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COMPARATIVE STUDY OF EPIDURAL 0.5% LEVOBUPIVACAINE AND EPIDURAL 0.5% LEVOBUPIVACAINE WITH DEXMEDETOMIDINE ON SENSORY BLOCKADE FOR PATIENTS UNDERGOING ELECTIVE INFRAUMBILICAL AND LOWER LIMB SURGERIES

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ABSTRACT

Levobupivacaine , the pure S enantiomer of bupivacaine has emerged as a safe local anaesthetic than its racemic counterpart. Dexmedetomidine the novel selective alpha2 adrenergic agonist has several advantages when given through epidural route as an adjuvant. To compare plain 0.5% Levobupivacaine with Dexmedetomidine and 0.5% levobupivacaine epidurally for the time of onset of sensory blockade and its duration. 60 patients undergoing infraumblical and lower limb surgeries were randomized to two groups. Group A(n=30) received only Levobupivacaine 0.5% 20 ml epidurally. Group B(n=30) received 50 mcg of dexmedetomedine with Levobupivacaine 0.5% 20 ml epidurally. The time of onset of sensory blockade, maximum height of sensory blockade and duration of blockade were noted. Statistical work done by student t test and chi-square test and $p<0.05\%$ were taken to be significant. Dexmedetomidine fastens the onset of sensory blockade and the duration of blockade without any significant adverse effects. : We conclude that Dexmedetomidine can be used as an adjuvant to Levobupivacaine which fastens the onset and prolong the duration of sensory blockade.

KEY WORDS: **Levobupivacaine, Dexmedetomidine, Sensory blockade.**

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INTRODUCTION

Regional anaesthesia came in vogue from the time of Sir August Bier in 1898. Intrathecal anaesthesia and epidural anaesthesia are the most popular regional anaesthesia techniques used for lower abdominal & lower limb surgeries[1]. Epidural anaesthesia and analgesia has become one among the best accepted techniques for lower abdominal & lower limb surgeries as it provides good sensory and motor blockade with contracted bowels retaining adequate spontaneous respiration, hemodynamic stability and also an indwelling epidural catheter facilitates further administration of analgesic doses for the postoperative period[2]. In recent years Levobupivacaine, the pure S (-) enantiomer of bupivacaine, emerged as a safer alternative for regional anaesthesia than its racemic parent. It demonstrated less affinity and strength of depressant effects onto myocardial and central nervous vital centres in pharmacodynamic studies and a superior pharmacokinetic profile[9.] Opioids like fentanyl have been used traditionally as an adjunct for epidural administration butt there is always a possibility of an increased incidence of pruritus, urinary retention, nausea, vomiting and respiratory depression.[3] Dexmedetomidine is an alpha 2 agonist which has got numerous beneficial effects when used through epidural route. It acts on both pre and post synaptic sympathetic nerve terminals and central nervous system thereby decreasing the sympathetic outflow and nor epinephrine release causing sedative, anti-anxiety, analgesic, sympatholytic and hemodynamic effects.[7] Dexmedetomidine, made up of medetomidine's dextrogyrous enantiomer,is currently considered a super selective alpha-2 adrenergic agonists prototype and is 1600-folds more selective for alpha-2 receptor. Dexmedetomidine is a highly selective alpha 2 adrenergic agonist with greater receptor affinity than clonidine.[3] In addition it also has hemodynamic stabilising effects and reduction of anaesthetic drug requirements. Epidural Dexmedetomidine does cause a manageable hypotension & bradycardia but the striking feature of this drug is its lack of opioid related side effects like respiratory depression, pruritus, nausea and vomiting. [9] Hence the present study is to evaluate the effects of addition of Dexmedetomidine to epidural 0.5% Levobupivacaine in infraumblical and lower limb surgeries.

AIM

To evaluate the effect of addition of Dexmedetomidine to epidural 0.5% Levobupivacaine solution on the time of onset of sensory blockade at T10 level , the maximum sensory blockade achieved and the time taken to achieve that level.

METHODOLOGY

After getting approval from the institutional ethical committee approval 60 adult patients of either sex belonging to the age group 25-45 years weighing between 50-70kg with BMI ranging between 19-24, undergoing elective infraumblical and lower limb surgeries with site of incision below T10 level were identified and randomly allocated to two groups through lots after getting written informed consent.

GROUP A: 30 patients who received 20 ml of epidural 0.5% Levobupivacaine with 0.5 ml distilled water.

GROUP B: 30 patients who received 20 ml of epidural 0.5% Levobupivacaine with 0.5 ml of Dexmedetomidine containing 50µg. Patients not willing for the study, pregnant women, ASA III & ASA IV patients, patients who are known allergic to study drugs, patients in sepsis, patients undergoing emergency surgeries, patients having infection at the site of injection, coagulopathy or other bleeding diathesis were excluded from the study. After included in the study , the patients were explained about the procedure and and shifted to the operation theatre where a good peripheral intravenous access was secured using 18 gauge cannula and baseline non invasive blood pressure, ECG, pulse rate and Spo_2 were recorded. Injection Midazolam 0.03mg/kg IV was given as standard premedication. All patients received Ringer lactate solution 20ml/kg as preloading solution before the block. Intravenous fluids were given as per body weight and operative loss requirement. Patients were put in right lateral position and skin over the desired site was infiltrated with 1% lignocaine 2ml. L2-L3/L3-L4 interspaces were selected and epidural space identified using 18G Tuohy needles, midline approach, using loss of resistance technique with air. After exclusion of blood in the needle with negative aspiration, 2

ml of 0.5% levobupivacaine was injected to exclude intrathecal placement of the needle. After which epidural catheter was inserted and fixed 5 cm inside. Now patients in group A received 18 ml of 0.5% Levobupivacaine with 0.5 ml distilled water and group B received 18 ml of 0.5% Levobupivacaine plus 0.5 ml of Dexmedetomidine containing 50µg epidurally. Baseline pulse rates, SpO2 at room air, noninvasive blood pressure were recorded. Cardio respiratory parameters were monitored continuously and recordings were made every 5 minutes until 30 minutes and at 10 minute interval for the first 2 hours and thereafter for every hour till 6 hours. Intraoperatively, incidence of bradycardia (heart rate<50beats per minute) will be treated with 0.6mg of injection atropine i.v and hypotension (systolic blood pressure falling more than 20% from the baseline value) will be treated with injection ephedrine 6 mg IV. Time to sensory block at T10 dermatome is the time interval between the initiation of anaesthesia and the onset of cutaneous analgesia at T10.This was evaluated using midline bilateral pin prick every minute till complete loss of cutaneous sensation at T10 at which point surgery was proceeded. Maximum level of sensory block reached and time taken to achieve the same were noted. During surgical procedure adverse effects like nausea, vomiting, dry mouth, dizziness, headache, respiratory depression, pruritus and shivering were recorded. Any postoperative untoward side effects were noted for 48 hours.

STATISTICAL ANALYSIS

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD and results on categorical measurements are presented in percentage. (%). Chi-square test has been used to find the significance of study parameters on categorical scale between two groups. Student't' test has been used to determine the significance between two group means. All analyses were two tailed and p <0.05 was considered significant. SPSS version 16.0 was used for data analysis.

RESULTS

All the 60 patients completed the study protocol. There were no significant differences in the age, sex, ASA physical status, height and weight as mentioned in Table 1.

Table 1
Demographic characteristics

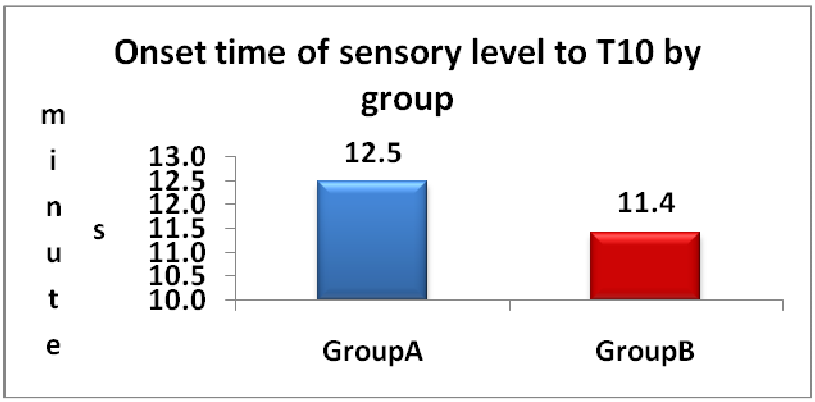
VARIABLE	GROUP A	GROUP B
AGE (YRS)	35.17± 4.969	34.63±5.147
GENDER(N)		
MALE	22	22
FEMALE	8	8
ASA		
1	25	25
2	5	5
WEIGHT(KGS)	61.77±5.250	61.20±4.290

The time of onset of sensory block to T10 level was slightly lesser with group B (12.5 minutes) than group A (11.4 minutes) but was not statistically significant between the two groups with p value being 0.224.

Table 2
Time of onset of sensory blockade (in minutes)

GROUP	MEAN	STANDARD DEVIATION	p-VALUE
A	12.5	4.193	0.166
B	11.4	3.900	

Figure 1
Onset time of sensory level to T10



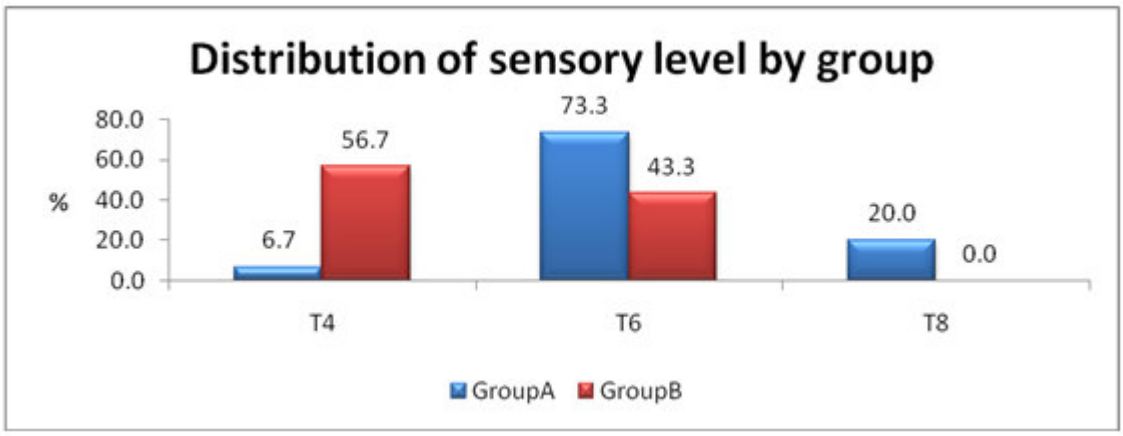
The maximum sensory height attained was T4-T6 for group B and T6-T8 for group A with much statistical difference between the 2 groups (p value-0.00004)

Table 3
Maximum height of sensory blockade

	T4		T6		T8	
GROUP	NUMBER	%	NUMBER	%	NUMBER	%
A	2	6.7	22	73.3	6	20.0
B	17	56.7	13	43.3	0	0.0

P=0.00004

Figure 2
Distribution of sensory level by group

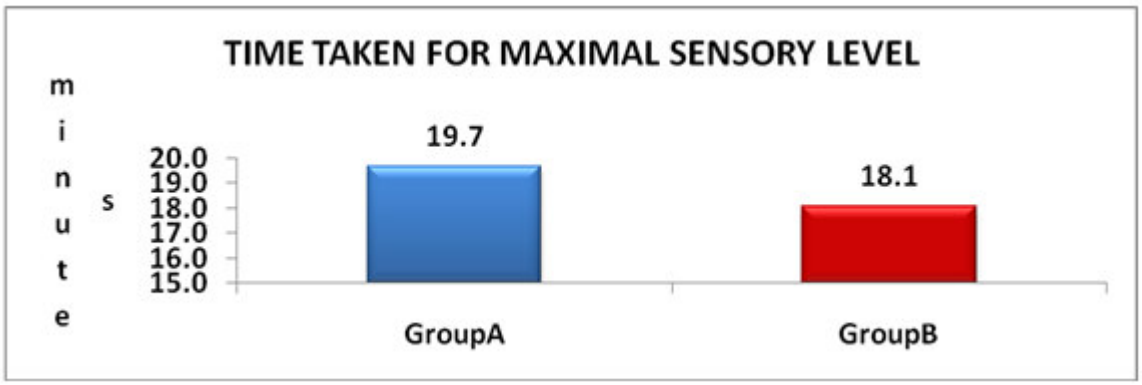


The time taken to achieve maximum sensory height was shorter with group B (18.1 minutes) when compared to group A (19.7minutes) but was statistically insignificant with p value of 0.126.

Table 4
Time taken for maximal sensory level

GROUP	MEAN	STANDARD DEVIATION	p-VALUE
A	19.67	3.604	0.126
B	18.07	4.346	

Figure 3
Time taken for maximum sensory level



DISCUSSION

The results of our study demonstrates that adding Dexmedetomidine to Levobupivacaine 0.5% epidurally fastens the onset time of sensory blockade and also heightens the level of sensory blockade compared to plain 0.5% Levobupivacaine. The time of onset time to sensory block at T 10 level was defined as time taken from the injection of local anaesthetic till the loss of sensation for pin prick at T10 level. In this study ,mean time of onset of sensory blockade to T10 level was 12.47 minutes for group A & 11.4 minutes for group B which shows that the onset is slightly earlier with group B but was not found to be statistically significant.(p value 0.224). The maximum sensory height reached ranged from T6 to T8 in group A compared to T4 to T6 in group B with p value of 0.00004 which is statistically significant. With regards to the mean time taken to achieve the maximum sensory level, it was found to be 19.67 min in group A and 18.07 min in group B which was not found to be statistically significant(p value 0.126).This correlates with the study conducted by Saurav et al[4] who showed that the time taken to achieve the uppermost sensory level with 0.5% Levobupivacaine was 13.5+/-7.5 mins and 13.38+/-4.48 mins with the addition of epidural dexmedetomidine 50 micrograms. No significant adverse effects were noted in patients who received dexmedetomedine along with levobupivacaine 0.5%. Hence the addition of selective alpha 2 adrenoreceptor blockade dexmedetomedine with levobupivacaine has faster onset of sensory blockade similar to conventional opiod adjuvants without any adverse effects. Further studies are needed to confirm the aspect of sensory blockade and its impact on sedation scores and the time needed for rescue analgesia.

CONCLUSION

The combination of epidural dexmedetomidine with 0.5% levobupivacaine provides a faster onset of sensory blockade and heightens the level of sensory blockade than epidural 0.5% levobupivacaine alone. The adjuvant addition has nil significant side effects. Further studies are recommended for the duration of analgesia and sedation scores for dexmedetomedine adjuvant.

Conflict of interest
Conflict of interest declared none.

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