A Comparative Study of Ropivacaine with Dexmedetomidine versus Ropivacaine with Fentanyl for Epidural Anaesthesia in Lower Limb Orthopaedic Surgeries

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Abstract

Background: Ropivacaine, the pure S enantiomer of propivacaine, due to its less lipophilicity than bupivacaine does not produce cardiotoxicity or neurotoxicity and causes less motor blockade. Dexmedetomidine the newer selective alpha 2 adrenergic agonist has several advantages when given through epidural route as a neuraxial adjuvant.

Aim: To compare 0.75% Inj.Ropivacaine with Inj.Fentanyl and 0.75% Inj.Ropivacaine with Inj.Dexmedetomidine epidurally for the duration of analgesia, hemodynamic changes, degree of motor blockade and occurrence of side effects.

Materials and Methods: 60 patients undergoing lower limb orthopaedic surgeries were randomized to two groups. Group RF (n=30) received 0.75% Inj.Ropivacaine 20 cc with Inj.Fentanyl 50 mcg whereas Group RD (n=30) received 0.75% Inj.Ropivacaine 20 cc with Inj.Dexmedetomidine 50 mcg in normal saline diluted upto 1cc. Quality of sensory block, motor block, pulse rate, blood pressure, pain assessment and any adverse outcome were noted. Statistical analysis was done by student's paired t-test for intragroup comparison and unpaired t-test for intergroup comparison and $p<0.05\%$ was taken to be significant.

Results: Dexmedetomidine fastens the onset of analgesia, prolongs the duration of analgesia thereby reducing the doses of rescue analgesics post operatively, improves the quality of motor blockade without aggravating changes in haemodynamic parameters and has less adverse effects.

Conclusion: We conclude that dexmedetomidine serves as a good neuraxial adjuvant when added to 0.75% ropivacaine in epidural anaesthesia given for lower limb orthopaedic surgery.

Keywords: Ropivacaine, Dexmedetomidine, Fentanyl, Neuraxial adjuvant, Epidural.

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Introduction

Early postoperative mobilization and rehabilitation with minimally associated pain and discomfort is the most desirable feature in modern orthopaedic surgery.[1,2,3] Regional anaesthesia in the form of central neuraxial blockade remains the most commonly used technique for lower limb orthopaedic surgeries.[4,5]

Epidural anaesthesia is the most commonly used technique for providing not only perioperative surgical anaesthesia but post-op analgesia in lower abdominal and lower limb surgeries.

The commonly used local anaesthetic agents in regional anaesthesia are lidocaine and bupivacaine. Ropivacaine is less lipophilic than bupivacaine and is therefore less likely to produce neurotoxicity and cardiotoxicity. Moreover due to less lipophilicity, it does not penetrate large myelinated motor fibres to a great extent resulting in a lesser degree of motor block.[6,7]

To improve the quality of regional anaesthesia in the form of better sensory and motor blockade, less haemodynamic effects, good post-operative analgesia and to prevent local anaesthetic toxicity, many pharmacologic agents have been used along with local anaesthetics. These are known as neuraxial adjuvant. Opioids, midazolam, ketamine, neostigmine, epinephrine, sodium bicarbonate, steroids etc have been used as neuraxial adjuvants.

Opioids improve sensory and motor block and intra and postoperative analgesia. However, their use is associated with certain unwanted side effects also like pruritis, nausea and vomiting, urinary retention, late respiratory depression etc.

Opioids like fentanyl have been used traditionally as an adjunct for epidural administration in combination with a lower dose of local anaesthetic. Also the incidence of motor block after epidural analgesia with amide local anaesthetics (LA) and opioids is approximately 4-12% which itself defeats the novel purpose of early rehabilitation.

Various α2 agonists like clonidine and dexmedetomidine have also been tried as neuraxial adjuvant.[8] The α2 agonists possess sedative, hypnotic, anxiolytic, sympatholytic and analgesic properties which make them a suitable choice for this work. Dexmedetomidine, is a highly selective α2agonist and is 8 times more potent than clonidine.

Dexmedetomidine has got numerous beneficial effects when used through epidural route.[9] Dexmedetomidine is a highly selective α2-adrenoceptor agonist. Dexmedetomidine's epidural effect is dose dependent and superior to intravenous route due to its high affinity for α2 adrenergic receptors in spinal cord. It prolongs analgesic action of LA by reducing systemic absorption caused by local vasoconstriction mediated by α_{2C} in smooth muscle of epidural venous plexus. During epidural administration cephalad spread into meninges may be responsible for sedation which is mediated by binding to α2A receptors in locus ceruleus and diminishing the release of norepinephrine. It acts on both pre and post synaptic sympathetic nerve terminal and central nervous system thereby decreasing the sympathetic outflow and nor epinephrine release causing sedative, anti-anxiety, analgesic, sympatholytic and haemodynamic effects. Dexmedetomidine does cause a manageable hypotension and bradycardia but the striking feature of this drug is the lack of opioid-related side effects like respiratory depression, pruritis, nausea, and vomiting.[10,11]

We therefore carried out this study to see the effect of addition of dexmedetomidine on ropivacaine induced epidural anaesthesia in lower limb orthopaedic surgeries in adult patients.

Aim and Objectives

The aim of this study is to evaluate and compare the efficacy of 0.75% ropivacaine and fentanyl with 0.75% ropivacaine and dexmedetomidine in epidural anaesthesia in patients undergoing lower limb orthopaedic surgeries with the following objectives,

1. The primary objective of this study is to compare the duration of analgesia between the two drugs.
2. The secondary objective of this study is to compare the hemodynamic changes in the intraoperative period, degree of motor blockade and occurrence of side effects in the postoperative period between the two drugs.

Materials and Method

After getting approval from the institutional ethical committee 60 adult patients belonging to the age group 18-60 years having average body weight of 50-65 kg with ASA I and II, undergoing elective lower limb surgeries were identified and randomly allocated to two groups through lots after getting written informed consent. It was a prospective randomized controlled double blind study.

Thus in this study,

Group RF (n=30): Patients received Inj.Ropivacaine 0.75% 20 cc + 50mcg Inj.Fentanyl

Group RD (n=30): Patients received Inj.Ropivacaine 0.75% 20 cc + Inj.Dexmedetomidine 50 mcg in Normal saline diluted upto 1cc

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.

All the selected patients were explained in detail about the purpose, procedure and the side effects of the study. After this a written informed consent was taken. All the patients were kept nil by mouth for minimum 8 hours pre-operatively.

A suitable wide bore intravenous line was taken using 18 G intra venous cannula. Preloading was done with Ringer Lactate 10 ml/kg IV over a period of 20 minutes before giving the epidural anaesthesia.

All the patients received premedication in the form of Tab.Ranitidine 150 mg a night before surgery. Inj.Glycopyrollate 0.2mg and Inj.Ranitidine 50mg were given IV before giving the epidural anaesthesia.

After taking the patient into the operation theatre, a multipara monitor was attached and base line vitals like pulse rate, blood pressure, ECG and oxygen saturation were noted down. The patient was given sitting position, the back was prepared with an antiseptic solution and draped with a sterile towel. After skin and subcutaneous infiltration with Inj. Lignocaine 2% 2 cc, 16G Touhy needle was inserted in L3-4 intervertebral space using midline approach. Following identification of the epidural space with loss of resistance technique, 18 G epidural catheter was inserted 4 cm in cephalad direction and was fixed. Thereafter patient was gently turned supine. A test dose consisting of Inj. Lignocaine 2% 3ml + Inj. Adrenaline 5mcg/ml was injected. After a negative test for intrathecal or intravascular placement of catheter, injection of study drug as per the group of the patient was given. Surgery was started once the peak sensory and motor levels were achieved. It was decided not to include in the study those patients having nil/or inadequate surgical anaesthesia. It was also decided to supplement the epidural anaesthesia with 6-8 ml of Inj.Ropivacaine 0.75% if surgical anaesthesia required top up.

Parameters monitored

Patients were observed for the quality of sensory block, motor block (Bromage scale), pulse rate, blood pressure and pain assessment (Visual analogue scale).

The patients were monitored for various intra and post-operative complications such as bradycardia (pulse rate less than 20% of pre procedure value), hypotension (Systolic blood pressure less than 20% of pre procedure value), nausea and vomiting, headache, backache, urinary retention, rigors, neurological complications.

A linear visual analogue scale of 10 cm was used graded from 0-10 in such a way that 0 denotes no pain and 10 denotes the most excruciating pain. Pain assessment was done starting at the end of surgery till VAS score of 4 or more than 4 noted.

Rescue analgesia (RA) in form of Inj. Diclofenac 1.5 mg/kg Intra muscular was given when the VAS was 4 or more than 4. Inj. Diclofenac 1.5 mg/kg IM was

repeated again if the patient complained of pain in next 24 hours. The total no. of analgesics required in first 24 hours postoperatively was noted down.

Bromage Scale

- Grade 0 - no motor blockade
- Grade I - unable to raise extended leg
- Grade II - unable to flex knee
- Grade III - unable to flex ankle

Statistical Analysis

Mean and standard deviation values were calculated. Analysis of variance (ANOVA) of the data for the various parameters was done using student's paired t-test for intragroup comparison and unpaired t-test for intergroup comparison. The significance of ANOVA was judged as follows-

- $P > 0.05$ not significant
- $P < 0.05$ significant
- $P < 0.001$ highly significant

Results

Table 1: Demographic data and duration of surgery

Variables		Group RF(n=30)	Group RD(n=30)	P value
Age(Years)(Mean±SD)		38.2±12.14	34.63±11.61	P>0.05
Sex	Male	28(93.33%)	28(93.33%)	
	Female	2(6.67%)	2(6.67%)	
ASA	Grade 1	21(70%)	22(73.33%)	
	Grade 2	09(30%)	08(26.67%)	
Mean duration of surgery (Minutes)(Mean±SD)		119.67±29.18	124.33±28.00	

The age group was in the range of 38.2±12.14 yrs in RF group and 34.63±11.61 yrs in RD group. There were 28 males and 2 females in both the groups. 21 patients were ASA 1 in RF group whereas 22 patients were ASA 1 in RD group. Out of the 9 patients in ASA 2 of group RF, 4 were known hypertensives on treatment, 3 were known cases of type 2 Diabetes mellitus on treatment and 2 patients had both. Similarly out of 8 cases of ASA 2 in RD group 4 were known case of hypertension and 3 had type 2 Diabetes Mellitus on treatment and 1 had both. The mean duration of surgery was 119.67±29.18 minutes in group RF and 124.33±28.00 minutes in group RD. None of the parameters were statistically significant between the groups.

Table 2: Type of surgery

Surgery	Group RF No. of patients	Group RD No. of patients
Tibia Plating	13	15
Tibia Interlock nailing	14	13
Tibia External Fixation	03	02

Of the 60 patients; 28 patients were posted for tibial plating, 27 were posted for tibial interlock nailing and 5 were posted for tibia external fixation.

Table 3: Assessment of sensory block

No.	Parameter	Group RF	Group RD	P Value
1.	Onset of Sensory Block (mins) (Mean±SD)	3.63±1.16	2.47±0.90	P<0.001
2.	Peak Sensory Level Achieved (range)	T6 (T6-T8)	T6 (T6-T8)	-
3.	Time to Achieve Peak Sensory Level (mins) (Mean±SD)	13.4±2.25	10.7±2.41	P<0.001
4.	Two Segment Regression Time from Highest Sensory Level(mins) (Mean±SD)	182.5±19.33	212±33.83	P<0.001

The quality of sensory block achieved between the two groups is statistically highly significant.

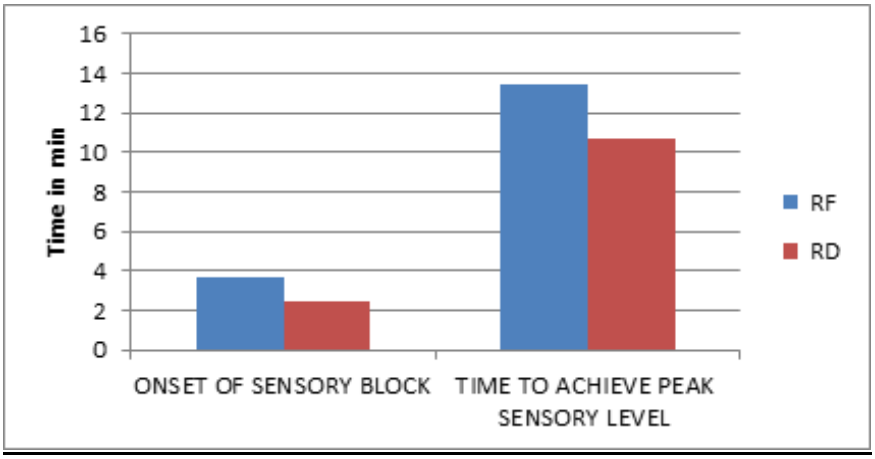

Fig. 1.1: Assessment of sensory block

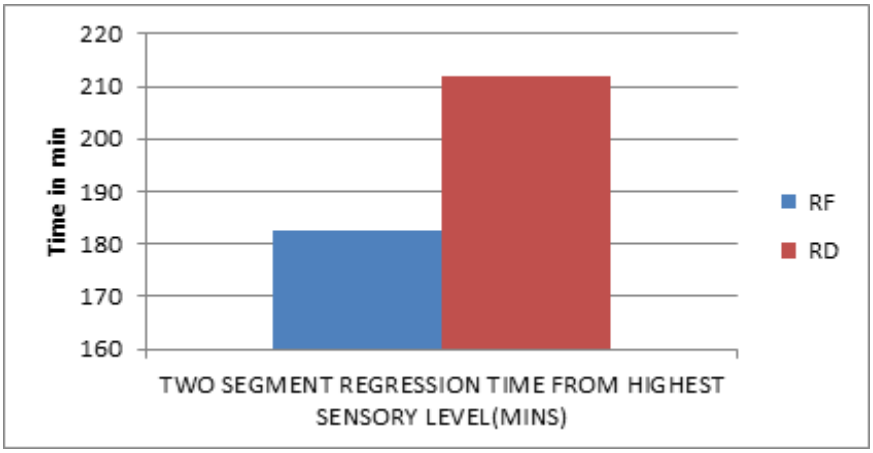

Fig. 1.2: Assessment of sensory block

Table 4: Assessment of motor block

No.	Parameter	Group RF	Group RD	P Value Significance
1.	Onset of Motor Block (mins) (Mean±SD)	5.6±1.4	5.2±1.73	P>0.05
2.	Maximum Motor Grade Achieved	Grade 2 in all cases	Grade 3 in all cases	-
3.	Time to Achieve Maximum Motor Grade (mins) (Mean±SD)	18.67±4.27	23.63±5.01	P<0.001
4.	Duration of Motor Block (recovery to bromage grade 0) (mins) (Mean±SD)	272±40.12	417±55.90	P<0.001

The recovery time to Bromage grade 0 is statistically significant between the two groups.

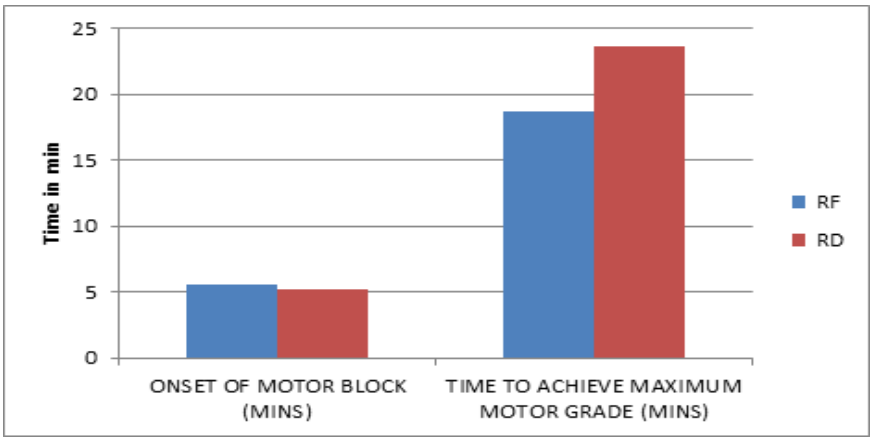

Fig. 2.1 Assessment of Motor Block

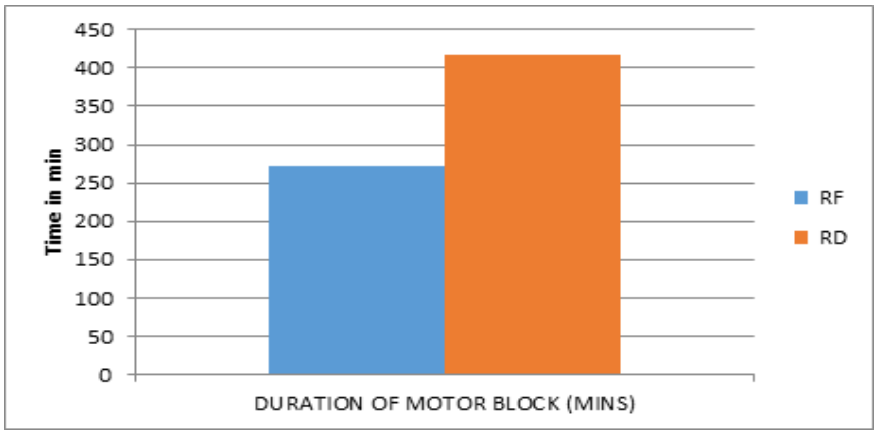

Fig. 2.2: Assessment of Motor Block

Table 5: Changes in mean pulse rate

	Group RF		Group RD		
Time	**Pulse Rate/Min**	**Intragroup p value**	**Pulse Rate/Min**	**Intragroup p value**	**Intergroup p value**
Pre Block	85.73±7.82	-	85.67±7.01	-	>0.05
Post Block					
1 min	85.6±7.67	>0.05	85.53±6.84	>0.05	>0.05
5 mins	84.8±8.86	>0.05	84.13±6.83	>0.05	>0.05
10 mins	84.23±9.61	>0.05	84.17±8.43	>0.05	>0.05
15 mins	82.67±9.46	>0.05	81.5±8.76	<0.05	>0.05
30 mins	79.73±11.08	<0.05	76.8±8.80	<0.001	>0.05
60 mins	77.07±8.25	<0.001	75.3±7.63	<0.001	>0.05
90 mins	78.23±7.24	<0.001	75.47±6.21	<0.001	>0.05
120 mins	78.42±6.41	<0.001	76.91±6.47	<0.001	>0.05
150 mins	79.5±5.73	<0.001	77.4±6.11	<0.001	>0.05
180 mins	80.0±5.29	<0.05	76.67±11.02	<0.001	>0.05
Post-Operative					
Immediate	80.27±6.41	<0.05	78.13±5.61	<0.001	>0.05
15 mins	80.07±5.02	<0.05	78.47±5.72	<0.001	>0.05
30 mins	80.33±5.41	<0.05	79.13±5.45	<0.001	>0.05
45 mins	81.0±5.50	<0.05	79.53±4.54	<0.001	>0.05
60 mins	81.47±5.51	<0.05	79.8±4.18	<0.001	>0.05
90 mins	81.67±4.93	<0.05	79.66±4.33	<0.001	>0.05
120 mins	81.73±4.39	<0.05	80.07±3.81	<0.001	>0.05

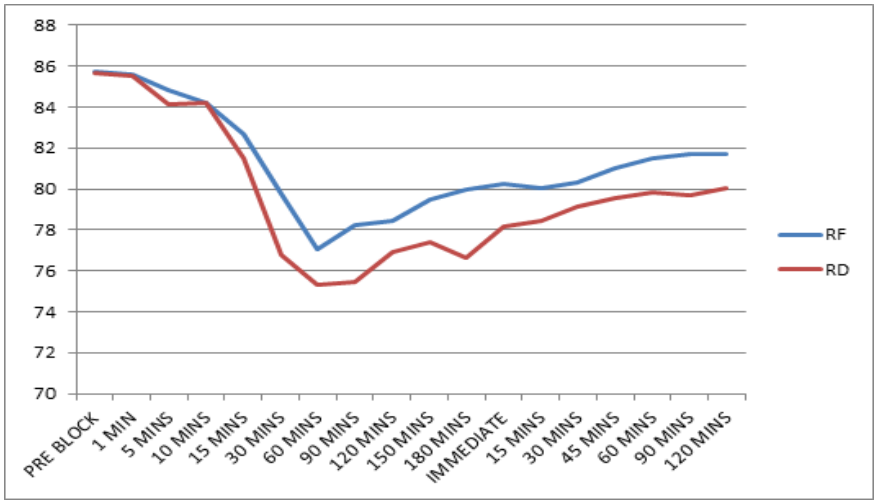

Fig. 3: Changes in Mean Pulse Rate

There is early onset of highly significant fall in pulse rate in RD group which is around 30min, whereas it is highly significant only around 60 min in RF group.

Table 6: Changes in mean systolic blood pressure

	Group RF		Group RD		
Time	**Systolic Blood Pressure**	**Intragroup p value**	**Systolic Blood Pressure**	**intragroup p value**	**Intergroup p value**
Pre Block	122.4±9.79		124.73±10.25		>0.05
Post Block					
1 min	121.27±9.79	>0.05	122.87±11.03	>0.05	>0.05
5 mins	117.7±9.43	>0.05	118.5±11.01	<0.05	>0.05
10 mins	114.67±9.21	<0.05	113.87±11.19	<0.001	>0.05
15 mins	110.13±9.34	<0.001	110.23±12.47	<0.001	>0.05
30 mins	107.8±12.23	<0.001	104.47±8.41	<0.001	>0.05
60 mins	105.1±9.75	<0.001	102.97±5.67	<0.001	>0.05
90 mins	109.47±9.04	<0.001	105.67±7.24	<0.001	>0.05
120 mins	110.53±7.60	<0.001	107.91±6.69	<0.001	>0.05
150 mins	110.25±8.10	<0.001	110.6±7.43	<0.001	>0.05
180 mins	111.33±16.16	<0.05	111.33±8.08	<0.001	>0.05
Post-Operative					
Immediate	113.27±7.82	<0.001	111.07±5.65	<0.001	>0.05
15 mins	113.47±6.43	<0.001	111.47±5.61	<0.001	>0.05
30 mins	113.33±4.91	<0.001	112.87±6.47	<0.001	>0.05
45 mins	114.87±4.06	<0.001	112.73±4.65	<0.001	>0.05
60 mins	114.93±4.66	<0.001	112.93±4.78	<0.001	>0.05
90 mins	114.8±4.09	<0.001	112.8±4.83	<0.001	>0.05
120 mins	114.47±4.26	<0.001	113.33±4.05	<0.001	>0.05

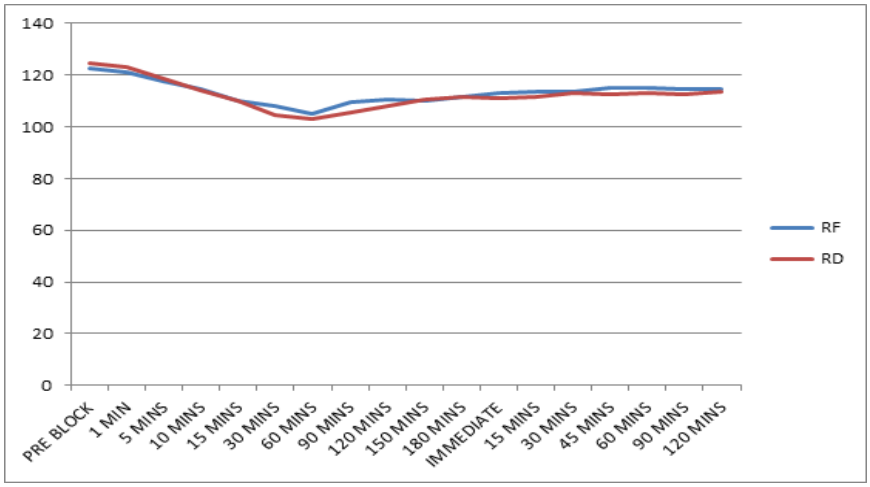

Fig. 4: Changes in Mean Systolic Blood Pressure

There is early onset of highly significant fall in systolic BP in RD group which is around 10min, whereas it is highy significant only around 15 min in RF group.

Table 7: Mean duration of pain relief

Observation Time	Group RF (n=30)	Group RD (n=30)	p-value
Range (hrs.)	4-8	6-14	p<0.001
Mean duration of effective analgesia (minutes)	455.67±73.56	740.33±143.42	

The mean duration of effective analgesia was 455.67±73.56 minutes in group RF and 740.33±143.42 minutes in group RD, the p value being highly significant.

Table 8: No. of rescue analgesia required in 24 hours

No. of Doses	No. of Patients	
	Group RF	Group RD
0	00	00
1	02	27
2	28	03

Patients in group RD required less no. of rescue analgesia than group RF.

Table 9: Perioperative complications

Complications	Group RF	Group RD
Hypotension	02	03
Bradycardia	Nil	01
Nausea/Vomiting	Nil	Nil
Headache	Nil	Nil
Backache	Nil	Nil
Retention of urine	Nil	Nil
Neurological complications	Nil	Nil

Discussion

Patients in the age group of 18-60 years having average body weight of 50-65 kgs undergoing lower limb orthopaedic surgery needing early ambulation were chosen for the study. Since it was lower limb orthopaedic patients, weight could not be properly measured. So patients were chosen on the basis of their built and approximate known weight. The patients had mean age group of 38.2±12.14 years in the RF group and 34.63±11.61 years in the RD group. There were 28 males and 2 females in each group. 21 patients were ASA 1 in RF group whereas 22 patients were ASA 1 in RD group. Out of the 9 patients in ASA 2 of group RF, 4 were known hypertensive on treatment, 3 were known cases of type 2 Diabetes mellitus on treatment and 2 patients had both. Similarly out of 8 cases of ASA 2 in RD group 4 were known cases of hypertension and 3 had type 2 Diabetes Mellitus on treatment and 1 had both.

Of the 60 patients; 28 patients were posted for tibial plating(13 in RF group and 15 in RD group), 27 were

posted for tibial interlock nailing(14 in RF group and 13 in RD group) and 5 were posted for tibial external fixation(3 in RF group and 2 in RD group). Since most of the patients needed early post-operative mobilisation they were chosen for the study.

The amount of ropivacaine used in our study in both the groups was 20 ml which is sufficient for lower limb surgeries. Sukhminder Singh et al. (2011), Salgado PFS et al. (2008), Bajwa SJ et al. (2011), Vieira AM et al 2004 and Katz JA et al 1990 also used 15-20 ml in their study.[12,13,14,15,16]

Dexmedetomidine is a highly selective α2-adrenoceptor agonist. It possesses anxiolytic, anaesthetic, hypnotic and analgesic properties. Dexmedetomidine's epidural effect is dose dependent and superior to intravenous route due to its high affinity for α2 adrenergic receptors in spinal cord. It prolongs analgesic action of LA by reducing systemic absorption caused by local vasoconstriction mediated by α_{2C} in smooth muscle of epidural venous plexus. During epidural administration cephalad spread into meninges may be responsible for sedation which is mediated by binding to α2A receptors in locus ceruleus and diminishing the release of norepinephrine. Dexmedetomidine causes more sensory block than motor block duration because 4 times the dose is required for inhibiting large, myelinated Aα fibers when compared to small unmyelinated C fibers.[10,11]

The amount of dexmedetomidine used in group RD in our study was 50 mcg fixed because our patients belonged to lower limb orthopaedic surgeries and hence it was not possible to elicit the weight. In various studies like those of Sukhminder Singh et al 2011, Salgado PFS et al 2008, Bajwa SJ et al 2011, Vieira AM et al 2004, Elhakim M et al, they have used 1-1.5 mcg/kg of dexmedetomidine along with local anaesthetic in epidural anaesthesia.[12,13,14,15,17] It has been noted that such doses reduces the latency time of block, increases the duration of analgesic effect, improves the analgesic quality and causes sedation without causing respiratory depression as per the study of Sukhminder Singh et al 2011.[12] Even in the caudal epidural anaesthesia the amount of dexmedetomidine used is between 1-2mcg/kg as in the study of Anand VG et al, EI-Hennawy AM et al.[18,19] The fixed amount of dexmedetomidine along with local anaesthetics has also been used in the studies of Gupta R et al, Kanazi GE et al but they gave the drug intrathecally instead of epidural route.[20,21]

Sensory Block

The quick onset, early peak effect and prolonged duration of sensory block in group RD compared to group RF indicates the synergism of effects between epidural ropivacaine and dexmedetomidine though the mechanism of action of both the drugs are different. Dexmedetomidine augments the action of local anaesthetic in regional blockade by interrupting the neuronal transmission of painful stimuli in Aδ and C fibers and also by increasing the conductance of potassium ions in nerve fibers.

Sukhminder Singh et al 2011 found that onset of analgesia and time to maximum sensory block level was less in dexmedetomidine group than in fentanyl group.[12]

On comparing our results with those of Salgado PFS et al 2008, there was no significant difference between the two studies regarding the onset time of sensory block, the peak sensory level reached and the time to reach peak sensory level. However, the total duration of sensory block was significantly increased or prolonged in dexmedetomidine group compared to control group by almost 40% in that study compared to only 17% in our study.[13] In a study by Bajwa SJ et al 2011 it was found that there was an early onset of sensory block, higher dermatomal spread, less time to reach the peak effect and prolonged two segment regression time in dexmedetomidine-ropivacaine group compared to clonidine-ropivacaine group.[14]

Motor Block

In our study the maximum motor block noted at 30 minutes and even at the end of surgery was only grade 2 in all the patients of group RF compared to grade 3 in all the patients of group RD proving that dexmedetomidine improved the quality of motor block produced by ropivacaine in group RD. The mean time to achieve maximum motor grade and total duration of motor block was statistically highly significant ($p < 0.001$).

The degree of motor block with the ropivacaine has been found to be comparatively less than bupivacaine. This differentiation is more when lesser concentration of ropivacaine is used (Concepcion M et al).[22] In our study we used 0.75% ropivacaine and all the patients of group RF developed motor grade 2 only whereas Dexmedetomidine improved the motor block to grade 3 in group RD. This improvement is due to the binding of dexmedetomidine to motor neurons in dorsal horn as per Gupta R et al and Kanazi GE et al.[20,21]

Comparing our study with Salgado PFS et al, the quality and duration of motor block was significantly higher in dexmedetomidine group ($p<0.05$), averaging 30% higher than that seen in control group.[13] (in our study prolongation by 53% than that seen in fentanyl group).

Changes in haemodynamics (Pulse and blood pressure)

In our study, there was a significant fall in mean pulse rate and mean systolic blood pressure from 15 to 30 minutes onwards after giving the epidural block in both the groups that is group RF and group RD. This matched with study of Sukhminder Singh et al.[12] Thus addition of dexmedetomidine did not make any significant change in haemodynamic parameters compared to fentanyl group in our study. This fall in pulse rate and mean systolic blood pressure though it was significant, was not more than 20% of pre-block value.

Our result in this regard match with the study of Bajwa SJ et al who also noted decrease in heart rate and mean arterial pressure in both ropivacaine-dexmedetomidine and ropivacaine- clonidine group though the decrease was never >15% of pre block value.[14]

Analgesia

The presence of Dexmedetomidine at α2 adrenergic receptors in dorsal horn of spinal cord modulates the release of substance P to produce analgesic effects.

The mean duration of effective analgesia was highly significantly ($p<0.001$) prolonged by 62.64% in group RD compare to group RF. The number of rescue analgesics required in 24 hours postoperatively therefore reduced in group RD compared to group RF.

Studies of Salgado PFS et al, Bajwa SJ et al have proved that epidural dexmedetomidine prolongs the duration of post-operative analgesia and reduces the number of rescue analgesics.[13,14]

Intra and postoperative complications

Hypotension (systolic blood pressure <20% of pre-operative value) was seen in 3 patients in group RD and 2 patients in group RF. In all the patients, hypotension was corrected with IV fluids and inj. Ephedrine. Bradycardia (pulse rate <20% of preoperative value) was seen in 1 patient in group RD at 30 minutes after giving the block, and it was treated with inj. Atropine 0.6 mg IV. No other complications were observed in any patient peri-operatively in 24 hours.

Sukhminder Singh et al noted higher incidence of nausea and vomiting in fentanyl group than dexmedetomidine group. Whereas higher incidence of urinary retention was seen in dexmedetomidine group (10%) than in fentanyl group (8%).[12] Salgado PFS et al 2008 noted higher incidence of bradycardia and hypotension in dexmedetomidine group, the p value being >0.05. They also noted nausea and vomiting and shivering in both the groups but with very low incidence and the p value was >0.05.[13]

On the other hand Bajwa SJ et al did not observe respiratory depression in any patients in their study. Incidence of nausea, vomiting, shivering, headache was quite low but dry mouth was noted in 6 patients of RD group compare to 7 patients in RC group.[14] Thus, the incidence of perioperative complications was less in our study.

Limitations of the study

Same dose of dexmedetomidine was used in all patients due to the fact that eliciting the weight was not possible. The results would have been more accurate if the dosing was done according to the weight of the patient. Since the surgery was carried out solely in epidural anaesthesia with ropivacaine, reduced motor block hampered with the manual reduction of the fracture site causing a delay in the duration of surgery.

Recommendations in routine clinical usage

Dexmedetomidine 1-2mcg/kg with ropivacaine can be used as an epidural top up for routine combined spinal epidural anaesthesia (instead of sole epidural technique), intra operatively and post operatively for all patients undergoing lower limb orthopaedic surgeries which will help in early ambulation.

Conclusion

After going through the study results, the following can be said for the addition of dexmedetomidine to 0.75% ropivacaine in lumbar epidural anaesthesia in comparison with fentanyl. The addition of dexmedetomidine,

1. Leads to early onset of sensory block and reduces the time required to reach peak sensory level. The duration of sensory anaesthesia is also prolonged.
2. It improves the quality and prolongs the duration of motor block.
3. Does not aggravate the changes in haemodynamic parameters.
4. Prolongs the duration of effective analgesia, thereby reducing the number of rescue analgesics post operatively.
5. Does not aggravate the incidence of perioperative complications.

Thus, dexmedetomidine serves as a good neuraxial adjuvant when added to 0.75% ropivacaine in epidural anaesthesia given for lower limb orthopaedic surgery in comparison to fentanyl.

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