ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 11,S Iss 3, Dec 2022

A Comparative Study Of Motor Block And Duration Of Analgesiabetween Epidural Bupivacaine With Low Dose Butorphanol And Epidural Bupivacaine Alone In Patients Undergoing Elective Infra Umbilical Surgeries

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ABSTRACT

Background: The international organization for the study of pain defines pain as an unpleasant sensory and emotional experience linked to actual or potential tissue damage, or expressed in terms of such harm.

Aim and Objective: The present research was aimed to compare the duration of Sensory block Motor block and analgesia between epidural bupivacaine with low dose butorphanol and epidural bupivacaine alone in patients undergoing elective infra umbilical surgeries

Methodology: This prospective, randomized clinical trial was carried out between the years of 2018 and 2020 at Santosh Medical College & Hospital in Ghaziabad, Uttar Pradesh, with approval from the Board of Studies and Ethical Committee. The whole sample included 60 ASA grade I/II patients.

Result: The study population consisted of 76.7% males and 23.3% females. The mean age of the study population consisted was 39.26±10.82 years among Group Bupivacaine and 36.44±10.19 years among Group Bupivacaine + Butorphanol. The mean duration of sensory block and motor block and Analgesia was significantly more among Group Bupivacaine + Butorphanol when compared to Group Bupivacaine.

Conclusion: The study concluded that bupivacaine with low dose butorphanol provided better anaesthetic properties and post operative analgesia when compared to bupivacaine alone.

Keywords: Bupivacaine, Butorphanol, sensory block, Motor block, Analgesia.

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INTRODUCTION

Pain is not just a sensory modality but is an experience. The international association for the study of pain defines pain as an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Other than psychological trauma, pain is shown to affect the physiology of almost all the system including respiratory, cardiovascular and metabolic profile there by increasing the morbidity.[1] Therefore, optimal pain relief is the main consideration for the anaesthesiologist.

The discovery of opioid receptors has opened a new horizon in the pain management. By passing the blood and blood brain barrier, small doses of opioids administered in either the sub arachanoid or epidural spaces provide profound analgesia. This is oneof the major achievement for the management of pain. [2]

Postoperative analgesia is the most important aspect of anaesthesia, especially in major abdominal surgeries. This increases the incidence of postoperative morbidity and leads to delayed recovery. [3] Spinal, epidural, and caudal neuraxial blocks result in sympathetic block, sensory analgesia, and motor block depending on dose, concentration, or volume of local anaesthetic.

Spinal anaesthesia requiring a small mass (i.e., volume) of drug virtually devoid of systemic pharmacologic effect, to produce profound, reproducible sensory analgesia, has become the most suitable and sensible neuraxial technique in day-to-day clinical practice.[4] Regional anaesthesia is the preferred mode of anaesthesia [5] for major abdominal surgeries in present times. While epidural and spinal blockades are well-established regional anaesthetic techniques, combined spinal-epidural technique has become increasingly popular in the last few years. [6] Epidural analgesia provides better analgesia, which may not be achieved with parenteral opioids owing to their innate adverse effects.[7] Epidural administration of opioids as additive to bupivacaine for postsurgical pain relief has resulted in better pain scores.

Bupivacaine is a widely used drug in epidural anaesthesia; it was first synthesized by Ekenstam in 1956 but was introduced in clinical practice by Telivuo and Widman in 1963. It is a type of amide group of Local Anaesthetic and characterized as pipecoloxylidedes as the molecule possess an asymmetric carbon atom. Butorphanol, a kappa agonist with weak mu (μ) agonist/antagonist with relatively high lipid solubility and lesser side effects has been used effectively to produce long-term post-operative pain relief by epidural route.[8,9] It is known to have strong analgesic activity without fear of respiratory depression.

Combination of butorphanol and local anaesthetics has been studied more often during labor in parturients.[10] There is paucity of studies comparing the efficacy of the above mentioned combination in infraumblical surgeries which are cause of morbidity in majority of hospital admissions. Butorphanol has been proven to have minimal side effect profile among opioids.[11] Therefore the present study was designed to compare between epidural, bupivacaine with low dose butorphanol and bupivacaine alone in patients undergoing elective infra-umbilical surgeries.

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MATERIALS AND METHODS

This prospective randomized clinical study was conducted after clearance from Board of Studies and Ethical committee in the Department of Anaesthesiology, Santosh Medical College & Hospital, Ghaziabad, UP during the period 2018-2020. The study population has been calculated by using G-power software with 80% power and 5% of the significance level. The total sample size was determined to be 60 ASA grade I/II patients. The patients were assigned to one of the two groups comprising of 30 patients each. Allocation of the groups was done randomly using sealed envelopes.

Group I, (n = 30): The patients will receive 15ml of 0.5% bupivacaine hydrochloride plus 1.5 mg (3ml) butorphanol. (Total volume of drug-18ml)

Group II, (n = 30): The patients will receive 15ml of 0.5% bupivacaine hydrochloride plus 3ml normal saline. (Total volume of drug-18ml)

Patients belonging to ASA grade 3 and grade 4 and history of drug allergy to local anaesthetics, bleeding diathesis, spine deformities, cardiac, pulmonary, hepatic, renal or neurological disorder, infection in lumbar region and BMI more than 30 were not included in the study.

A thorough pre anaesthetic checkup was done for all the patients. The patients who will fulfill the above inclusion criteria and with none of the exclusion criteria mentioned above was explained about the study. The patients were explained in detail about the procedure of lumbar epidural block. All their queries and doubts were answered to get their confidence and support. Written informed consent was taken. VAS was explained to all the patients and information was given regarding the pain scoring system, which is ranged from 0 to 10, for the determination of pain severity.

The data was entered into the Microsoft excel and the statistical analysis was performed by statistical software SPSS version 21.0. The student t-test was used for comparing the mean values between the 2 groups whereas chi-square test was applied for comparing the frequency. The p-value was considered to be significant when less than 0.05.

RESULTS

In this prospective randomized clinical study, patients undergoing elective infra umbilical operations were compared between epidural bupivacaine, low dose butorphanol, and epidural bupivacaine alone. One of the two groups, each with 30 patients, was given to the patients.

Table1: Demographic data distribution of study subject.

Demographic Distribution		Number (Percentage)
Gender	Male	30 (37.5)
	Female	50 (62.5)
Age (Mean±SD)	Group Bupivacaine	39.26±10.82

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	Group Bupivacaine + Butorphanol	36.44±10.19
Weight (Mean±SD)	Group Bupivacaine	55.62±5.76
	Group Bupivacaine + Butorphanol	57.34±6.35

According to table 1, there were 37.5% male and 62.5% female in the study. Patients receiving bupivacaine had mean age 39.26 ± 10.82 years and weight 55.62 ± 5.76 kg while patients receiving Bupivacaine + Butorphanol had mean age 36.44 ± 10.19 years and 57.34 ± 6.35 kg.

Table 2: Comparison of mean Time taken for onset and duration of sensory block and onset and duration of motor block between Buivacaine and Bupivacaine + Butorphanol groups

Comparison of mean Time		**Mean ± SD**		**p-value**
		Group Bupivacaine	**Group Bupivacaine+Butorphanol**	
Sensoryblock (minutes)	Onset	9.63±1.52	7.00±1.03	<0.001
	Duration	10.37±1.19	13.10±1.47	<0.001
Motor block (minutes)	Onset	11.63±1.52	9.00±1.14	<0.001
	Duration	20.67±2.02	23.43±1.55	<0.001

The mean time taken for onset of sensory block was significantly more among Group Bupivacaine (9.63 ± 1.52) compared to Group Bupivacaine + Butorphanol (7.00 ± 1.03 respectively). The mean duration of sensory block was significantly more among Group Bupivacaine + Butorphanol (13.10 ±1.47 minutes) compared to Group Bupivacaine (10.37±1.19 minutes).

The mean Time taken for onset of motor blockade was significantly more among Group Bupivacaine (23.54±1.5 minutes) compared to Group Bupivacaine + Butorphanol (20.62 ±1.96 minutes). The mean duration of motor block was significantly more among Group Bupivacaine + Butorphanol (23.43 ± 1.55 minutes) compared to Group Bupivacaine (20.67 ± 2.02 minutes).

Table 3: Comparison of mean Duration of Analgesia between Bupivacaine and Bupivacaine+Butorphanol groups.

Groups	**Duration of Analgesia (minutes) Mean ± SD**
GroupBupivacaine	287.34±23.32
GroupBupivacaine+Butorphanol	381.48±25.78

ISSN PRINT 2319 1775 Online 2320 7876

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The mean Duration of Analgesia was significantly more among Group Bupivacaine + Butorphanol (381.48 ± 25.78 minutes) compared to Group Bupivacaine (287.34 ± 23.32 minutes).

DISCUSSION

Effective pain control is essential and has been recognized as a prime concern for anaesthesiologists. [9] Opioids acting on spinal cord receptors provide distinct advantage over its systemic administration in view of better quality of analgesia, lower sedation scores, preservation of physiological function and improved outcome.[11] Epidural analgesia using local anaesthetic agents has been proven to be better than systemic opioid analgesics in providing thoracotomy pain management.[12-15]

Butorphanol, a lipid soluble narcotic, has strong analgesic and sedative properties without respiratory depression. When compared with more potent narcotics such as fentanyl, epidural butorphanol provides significantly prolonged analgesia with minimum cardio-respiratory side effects.[16]

In current study, the mean time taken for onset of sensory block was significantly more among Group Bupivacaine (9.63±1.52) compared to Group Bupivacaine + Butorphanol (7.00±1.03 respectively). The mean duration of sensory block was significantly more among Group Bupivacaine + Butorphanol (13.10±1.47 minutes) compared to Group Bupivacaine (10.37±1.19 minutes). This study showed that the mean Time taken for onset of motor blockade was significantly more among Group Bupivacaine (11.63±1.52 minutes) compared to Group Bupivacaine + Butorphanol (9.00±1.14 minutes). The mean duration of motor block was significantly more among Group Bupivacaine + Butorphanol (23.43 ± 1.55 minutes) compared to Group Bupivacaine (20.67 ± 2.02 minutes).

Kaur et al, [17] studied that the addition of butorphanol & sufentanil to bupivacaine for subarachnoid block and reiterated that the addition of butorphanol significantly prolonged the duration of sensory block. They also found that 90% of patients achieved a bromage scale of 3 in butorphanol group & the duration of motor block was prolonged. Vaghadia et al. observed that opioids like butorphanol increases the sensory block and delays the time of two-segment regression of the sensory level. [18,19] Kumar et al, observed onset of motor blockade 10.1±1.7min with bupivacaine- butorphanol combination in epidural blocks [20] which was slightly lesser than the present study. Kujur et al [21] observed faster onset as well as peak effect of both sensory and motor effect with group B patients as compared to group A patients. Another study also reported similar findings where 2 and 4 mg of epidural Butorphanol has been used. [22]

The mean duration of analgesia in our study was significantly more among Group Bupivacaine + Butorphanol (381.48 ± 25.78 minutes) compared to Group Bupivacaine (287.34 ± 23.32 minutes).

Banerjee and Pattnaik [23] found that the duration of analgesia was significantly longer in butorphanol group. This also correlates with the works of Maliket al. [9] that used 2 mg butorphanol

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epidurally for post-operative analgesia after orthopedic surgeries and found duration to be 5.59 ± 1.15 hrs after the first dose.

Mok and Tsai [24] who did a study to evaluate the analgesic efficacy and safety of epidural butorphanol (4 mg) in comparison to that of epidural morphine 5 mg in patients with post-operative pain. It was observed that the onset of pain relief with epidural butorphanol appeared at 15 minutes and peaked at 30 minutes.

CONCLUSION

Butorphanol administered epidurally has an advantage of longer duration of analgesia than bupivacaine alone. Addition of butorphanol to bupivacaine in infra- umbilical surgeries significantly prolongs the duration of analgesia and motor block and is a remarkably safe. Therefore, bupivacaine with low dose butorphanol provided better anaesthetic properties and post operative analgesia when compared to bupivacaine alone.

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