6 $\pm$ 5.6	29.7 $\pm$ 5.9
	P_{CO_2}	37.4 $\pm$ 4.2	38.3 $\pm$ 5.4
	Base Excess	-4.7 $\pm$ 2	-3.5 $\pm$ 3.5
UA	pH	7.26 $\pm$ 0.04	7.28 $\pm$ 0.07
	P_{O_2}	15.2 $\pm$ 5.5	15.0 $\pm$ 3.1
	P_{CO_2}	50.2 $\pm$ 5.4	50.1 $\pm$ 5.1
	Base Excess	-5.2 $\pm$ 2.3	-4.1 $\pm$ 3.8
pH (MA-UV)		0.09 $\pm$ 0.03	0.07 $\pm$ 0.03
Apgar Scores	1 minute	8.2	8.3
	5 minute	8.9	9.0
Time for sustained respiration (Seconds)		18.9	22.5