

Title: THE INCIDENCE AND NEONATAL EFFECTS OF MATERNAL HYPOTENSION DURING EPIDURAL ANESTHESIA FOR CESAREAN SECTION

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**Introduction.** The incidence, prevention, and possible adverse effects on the neonate of maternal hypotension during epidural anesthesia for cesarean section were investigated.

**Methods.** Institutional human research committee approval was obtained. Five hundred eighty-three consecutive women in the 38th to 42nd weeks of pregnancy undergoing cesarean section (CS) with epidural anesthesia were studied and four groups were identified: A) planned repeat CS (n=271); B) planned primary CS (n=39); C) emergency CS, no fetal distress (n=229); and D) emergency CS, mild-to-moderate fetal distress (n=44). All patients received a rapid infusion of at least 1 L lactated Ringer's solution, and 47% received 25 mg prophylactic intramuscular administration of ephedrine. Seventy percent of the patients received bupivacaine; 24% received chloroprocaine; and 6% received lidocaine to achieve anesthesia to a T4 sensory level. The patient was then placed on a table in a left lateral tilt of 30° and BP was monitored at one minute intervals. The treatment of hypotension (systolic BP < 100 or > 30% fall of baseline BP) consisted of infusing fluid, maximizing left uterine displacement (LUD), and positioning the patient head down. If blood pressure was not restored within 60 seconds, incremental doses of ephedrine were used to restore normal blood pressure. Comparisons of the incidence of hypotension were made according to 1) whether ephedrine prophylaxis was used, 2) whether the woman was in labor, and 3) type of local anesthetic used. Apgar scores and time-to-sustained respiration (TSR) were assigned by a pediatrician unaware of the local anesthetic used or if hypotension had occurred. These outcome variables, as well as umbilical venous (UV) and arterial (UA) cord blood gas values were examined between infants of normotensive and hypotensive mothers.

**Results.** The incidence of hypotension for all groups tended to be less with the use of prophylactic ephedrine but the differences were not statistically significant. Hypotension occurred in 26% of patients with ephedrine prophylaxis and in 32% without prophylaxis. Hypotension occurred more frequently in women not in labor (36%) than in those who were in labor (24%) (p<0.05). Women receiving chloroprocaine had an incidence of hypotension of

40% compared with 28% in those who received bupivacaine (p>0.05). Neither Apgar scores, TSR, or fetal acid-base status seemed affected by maternal hypotension. The UV and UA acid-base values of the two largest groups of neonates are given for normotensive versus hypotensive mothers.

Umbilical Cord Venous and Arterial Blood Gas Values

UV	pH	pO <sub>2</sub>	pCO <sub>2</sub>	BE
Repeat CS nl BP n=149	7.32 ±0.01	31.5 ±0.5	42.1 ±0.6	-3.8 ±0.3
Repeat CS hypot n=67	7.31 ±0.01	31.7 ±1.0	43.1 ±0.8	-4.1 ±0.5
Emerg CS nl BP n=134	7.32 ±0.01	29.3 ±0.6	41.0 ±0.5	-4.5 ±0.2
Emerg CS hypot n=36	7.30 ±0.01	29.0 ±1.4	42.5 ±1.1	-4.9 ±0.6
UA	pH	pO <sub>2</sub>	pCO <sub>2</sub>	BE
Repeat CS nl BP n=139	7.24 ±0.01	15.9 ±0.5	54.4 ±0.9	-4.3 ±0.3
Repeat CS hypot n=67	7.22 ±0.01	16.1 ±0.7	57.6 ±1.4	-4.9 ±0.6
Emerg CS nl BP n=134	7.24 ±0.01	15.8 ±0.4	51.0 ±0.7	-5.2 ±0.3
Emerg CS hypot n=33	7.21 ±0.01	14.2 ±1.1	53.5 ±1.6	-5.8 ±0.7

In addition, when mild-to-moderate fetal distress was present and the labor epidural was extended for the cesarean section (group D), rapidly treated hypotension was not associated with acidotic or hypoxic infants.

**Discussion.** Approximately 30% of patients undergoing CS with epidural anesthesia developed hypotension. I prehydration and LUD were used, 25 mg intramuscular prophylactic ephedrine did not appear to provide additional protection against hypotension. Hypotension, rapidly treated with intravenous hydration, LUD, and ephedrine, did not result in clinically depressed or hypoxic, acidotic neonates. The higher incidence of hypotension in the no-labor group may indicate the greater degree of hypovolemia in these patients after a fast without continuous intravenous hydration.