

Title : LOCAL ANESTHETICS IN CESAREAN SECTION EPIDURAL ANALGESIA
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Introduction. Lumbar epidural analgesia (LEA) offers many advantages over subarachnoid block for cesarean section (C/S). However, the longer time to establish surgical analgesia makes it less convenient. The slower onset of LEA may facilitate cardiovascular compensatory mechanisms accounting for the lower incidence of hypotension. An ideal local anesthetic (LA) for LEA would act rapidly but would not increase the incidence of hypotension. This study compares rapid and slow acting local anesthetics for surgical analgesia, plus several other maternal and fetal parameters.

Methods. Institutional approval was obtained and 30 women with uncomplicated term pregnancies scheduled for elective C/S gave informed consent. Following transport to the delivery suite in the lateral position a 20 gauge plastic canula was placed in a radial artery for baseline blood pressure (BP), pulse rate (PR), and blood gas measurements. An epidural catheter was introduced at L₂L₃ or L₃L₄ and a 2 ml test dose of 1% lidocaine was given. During the 20 minutes before initiation of LEA subjects received an i.v. preload of lactated Ringers solution equal to 20% of estimated blood volume. With the patient positioned in a 15 degree left lateral tilt 20 ml of 3% chloroprocaine or 0.5% bupivacaine, selected randomly, were injected. BP and PR were recorded every 2 minutes thereafter. Additional local anesthetic was given as needed to achieve sensory levels of T₄-T₆. After injection subjects inhaled 100% oxygen although 25-40% nitrous oxide was given if supplementary analgesia was required. Hypotension to systolic levels <100 torr was managed with increased left uterine displacement, administration of fluids, and placement in Trendelenberg position. Intravenous ephedrine was given if systolic BP remained <90 torr for 3 minutes. Maternal blood gases were repeated at uterine incision and umbilical blood was sampled from a doubly clamped loop of cord. Times from injection of LA to surgical analgesia (I-S), delivery (I-D), skin incision until delivery (S-D), uterine incision to delivery (U-D), and time to sustained respiration (TSR) were noted. Apgar scores were assigned by a member of the anesthesia team. Student's T test was used for statistical analysis.

Results. Parturients receiving chloroprocaine and bupivacaine were nearly identical in height, weight, BP, hemoglobin, and blood gas values before anesthesia and at uterine incision. The level of analgesia

was T₆ in both groups. Two women in each group required nitrous oxide analgesia before delivery. Hypotension necessitating ephedrine occurred in 13% of bupivacaine and 33% of chloroprocaine subjects. The onset of surgical analgesia was more rapid ($p < 0.001$) with chloroprocaine (13.8 ± 0.97 min) than with bupivacaine (21.8 ± 1.52 min). S-D and U-D times were similar for both groups (Table 1). There were no significant differences between groups in newborn weight, TSR, 5 minute Apgars, or umbilical cord blood gas values (Table 2). Two one minute scores in the chloroprocaine group were less than 7. In one hypotension did not occur but uterine incision to delivery was prolonged at 115 seconds. In the other, a breech presentation, hypotension occurred but was promptly corrected with ephedrine. Infants of hypotensive mothers had umbilical vessel values very similar to infants of normotensive mothers. All infants did well in the nursery.

Discussion. Surgical analgesia occurs rapidly with chloroprocaine, but the incidence of hypotension increases. Hypotension probably results from rapid onset of sympathetic block and less time for maternal cardiovascular compensation. This information should help anesthesiologists in selecting local anesthetics for C/S. For example, if LEA is given to a woman with diabetes or pregnancy hypertension bupivacaine would be indicated because of less frequent hypotension. In the healthy woman for elective C/S chloroprocaine might be preferable since rapid achievement of analgesia decreases surgical delay while reassuring mother and anesthesiologist that the block is working. If hypotension occurs and is rapidly corrected newborn outcome remains excellent for the previously uncompromised fetus.

Table 1. Critical Times (Mean \pm SEM)

	Bupiv (n=15)	Chloro (n=15)	p
I-S	21.9 \pm 1.52	13.9 \pm 0.97	<0.001
I-D	30.2 \pm 1.78	21.9 \pm 1.75	ns
S-D	8.3 \pm 1.26	8.0 \pm 1.52	ns
U-D	76.7 \pm 13.07	81.9 \pm 9.62	ns

Table 2. Umbilical Blood Gas Values (Mean)

	Vein			Artery		
	Bupiv. (n=15)	Chloro. (n=15)	p	Bupiv. (n=15)	Chloro. (n=15)	p
pH	7.38	7.39	ns	7.31	7.32	ns
PO ₂	35.1	34.9	ns	17.3	17.7	ns
PCO ₂	39.8	39.8	ns	51.4	49.8	ns
HCO ₃	22.3	22.9	ns	24.8	24.9	ns