ADDITION OF TRIAMCINOLONE OR PETHIDINE TO EPIDURAL BUPIVACAINE CAN NOT IMPROVE POSTOPERATIVE PAIN RELIEF IN LUMBAR DISCECTOMY

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SUMMARY: There is uncertainty as to whether addition of steroids or narcotics to epidural local anesthetics improves pain control in spine surgery. The aim of the current placebo-controlled, double blind study was to assess the postoperative pain score using a single epidural administration of bupivacaine alone, bupivacaine plus triamcinolone or bupivacaine plus pethidine after wound closure in patients underwent lumbar discectomy.

108 patients were included in this study. After closure of wound, patients were randomly assigned to receive bupivacaine 0.25% (group A), bupivacaine 0.25% plus triamcinolone 40 mg (group B), bupivacaine 0.25% plus pethidine 50 mg (group C) or saline (group D) via epidural catheter. 5 or 10ml of prepared medication was infiltrated in epidural space based on one or two segment procedures. Additional postoperative pain relief was provided using morphine. Patients were assessed with respect to pain score by visual analog scale (VAS), cumulative morphine requirement (mg), ambulation time (hour) and discharge time (day), at the postoperative period. Data were analyzed using chi-square, kruskal wallis, and ANOVA tests.

Mean pain scores were higher in group D at recovery time, 6 and 24 hours postoperatively ($P<0.05$). The mean total morphine consumption up to 48 hours after operation in groups A, B, C, and D were 1.4±1.5, 1.4±1.3, 1.4±1.3 and 4.6±2.1 mg, respectively ($P<0.05$). The ambulation time and discharge time were higher in group D ($P<0.05$). There were not any statistically differences between group A, B and C in order to above variables. In conclusion, epidural administrations of bupivacaine 0.25% results in lower pain scores, opioid consumption and ambulation time and also discharge time when compared with placebo. Triamcinolone or pethidine added to bupivacaine could not improve these parameters.

Key words: discectomy, postoperative pain, bupivacaine, triamcinolone, pethidine.

INTRODUCTION

Postoperative pain management results in lower rate of morbidity and mortality and also associated with shorter hospital stay, which reduces medical cost (1). Lumbar discectomy as a common elective surgery is painful for many patients. Opiates have been administered for postoperative pain relief in patients undergoing discectomy but such pain control provides inadequate analgesia and may

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Table 1: Demographic Data and Operation Characteristics (NS).

	Group A (n=27)	Group B (n=27)	Group C (n=27)	Group D (n=27)
Age (y)	42.2 ± 5.1	39.9 ± 7.2	40.0 ± 7.8	39.5 ± 7.0
Sex (M/F)	23/4	23/4	21/6	21/6
Weight (kg)	71.1 ± 7.8	72.5 ± 7.6	72.4 ± 8.0	72.7 ± 7.2
ASA(I/II)	21/6	19/8	19/8	18/9
Operation time (min)	96.8 ± 12.5	93.9 ± 11.7	95.8 ± 14.4	91.6 ± 15.1
One segment procedure	22 (82%)	22 (82%)	22 (82%)	20 (74%)
Two segments procedure	5 (18%)	5 (18%)	5 (18%)	7 (26%)

Values are mean ± SD or the number (%) of patients, NS: Not significant.

result in nausea, vomiting, bradycardia, hypotension, respiratory depression and addiction (2,3).

Epidural administration of local anesthetics is an effective method for pain control in spinal surgeries (4,5) but this technique can lead to some degree of sympathetic, sensory and motor block which associated with unwanted effects (1). Injection of morphine as an opiate analgesic in epidural space is another method for postoperative analgesia in spinal operations (6,7). However some of the side effects such as late onset respiratory depression, nausea, vomiting and pruritus limited its widespread use (8). Most reports indicated that combination of local anesthetics and opioids for epidural analgesia may be result in need to lower doses of each agents, effective analgesia and attenuation of some problems associated with the use of individual drugs (1,9).

Corticosteroids have been used epidurally for chronic pain relief (10,11). Infiltration of the wound site by local anesthetics plus corticosteroids during lumbar discectomy can reduce postoperative pain (12,13). Pethidine as a narcotic analgesic with some local anesthetic property has been used epidurally for postoperative pain relief after caesarean section and abdominal surgery (14,15).

The aim of this study was to evaluate the postoperative pain score, opioid requirement, ambulation time and discharge time using single epidural administration of bupivacaine alone, bupivacaine plus triamcinolone and bupivacaine plus pethidine after wound closure in patients underwent lumbar discectomy.

MATERIALS AND METHODS

In this double blind, randomized prospective study, 108 adult patients who were candidate for lumbar discectomy from a dorsal approach, were enrolled in the study. The design for this study was approved by our institutional ethics committee and written informed consent was obtained from all participants. This study was performed in Kashani Medical Center, Isfahan, Iran, during the period from March 2005 to December 2006.

Patients were selected if they met the following criteria: physical status (American Society of Anesthesiologists: ASA) I or II; age 18-50 year; first disc surgery, and no history of drug abuse. The exclusion criteria were unwanted anesthesia or surgery intervention other than study protocol, known allergy to local anesthetics, and using corticosteroids. Patients were randomized to 4 equal groups (n=27) by the sealed envelope technique as follows: group A; bupivacaine 0.25% alone, group B; bupivacaine 0.25% plus 40mg triamcinolone, group C; bupivacaine 0.25% plus pethidine 50mg and group D; saline.

In preoperative period, patients' preparation was done identically with intravenous infusion of crystalloid solution and 8-10 hours (none per oral) NPO time. Patients did not receive any premedication. After preoxygenation, induction of anesthesia was performed using sodium thiopental 5 mg/kg, pancura-

Table 2: Mean Pain Score and Frequency of Pain Occurrence in the First 48 Hours after Operation.

	Group A (n=27)	Group B (n=27)	Group C (n=27)	Group D (n=27)	P value
At the end of recovery time	1.4 ± 1.7 16 (59%)	0.9 ± 1.6 10 (37%)	1.2 ± 1.7 12 (44%)	2.8 ± 2.5 18 (66%)	0.002* 0.115
6 hours after operation	0.7 ± 0.8 15 (55%)	0.9 ± 1.6 10 (37%)	0.8 ± 1.5 11 (40%)	1.8 ± 1.9 17 (63%)	0.023* 0.183
24 hours after operation	0.2 ± 0.5 7 (25%)	0.2 ± 0.5 6 (22%)	0.5 ± 1.1 8 (29%)	1.2 ± 1.5 15 (55%)	0.002* 0.026*
48 hours after operation	0.1 ± 0.5 4 (15%)	0.1 ± 0.4 4 (15%)	0.2 ± 0.8 3 (11%)	0.4 ± 1.1 6 (22%)	0.393 0.526

Values are mean ± SD for mean pain score, The number (%) of patients for frequency of pain occurrence, *Statistically significant.

nium bromide 0.1 mg/kg and fentanyl 2 μg/kg. Anesthesia was maintained with oxygen 50%, nitrous oxide 50%, isoflurane 1-1.5% and fentanyl 1 μg/kg/30minutes. Following tracheal intubation, mechanical ventilation was started with 10 ml/kg tidal volume and 10/minutes respiratory rate.

Patients were monitored using pulse oximetry, electrocardiography, respiratory rate and non invasive blood pressure measurement. At the end of operation and before wound closure, the surgeon inserted a number 8 French catheter with 5 pores at the distal part in epidural space of surgical field. Before dressing of surgical wound, 5 or 10ml of prepared and encoded medication was infiltrated by surgeon in epidural space via inserted catheter based on one or two segment procedures, respectively and then the catheter was removed. No surgical drains were used. All syringes were prepared similarly in two groups (5 and 10ml) and enveloped in dark paper because triamcinolone when prepared for injection gives a white opaque solution.

All patients were operated in prone position by one surgeon who was unaware of the medication and the assessments were performed by a blinded anesthesiologist. Systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), and respiratory rate (RR) were recorded at the end of recovery time and in 3hours intervals until 24 hours and then in 12 hours intervals until 48 hours after operation.

Postoperative pain intensity was asked from the patients before discharge from recovery room and at 6, 24 and also 48 hours after operation using an 11-point visual analog scale (VAS), with 0 corresponding to "no pain" and 10 to "the worst imaginable pain". The number of VAS equal to 1-3 was assumed as mild, 4-7 as moderate and 8-10 as severe pain. For postoperative pain relief, patients received morphine sulfate 2mg iv as their request. Ambulation time and hospital discharge time were determined in each patient. Ambulation time defined as the time that the patients can walking in ward with or without help. The occurrence of nausea and vomiting (PONV), urinary retention (need of bladder catheterization) and respiratory depression (SPO_2 <90% or RR<30% baseline) were recorded at postoperative period.

The sample size that was needed to detect a significant difference for pain score between 4 groups with a 1.5 unites of VAS, 0.90 powers and α error of 0.05 was calculated to be 108. Variables in study groups were compared using ANOVA for quantitative variables like age, weight, operation time, SBP, DBP, PR and RR, and chi-square test for nominal variables like sex, ASA, type of operation, pain occurrence and side effects. Kruskal Wallis test was used for comparison of pain intensity, frequency of morphine demand, ambulation time, and discharge time between groups. For comparison of quantitative variables within groups in different situation and between two groups, such as pain score and total morphine consumption, ANOVA was used for repeated measurements, taking baseline values as covariate. Paired t-test was used to compare values in different time with baseline separately.

Values for quantitative variables were reported as mean ± standard deviation (SD), and for qualitative variables as count and percent. For all tests, statistical significance was assumed if $P<0.05$. SPSS software version 16 was used for statistical analysis.

Table 3:The frequency distribution of pain intensity at the end of recovery time.

	Group A (n=27)	Group B (n=27)	Group C (n=27)	Group D (n=27)
Mild or no pain (VAS: 0-3)	24 (89%)	25 (93%)	24 (89%)	16 (59%)
Moderate (VAS: 4-7)	3 (11%)	2 (7%)	3 (11%)	9 (33%)
Severe (VAS: 8-10)	0	0	0	2 (7%)

Values are the number (%) of patients, P=0.003.

RESULTS

All patients in 4 groups completed the study protocol. Demographic data and operation characteristics were similar in study groups (Table 1).

Mean VAS score in group D was higher than the other groups up to 24 hours after surgery. At the time of 48 hours, no significant difference was reported among the groups. The patients in group D had a greater frequency of pain occurrence compared with other groups at the time of 24 hours after surgery (Table 2). Frequency distribution of moderate and severe pain intensity were higher in group D only at the time of discharge from recovery room (Table 3). All parameters related to pain score, pain occurrence, and pain intensity were not significantly different among groups A, B and C.

The numbers and percent of patients that requiring morphine sulphate after operation in groups A, B, C, and D were 6(23%), 7(26%), 7(26%) and 17(63%), respectively (P=0.004). The mean total morphine consumption after operation in 4 groups were 1.4 ± 1.5, 1.4 ± 1.3, 1.4 ± 1.3 and 4.6 ± 2.1 mg, respectively (P=0.001). The patients in group D received more morphine as an analgesic up to 48 hours after surgery. Mean ambulation time and mean discharge time in 4 groups were 25.8 ± 5.1, 23.1 ± 7.1, 25.9 ± 7.2, 33.3 ± 17.5 hour (P=0.008) and 3.2 ± 0.4, 3.1 ± 0.3, 3.2 ± 0.4, 3.5 ± 0.5 day (P=0.011), respectively.

There were also no significant differences among the groups with respect to SBP, DBP, PR, and RR at the times of before operation, discharge from recovery and in postoperative period up to 48 hours. The postoperative SBP, DBP, PR, and RR compared with that of baseline values (before operation) were not significant in each group.

The number of patients who experienced PONV in groups A, B, C, and D were 4, 3, 4, and 5, respectively. The number of patients who experienced urinary retention were 3, 2, 4, and 3, respectively. No patients developed respiratory depression. There were no significant differences in the incidence of PONV and urinary retention at postoperative period.

DISCUSSION

The current randomized, placebo-controlled study was performed to assess the postoperative pain score, opioid requirement, ambulation time and discharge time in patients underwent lumbar discectomy using an intraoperatively placed epidural catheter in surgical field with single administration of bupivacaine 0.25% alone, bupivacaine plus triamcinolone 40 mg and bupivacaine plus pethidine 50 mg at the end of surgery.

In this study, the treated groups of lumbar discectomy patients who received bupivacaine or bupivacaine-triamcinolone or bupivacaine-pethidine showed significantly better results than the placebo group for most parameters. The patients who treated with one of three drug protocols, had lower postoperative pain in recovery room and at the time of 24 after surgery, lower morphine requirements up to 48 hours after operation, shorter ambulation time and shorter discharge time from hospital. There were not any statistically differences between three drugs groups in order to above variables.

Patients undergoing spinal surgery may suffer from significant postoperative pain. In previous studies, epidural analgesia has been shown to be safe and effective and may confer some advantages over systemic opioid-based analgesia. Gottschalk and co-work-

ers demonstrated that in major lumbar spinal surgery, continuous epidural infusion 12 ml/h of ropivacaine 0.1% after an initial bolus of 10 ml of drug during the postoperative period, results in better pain control and lower opioid requirement when compared with placebo (4). In our study, bupivacaine 0.25% alone or combined with opioid or steroid had similar results compared with this study. Epidurally introduced local anesthetics in both studies can diminished significantly pain experience at the operation site.

In present study, addition of triamcinolone to bupivacaine had no significant effects on the postoperative pain score, opioid requirement, ambulation time and discharge time. Epidural steroid injection can improve analgesia in chronic pain setting. Injection of steroids in epidural space was shown to be effective and safe in low back pain related to disc herniation (16,17). In two study, extra-dural or intratechal triamcinolone were effective in the relief of acute postdiscectomy pain (18,19). In these studies, neuraxial steroid was administered without local anesthetics but in present investigation, bupivacaine was supplemented with triamcinolone 40 mg. For acute pain control, adding of steroid to local anesthetic may not significantly change the potent and long acting analgesic property of bupivacaine. Addition of triamcinolone 40 mg to bupivacaine 0.5% offers no advantage over plain bupivacaine when used for ilioinguinal block for postoperative pain relief after inguinal hernia repair (20).

Numerous studies have shown that the opiates alone or in combination with local anesthetics produce a postoperative analgesia after spinal surgeries when injected into epidural space.

Epidurally introduced morphine provides better analgesia and a reduction in early postoperative analgesic requirement after spinal surgery (7,21).

In another study, continuous epidural infusion of fentanyl was superior to intravenous patient control analgesia based morphine in the management of pain after lumbar laminectomy (22). In two studies administration of fentanyl plus local anesthetics to epidural space resulted in safe and effective control of postoperative pain after spine deformity surgery (23,24). Although these studies are in line with our results, lack of control groups in two later studies are important methodologic difference with present study.

Pethidine was chosen in our study as it has lipophilic property in addition to a local anesthetic action. Ruttar demonstrated that pethidine was more effective than morphine when injected to epidural space, probably due to the use of larger dosages (25). So far no study compared the effect of local anesthetics supplementation with pethidine for better postoperative pain control after spinal surgery. In our study addition of pethidine to local anesthetics had no any effect on postoperative pain compared with local anesthetic alone. Neuraxial administration of lipophilic narcotics tends to provide shorter duration of analgesia than the narcotics with hydrophilic property (1). Epidural pethidine 25 mg plus adrenaline 50 micrograms for analgesia after caesarean section had only a median duration of analgesia to 196 min 26. Based on these data and like triamcinolone, addition of pethidine 50 mg to bupivacaine could not increase the duration or intensity of analgesia.

Postoperative pain at 48 hours after operation was not different between 4 groups. This may be due to termination of bupivacaine or pethidine analgesic effect without beginning of anti inflammatory property of triamcinolone. The frequency of pain occurrence and pain intensity in treated groups was lower than control group only in one time after surgery. This is probably due to low sample size which may be inadequate to demonstrate a detectable difference of these variables in order to postoperative times.

The lack of respiratory depression and hemodynamic instability in this study may be because of using low dose drugs. In addition, we completely avoided the administration of opiates as premedication.

In conclusion, this study demonstrated that epidural administration of bupivacaine 0.25% in patients, who undergo lumbar discectomy, effectively reduced pain scores, opioid consumption, ambulation time, and hospital stay when compared with placebo. Triamcinolone 40 mg or pethidine 50 mg added to bupivacaine provided similar postoperative pain control to bupivacaine alone.

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