Comparative evaluation of ropivacaine versus dexmedetomidine and ropivacaine in epidural anesthesia in lower limb orthopedic surgeries

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ABSTRACT

Background: Various adjuvant are being used with local anesthetics for prolongation of intra operative and postoperative analgesia in epidural block for lower limb surgeries. Dexmedetomidine, the highly selective α_2 adrenergic agonist is a new neuroaxial adjuvant gaining popularity. The aim of the present study was to compare the hemodynamic, sedative and analgesia potentiating effects of epidurally administered dexmedetomidine when combined with ropivacaine. **Materials and Methods:** The study was conducted in prospective, randomized double-blind manner in which 100 patients of American Society of Anesthesiologist Grade I and II in the age group of 20-65 years of either sex under going lower limb surgeries were included after taking informed consent. The patients were randomly allocated into two groups of 50 each. Epidural anesthesia was given with 150 mg of 0.75% ropivacaine in Group A (n = 50) and 150 mg of 0.75% ropivacaine with dexmedetomidine (1 μg/kg) in Group B (n = 50). Two groups were compared with respect to hemodynamic changes, block characteristics which included time to onset of analgesia at T10, maximum sensory analgesic level, time to maximum sensory and motor block, time to regression at S1 dermatome and time to the first dose of rescue analgesia for 24 h. At the end of study, data was compiled and analyzed statistically using Chi-square test, Fisher's exact test and Student t-test. $P < 0.05$ was considered to be significant and $P < 0.001$ as highly significant. **Results:** Significant difference was observed in relation to the duration of sensory block (375.20 ± 15.97 min in Group A and 535.18 ± 19.85 min in Group B [P - 0.000]), duration of motor block (259.80 ± 15.48 min in Group A and 385.92 ± 17.71 min in Group B [P - 0.000]), duration of post-operative analgesia (312.64 ± 16.21 min in Group A and 496.56 ± 16.08 min in Group B [$P < 0.001$]) and consequently low doses of rescue analgesia in Group B (1.44 ± 0.501) as compared to Group A (2.56 ± 0.67). Sedation score was significantly more in Group B in the post-operative period. **Conclusion:** Epidural Dexmedetomidine as an adjuvant to Ropivacaine is associated with prolonged sensory and motor block, hemodynamic stability, prolonged postoperative analgesia and reduced demand for rescue analgesics when compared to plain Ropivacaine.

Key words: *Dexmedetomidine, epidural anesthesia, lower limb orthopedic surgery, ropivacaine*

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INTRODUCTION

Use of neuraxial blocks for orthopedic surgery has increased rapidly during the last few decades, with increasing demand for post-operative pain relief and also to decrease the need for intravenous anesthetic drugs during the post-operative period. Various adjuvants are being used with local anesthetics to prolong the duration of intra operative and postoperative analgesia and to minimize the adverse effects of high doses of local anesthetics.[1] The α_2 adrenergic agonists have both analgesic and sedative properties when used as an adjuvant in regional anesthesia.[2] Dexmedetomidine, a newer and highly selective α_2 adrenergic agonist has evolved as a panacea for various applications and procedures in the perioperative and critical care settings.[3] The stable hemodynamics and the decreased oxygen demand due to

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enhanced sympathoadrenal stability make it a very useful adjuvant.[4] Based on earlier studies, it was found that Dexmedetomidine produces prolonged postoperative analgesia with minimal side-effects when added to Ropivacaine in epidural and caudal anesthesia.[5-8] Since only few studies are available where Dexmedetomidine's efficacy as an adjuvant to Ropivacaine in epidural anesthesia had been explored,[6-8] so we planned a prospective double blind study to explore the efficacy of Dexmedetomidine as an adjuvant to Ropivacaine in terms of duration of sensory and motor block, post-operative analgesia and side effects in epidural anesthesia for lower limb surgeries.

MATERIALS AND METHODS

In a prospective, randomized double blind study, 100 patients of American Society of Anesthesiologist (ASA) physical status I and II in the age group 20-65 years of either sex, scheduled to undergo lower limb orthopedic surgeries under epidural anesthesia were included after approval from the institution's ethical and scientific committee. Patients with coagulation or neurological disorders, morbid obesity, pregnancy, deformity or previous surgery of spine, anticipated difficulty in regional anesthesia, allergy to the study drug and unwillingness were excluded from the study. After taking informed and written consent patients were randomly allocated by a computer generated table of random numbers by a person blinded to the procedure in to two groups of 50 each as Group A (n = 50) and Group (n = 50). A day before surgery, a detailed pre anesthetic checkup was carried out. Patients were asked to restrict fluids and solids by mouth at least 6 h before the operation. Interpretation of visual linear analogue scale (VAS) was explained to determine the level of analgesia in the postoperative period. This was carried out with 10 cm line. The first end mark '0' means 'no pain' and the end marked '10' means 'severe pain'. All patients were given tablet alprazolam 0.25 mg a night before surgery. On the day of surgery, injection glycopyrrolate 0.2 mg by intramuscular route 45 min before the operation and injection midazolam 0.04 mg/kg body weight by the intravenous route just before the procedure was given.

Pre-operatively pulse rate, non-invasive systolic and diastolic blood pressure (DBP) and respiratory rate was recorded. In the operation room, a good intravenous access was secured and patients were preloaded with 10 ml/kg body weight of Ringer Lactate solution over 15-20 min. Multipara monitor was attached and baseline pulse rate, noninvasive systolic blood pressure (SBP) and DBP, oxygen saturation, and electrocardiogram (ECG) were recorded and monitoring was initiated. The study drug was prepared by an anesthesiologist who then handed it to another anesthesiologist blinded to the nature of the drug given to him or her. Patients were put in the lateral decubitus position. Under aseptic precautions, Epidural block was performed through midline approach in L3-L4 (in case of difficulty L2-L3) intervertebral space. Skin wheal was raised with 2% lignocaine and lumber epidural space was identified with an 18G Tuohy needle using loss of resistance to saline technique. Then test dose of 2-3 ml of lignocaine with epinephrine 1:200,000 after negative aspiration for blood and CSF was given to rule out intravascular or intrathecal injection. The study drug was given slowly in the epidural space. Group A (n = 50) received 20 ml of 0.75% ropivacaine hydrochloride and Group B (n = 50) received 20 ml of 0.75% ropivacaine hydrochloride plus dexmedetomidine (1 μg/kg bodyweight). Volume of the drug was kept constant as 22 ml in both the groups by adding normal saline to avoid bias during drug administration. Patients were turned supine immediately after epidural block. Oxygen was administered to all the patients @ 6 L/min. Continuous monitoring of pulse rate, respiratory rate, non-invasive SBP and DBP, SpO_2 and ECG was done. Readings were recorded preoperatively, and then intra operatively every 5 min for the first 30 min and thereafter every 15 min till the end of surgery. Bradycardia defined as heart rate less than 60 beats/min was treated with intravenous Atropine 0.6 mg. Hypotension defined as SBP < 20% of baseline value or less than 90 mm of Hg was treated with additional Ringer's lactate solution intravenously or if needed injection ephedrine hydrochloride 5 mg titrated according to blood pressure. Following parameters were noted.

Sensory block

Sensory block was assessed by loss of sensation to pin prick in the midline using a 22 gauge blunt hypodermic needle every 2 min interval until T_{10} dermatome was reached and then every 5 min interval until no change in level occurred. Onset of sensory block to T_{10} dermatome level, maximum level of sensory block achieved, time taken to achieve maximum sensory level and duration of sensory block (interval from epidural administration of drug until the regression of sensory block to S_1 dermatome) was noted.

Motor block

The degree of motor block was assessed every 5 min for first 30 min and then every 15 min till completion of surgery by the modified Bromage score. Bromage 0: Patient is able to move hip, knee and ankle. Bromage 1: Inability to move the hip but is able to move knee and ankle, Bromage 2: Inability to move hip and knee but can move ankle, Bromage 3: No movement at all and unable to move hip, knee and ankle. Maximum motor block achieved, time required to reach maximum motor block and total duration of motor block (motor recovery to Bromage 0) was noted.

All durations were calculated considering the time of epidural injection as zero. Analgesia was monitored by using VAS score. VAS score was recorded 5 min before epidural, at the start of surgery and then every 15 min interval till the surgery was over. Postoperatively, VAS was recorded half hourly for first 1 h then one hourly for 12 h and then three hourly for next 12 h till 24 h. When patients had VAS score of more than 3, rescue analgesia in the form of injection diclofenac sodium 75 mg intramuscular or if needed injection tramadol 50 mg slow intravenously was given. Time to first dose of rescue analgesia, number of doses of rescue analgesia and the time at which it was repeated was recorded in both groups. The time at which patient demanded first dose of rescue analgesia was the primary end point of this study because at this time the effect of epidural block had weaned off.

The operation was started on achieving adequate sensory block at T_8 dermatome. In case of failed epidural block, patients were given general anesthesia and these patients were excluded from the study. The quality of surgical analgesia was assessed and graded as: Excellent if no supplementary drugs were required, good if only one analgesic was required, fair if more than one analgesic was required and poor if general anesthesia was required. If full surgical analgesia was not achieved then injection tramadol 50-100 mg intravenously was given as supplementary analgesia during surgery. Patients were monitored for sedation every 10 min interval for first 30 min and then every 15 min interval till completion of surgery. Following sedation score was used. 0 as no sedation,

1. Patient somnolent but responding to verbal commands,
2. Patient somnolent, not responding to verbal commands but responding to manual stimulation and
3. Patient somnolent, not responding to verbal commands and manual stimulation.

After completion of surgery, patients were monitored for sensory and motor block, post-operative analgesia (VAS score), hemodynamic parameters, side effects and complications for 24 h postoperatively. Any side effect or complication like hypotension, bradycardia, headache, dry mouth, nausea and vomiting, local anesthetic toxicity, backache, urinary retention and sedation were noted in these 24 h. This was the secondary end point of our study. The patient satisfaction score was generated at the end of the study by verbal questioning of the patients about their satisfaction regarding anesthesia. Following scoring system was used: 5: Very satisfied, 4: Satisfied, 3: Neutral, 2: Dissatisfied, 1: Very dissatisfied.

Statistical analysis

The data obtained was tabulated and analyzed using statistical package for social science (SPSS 19.0 evaluation version, IBN Corporation 1968). Data was expressed as means and standard deviation and percentages. The categorical covariates (sex, ASA grade) were analyzed using the 'Chi-Square test' and 'fisher's exact test' while the intergroup comparison of the parametric data (age, weight, VAS score, duration of analgesia, number of doses of rescue analgesia, sedation score) was done using two tailed 'student *t*-test' having equal variance. The '*P*'–value was determined to finally evaluate the levels of significance. $P < 0.05$ was considered as significant at 5% significance level; $P < 0.01$ was considered to be significant at 1% significance level and a $P < 0.001$ was considered highly significant. *Post-hoc* power analysis was done using power and sample size calculator. The cut-off value for power analyses was taken as ≥80% ($\beta = 0.8$). The effective size/power of the study was calculated for the duration of analgesia ($\beta = 1$) and duration of motor block ($\beta = 1$). For both of these, power was above the well-accepted 80% with alpha error 0.05. Thus *post-hoc* assessment of effect size justified the sample size.

RESULTS

In the present study, both groups were comparable with respect to demographic characteristics and did not show any statistical significant difference ($P > 0.05$) [Table 1]. The number of patients under each type of lower limb surgery were similar in the two groups there by keeping the comparison unbiased. Furthermore the mean duration of surgery in both groups was comparable (Group A: 105.80 ± 31.88 min and Group B: 110.40 ± 30.26 min). Motor and sensory characteristics of both groups are shown in Table 2. After administering the study drug in epidural space the mean time taken for onset of sensory block to T10 dermatome in Group A was 14.182 ± 6.02 min and in Group B was 12.536 ± 4.172 min and this difference among the two groups was not statistically significant ($P = 0.115$). However the median maximum sensory level reached in Group A was T6 dermatome and in Group B was T5 dermatome. Difference in the maximum sensory level achieved in the two groups was

Table 1: Demographic profile of group A and group B

Demographic profile	Group A (*n* = 50)	Group B (*n* = 50)	*P* value
Mean age in years	39.96±11.917	40.16±12.928	0.834
Mean weight in kg	64.26±11.935	64.82±11.807	0.814
Sex (%)			
Male	28 (56)	30 (60)	0.164
Female	22 (44)	20 (40)	
ASA grade (%)			
Grade 1	36 (72.0)	34 (68.0)	0.666
Grade 2	14 (28.0)	16 (32.0)	

P > 0.05 non-significant, ASA: American Society of Anesthesiologist

Table 2: Sensory and motor block characteristics in group A and group B

Values in minutes	Group A (n = 50)	Group B (n = 50)	P value
Onset of sensory block to T10 dermatome	14.182±6.020	12.536±4.172	0.115
Maximum sensory level achieved	T6 dermatome	T5 dermatome	0.0001
Time for maximum sensory level	23.24±5.971	21.63±4.172	0.122
Time for regression to T10 dermatome	277.58±17.66	404.18±17.93	0.000
Time for regression to L5 dermatome	354.56±16.446	504.68±20.642	0.000
Total duration of sensory block	375.20±15.97	535.18±19.85	0.000
Time to complete motor block	27.34±5.970	25.73±4.172	0.123
Total of duration motor block	259.80±15.486	385.92±17.719	0.000
Time to first dose of rescue analgesia	312.64±16.217	496.56±16.086	<0.001
Mean of total doses of rescue analgesia	2.56±0.67	1.44±0.501	<0.001

P > 0.05 non-significant, P < 0.05 significant, P < 0.001 highly significant

highly significant (P < 0.001). Although the mean time taken to reach maximum sensory level (Group A: 23.24 ± 5.971 min vs. Group B: 21.63 ± 4.172 min) was again comparable in both groups (P = 0.122). The mean time taken for regression of sensory block to T_{10} dermatome in Group B (404.18 ± 17.93 min) was prolonged when compared to Group A (277.58 ± 17.66 min) and the difference among the two groups was highly significant (P = 0.000). Further regression of sensory block to L_5 dermatome was also significantly delayed in Group B (504.68 ± 20.64 min) as compared to Group A (354.56 ± 16.446 min) (P = 0.000). Total duration of sensory block was taken as the time required for regression of sensory block to S1 dermatome was again prolonged in Group B (535.18 ± 19.85 min) as compared to Group A (375.20 ± 15.97 min) and this difference was highly significant (P = 0.000). Maximum motor block achieved in plain Ropivacaine group was Bromage 1 in 13 (26%) patients, Bromage 2 in 25 (50%) patients and Bromage 3 in 12 (24%) patients. With addition of dexmedetomidine to ropivacaine maximum motor block achieved was Bromage 3 in 18 (36%) patients, Bromage 2 in 32 (64%) patients and none (0%) of the patient remained in Bromage 1. The difference in maximum motor block achieved in both the groups was found to be statistically highly significant (P < 0.001). But the mean time taken for achieving maximum motor block (Group A: 27.34 ± 5.970 min and Group B: 25.73 ± 4.172 min) was comparable in both groups (P = 0.123). Complete motor recovery to Bromage 0 was considered as total duration of motor block. The total duration of motor block was also prolonged in Group B (385.92 ± 17.719 min) as compared to Group A (259.80 ± 15.486 min) and the difference was highly significant (P = 0.000).

VAS score was recorded intraoperatively and remained less than 3 in both the groups. In the postoperative period, mean VAS score in both the groups was zero for first 2 h. In Group A, VAS score increased more rapidly and patient demanded first dose of rescue analgesia (injection diclofenac sodium 75 mg I/M) between 4th and 5th h (mean VAS was 2.93 ± 1.04 and 3.13 ± 1.00 respectively). At 5th h, mean VAS score in Group A was 3.13 ± 1.00 and in Group B was 0.57 ± 0.62 and the difference between the two groups was highly significant (P = 0.00). In Group B, VAS started increasing at 4th h (0.10 ± 0.30) and patient demanded first dose of rescue analgesia (injection diclofenac sodium 75 mg I/M) between 8th and 9th h (mean VAS was 3.03 ± 1.21 and 3.27 ± 0.78 respectively). Thus requirement of rescue analgesia was delayed in Group B as compared to Group A. In Group A, VAS again increased to more than three between 11th and 12th h (mean VAS 3.45 ± 0.57 and 3.03 ± 1.21 respectively) and injection tramadol 50 mg slow intravenously was given as rescue analgesia. After injection tramadol patients were pain free for 4-5 h and third dose of rescue analgesia (injection diclofenac sodium 75 mg) was given between 18th and 19th h postoperatively. In Group B, after first dose of rescue analgesia VAS decreased to less than three and patients remained pain free for 10-11 h. Second dose of rescue analgesia (diclofenac sodium) was given between 18 and 21 h. At 24 h, mean VAS in Group A was 2.86 ± 0.78 and in Group B was 2.40 ± 0.17 and the difference was statistically significant (P = 0.03). The mean time at which patients demanded first dose of rescue analgesia was delayed in Dexmedetomidine group (496.56 ± 16.086 min) as compared to plain Ropivacaine group (312.64 ± 16.217 min) (P < 0.001). Patients in Group B also required significantly less doses of rescue analgesia as compared to Group A (1.44 ± 0.501 vs. 2.56 ± 0.675) in the post-operative period (P < 0.001). None of the patient in Group B required opioids (injection tramadol) as rescue analgesia in the postoperative period. The mean sedation score was measured at an interval of 10 min for first 30 min. During this interval, patients in both the groups had sedation score in the range of 1-2 and were comparable. After 30 min, sedation score started increasing gradually in Group B (2-3) as compared to Group A (1) and the difference was highly significant in this period (P < 0.001) [Figure 1]. After 180 min sedation score gradually decreased in Group B and was again comparable in both the groups. Hemodynamic parameters remained stable at all measured intervals and were comparable in both the groups [Figure 2]. Only 2 (4%) patients in Group A and 5 (10%) patients in Group B had Bradycardia during first 40 min and was treated by giving injection atropine 0.6 mg

intravenously. Later on heart rate remained stable in both the groups. Among 50 patients, 2 (4%) patients in Group A and 4 (8%) patients in Group B had fall in blood pressure (SBP <90 mm of Hg) during first 40 min interval which was corrected by giving oxygen and intravenous fluids. Only 1 (2%) patient in Group A and 3 (6%) patients in Group B required injection ephedrine hydrochloride intravenously and the dose difference was not statistically significant ($P > 0.05$). Ephedrine was given as 5 mg bolus and repeated according to blood pressure and total Ephedrine given in Group A was 10 mg and in Group B was 15 mg. Later on blood pressure remained stable at all measured intervals. Difference in incidence of nausea was not significant ($P = 0.609$) as it occurred in 1 (2%) patient in Group A and 3 (6%) patients in Group B during first 40 min. This could be due to fall in blood pressure in these patients as it was relieved by oxygen and stabilization of blood pressure. In the present study incidence of urinary retention could not be compared as patients were catheterized in both groups. None of the patients had respiratory depression, pruritis, dry mouth, headache or backache in both groups in the postoperative period. In Dexmedetomidine group quality of surgical analgesia was excellent in all 50 (100%) patients. In plain Ropivacaine group, in 45 (90%) patients quality of surgical analgesia was excellent and in 5 (10%) patients it was good. In these five patients duration of surgery was more than 2½ h and these patients required injection tramadol 50-100 mg intravenously as supplementary analgesia during intra operative period. The mean of patient satisfaction score in Group A was 3.96 ± 0.968 and in Group B was 4.42 ± 0.498. The difference in the patient satisfaction score in the two groups was found to be statistically significant ($P = 0.003$).

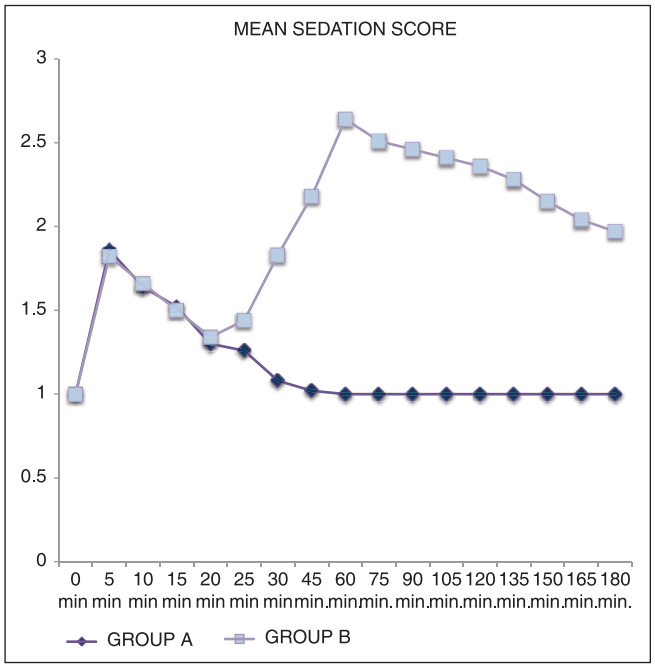

Figure 1: Mean sedation score of Group A ($n = 50$) and Group B ($n = 50$)

DISCUSSION

The results of the present study show that supplementation of epidural Ropivacaine with Dexmedetomidine significantly prolongs the duration of sensory and motor block with improved quality of postoperative analgesia as compared to Ropivacaine alone. The mechanism by which α_2 adrenergic agonists prolong the motor and sensory block of local anesthetics may be an additive or synergistic effect secondary to the different mechanisms of action of local anesthetics. Dexmedetomidine act by binding to the presynaptic C-fibers and post synaptic dorsal horn neurons. They produce analgesia by depressing the release of C-fiber transmitters and by hyperpolarisation of post synaptic dorsal horn neurons.[9-11] The complimentary action of local anesthetics and α_2 adrenergic agonists accounts for their profound analgesic properties. The prolongation of motor block may be the result of binding α_2 adrenergic agonists to the motor neurons in the dorsal horn.[9,10] The use of Dexmedetomidine has been studied as an epidural adjuvant by various authors who have observed its synergism with local anesthetics without any additional morbidity.[6,7] Clinical studies exhibit potentiation

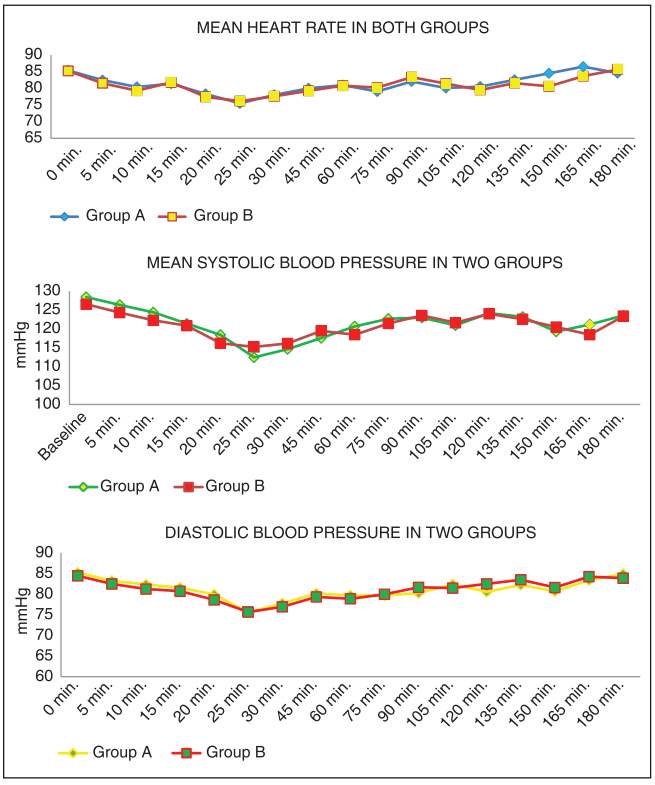

Figure 2: Hemodynamic parameters of Group A ($n = 50$) and Group B ($n = 50$)

of neuroaxial local anesthetics, decrease in intraoperative awareness and anesthetic requirements and postoperative analgesia when epidural or caudal dexmedetomidine was used in conjunction with general anesthesia.[12-14]

The demographic profile in the present study was comparable and did not show any significant difference. Time of onset of sensory block to T10 dermatome in Group B (12.53 ± 4.17 min) was found to be little earlier than Group A (14.18 ± 6.02 min). But the difference was found to be statistically non-significant ($P > 0.05$). These results were in concordance with the results of Salgado *et al*.[6] who observed that mean time for onset of sensory block to T10 dermatome was 13.8 min with 20 ml of 0.75% ropivacaine hydrochloride and with 0.75% ropivacaine and 1 μg/kg dexmedetomidine, onset to T10 dermatome was in 11.5 min. However, in study done by Bajwa *et al*.,[7] using 1.5 μg/kg dexmedetomidine, onset at T10 dermatome was 8.52 ± 2.36 min. This difference can be due to higher concentration of dexmedetomidine used. The median maximum sensory level reached was higher in Group B than in Group A. These results were similar to the study done by Shaikh and Rohin[15] with plain Ropivacaine, maximum sensory level achieved was T6 dermatome and by Bajwa *et al*.[7] with Dexmedetomidine as an adjuvant to Ropivacaine, maximum sensory level reached was T5-6 dermatome. The mean time taken to reach maximum sensory level in Group A was 23.24 ± 5.971 min and in Group B was 21.63 ± 4.172 min which was almost comparable. Bajwa *et al*.[7] in their study also observed that the time to reach maximum sensory level was 13.14 ± 3.96 min when Dexmedetomidine was used as an adjuvant to Ropivacaine. This was little earlier as the dose of dexmedetomidine used by Bajwa *et al*.[7] was higher (1.5 μ/kg).

Regression of sensory block to T_{10} dermatome was earlier in Group A (277.58 ± 17.66 min) when compared to Group B (404.18 ± 17.93 min). Similarly, comparable time (237 ± 65 min) was observed by Brown *et al*.,[16] using 20 ml of 0.5% Ropivacaine. The total duration of sensory block was significantly prolonged in Group B (535.18 ± 19.85 min) as compared to Group A (375.20 ± 15.97 min). Brown *et al*.[16] observed that total duration of sensory block was 333 ± 54 min, using 20 ml of 0.5% Ropivacaine which is nearly consistent with the present study.

The epidural Dexmedetomidine used in our study had shown comparable onset of maximum motor block with significantly prolonged duration of motor block. Similar results were observed by Salgado *et al*.[6] and Bajwa *et al*.[7] Total duration of motor block (regression to Bromage 0) in Group B was 335.92 ± 17.71 min which is in concordance with the results of Salgado *et al*.[6] (390 min) and Bajwa *et al*.[8] (259.62 ± 21.38 min as they have taken regression to Bromage 1 not Bromage 0). Total duration of motor block in Group A was 259.80 ± 15.86 min which is almost similar to the results of Salgado *et al*.[6] (300 min) and Brown *et al*.[16] (220 ± 52 min).

In the present study, there was significantly delayed requirement of rescue analgesia (496.56 ± 16.08 min in Group A and 312.64 ± 16.21 min in Group B) and also reduced 24 h analgesic requirement (1.44 ± 0.501 in Group B and 2.56 ± 0.67 in Group A) with 1 μ/kg Dexmedetomidine added to Ropivacaine, which supports the analgesic efficacy of Dexmedetomidine as an epidural adjuvant. Similarly, significantly improved analgesic efficacy was seen by Salgado *et al*.[6] No side effects like respiratory depression, pruritis, headache, backache and vomiting were noted in our study which was similar to other studies.[7,8] The side effect profile of Dexmedetomidine was quite favorable which correlates very well with other studies.[17-19] One patient in Group A and three patients in Group B had nausea which was relieved without any intervention. Bajwa *et al*.[7] reported urinary retention in 10% patients with Dexmedetomidine used as adjuvant to Ropivacaine. In our study most of the patients were catheterized so incidence of urinary retention could not be evaluated. Patients were sedated in both groups during first 30 min of surgery as injection midazolam was given in premedication. After 30 min patients were more sedated in Dexmedetomidine group as compared to plain Ropivacaine group and the difference in sedation score was statistically highly significant. This was in accordance with the study done by Bajwa *et al*.[7] which showed significant sedation produced by addition of dexmedetomidine to ropivacaine.

In the present study patients remained hemodynamically stable in both groups and incidence of Bradycardia and hypotension was comparable at all measured intervals which reaffirms the established effects of α_2 agonists in providing a hemodynamically stable perioperative period.[20,21] There was no significant difference in the doses of Atropine and Ephedrine given to the patients in both groups, for treating Bradycardia and hypotension respectively.

Limitations

In the present study, the population enrolled was in the age group of 20-65 years which were otherwise healthy patients of ASA Grade I and II, So the effect of Dexmedetomidine as an adjuvant in older patients with cardiovascular comorbidities is yet to be investigated. Secondly we have used single shot epidural without catheter. With epidural catheter the need for repeated injections of rescue analgesics would have been decreased and patients would remain pain free in post-operative period.

CONCLUSION

It was concluded that anesthesia in both the groups was effective and patients were hemodynamically stable. However dexmedetomidine group was better as regards to prolonged duration of sensory block, postoperative analgesia with reduced doses of rescue analgesic required and better patient satisfaction score. However, prolonged duration of motor block and sedation produced with Dexmedetomidine may be undesirable for short surgical procedures or ambulatory surgery.

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