

# Use of Epidural Opioids for Postop Analgesia after Abdominal Hysterectomy: Comparison of Bupivacaine 0.375% and Bupivacaine 0.125% plus Buprenorphine 0.3 Mg

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## ABSTRACT

**Background:** Epidural administration of drugs, both opioids and non opioids for management of acute postoperative pain has gained wide spread popularity.

**Aim:** To assess the effect of buprenorphine administered together with bupivacaine into the epidural space, on the intensity and duration of postoperative pain relief and to assess the complications.

**Methods:** This study included 80 women who underwent hysterectomy by laparotomy. The operations were performed under general anesthesia. The epidural analgesia was given at the time of closure of peritoneal cavity. In the postoperative period, the epidural analgesia was given to the two groups as boluses, while assessing the intensity and duration of pain relief in both the groups. Any complication relating to the opioids and bupivacaine was also noted. The effects on hemodynamics (blood pressure, heart rate) were also recorded.

**Results:** Significant reduction in the intensity of pain was noted in the group B receiving bupivacaine plus buprenorphine as compared to group A receiving bupivacaine alone. No patient in the group B required the rescue analgesia and one patient developed respiratory depression. Moreover lower values of mean arterial pressure were recorded in group A, whereas significantly slower heart rate were found in the 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> hour of post operative period in group B.

**Conclusions:** The addition of opioids along with the local anesthetic agents in epidural space improves the quality of analgesia by decreasing mean pain score and prolonging the duration of analgesia.

**Keywords:** Analgesia, Epidural, Bupivacaine, Buprenorphine

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## INTRODUCTION

The effective management of acute postoperative pain as well as of chronic pain is one of the primary skills of competent anesthetist. Apart from the emotional suffering that it produces, acute postoperative pain influences significantly the morbidity and mortality figures in surgical patients. This is especially true in major abdominal or abdomenothoracic surgery, where inefficient analgesia may contribute to higher postoperative morbidity and mortality<sup>1,2</sup>.

Epidural administration of drugs both opioids<sup>3,4</sup> and non opioids<sup>5,6,7</sup> for management of acute postoperative pain has gained wide spread popularity in the recent past. However, the side effects have also been reported, the most serious being respiratory depression with use of opioids and disturbance of haemodynamic with the use of local anaesthetics.<sup>8,9,10</sup> The combination of drugs has reduced the side effects of both types of drugs.

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Postoperative epidural analgesia with local anesthetic solution is known to have beneficial effects on patient's outcome after major abdominal surgery. However the use of local anesthetics alone for the postoperative epidural analgesia is unsatisfactory because of motor blockade when administered in doses sufficient for analgesia.<sup>11</sup> Epidural opioids combined with local anesthetic solution improve the quality of postoperative analgesia reducing the dose related adverse effects of either class of the drugs when used alone.

## MATERIAL AND METHODS

This study was conducted at Department of Anesthesia and Intensive Care Unit, Bahawal Victoria Hospital, Bahawalpur from January 1, 2013 to November 30, 2013. The study was conducted on 80 patients. The patients were divided into two groups, each group comprising 40 patients, using non probability convenience sampling technique. This was a comparative study.

Patients belonging to ASA status I and II, of age ranging between 45-60 year, body weight 50-70kg, undergoing elective abdominal hysterectomy were included in this study. Patients with the history of

allergy to local anaesthetic agents or opioids, patients with biochemical evidence of hepatic or renal dysfunction were excluded from the study. Patients with local sepsis or deformity and patients with coagulation profile abnormality or on anticoagulant therapy were also excluded.

Every patient was examined an evening before operation. Complete general physical examination and systemic examination of all the patients were done. Patients were reassured and informed consent from each patient was taken. Premeditation, Tab Alprazolam 0.5mg was given to every patient at bed time. Intravenous access was gained with 18G I/V cannula. Epidural Catheter was inserted in the lumbar region of every patient before induction of general anesthesia. Patients in both groups were given endotracheal general anesthesia with I/V thiopentone sodium 4-6mg/kg body weight. Intubation was facilitated by atracurium 0.6 mg/kg body weight and anesthesia was maintained using 40% oxygen and 60% N<sub>2</sub>O and 1-2% isoflourane.

At the time of closure of peritoneal cavity the epidural analgesia for post operative pain relief was given using the following regimens.

Group A: injection Bupivacaine 0.375% 10ml.  
Group B: injection Bupivacaine 0.125% plus injection Buprenorphine 0.3mg 15 ml.

Postoperatively the patients (group A and B) were given epidural analgesia at 8 hours interval of the specified drugs with mentioned concentration and volume. Rescue analgesia was given using bupivacaine 0.25% 10ml alone. Pain intensity at rest and during coughing was evaluated using a 10cm visual analogue scale with end points labeled no pain and worst possible pain after tracheal extubation at 0, 3, 6, 9 and 20 hours. Pain score  $\geq 3$  was considered as significant. Duration of analgesia was assessed by subjective assessment by the patient.

Mean arterial pressure was measured automatically using a noninvasive oscillometric method and heart rate read from ECG monitor. Nursing staff of ICU filled the proforma showing hourly record of blood pressure, heart rate, respiratory rate and pain score at rest and coughing. Any complication was also recorded. Results were analyzed using SPSS-16. Statistical significance was analyzed by applying student t test and Chi square test with  $p < 0.05$  being significant.

**RESULTS**

A total of eighty patients were included in this study. The mean age of patients in group A (injection Bupivacaine 0.375%) was  $52 \pm 7$  years while in group B (injection Bupivacaine 0.125% plus injection Buprenorphine 0.3mg), it was  $53 \pm 6$  years. The mean

weight of patients in group A was  $54 \pm 4$  Kg while in group B was  $55 \pm 4$  Kg.

The number of patients having ASA grade I was 23 in group A while there were 19 patients in groups B. There were 17 patients in group A while 21 in group B having ASA grade II. Comparative variability of heart rate and mean arterial pressure in both groups of patients is shown in Table 1 and 2 respectively. The duration of pain relief in the patients with bupivacaine 0.125% plus buprenorphine 0.3mg was  $538 \pm 72$  minutes which is significantly better than in the patients with bupivacaine 0.375% alone having a mean duration of analgesia  $139 \pm 13$  minutes ( $p$  value  $< 0.05$ ).

Pain score of the patients with bupivacaine plus buprenorphine was significantly better than the pain score of the patients with bupivacaine alone ( $P < 0.05$ ). Mean visual analogue pain score at rest and during coughing in shown in Table 3 and 4 respectively.

Table 1: Comparative variability of heart rate in both groups

Time	Group A	Group B
0-hours (Extubation)	80±7	80±5
3 hours	65±6	75±5
4 hours	60±5	70±6
5 hours	55±6	72±6
6 hours	54±5	68±5
7 hours	55±6	70±7
8 hours	57±5	77±8
9 hours	56±7	73±7
20 hours	60±6	70±6

Table 2: Comparative variability in mean arterial pressure in both groups

Time	Group A	Group B
0-hours (Extubation)	95±10	95±10.5
3 hours	90±12	80±11.5
6 hours	95±10.5	70±5.5
9 hours	100±8	72±5.8
20 hours	101±8.5	75±10

Table 3: Mean Pain Score (0-10) at Rest (VSA-R) after Extubation

Time	Group A	Group B
0-hours (Extubation)	0.25±0.55	0.25±0.54
3 hours	1.5±0.50	0.5±0.50
6 hours	3.00±0.50	0.75±0.51
9 hours	3.5±0.52	1.5±0.54
20 hours	3.5±0.55	1.5±0.53

Table 4: Mean pain score (0-10) during coughing (VAS-C) after extubation

Time	Group A	Group B
0-hours (Extubation)	0.25±0.55	0.25±0.20
3 hours	3.0±0.50	0.25±0.25
6 hours	4.0±0.72	0.5±0.50
9 hours	4.5±0.53	2.5±0.5
20 hours	5±0.50	2.5±0.5

Fig. 1: Mean pain score (0-10) at rest (VSA-R) after extubation

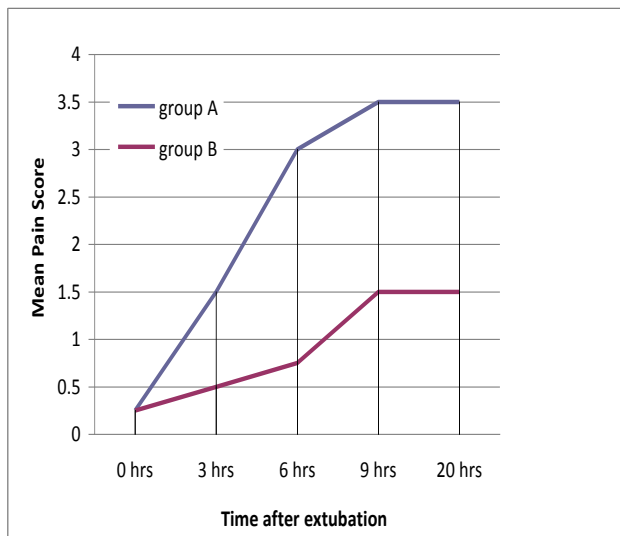
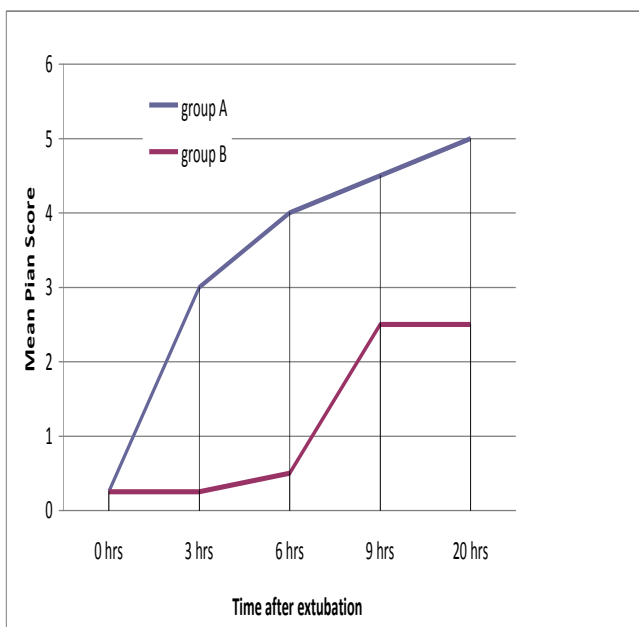


Fig. 2: Mean pain score (0-10) during coughing (VAS-C) after extubation



## DISCUSSION

We have done this study on 80 patients to evaluate the postoperative analgesia by the addition of opioids to the local anesthetic solution for use in epidural anesthesia. The results correlate well with the work done by the others. The group B patients receiving buprenorphine and bupivacaine have resulted in better pain scores and patients satisfaction.

Several authors have suggested that this combination may produce a synergistic effect, while reducing the incidence of side effects<sup>11,12</sup>. The side effects associated with bupivacaine include

sympathetic blockade resulting in hypotension, as well as sensory and motor blockade yielding discomfort or difficulty with ambulation, and it is dose dependent phenomenon<sup>13,14</sup>.

Various studies investigated the influence of dose, volume and concentration on the development of extradural blockade produced by lower lumbar injection of bupivacaine<sup>11,15</sup>. In our study the arterial blood pressure in both the groups was stable following surgery although systolic blood pressure was lower but no medication was needed for hypotension. Also the heart rates were towards lower side in group A.

We have chosen buprenorphine in our study because of unavailability of fentanyl and sufentanyl and because it is a better analgesic than other available opioids. It has been shown to be a better analgesic when given epidurally than morphine. Buprenorphine is a relatively new synthetic opioid with both agonist and antagonist properties, and has high receptor affinity and lipid solubility with less physical dependence.<sup>16,17</sup> Unlike morphine, the more lipid soluble and less water soluble drugs such as buprenorphine are less likely to cause late respiratory depression unless an extremely large dose is used<sup>18,19</sup>.

We found statistically significant difference in the pain relief scores between the study groups. There is also significant statistical difference in the duration of analgesia. Both the duration and quality of analgesia was significantly better with buprenorphine plus bupivacaine than with bupivacaine alone. We used bupivacaine 0.125% and buprenorphine 0.3mg and had the superior pain scores (VAS 0.50±0.50) as compared to bupivacaine alone (VAS 1.50±0.50) at 3 hours. Afterward scores increased in both the groups but lesser increase in the group B patients.

The possible side effects of extradural buprenorphine including nausea, vomiting, dizziness and drowsiness<sup>20,21</sup>. In our study there were no major adverse effects such as respiratory depression. The ideal dose of buprenorphine to add to the intrathecal space was 3µm/kg, which produced the same duration of analgesia as 7µgm/kg of morphine, but with fewer side effects. It was shown that epidural administration of 0.3mg buprenorphine was safe and effective for postoperative pain relief<sup>8</sup>. In contrast, it was reported that 0.3mg buprenorphine administered epidurally provided similar analgesia to 4mg morphine, and did not offer any advantage over morphine. However a high incidence of pruritis and urinary retention was reported with the administration of morphine<sup>22</sup>.

The safety of opioids bupivacaine mixtures given was also demonstrated in this study. No patient suffered clinical respiratory depression.

Cardiovascular stability was obtained and postoperative hypotension did not occur. More experience work is needed in order to find out the lowest effective doses of bupivacaine in combination with buprenorphine to improve postoperative analgesia.

## CONCLUSION

The addition of opioids along with the local anesthetic agents in epidural space improves the quality of analgesia by decreasing mean pain score and prolonging the duration of analgesia.

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