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Title : POST-CESAREAN EPIDURAL MORPHINE: DOUBLE-BLIND STUDY

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INTRODUCTION. Repeated demonstration of varying degrees of analgesia have been reported from subarachnoid or epidural narcotic injections.[1,2] We present a controlled, double-blind study of the postoperative analgesia and serum narcotic levels produced by epidural morphine in patients following cesarean section.

METHODS. Twenty-one unpremedicated patients received continuous lumbar epidural anesthesia with chloroprocaine without other sedation for elective cesarean section. Approval by the Institutional Review Board for Human Investigation and informed consent were obtained. At the end of surgery before the anesthetic had receded, each patient received one of three treatments previously prepared and randomly assigned. The control Group A received 10 ml epidural saline and 4 mg IM morphine. Experimental Group B received IM saline and 4 mg epidural morphine without preservative in 10 ml saline. In Group C epinephrine 1:200,000 was added to the epidural morphine. An additional Group D of seven patients received epidural narcotic in a comparably designed pilot study employing 2 mg morphine. Thereafter, each patient was allowed to request PRN IM meperidine. McGill Pain Scores (0 - 5, corresponding to no pain, mild, discomforting, distressing, horrible, and excruciating) and PRN IM meperidine doses were recorded. Blood samples for serum morphine determination were drawn at intervals from 5 min to 12 hours after injection. Pain scores and blood samples were not obtained when they interfered with mother/infant contact or patient care. Patients were observed for nausea, vomiting, or excessive sedation, and clinical evidence of sensory, motor, and autonomic dysfunction, as well as respiratory or circulatory depression. The Wilcoxon rank sum, X^2, and t tests were used for statistical analyses. Serum morphine levels were determined by a gas chromatographic electron capture method.

RESULTS. The mean number of supplemental narcotic doses requested during the first 20 hours after operation are reported in Table 1. Groups B and C are combined as they are not statistically different. One patient who received unrequested narcotic doses was dropped from Group C. When patients with previous cesarean sections served as their own controls, 5 in Group BC required significantly fewer narcotic doses for the 20 hours following epidural morphine ($p < .05$, paired sample t test); while 4 such Group A patients evinced no statistically significant difference. We present the pain score distribution for the first 8 hours in Table 2 disregarding the first hour, during much of which the epidural anesthetic was still in effect, and during which pain scores and narcotic doses are generally low. Fifty % of Group A pain scores were 3 or higher, while ninety-two % of Group BC were 2 and below. We noted that 7 of the 13 Group BC patients, while experiencing no or minimal incisional pain, were able to perceive mild or moderate uterine cramping. Only one severely preeclamptic patient in Group B experienced nausea and vomiting. No clinical evidence of respiratory or circulatory depression, or sensory (other than pain perception), motor, or autonomic impairment was identified. The mean peak serum morphine concentration was 17.8± 2.8 (SE) ng/ml in Group A patients; 11.0 ± 0.23 (SE) ng/ml in Group B ($p < .02$).

DISCUSSION. We conclude that epidural injection of 10 ml 0.04% morphine results in diminished postoperative pain as evidenced by a highly significant reduction in requests for supplemental narcotics as well as improvement in pain scores following cesarean section, without undesirable side effects. These benefits are not achieved with 0.02% epidural morphine. Moreover, blood morphine levels following epidural injection were consistently low, and cannot account for the potent and prolonged analgesia observed. Seven Group BC patients requested IM narcotic early in their post-operative course (mean time to first injection was not different than for Group A, approximately 1-1/4 hours); however, only 2 went on to require repeated dosing throughout the day. This may indicate that the epidural morphine concentration or segmental level was inadequate for 2 of 13 patients, while latency may be considerably longer than heretofore suggested. Five of 13 Group BC patients, after a prolonged period of pain relief without IM narcotic supplementation noticed a distinct qualitative algesic change at their incision. These observations suggest a duration of action for epidural morphine of approximately 19 (± 5-1/2) hours. Peak mean serum morphine concentrations are significantly lower with the epidural as compared to the IM route of administration. Epidural morphine is a promising means of providing prolonged effective pain relief following cesarean section.

TABLE 1. Post-operative IM Narcotic Doses (Mean)

	Patient#	0 - 3 hr	8 - 20 hr	0 - 20 hr
Group A	7	20 (2.9)	14 (2.0)	34 (4.9)
Group BC	13	10 (0.8^x)	5 (0.4^y)	15 (1.2^z)
Group D	7	15 (2.1)	11 (1.6)	26 (3.7)

x - $p < .01$ vs A, $p < .05$ vs D; y - $p < .01$ vs A & D
z - $p < .001$ vs A, $p < .01$ vs D

TABLE 2. Pain Score Distribution as % of all Observations Within Each Group Between 1st and 8th Hours

Pain Scores	0 - 2	3 - 5	Total Observations #
Group A	50%	50%	25
Group BC	92%	8%	38

X^2 - $p < .001$

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