Title : CONTINUOUS INFUSION EPIDURAL BLOCK FOR ANALGESIA IN LABOR

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Introduction. The optimal dose for continuous infusion epidural block using 2-chloroprocaine (2 CP) is unknown and difficult to predict from our present knowledge of the mechanism of action of epidural block. Bromage stated that drug mass determined the extent of the block with intermittent injections of the usual concentrations of lidocaine. Volume became important with dilute concentrations but the resulting blocks were too patchy to permit their use in surgery.[1] This prospective study attempts to determine the optimal concentration of 2 CP for continuous infusion epidural analgesia and whether equal drug masses produce identical blocks in this technique as they do in the intermittent infusion method.

Methods. The protocol was approved by the Committee on Studies Involving Man and informed consent was obtained from 25 uncomplicated term parturients. Epidural catheters were uniformly 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 three groups randomly. All received a 2 cc test dose of 2% 2 CP followed in 5 minutes by a loading bolus of 100 mg of either 0.5, 1 or 2% 2 CP over 4 minutes. For the next 130 minutes, 220 mg per hour of 0.5, 1 or 2% 2 CP were infused 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. The patients within the groups were uniform except for a difference in weight in the 1% group and in age in the 2% group.

Results. There were 22 patients with functional epidural catheters: 1 patient in each group had no sensory level with supplementary drug and was dropped from the study. Other patients dropped before conclusion of the study were: 4 for inadequate pain relief (3 in the 2% group and 1 in the 1% group) and 3 who delivered (2 from the 0.5% group and 1 from the 1% group). The block at 20 minutes was assumed to represent the result of the 100 mg loading dose. All patients receiving 0.5% 2 CP reported adequate analgesia and 80% were unable to maintain their legs in an elevated position. Patients in the 1% group had adequate analgesia 86% of the time and 33% motor block. Patients receiving 2% 2 CP reported adequate analgesia 56% of the time and 33% had a motor block of the lower extremities. 0.5% 2 CP blocked 17 dermatomes to temperature sensation with a standard error of 1.9 whereas 1% 2 CP blocked 10 ± 8 dermatomes and 2% 2 CP 6 ± 1.2 dermatomes. At 110 minutes all patients on 0.5% 2 CP had good analgesia as well as a motor block. 67% of the patients given 1% 2 CP had adequate analgesia and 80% had a motor block. 50% of the patients given 2% 2 CP had good analgesia and 50% had a motor block. 0.5% 2 CP blocked 18 ± 1.7 dermatomes to temperature sensation whereas 1% 2 CP blocked 15 ± 2.3 dermatomes and 2% 2 CP blocked 8 ± 1.9 dermatomes. The differences between the dermatome levels obtained in the 0.5% and 2% 2 CP group are all significant with a $p < .01$ using the unpaired student's t-test. The dermatome levels and standard errors of the patients in each group completing the entire study are shown in the graph. 0.5% and 1% 2 CP maintained the sensory level in all patients studied: 2% 2 CP maintained the sensory level in the patients who had enough analgesia to remain in the study.

Discussion. Equal mg doses of 0.5% 2 CP are more effective than 1 or 2% 2 CP when given as a loading dose for continuous epidural analgesia for labor. 2% 2 CP is not as effective as 0.5% or 1% 2 CP in continuous infusion epidural analgesia. High volume low concentration doses produce sensory loss in more dermatomes per mg than low volume high concentration doses. The lack of effectiveness of 2% 2 CP was unexpected and is probably related to volume, an increased vascular uptake of the higher concentration and/or a difference in the predominant site of action of 2 CP when infused continuously. Low concentrations such as 0.5% 2 CP can be used effectively with a continuous infusion technique for control of pain during labor and are recommended as an alternative to intermittent injection.

Reference.

1. Bromage PR: Mechanism of action of extradural analgesia. Br J Anaesth 47:199-212, 1975