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Title : CONTINUOUS INFUSION EPIDURAL BLOCK FOR ANALGESIA IN LABOR

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Introduction. Several concentrations of 2-chloroprocaine (2 CP) administered by continuous epidural infusion are effective for analgesia during labor. A study reported by us at the 1979 A.S.A. meeting found 0.5% 2 CP most effective. However, further evaluation of the infusion of 2% 2 CP was needed, as the dermatome level regressed before the effects of the infusion and the loading doses could be separated. In this work, use of a uniform loading dose exposed a basic difference in the mechanism of action of 0.5% 2 CP and 2% 2 CP during the infusion.

Methods. The protocol was approved by the Committee on Studies Involving Man and informed consent was obtained from twenty-five uncomplicated term parturients. Epidural catheters were uniformaly positioned in the L_{3-4} interspace and patients were nursed in the semi-supine position with left uterine displacement. The patients were assigned to one of four groups randomly. All received a 2 cc test dose of 2% 2 CP followed by a loading bolus of 2% 2 CP 8.0 cc (160 mg). For the next 135 minutes the patients received 220 mg per hour of 0.5, 1 or 2% 2 CP (Groups A, B, C, respectively) or 110 mg per hour of 0.5% 2 CP (Group D), unless inadequate analgesia or delivery dictated termination of the study. Pain and temperature sensation, motor block, and subjective analgesia were evaluated at 20 minute intervals during the first hour and at 30 minute intervals thereafter.

Results. In each of the groups, the subjects were of uniform age, parity, height and weight (analysis of variance and chi square for probability of a difference were not significant). There were 21 patients with functional epidural blocks. One patient each in Groups B, C, and D had a one-sided block and one patient in Group C had no block. In addition, two patients (from Groups A and D) with errors in infusion technique were deleted. Finally, one in Group B underwent cesarean section and one in Group C with a T_2 block had the infusion stopped when the dermatome level rose further. Seventeen patients completed at least 80 minutes of 2 CP infusion and constitute the results. Mean dermatome levels during the infusion (on the y-axis in the figure) were evaluated by regression analysis starting with the 40 minute values. Group A had a slower onset but rose progressively. Levels in Group B either rose for 40 minutes and fell abruptly or rose gradually; their mean is a straight line. In Group C dermatome levels rose rapidly for 40 minutes and declined thereafter; the slope in this group is opposite to that in Group A. Dermatome levels in Group D either rose or fell gradually. Subjective analgesia and motor block scores were greater at 20 minutes in Group C ($p < .05$ by chi square analysis) and at 110 minutes in Group B ($p < .05$). Dermatome level was compared to both mass and volume of drug administered. The relation of the block to volume changed during the infusion; at 20 minutes it varied indirectly with volume (slope -.11, r -.36, $p < 2$). Progressive slopes were: -.07 at 40 minutes, -.01 at 60 minutes, .05 at 80 minutes, and .16 at 110 minutes. By 140 minutes dermatome level varied directly with volume (slope .21, r .50, $p < 2$). The relation of dermatome level to mass was essentially constant after 40 minutes.

Discussion. Our earlier study indicated low concentration, high volume infusions are most effective. This study affirms the conclusion and indicates the mechanism involved. Dermatome level in Group C was higher than in Group A at 20 minutes and at 40 minutes (when it peaked). Initially the 2% 2 CP infusion in Group C patients increases the volume of 2% 2 CP already present, whereas the 0.5% 2 CP infusion in Group A dilutes it. Thus the level rises rapidly in Group C, the onset is prolonged in Groups A and D and dermatome level varies indirectly with volume at 20 and 40 minutes. We confirmed tachyphylaxis in one patient in Group B; the peak in Group C probably represents its onset, as subsequently the 2% 2 CP infusion is increasingly ineffective and dermatome level varies directly with volume. Tachyphylaxis was suspected in the earlier study, but the low initial dose in the 2% 2 CP infusion masked the effect. Thus for continuous infusion epidural block, low concentrations of 2 CP are more effective because tachyphylaxis occurs rapidly with higher concentrations.

DERMATOME LEVEL DURING INFUSION OF 2-CHLOROPROCAINE