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Original Research Article

Postoperative Analgesia in Patients Single Shot Epidural Dexamethasone to Bupivacaine Undergoing Lower Abdominal Surgeries

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Abstract: ***Background:*** Good postoperative analgesia helps to reduce postoperative stress response, improve patient satisfaction, and improve outcome. Epidural block with local anaesthetic with or without additives is being used for perioperative analgesia. Various additives have been used to enhance the effect of regional blocks including epidural blocks. ***Objective:*** To assess the postoperative analgesia in patients single shot epidural dexamethasone to bupivacaine undergoing lower abdominal surgeries. ***Methods:*** This was a prospective, randomized, double blind study carried out at the Dept. of Anesthesia, Sheikh Russel National Gastroliver institute and hospital, Mohakhali, Dhaka, Bangladesh from July to December 2021. One hundred (100) adults patients of ASA physical status I and II of age Group 16-65 years and undergoing routine elective lower abdominal surgery. The patients were randomized into two groups. Group A received 9ml of 0.5% bupivacaine plain with 1 ml of normal saline. Group B received 9ml of 0.5% bupivacaine plain 9 ml with 1 ml of dexamethasone (4mg). After standard balanced anaesthesia technique, patients were observed in postoperative period for pain and hemodynamic variables accordingly. ***Results:*** In our study 100 patients belonging to ASA physical status I and II undergoing lower abdominal surgery under general anaesthesia were studied. The patient's age ranged from 16 to 65 years. Our study showed significantly longer duration of analgesia of 8 hours when dexamethasone was added to bupivacaine for single shot epidural injection compared to four and half hours when bupivacaine alone was used ($p<0.001$). Consumption of rescue analgesic, Tramadol, was significantly lower in dexamethasone group in 24 hours (168.32±49.72 mg in Group A and 113.72±60.57mg in Group B, $p<0.001$). No adverse events were noted. The both groups the lowest blood pressure was observed at ½ hours following the block and highest at 6 hours. While comparing the two groups at 6 hours the blood pressure in Group B (120.56±12.06) was significantly less than that in Group A (125.90±9.54) ($p=0.024$). No significant difference was observed at ½ hours, 12 hours and 24 hours after the block. ***Conclusion***: In conclusion, the quality of analgesia it offers not only in post-operative pain but also in labour analgesia and chronic pain management. Addition of dexamethasone to bupivacaine for single shot epidural block almost doubled the duration of analgesia. Single shot epidural block using bupivacaine with addition of dexamethasone provides effective post-operative analgesia and significantly reduced the postoperative rescue analgesic requirement.

Keywords: Bupivacaine, Dexamethasone, Epidural Analgesia, Postoperative Pain.

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INTRODUCTION

Good postoperative analgesia helps to reduce postoperative stress response, improve patient satisfaction, and improve outcome [1, 2]. The World Health Organization (WHO) states that 80% of people worldwide do not receive adequate treatment for pain. Based on that, one in four patients had adequate relief of post-operative pain (POP) [3, 4]. The regional nerve blocks serve dual purpose of anaesthesia for operation as well as analgesia for post- operative pain for considerable amount of time. Among the various regional blocks, epidural block with local anaesthetic with or without various additives is being used for intraoperative and post-operative analgesia. Dexamethasone is a high-potency, long-acting glucocorticoid with little mineralocorticoid effect that has been used for prophylaxis of post-operative nausea [5]. Single doses of dexamethasone and other glucocorticoids have also been reported to improve analgesia after various operations [6, 7], whether by oral [8] or intravenous (I.V.) [9] routes. Some studies revealed that epidural bupivacaine-dexamethasone admixture had almost the same analgesic potency as bupivacaine-fentanyl with opioid sparing and antiemetic effects [10]. Epidural anaesthesia with a local anaesthetic is known to provide better quality of postoperative analgesia in comparison with systemic opioids. It also lowers perioperative morbidity and mortality as compared to general anaesthesia alone [11]. Various additives have been used to enhance the effect of regional blocks including epidural blocks. Addition of dexamethasone has been reported to result in quicker onset of action and prolonged duration of analgesia when used as additive in brachial plexus block. However, data on use of dexamethasone in epidural space for acute postoperative pain relief in lower abdominal surgeries is scarce. This study was designed to find out postoperative analgesia in patients single shot epidural dexamethasone to bupivacaine undergoing lower abdominal surgeries.

MATERIALS AND METHODS

This was a prospective, randomized, double blind study carried out at the Dept. of Anesthesia, Sheikh Russel National Gastroliver institute and hospital, Mohakhali, Dhaka, Bangladesh from July to December 2021. One hundred (100) adults patients of ASA physical status I and II of age Group 16-65 years and undergoing routine elective lower abdominal surgery. The patients were divided randomly into two equal groups using computers generated sequence maintained in sequentially numbered opaque envelopes and the study medication was given according to following distribution. Group A received:-9ml of 0.5% bupivacaine plain with 1 ml of NS Group B received: - 9ml of 0.5% bupivacaine plain 9 ml with 1 ml of dexamethasone (4mg) Allergy or any contraindication to study medication, ASA III and above, any contraindication to steroid- diabetes mellitus, hypertension, immunocompromised patient, morbidly obese patient and contraindication to epidural block- anticoagulant therapy, spine pathology and deformities were used as exclusion criteria. Medications used in the study involved 0.5% isobaric bupivacaine and dexamethasone.

Anaesthetic Technique

All recruited patients and their relatives were informed regarding the study, medication being used and expected co-operation from them for the study during pre- anesthetic check up in the ward, the evening before the surgery. Informed written consent was obtained from each patient for accepting participation in the study. During the visit, the patient was familiarized and explained about the use of visual analogue scale (VAS) for pain assessment (0 as"no pain at all" to 10 as "worst imaginable pain"). All the patients were premedicated with diazepam approximately 0.2mg/kg given orally at night and morning before surgery. On the day of operation, intravenous cannulation was established and patient monitor was attached for monitoring vital parameters (heart rate, NIBP, SpO2). The study medication was prepared by anesthesia assistant not involved in the study and the patients were also unaware of the drug administered. Epidural catheter was inserted in sitting or lateral position under all aseptic conditions. Heart rate and BP after injection were monitored and noted. Then the patient was positioned for general anesthesia. Anesthesia was induced using propofol (2ml/kg) and vecuronium was used for facilitation of endotracheal intubation and muscle relaxation, injection pethidine (1mg/kg) was used for analgesia. Patients were mechanically ventilated with oxygen and isoflurane. Parameters monitored intraoperatively included non-invasive blood pressure (NIBP), heart rate, and pulse oximetry. The cumulative dose of pethidine and time of last pethidine supplement were recorded. All the patients received epidural block (bupivacaine with or without dexamethasone) 15 minutes prior to completion of surgery. The residual neuromuscular blockade was reversed using neostigmine and glycopyrrolate. VAS score for pain, level of consciousness, systolic BP, SpO2 were recorded starting at 30 minutes postoperatively, and then at six hours intervals for 24 hours. After each VAS score patient was asked if he/she required additional analgesics regardless of his /her VAS score. Every patient was also instructed to request

analgesics from the nurse whenever he/she required pain relief, and not to wait for their next scheduled pain assessment. Tramadol 50 mg intravenously was given as rescue analgesic. No other analgesics or sedative was given for 24hrs after surgery. Time to first analgesia after surgery, hemodynamic variables (MAP, HR, SpO2) and occurrence of intra or post-operative adverse events if any were noted.

Pain Management

The pain intensity was measured regularly at intervals mentioned above by using 10 cm Visual Analogue Scal (VAS). VAS ruler consisted of a 10 cm horizontal line with 'no pain' at one end and worst imaginable pain at other end. Then the intensity of pain was assessed by asking the patient to grade the severity of pain they felt by pointing on the scale. The distance from patient's mark in cm from no pain (end 0) in whole number was taken as numerical index of the severity of pain. If the severity of pain (VAS score) was more than four, then Tramadol 50 mg was given slowly to the patient as a rescue analgesic and repeated if required. Time of administration of rescue analgesic and the total analgesic requirement in the post-operative period for 24 hours were noted. Time of administration of first dose of rescue analgesic was considered as the time of termination of post-operative analgesic effect of epidural block.

Statistical Analysis

Sample size calculation was based upon the standard deviation of total Tramadol consumption in 24 hours postoperatively from patients who participated in a pilot study with a similar anesthetic and analgesic treatment. Assuming $\alpha = 0.05$, and power of study 80%, 45 patients per group were required to detect a difference of Tramadol consumption. Data were entered into the master sheet in Microsoft Excel, Statistical Package for Social Science (SPSS version 20) was used for data analysis. Results were compared using independent t-test for continuous variables and chi square test for discrete variables. Level of significance was set at $p<0.05$.

RESULTS

In our study 100 patients belonging to ASA physical status I and II undergoing lower abdominal surgery under general anaesthesia were studied. The patients age ranged from 16 to 65 years. The demographic parameters of the patients of both the groups were comparable (Table-1). Table-2 shows that duration of analgesia following the administration of epidural block and analgesic consumption in 24 hours are given. Our study showed significantly longer duration of analgesia of 8 hours when dexamethasone was added to bupivacaine for single shot epidural injection compared to four and half hours when bupivacaine alone was used ($p<0.001$). Consumption of rescue analgesic, Tramadol, was significantly lower in dexamethasone group in 24 hours (168.32±49.72 mg in Group A and 113.72±60.57mg in Group B, $p<0.001$).

Table 1: Comparison of age, sex and weight (N=100)

Variable	Group		P value
	A (n=50)	B (n=50)	
Age (years)	38.2 ±11.3	36±10.2	0.219
Sex			
Female	36(72.0%)	32 (64.0%)	0.651
Male	14 (28.0)	18 (36.0%)	
Weight (Kg)	53.2±11.82	54.8±11.3	0.522

Table-2: Comparison of duration of analgesia following epidural block (N=100)

Group	**duration ±SD Time**
Bupivacaine only (Group A)	4.5±2.6
Bupivacaine wih Dexamethasone (Group B)	8.0±2.5

The pain VAS score and vital hemodynamic parameters documented at 0 hours, ½ hours, 6 hours, 12 hours, 24 hours after single shot epidural block administration. After ½ hours of block administration (end of surgery) the mean pain VAS scores (±SD) was comparable between the groups, 1.63 (±0.86) vs 1.27±0.81 ($p > 0.05$). The difference was highly significant. At 6 hours, mean VAS score ±SD for pain in Group A was more than that of Group B and the difference was statistically highly significant (3.09 ±0.67 vs 2.34 ±1.11 with p value <0.001). At 12 and 24 hours mean VAS was again comparable (Fig-1).

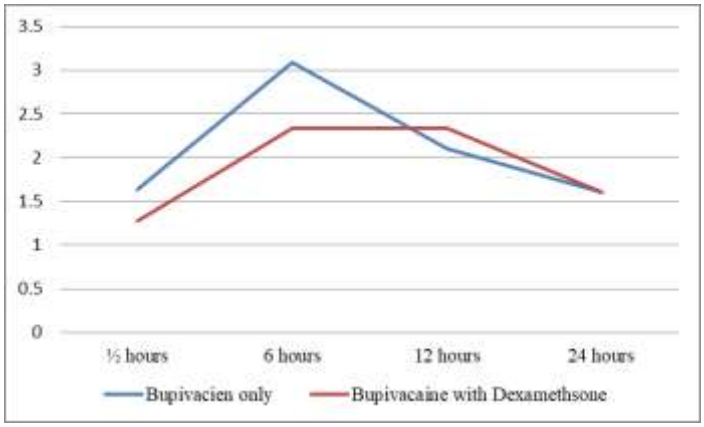

Figure 1: Comparison of VAS Score.

Fig-2 shows that the both groups the lowest pulse rate was observed at ½ hours following the block and highest at 6 hours. While comparing the two groups at 12 hours the pulse rate in Group A (81.20±7.48) was significantly less than that in Group B (85.34±9.01) (p-value 0.022). No significant Time (hours).

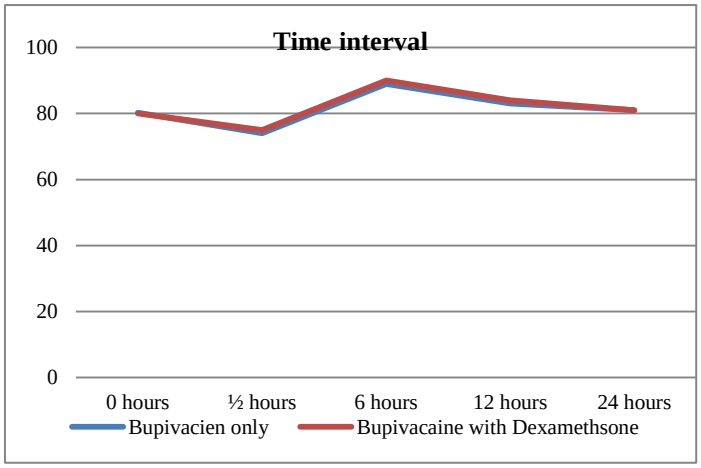

Figure 2: Comparison of Heart rate following block.

Fig-3 shows that the both groups the lowest blood pressure was observed at ½ hours following the block and highest at 6 hours. While comparing the two groups at 6 hours the blood pressure in Group B (120.56±12.06) was significantly less than that in Group A (125.90±9.54) (p=0.024). No significant difference was observed at ½ hours, 12 hours and 24 hours after the block.

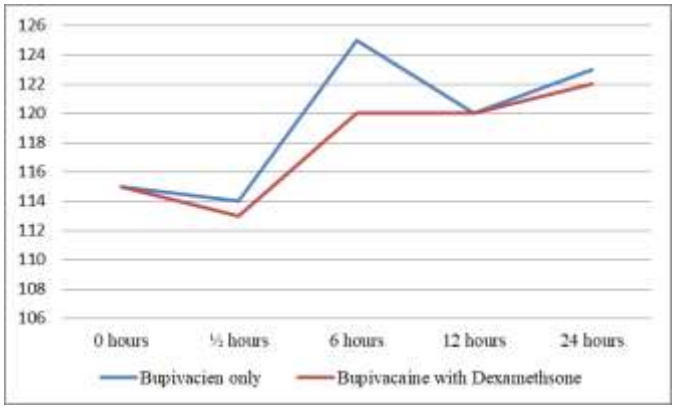

Figure 3: Comparison of systolic blood pressure following between two groups.

DISCUSSION

In our study postoperative pain has still remained a concern to practicing clinicians despite development and advances in various newer techniques and modalities for its management. Epidural techniques are particularly effective at providing dynamic analgesia, allowing the patient to mobilize early and resume normal activities [12]. In our study 100 patients belonging to ASA physical status I and II undergoing lower abdominal surgery under general anaesthesia were studied. The patient's age ranged from 16 to 65 years. The demographic parameters of the patients of both the groups were comparable. Duration of analgesia following the administration of epidural block and analgesic consumption in 24 hours were given. Our study showed significantly longer duration of analgesia of almost 8 hours when dexamethasone was added to bupivacaine for single shot epidural injection compared to four and half hours when bupivacaine alone was used ($p<0.001$). The difference was highly significant. The pain VAS score and vital hemodynamic parameters documented at 0 minutes, ½ minutes, 6 hours, 12 hours, 24 hours after single shot epidural block administration. Epidural analgesia has been shown to have benefits over conventional intramuscular opioid analgesia and patient controlled analgesia using opioids. It provides excellent pain relief associated with minimal side effects and better patient satisfaction in comparison to other methods of analgesia [13]. Since dexamethasone, a steroid additive has been shown to hasten the onset and prolong the duration of regional blocks when used with local anaesthetic, we chose it as the study medication. In order to give adequate time for onset and longest possible duration of analgesia we injected the study medication approximately 15 minutes prior to the end of surgery. Our study as it has the best pharmacological profile for postoperative analgesia when used as single shot. Similarly no significant difference was observed between the groups in respect to type of surgical procedures, duration of anaesthesia and surgery, intra operative fluid administered, urine output and intraoperative analgesic requirement [14-16]. Epidural analgesia with local anaesthetics combined with opioids has been shown not only to provide better analgesia but also to improve post-operative outcome. Thus the findings in their study compares with our study quite well though they had much longer duration of analgesia with combination arm of their study. Our study showed significantly longer duration of analgesia of 8 hours when dexamethasone was added to bupivacaine for single shot epidural injection compared to 4 and half hours when bupivacaine alone was used. When dexamethasone 4-8mg was added as adjuvant to 2% lignocaine with adrenaline and 0.5% bupivacaine mixture for brachial plexus block in patients undergoing upper limb surgeries, Shrestha *et al*., [17] observed almost 4 times longer (12.75 hours Vs 3.11 hours) duration of analgesia as compared to the mixture without dexamethasone. Significantly higher VAS for pain at 720 minutes in combination group similarly corresponds to the termination of effect of block and need of rescue analgesic in Group B. At this point of time, the group receiving bupivacaine alone expectedly had lower VAS owing to the effect of the rescue analgesic already received. Thereafter, the VAS for pain was lower in both the groups. In other words, addition of dexamethasone to bupivacaine for single shot epidural block almost doubled the duration of analgesia. Similar analgesic sparing effect of single shot dexamethasone has been observed by Thomas and colleagues when epidural administration of dexamethasone with or without bupivacaine was used in patients undergoing laparoscopic cholecystectomy [16]. Their study showed more than 50% reduction in post-operative morphine consumption. Similar to the observation of VAS for pain, the maximum pulse rate was observed at 6 hours after the block in both the groups. Significantly higher blood pressure (systolic) was observed in group receiving bupivacaine alone in comparison to bupivacaine and dexamethasone at 6 hours (125±9.5 vs 120±12 mm of Hg, p-value 0.024). Post-operative analgesic (Tramadol) requirement in our study has clearly demonstrated analgesic sparing effect of single shot dexamethasone added to bupivacaine for epidural analgesia. We observed almost 33% reduction in analgesic requirement in the group receiving combination of dexamethasone and bupivacaine for epidural analgesia. Thomas and collegues *et al*., [18] also observed significantly lower VAS in the postoperative period up to 24 hours in the groups receiving epidural dexamethasone added to bupivacaine as compared to those receiving saline. This also corresponds closely with the time of termination of duration of analgesia in that group. Although using patient controlled analgesia will achieve ideal post-operative pain control, it may not allow the observer precisely to pick-up the accurate maximum VAS scores in relation to time.

CONCLUSION

In conclusion, the quality of analgesia it offers not only in post-operative pain but also in labour analgesia and chronic pain management. Our study has shown that single shot epidural block using bupivacaine alone provides effective post-operative analgesia for almost 4 hours and 51 minutes which can be further prolonged to around 7

hours by addition of dexamethasone while significantly reducing the postoperative analgesic requirement. Based on one finding we recommend the use of dexamethasone as additive to local anaesthetics for single shot epidural analgesia wherever appropriate.

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