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Ropivacaine versus Dexmedetomidine and Ropivacaine by Epidural Anaesthesia in Lower Limb Surgeries

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Abstract

Aim: To evaluate the effect of ropivacaine versus Dexmedetomidine and ropivacaine in epidural anaesthesia in lower abdominal surgeries. *Materials and Methods:* This study is a prospective double blinded randomized study which was carried out on 100 patients who were admitted in Department of Anaesthesia in Government Medical College Gulbarga & ESIC Medical College, Gulbarga, Karnataka. This study was conducted in the period of 2014 to 2017. Patients were randomly divided in to two groups each of 50 each, which were Group A in which ropivacaine and normal saline were administered, Group B in which ropivacaine and dexmedetomidine were administered. *Results:* There was no statistical significant variation between the two groups with respect to age, height, weight and ASA I/II grading ($p>0.05$). The mean onset of analgesia in group A was 11.33±1.89, in group B was 8.99±0.97, the mean time to attain maximum sensory level was 15.00±1.45 in group A and in group B, it was 12.58±2.58, the mean time for complete motor block was 20.41±1.47 in group A and in group B it was 15.22±2.89. Mean time to two segment regression was 95.85±5.48 in group A and in group B it was 161.59±9.87, mean duration of analgesia was 201.25±4.26 in group A and in group B it was 290.87±8.99 and mean time to complete recovery of motor block was 133.49±5.87 in group A and in group B it was 214.21±4.25. Sedation score of 1 was observed in 12% patients in Group A, whereas in group B, 50% patients showed a score of 1 and 50% patients showed a score of 2. The sedation was more in group B compared to group A. Side effects are significantly more in group B compared to group A. ($p=0.001$). *Conclusion:* The onset of action, better analgesic effect with dexmedetomidine is fastened with the addition of alpha 2 agonists, and incidence of side effects insignificantly.

Keywords: Dexmedetomidine; Epidural Local Anaesthetics; Sedation Score.

Introduction

Relieving of post-operative pain is one of the most essential components of spine surgeries. For management of post-operative pain in spine surgeries, various methods have been tried, out of which epidural techniques were becoming popular. α2 adrenergic agonists have both analgesic and sedative properties, when used as an adjuvant in regional anaesthesia. For lower abdominal and lower limb surgeries, central neuraxial blockade in the form of epidural is very popular technique [1]. This technique avoids the disadvantages of general anaesthesia such as poly pharmacy, airway manipulation, and other untoward effects like vomiting, postoperative nausea. An ideal local anaesthetic in the epidural space should provide sufficient motor block for surgical relaxation, quick onset and good sensory block for providing post-operative analgesia with central nervous system and cardiovascular toxicities [2]. Ropivacaine has to be given in larger doses to obtain the analgesic and anaesthetic effects, the addition of α2 agonists, dexmedetomidine [3] can decrease the dose requirement and permit the use of more diluted solutions for better analgesia, and this also prevents side effects associated with larger doses of

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ropivacaine. Dexmedetomidine has receptor affinity of 8 times greater than clonidine which makes it a highly selective α2 adrenergic agonist [4]. When used in epidural route, the dose of clonidine is 1-2 times higher than Dexmedetomidine. Because of their analgesic properties and local anaesthetic effects, with the addition of alpha agonist to epidural local anaesthetics, the degree of pain relief increases [5].

Materials and Methods

This study is a prospective double blinded randomized study which was carried out on 100 patients who were admitted in Department of Anaesthesia in Government Medical College Gulbarga & ESIC Medical College, Gulbarga, Karnataka. This study was conducted in the period of 2014 to 2017. Patients were randomly divided into two groups each of 50 each, which were Group A in which ropivacaine and normal saline were administered, Group B in which ropivacaine and dexmedetomidine were administered.

Inclusion Criteria

After institutional ethical committee approval and after obtaining written consent from patients of either sex, ASA I and II of age group between 18-56 years, undergoing lower abdominal and lower limb surgeries were selected in the study.

Exclusion Criteria

Patients who were allergic to local anaesthetics, who were dependent on narcotics, who had gross spinal abnormality, localized skin sepsis, hemmorhagic diathesis, head injury, hypertension, diabetes mellitus, cardiac, pulmonary, hepatic, renal disorders, peripheral neuropathy, psychiatric diseases. On the previous day of surgery, the patients detailed history was taken, general and systemic examinations were done, the patients were explained about advantages and disadvantages of epidural technique with catheter in situ. On the day of surgery, an intravenous line was secured and patients were preloaded with 15 mL/Kg ringer's lactate, 30 minutes prior to surgery, then pulse rate, blood pressure, respiratory rate, SpO2 were recorded. Then epidural anaesthesia was given in Group A, 19 mL of 0.75% ropivacaine with 1mL normal saline and in Group B, 19 mL of 0.75% ropivacaine with 1mL of dexmedetomidine (75µg made up to 1mL with normal saline). The sensory level was checked by bilateral pin prick method and motor blockade was measured by modified bromage scale. Modified bromage scale: Grade 0: Feet and knees full flexion, Grade I: Feet full flexion and just able to flex knees, Grade II: Unable to flex knees, but some flexion of feet possible, Grade 3: Unable to move feet and knees. Sedation was assessed by four point score; Grade 0: wide awake, Grade 1: sleeping comfortably but responding to verbal commands, Grade 2: deep sleep but arousable, Grade 3: deep sleep but unarousable. Postoperative pain was assessed by visual analogue scale (VAS).

Results

Table 1 shows that there was no statistical significant variation between the two groups with respect to age, height, weight and ASA I/II grading ($p>0.05$).

Table 2 shows the mean onset of analgesia in group A was 11.33±1.89, in group B was 8.99±0.97, the mean time to attain maximum sensory level was 15.00±1.45 in group A and in group B, it was 12.58±2.58, the mean time for complete motor block was 20.41±1.47 in group A and in group B it was 15.22±2.89.

Table 3 shows mean time to two segment regression was 95.85±5.48 in group A and in group B it was 161.59±9.87, mean duration of analgesia was 201.25±4.26 in group A and in group B it was 290.87±8.99 and mean time to complete recovery of motor block was 133.49±5.87 in group A and in group B it was 214.21±4.25.

Table 1: Shows the demographic profile of patients in both the groups

Demographic parameters	Group A	Group B	P value
Age (in years)	25.36±9.87	35.12±2.01	0.702
Height (cms)	168.23±5.00	170.68±3.54	0.487
Weight (Kgs)	64.21±6.58	58.35±6.85	0.025
ASA I/II	27/3	26/5	0.564

Table 2: Shows comparison of block characteristics

Variables (mins)	Group A	Group B	P value
Onset of Analgesia T10	11.33±1.89	8.99±0.97	<0.001
Time to attain max. sensory level	15.00±1.45	12.58±2.58	<0.001
Complete motor block	20.41±1.47	15.22±2.89	<0.001

Table 3: Shows comparison of study variables in two groups

Variables (mins)	Group A	Group B	P value
Two segment regression	95.85±5.48	161.59±9.87	<0.001
Duration of Analgesia	201.25±4.26	290.87±8.99	<0.001
Complete recovery of motor block	133.49±5.87	214.21±4.25	<0.001

Table 4: Shows comparison of sedation score in two groups

Sedation Score	Group A		Group B	
	Number	Percentage (%)	Number	Percentage (%)
0	44	88	0	0
1	6	12	25	50%
2	0	0	25	50%
Total	50	100	50	100

Table 5: Shows comparison of side effects in two groups

Side Effects	Group A		Group B	
	Number	Percentage (%)	Number	Percentage (%)
Nil	50	100	31	62
Bradycardia	0	0	17	34
Dry mouth	0	0	0	0
Headache	0	0	0	0
Nausea & Vomiting	0	0	0	0
Shivering	0	0	2	4
Respiratory depression	0	0	0	0
Total	50	100	50	100

Table 4 shows sedation score of 1 was observed in 12% patients in Group A, whereas in group B, 50% patients showed a score of 1 and 50% patients showed a score of 2. The sedation was more in group B compared to group A.

Table 5 shows side effects are significantly more in group B compared to group A. (p=0.001)

Discussion

In the present study, there was no statistical significant variation between the two groups with respect to age, height, weight and ASA I/II grading (p>0.05). The mean onset of analgesia in group A was 11.33±1.89, in group B was 8.99±0.97, the mean time to attain maximum sensory level was 15.00±1.45 in group A and in group B, it was 12.58±2.58, the mean time for complete motor block was 20.41±1.47 in group A and in group B it was 15.22±2.89. Mean time to two segment regression was 95.85±5.48 in group A and in group B it was 161.59±9.87, mean duration of analgesia was 201.25±4.26 in group A and in group B it was 290.87±8.99 and mean time to complete recovery of motor block was 133.49±5.87 in group A and in group B it was 214.21±4.25. Sedation score of 1 was observed in 12% patients in Group A, whereas in group B, 50% patients showed a score of 1 and 50% patients showed a score of 2. The sedation was more in group B compared to group A. Side effects are significantly more in group B compared to group A. (p=0.001).

Manjunath Thimmappa et al [6], conducted a study to compare epidural ropivacaine 0.75% alone and Ropivacaine 0.75% with alpha 2 agonists showed that onset of blockade is faster when additives are added like clonidine and dexmedetomidine. Time for two segment regression was 30-35minutes earlier in ropivacaine and clonidine. Time for rescue analgesia was longer in clonidine and dexmedetomidine group. Ropivacaine and clonidine had mild sedation, dexmedetomidine and ropivacaine group had moderate sedation with

better analgesic profile when compared to other groups, except for incidence of bradycardia. Addition of alpha 2 agonists fastens the onset of action, better analgesia with dexmedetomidine, insignificant incidence of side effects.

Vivek Maratha et al [7], comparatively evaluated the effect of ropivacaine versus dexmedetomidine and ropivacaine in epidural anaesthesia in lower limb orthopedic surgeries. The present study included 200 patients concluded dexmedetomidine may be undesirable as it produces prolonged duration of motor block and sedation.

Sarabjit Kaur et al [8], conducted a study to compare the hemodynamic, sedative and analgesia potentiating effects of epidurally administered dexmedetomidine when combined with ropivacaine. The study was conducted in 100 patients showed 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.

Shrirang N Bamne et al [9]; compared efficacy and safety of clonidine and dexmedetomidine as an adjuvant to ropivacaine for epidural anesthesia in lower limb surgery. It was observed that onset of sensory blockade at T12 level was faster in group RD (6.00±2.03 min) as compared to group RC (7.33 ±2.54 min). Mean time duration of onset of motor blockade was shorter in group RD (7.17± 2.52 min) as compared to group RC (12.67± 2.86 min) and time to achieve highest sensory dermatome blockade was shorter in group RD (21.00±2.75 min) as compared to group RC (28.50±2.33 min). Also mean time duration for complete motor blockade was shorter in group RD (20.17±3.40 min) as compared to group RC (27.33±3.14 min). It was concluded that dexmedetomidine was better than clonidine as an adjuvant.

Krishan Yogesh Sawhney et al [10]; conducted a study to comparatively evaluate postoperative analgesic efficacy, motor sparing effect, postoperative haemodynamic variations and total postoperative analgesic consumption in first 24 hours on 100 adult. The haemodynamic parameters were stable in all the groups. Side effects including the motor block were negligible and comparable in all groups. Group I patients had significantly lower VAS scores, mean total epidural consumption, supplemental epidural bolus requirement and rescue analgesic requirement among all groups. He concluded in study as epidural analgesia using Ropivacaine 0.2% infusion is more effective than other study groups when used for postoperative pain relief in lower limb surgeries.

Conclusion

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. The onset of action, better analgesic effect with dexmedetomidine is fastened with the addition of alpha 2 agonists, and incidence of side effects insignificantly.

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