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A comparative study of the efficacy of postoperative analgesia with intraoperative epidural lidocaine with or without morphine

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Abstract: We compared postoperative analgesia in 15 patients (group A) who were given intraoperative epidural morphine 3 mg and lidocaine 150 mg after laminectomy/discectomy with that of 15 patients (group B) who were given only epidural lidocaine 150 mg. Epidural administration was accomplished by direct placement of the epidural catheter into the epidural space under direct vision during surgery. Eight patients (53%) in group A and 15 patients (100%) in group B required supplementary narcotics during the first 24 h postoperatively ($P < 0.05$). The amount of supplementary narcotics given to group A patients was significantly less than that for group B ($P < 0.05$), and the pain scores for group A patients were also significantly lower at 1, 2, and 6 h postoperatively ($P < 0.05$). There was no difference in the observed side effects in the two groups. We conclude that postoperative pain relief following laminectomy/discectomy is superior when epidural morphine is added to lidocaine than when lidocaine is being used alone.

Key words: Epidural, Morphine, Lidocaine, Postlaminectomy, Catheter

Introduction

Laminectomy causes pain which is intolerable to patients. Inadequate or inconsistent administration of parenteral narcotics provides unsatisfactory pain relief [1]. To improve the quality of postoperative pain relief for patients, epidural narcotics are an acceptable alternative mode of pain relief [2,3].

Laminectomy provides access to the epidural space where insertion of an epidural catheter under direct vision can be achieved without difficulty. It is therefore possible to directly administer epidural narcotics and local anesthetics for the treatment of postoperative pain. As catheter insertion during laminectomy does not interfere with the surgical procedure, it is a superior method to catheter insertion prior to surgery. It is also simpler than catheter insertion after closure of the surgical wound.

We conducted a study in which epidural lidocaine and morphine were administered directly into the epidural space intraoperatively to evaluate the degree of pain relief and side effects. Specifically, we compared the efficacy of morphine plus lidocaine with that of lidocaine alone.

Materials and methods

Thirty patients undergoing lumbar laminectomy and/or discectomy were studied. Approval from the National University Hospital Ethics Committee was obtained. Informed consent was also obtained from all patients. A detailed explanation of the nature and purpose of the study was given to the patients during the preoperative visit.

Patients were randomly allocated to the following groups: group A (15 patients) received 3 mg of morphine and 150 mg of lidocaine in 10 ml injectate and group B (15 patients) received 150 mg lidocaine in 10 ml injectate. The patients were not aware to which treatment group they belonged. Pain scores were based on the patients' self-assessment.

All patients received lorazepam 1–2 mg orally 2 h before anesthesia. Anesthesia was induced with thiopental 4 mg/kg, tracheal intubation was facilitated with succinylcholine 1–2 mg/kg, and anesthesia was maintained with 70% nitrous oxide in oxygen and isoflurane 0.5% to 2% expired concentration. Muscle relaxation was achieved by alcuronium 0.2 mg/kg. No intravenous narcotic was administered during the operative period.

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After the laminectomy/discectomy, but before the wound was closed, an 18-gauge epidural catheter (Braun, Melsungen AG, Germany) was threaded 5–7 cm cephalad into the epidural space from the upper border of the incision wound and aspirated to exclude blood or cerebral spinal fluid tap. The mixture was injected into the epidural space through the epidural catheter. The catheter was pulled out and the wound was closed. The purpose of inserting the catheter into the epidural space 5–7 cm cephalad to the upper border of the opened epidural wound was to avoid backflow of injectate into the wound and therefore prevent subsequent drainage of the injectate.

Postoperative pain was evaluated at 1, 2, 6, 12 and 24 h after the epidural administration using the linear analogue pain score [4,5]. The score was explained to the patients preoperatively: "0" corresponded to "no pain" and "10" corresponded to "most severe pain". Intramuscular administration of meperidine 1.5 mg/kg was given when the pain score exceeded 5 or when patients requested pain relief. All patients were monitored with an apnea monitor (Neotrak 502, Corometric, CT USA) which monitors the respiratory rate for 24 h postoperatively. Respiratory depression was defined as a respiratory rate of 10 or less per minute. Blood pressure and pulse rate were also monitored and all patients were observed for urinary retention, nausea and vomiting, pruritus and any other side effects. All the patients were interviewed. The overall satisfaction of pain management was assessed and any sleep disturbance was recorded 24 h after epidural injection.

The chi-square test was used to analyze the demographic data, the intervals between epidural administration and reversal of general anesthesia, the patients' pain scores between groups for 24 h, the patients' overall evaluation of the assigned methods of analgesia, and the side effects encountered. The difference in the supplementary narcotics requirements in the postoperative period between groups was analyzed by the Mann-Whitney U-test.

Results

The mean ages, weights, and intervals between epidural administration and reversal of general anesthesia of the two groups were comparable (Table 1).

There was no difficulty in removing the epidural catheter from patients after the injectates were given through the epidural catheter. Although there was a statistically significant decrease in blood pressure in six patients (40%) in group A and four patients (26.7%) in group B after the epidural administration of morphine/lidocaine and lidocaine, respectively, it was not considered clinically significant. Blood pressures

Table 1. Demographic and comparative data of patients

	Morphine/lidocaine group $n = 15$	Lidocaine group $n = 15$
Age (years)	43.9 ± 12.2	43.3 ± 14.5
Weight (kg)	65.7 ± 9.3	66.2 ± 6.8
Interval between epidural administration and reversal of general anesthesia (min)	23.5 ± 6.7	23.0 ± 6.6

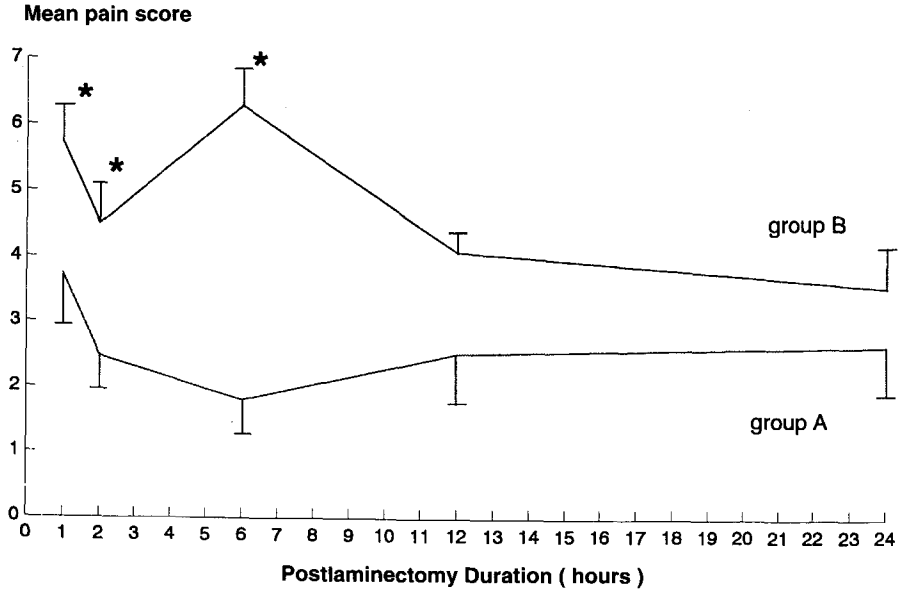

Fig. 1. Mean pain score for 24 h after epidural analgesia (*$P < 0.05$)

were still within the normal range. We did not deem it necessary to treat this drop in blood pressure clinically.

The mean pain score in group A patients was significantly lower than group B patients at 1, 2 and 6 h of assessment ($P < 0.05$) (Fig. 1). Three patients (20%) in group A, compared with nine patients (60%) in group B, required supplementary narcotics in the 1st h of assessment. At 12 and 24 h, the difference was not statistically significant.

Table 2 shows the number of supplementary narcotic injections for each group. Eight patients (53%) in group A and all (100%) patients in group B required one or more injections. The difference in supplementary narcotics requirements between groups A and B was significant ($P < 0.05$).

Eleven patients (73%) in group A, compared to 3 patients (20%) in group B, experienced no sleep disturbance and their self-assessment of the quality of postoperative analgesia was also different between the two groups; significantly more patients in group A expressed satisfaction with the postoperative analgesia method than did the group B patients (Table 3).

Table 2. Number of supplementary doses of narcotic (meperidine) per patient during the first 24 h postoperatively

	No. of doses				
No. of patients	0	1	2	3	4
Morphine and lidocaine group (Group A)	7	4	3	1	0
Lidocaine group (Group B)	0	3	0	8	4

Table 3. Patients' overall evaluation of the randomly assigned method of analgesia

	Epidural morphine/ lidocaine	Epidural lidocaine
Excellent	6	1
Good	5	3
Fair	3	5
Poor	1	6

* $P < 0.05$ compared with epidural lidocaine.

Table 4. Frequency of side effects in both studied groups

	Morphine/lidocaine group (%)	Lidocaine group (%)
Respiratory depression	0.0	0.0
Urinary retention	33.3	20.0
Nausea/vomiting	33.3	20.0
Pruritus	6.7	0.0

Table 4 shows the incidence of side effects experienced by both groups. Five patients (33%) in group A and three patients (20%) in group B experienced urinary retention which required temporary catheterization, but no pharmacological treatment was necessary. All of them recovered spontaneously within 24 h. Nausea and vomiting were also frequent [five patients (33%) in group A and three patients (20%) in group B]. One patient (6.7%) in group A developed pruritus over the face. None of these differences was statistically significant. No patient developed hemodynamic instability or respiratory depression during the monitoring period.

Discussion

As the epidural space is exposed during laminectomy, it is convenient and easy to administer narcotics through the epidural catheter directly into the epidural space. We recognize that leaving the catheter behind allows for continuous epidural infusion of short-acting narcotics which could provide continuous postoperative pain relief. However, the epidural catheter was removed to minimize the risk of infection. Favorable results were reported when epidural morphine was used for post-laminectomy pain relief, though the initial pain score of patients was not reported after recovery from general anesthesia [6]. In our study, patients in the morphine/lidocaine group experienced better pain relief in the first 6 h postoperatively and required less supplementary narcotics. We postulate that synergistic actions of both morphine and lidocaine, which act on different sites in the pain pathway, may have improved pain relief for this group of patients.

Of the 15 patients given morphine/lidocaine, 3 (20%) required supplementary narcotics during the 1st h of assessment. We postulate that one of the reasons for inadequate pain relief may be due to the misplacement of the epidural catheter into less ideal sites such as the paravertebral space, thereby producing patchy sensory blocks after laminectomy. The catheter may also be coiled around the epidural space close to the wound site, resulting in a backflow of and subsequent draining of the injectate from the wound. One also has to take into account the patients' varied dosage requirements and their different perceptions of pain when assessing pain relief.

The rates of minor side effects associated with epidural morphine/lidocaine and lidocaine do not differ. Although there was no respiratory depression in the group of patients receiving epidural morphine/lidocaine, the true rate of delayed respiratory depression is as yet undetermined. The possibility of developing delayed respiratory depression is always a threat to patients, but

this can be minimized with close monitoring of the patients postoperatively.

Our method of insertion of epidural catheter under direct vision, into the opened epidural space during surgery, may seem simple, attractive, and easy to apply. However, the associated problems such as backflow of injectate and the inability to confirm the position of the catheter tip still need to be addressed and resolved. Perhaps one could ascertain the position of the catheter tip by injecting a radiopague dye through the catheter and localizing the catheter by X-ray fluoroscopy prior to administration of the injectate.

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