Original Article

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A Comparative Study of Isobaric Levobupivacaine 0.5% versus Isobaric Levobupivacaine 0.5% with 3µg Dexmeditomidine in Spinal Anaesthesia in Patients Undergoing Effective Lower Limb Surgeries

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Abstract

Background: Intrathecal apha-2 agonists prolong the duration of action of local anesthetics and reduce the required dose. Dexmedetomidine is a 2 receptor agonist and its 2/1selectivity is 8 times higher than that of clonidine. Aim: In this study, we aimed to investigate the effect of adding 3µg dexmedetomidine to Intrathecal Isobariclevobupivacaine0.5% on the onset time and duration of motor and Sensory blocks. Study design: Randomized controlled study. **Subjects and Methods:** Patients were randomly assigned into two groups. Group L (n=30) patients received 3 mL (15mg) of 0.5% levobupivacaine+0.3mL normal saline and Group LD (n=30) patients received 3mL (15mg) of 0.5% levobupivacaine+0.3mL (3mcg dexmedetomidine). Sensory block onset time, block reaching time to T10dermatome, the most elevated dermatome level, two dermatome regression time, sensory block complete regression time as well as motor block on a set time, reaching Bromage3and regressing to Bromage 0 were recorded. **Results:** Sensory and motor block onset times were shorter in Group LD than in Group L ($p<0.001$). The regression of the sensory block to S1 dermatome and Bromage 0 was Longer in Group LD than Group L ($p<0.001$).The two dermatome regression time was Longer in Group LD than Group L ($p<0.001$). There were no statistically significant Differences between groups in blood pressure and hear trate. There was no statistically Significant difference between groups when adverse effects were compared. **Conclusion:** We conclude that intrathecal dexmedetomidine addition to Isobaric levobupivacaine 0.5%for spinal anaesthesia shortens sensory and motor block onset time and prolongs Block duration without any significant adverse effects.

Keywords: Spinal Anaethesia, Dexmedetomidine, Isobaric Levobupivacaine

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Introduction

Spinal anesthesia is a safe, reliable and inexpensive technique with the advantage of providing surgical anesthesia and also extended pain relief in postoperative period. It is also an effective treatment for acute operative pain and blunts autonomic, somatic and endocrine responses.[1] Lower Limb surgeries are often done under regional anesthesia. Till recently hyperbaric bupivacaine 0.5% was the only drug used for spinal anesthesia after the discontinuation of lidocaine's intrathecal use. Bupivacaine is available as a racemic mixture of its enantiomers, dextrobupivacaine and levobupivacaine. It has been found that dextro enantiomer is the cause for cardiotoxicity and the levobupivacaine the pure S (-) enantiomer does not have the cardiotoxicity. Levobupivacaine has similar pharmacodynamic properties of racemic bupivacaine but a documented reduced central nervous system and cardiovascular toxicity.[2-4]

In recent years levobupivacaine, the pure S (-) enantiomer of bupivacaine emerged as a safer alternative for regional anaesthesia than its racemic parent.[2,3] The superior pharmacological profile of levobupivacaine can be attributed to the following differences in, Pharmacokinetics-Protein binding of levobupivacaine (97%) is more than that of racemic bupivacaine (95%).[4] There is less free drug circulating in the plasma and acting on other tissues to cause adverse effects and toxicity. Studies have shown that while volumes of distribution and overall clearance of the two drugs are comparable, the clearance of unbound fraction of levobupivacaine is higher.[5]

In recent years levobupivacaine, the pure S (-) enantiomer of bupivacaine emerged as a safer alternative for regional anaesthesia than its racemic parent.[2,3]

Though the duration of action of levobupivacaine is prolonged, it will not produce prolonged postoperative analgesia.

Uncontrolled postoperative pain may produce a range of detrimental acute and chronic effects. For this reason there

has been in recent years, an increasing interest in the relief of postoperative pain by a technique using local anesthestic agents with adjuvant for spinal anesthesia. Neuraxial adjuvants such as opioids and 2- agonists are commonly used to improve perioperative analgesia.

To study the effect of adding 3µg of dexmedetomidine to isobaric levobupivacaine 0.5% in the subarachnoid block for lower limb surgeries compared to isobaric levobupivacaine alone, regarding.

The onset of the sensory blockade to reach T10 level and the onset of motor blockade. The maximum level of sensory blockade attained and the time taken for the same. The maximum level of motor blockade attained and the time taken for the same. Time for two-segment regression from highest sensory level.

Time for rescue analgesia

Time taken for regression to S1 dermatome.

Time for regression to Bromage 0 muscle power.

The occurrence of adverse drug reactions like hypotension, bradycardia.

Subjects and Methods

This study was conducted in the Department of anaesthesiology at PRATHIMA medical college and Hospital Karimnagar, Telangana from May 2017 to June 2018.

Study population:

Patients posted for elective lower limb surgeries

Study design:

Prospective controlled comparative clinical study

Sampling size and technique:

Sixty patients in the age group between 20 and 60 years belonging to ASA

Grade-I and Grade-II: posted for elective lower limb surgeries were grouped randomly into two groups (n=20). Randomization was done using a simple sealed envelope technique. Determination of patient numbers was made according to the study of Kanazi et al6. A minimum of 25 patients in each group was recruited according to the power analysis (=0.05 and, =0.05, power 95%).

Group L (n=30): Levobupivacaine 0.5% isobaric (3ml) with normal saline (0.3ml) (Total 3.3 ml).

Group LD (n=30): Levobupivacaine 0.5% isobaric (3ml) with Dexmedetomidine 3µg (0.3ml) (Total 3.3 ml).

Inclusion criteria

Adult patients aged between 20-60 years; belonging to ASA grade I and II posted for elective Lower limb surgeries were included in the study with

1) Weight >50kgs

2) Height >150cm.

Exclusion criteria

Patients belonging to the following classes:

Age group less than 20 years and more than 60 years,

Patients with ASA Grade > II,

Patients with spinal deformities or injection site infection,

Patients posted for emergency surgeries,

Patients with morbid obesity,

Patients shorter than 150 cm,

Patients having any absolute contraindications for spinal anaesthesia like raised intracranial pressure, severe hypovolemia, bleeding diathesis,

Patients who were not willing to participate in the study, were excluded from the study.

They were explained, in their native language, the nature of the study and their initials were obtained on the Informed Consent Form. Patients were premedicated on the night before surgery with Pantoprazole 40mg and Alprazolam 0.5mg and also 90 min before surgery and were kept fasting overnight. After shifting to OT standard monitoring was carried using multiparameter monitor having pulse oximetry, ECG and NIBP. Intravenous access was obtained with 18 gauge cannula and was preloaded with Ringer lactate 500ml half an hour before spinal anaesthesia.

Patients were placed in the right lateral position. Under strict aseptic precautions, lumbar puncture was performed at the level of L3-L4 through a midline approach using 23G or 26 G Quincke spinal needle and study drug was injected after confirmation of needle tip in the subarachnoid space by a free flow of CSF. Patients were made to lie down in supine posture immediately after spinal anaesthesia with 150 head up and supplementary oxygen was given with mask.

The following parameters were noted:

Onset of sensory blockade at T10 dermatome and onset of motor blockade motor blockade.

Maximum level of sensory blockade attained and the time taken for the same.

Maximum level of motor blockade attained and the time taken for the same.

Total duration of sensory blockade and motor blockade.

Sensory blockade was tested using Ice swab technique.

Patients with inadequate or failed block were excluded from the study.

Quality of motor blockade was assessed by the modified Bromage scale.

The time of first rescue analgesic requirement was noted.

Total duration of surgery, analgesia and side effects were noted.

All patients were monitored during the surgery and perioperative period

Employing multi parameter monitor which displays heart rate, blood pressure,ECG and SPO2.

Statistical Methods:

Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance.

Results

[Table 1] shows age distribution of the patients in two groups. There is no statistically significant difference in the age-wise distribution of patients between the groups (p=0.510)

[Table 2] shows the mean height distribution in both groups.

The mean height in Group L is 156.40±6.82cm, and in Group LD it is 158.20±7.19 cms. There is no statistically significant difference between the groups (p=0.664).

Table 1: Age distribution of patients studied

Age in years	Levobupivacaine		Levobupivacaine + dexmeditomidine	
	No	%	No	%
21-30	4	13.3	6	23.3
31-40	6	20.0	6	23.3
41-50	15	50.0	14	33.3
51-60	5	16.7	4	20.0
Total	30	100.0	30	100.0

Table 2: Comparison of Mean Height in two groups studied

	Group L	Group LD	P-value
Height (cm)	156.40±6.82	158.20±7.19	0.664

Table 3: Comparison of Mean Weight in two groups studied

	Group L	Group LD	P-value
Weight (kg)	57.20±9.04	57.57±8.49	0.872

Table 4: ASA Grade distribution of patients studied

ASA Grade	Levobupivacaine		Levobupivacaine + dexmeditomidine	
	No	%	No	%
Grade 1	15	50.0	15	50.0
Grade 2	15	50.0	15	50.0
Total	30	100.0	30	100.0

Table 5: Surgical Procedure

Surgery	Levobupivacaine		Levobupivacaine + dexmeditomidine	
	No	%	No	%
1. CRIF OF SOF RT	2	6.7	2	6.7
2. CRIF OF SOF LT	2	6.7	1	3.3
3. Implant Removal Femur RT	2	6.7	0	0.0
4. Implant Removal Femur LT	0	0.0	1	3.3
5. Skin grafting Lt leg	3	10.0	3	10.0
6. Tendon repair TA RT	2	6.7	3	10.0
7. RT partial patellectomy	2	6.7	2	6.7
8. Tendon repair TA LT	3	10.0	1	3.3
9. Above Knee Amputation RT	1	3.3	1	3.3
10. CRIF with Long PFN LT	0	0.0	1	3.3
11. CRIF with Long PFN RT	1	3.3	0	0.0
12. Left partial patellectomy	1	3.3	2	6.7
13. CRIF Tibial condyle RT	3	10.0	2	6.7
14. CRIF Tibial Condyle LT	1	3.3	2	6.7
15. CRIF IL nail Tibia LT	3	10.0	2	6.7
16. CRIF femur + Bone Grafting RT	1	3.3	2	6.7
17. CRIF femur + Bone Grafting LT	0	0.0	1	3.3
18. CRIF+ EF of Tibia LT	1	3.3	0	0.0
19. CRIF+ EF of Tibia RT	0	0.0	1	3.3
20. Implant Removal Tibia RT	1	3.3	1	3.3
21. Implant Removal Tibia LT	0	0.0	1	3.3
22. CRIF IL tibia RT	1	3.3	1	3.3
Total	30	100.0	30	100.0

[Table 4] shows the ASA Grade distribution in both groups. There is no statistically significant difference between the groups (p=1.000).

Table 6: Comparison of Mean Time for Onset of sensory block at T10 in mins

Variables	Levobupivacaine	Levobupivacaine + dexmeditomidine	P-value
1. Sensory block onset time(mins)	6.10±0.84	3.93±0.83	<0.001

Table 7: shows the meantime taken for attaining the maximum sensory blockade.

	Group L	Group LD	P-value
Time for Maximum sensory block in mins	11.10±1.03	7.23±0.6	<0.001

[Table 5] showing the meantime of onset of the sensory blockade at T 10. In Group L it was 6.10±0.84mins and in Group LD it was3.93±0.83. There was a statistically significant difference between the two groups regarding the onset of sensory blockade (p<0.001).

[Table 7] shows the meantime taken for attaining the maximum sensory blockade. In Group L it was 11.10±1.03mins and in Group LD it was 7.23±0.68mins. There was a statistically significant difference between the two groups (p<0.001.).

Table 8: Maximum level of sensory blockade attained

Sensory level	Group L (Number of patients)	Group LD (Number of patients)	p-value
T6	30	30	1

[Table 8] shows the maximum level of sensory block attained by the patients in both groups. All the patients in both groups attained a block of T6 level with no statistically significant difference between the two groups (p=1).

Table 9: comparison of Mean Time for Onset of motor block in minutes

	Group L	Group LD	P-value
Time for Onset of motor block in mins(Bromage >0)	8.53±1.14	5.40±1.04	p<0.001

[Table 9] shows the meantime taken for the onset of motor blockade. In Group L it was 8.53±1.14mins and in Group LD it was 5.40±1.04mins. There was a statistically significant difference between the two groups (p<0.001).

Table 10: Comparison of Time for Maximum motor block (Bromage 3)

	Group L	Group LD	P-value
Time for Maximum motor block in mins	17.00±1.62	17.03±1.56	0.936

Table 11: Grade of motor blockade

	Group L (Number of patients)	Group LD (Number of patients)	p-value
Bromage 3	30	30	1.000

[Table 10] shows the meantime taken for attaining the maximum motor blockade. In Group L it was17.00±1.62

mins and in Group LD it was17.03±1.56mins. There was no statistically significant difference between the two groups (p=0.936).

[Table 11] shows the Bromage scale attained by the patients in both groups. A complete motor block (Bromage 3) was attained in all patients in both groups.

Table 12: Comparison of Pulse Rate in two groups of patients studied

Heart rate (bpm)	Levobupivacaine	Levobupivacaine + dexmeditomidine	P-value
Basal	72.80±11.95	69.10±11.86	0.233
2min	77.40±11.66	71.10±12.15	0.045*
5min	77.60±10.48	71.10±10.51	0.020*
10min	79.90±7.62	72.30±10.19	0.002**
20min	81.00±6.45	71.20±9.20	<0.001**
30min	83.40±7.05	73.70±9.26	<0.001**
40min	83.40±6.56	74.20±8.60	<0.001**
60min	82.70±6.65	76.60±8.39	0.003**
90min	73.75±9.11	63.43±6.13	0.050+
120min	74.00±8.49	74.00±0.00	1.000
At the end of surgery	72.67±4.21	74.40±10.11	0.639

[Table 12] shows the comparison of Pulse Rate in two groups of patients studied. There were a statistically significant change in the pulse rate between two groups during first 60 minutes. Two patients in Group LD had bradycardia and no patients in Group L.

Table 13: Comparison of SBP (mm Hg) in two groups of patients studied

SBP (mm Hg)	Levobupivacaine	Levobupivacaine + dexmeditomidine	P-value
Basal	130.16±10.27	128.17±9.72	0.442
2min	122.03±13.88	120.70±13.42	0.707
5min	118.00±13.42	113.60±6.22	0.109
10min	107.30±17.68	113.00±12.89	0.159
20min	115.00±9.63	115.60±11.13	0.824
30min	112.60±15.14	110.80±12.90	0.622
40min	107.30±15.06	99.20±31.42	0.208
60min	109.40±8.49	112.20±13.25	0.334
90min	111.75±7.37	120.43±13.20	0.263
120min	113.50±4.95	107.50±4.95	0.349
At the end of surgery	113.22±8.15	113.60±14.32	0.945

[Table 13] shows the mean SBP (mm Hg) in two groups of patients studied. There is no statistically significant difference in systolic blood pressure between the groups. Two patients in Group L and Two patients in Group LD had hypotension.

Table 14: shows Mean DBP(mm Hg) in two groups of patients

DBP (mm Hg)	Levobupivacaine	Levobupivacaine + dexmeditomidine	P-value
Basal	79.70±10.83	80.90±17.86	0.754
2min	72.40±8.00	68.70±11.09	0.144
5min	68.60±9.40	70.10±11.03	0.573
10min	61.80±12.66	73.10±15.67	0.003**
20min	63.80±9.99	69.30±12.08	0.060+
30min	67.20±13.62	68.00±12.48	0.813
40min	63.40±10.37	66.00±10.46	0.338
60min	64.70±9.49	67.90±11.39	0.242
90min	59.75±14.73	72.00±8.60	0.110
120min	69.00±5.66	60.50±12.02	0.461
At the end of surgery	67.67±9.97	70.30±14.02	0.647

[Table 14] shows Mean DBP(mm Hg) in two groups of patients studied. There was a statistically significant difference in diastolic blood pressure at 10 mins between the groups.

Table 15: Comparison of MAP (mm Hg) in two groups of patients studied

MAP (mm Hg)	Levobupivacaine	Levobupivacaine + dexmeditomidine	P-value
Basal	96.00±9.14	95.10±13.90	0.768
2min	86.17±9.38	86.71±8.92	0.823
5min	83.60±10.35	84.20±8.29	0.805
10min	75.33±13.53	73.27±14.29	0.567
20min	77.90±10.07	80.50±10.74	0.337
30min	80.80±16.13	79.20±11.30	0.658
40min	76.40±12.38	79.30±10.80	0.338
60min	76.70±8.62	80.20±12.00	0.200
90min	77.60±8.99	84.88±7.36	0.138
120min	79.50±12.02	78.00±8.49	0.899
At the end of surgery	80.78±9.38	79.2.00±11.84	0.753

[Table 15] shows the mean MAP (mm Hg) in two groups of patients studied.

There is no statistically significant difference in mean arterial pressure between the groups.

Table 16: Comparison of SpO2 % in two groups of patients studied

SpO2 %	Group L	Group LD	P-value
Basal	100.00±0.00	100.00±0.00	-
2 min	100.00±0.00	100.00±0.00	-
5 min	100.00±0.00	100.00±0.00	-
10 min	100.00±0.00	100.00±0.00	-
20 min	100.00±0.00	100.00±0.00	-
30 min	100.00±0.00	100.00±0.00	-
40 min	100.00±0.00	100.00±0.00	-
60 min	100.00±0.00	100.00±0.00	-
90 min	100.00±0.00	100.00±0.00	-
120 min	100.00±0.00	100.00±0.00	-
At the end of surgery	100.00±0.00	100.00±0.00	-

[Table 16] shows the mean SpO2 % in two groups of patients studied. All the patients in both groups maintained 100% saturation.

Table 17: Comparison of mean Time at which rescue analgesic required in minutes

	Group L	Group LD	P-value
Time at which rescue analgesic required in minutes	237.67±23.44	429±18.45	<0.001

[Table 17] shows the comparison of mean time at which rescue analgesic required in minutes. In Group L it was 237.67±23.44 min and in Group LD it was429±18.45 min. There was a statistically strongly significant difference in the meantime at which rescue analgesics required (p<0.001).

Table 18: Comparison of the mean duration of Regression time to S1

	Group L	Group LD	P-value
(Regression Time To S1 Dermatome Mins)	233.00±11.03	380.83±14.09	<0.001

[Table 18] shows the comparison of the mean duration of

sensory block in minutes. In Group L it was 233.00±11.03 min and in Group LD it was 380.83±14.09 min. There was a statistically strongly significant difference in the mean duration of sensory block (p<0.001).

Table 19: Comparison of mean duration of regression to Bromage 0

	Group L	Group LD	P-value
(Regression Time To Bromage 0 in mins)	220.17±12.7	322.17±15.01	<0.001

[Table 19] shows the comparison of the mean duration of motor block in minutes. The mean duration of the motor blockade was 220.17±12.7 mins in Group L and322.17±15.01 mins in Group LD. There was a statistically strongly significant increase in the mean duration of motor block in group LD (p<0.001).

Regarding adverse effects in both the groups. Two patients in Group L developed adverse effects (Bradycardia-2), and Four patients in Group LD (Hypotension 2, Bradycardia 2). There was no statistically significant difference between the groups regarding adverse effects (p=0.671). In the present study, there was no statistically significant difference between the dose of ephedrine required in two groups (p=1.000).

Discussion

The aim of good postoperative analgesia is to produce long-lasting, continuous adequate analgesia with minimum side effects. Spinal anaesthesia is a commonly used technique for lower limb surgeries, as it provides a faster and effective onset of sensory and motor block and also extended postoperative analgesia.

Levobupivacaine is a preferred local anesthetic due to its more extended sensory block, lower cardiac and central nervous system toxicity.[2-4] Opioids and 2-agonists are commonly used neuraxial adjuvants to improve the quality of perioperative analgesia.[7]

In the current study, 60 patients undergoing elective lower limb surgeries were included. The demographic data in terms of age, height, weight showed no statistical difference. The drug selected for the subarachnoid block was 15mg of 0.5% isobaric levobupivacaine. Similarly Sathitkarnmanee Tet al,[8] and Mantouvalou M et al,[9] used 15mg of levobupivacaine which provided adequate sensory and motor block for abdominal surgeries. Lee YY et al,[10] concluded that 2.6ml of 0.5% levobupivacaine could be used as an alternative to 0.5% racemic bupivacaine in spinal anaesthesia.

In our study we add dexmedetomidine3µg in groups D To levobupivacaine. Similarly Esmaogluet al,[3] hypothesized that intrathecal 3 g dexmedetomidine shortens sensory and motor block onset time and prolongs block duration without any significant adverse effects.

Table 20: Comparision of present studies with different studies.

Spinal block characteristics	Group L	Group LD	Control Group	Dexmed group	Authors
Time for Onset of sensory block in minutes (at T10)	6.10±0.84	3.93±0.83	5.2 ±0.7	3.1± 0.7	Esmaoglu et al,[11]
Time for Maximum sensory block in minutes	11.10±1.03	7.23±0.68	13.4±5.8	12.7±5.0	Esmaoglu et al,[11]
Maximum sensory block attained	T6	T6	8.6±1.0	8.2±2.0	Esmaoglu et al,[11]
Time at which rescue analgesic required in minutes	237.67±23.44	429±18.45	241.7± 21.7	478.4±20.9	Esmaoglu et al,[11]
Two Segment Regression time	101.67±7.81	184.67±12.03	83.0±18.9 125.3±22.8	125.3±22.8	Gupta R et al,[12]
Time to regression to S1 Dermatome	233.00±11.03	380.83±14.09	226.6±26.4	356.3±35.2	Esmaoglu et al,[11]
Time to onset of motor block in minutes(Bromage 1)	8.53±1.14	5.40±1.04	3.5±1.5	1.7±0.6	Esmaoglu et al,[11]
Time for onset of Maximum motor block in minutes	17.00±1.62	17.03±1.56	14.3±7.1	13.9±6.9	Esmaoglu et al,[11]
Duration of motor block in minutes (Regression Time To Bromage 0)	220.17±12.7	322.17±15.0	201.0±26.9	332.0±36.7	Esmaoglu et al,[11]

So we have chosen 3µgdexmedetomidine as an adjuvant with levobupivacaine to avoid the excessive length of motor block and also to minimize the cardiovascular side effects like bradycardia.

In the present study the meantime is taken for onset of sensory block at T10 was6.10±0.84mins in Group L and 3.93±0.83mins in Group LD. There was a statistically significant difference in the meantime made for onset of neural blockade between the two groups (p<0.001).Similarly Esmaoglu et al,[11] found statistically significant difference in the time taken for onset of sensory blockade between levobupivacaine and 3µg dexmedetomidine along with Isobaric levobupivacaine (Group L-5.2 ±0.7min, Group LD 3.1± 0.7mins.P<0.001)

The mean time taken for maximum sensory blockade in the present study was11.10±1.03min in Group L and in 7.23±0.68min Group LD. There was statistically significant difference (p<0.001) in the meantime taken for maximum sensory blockade. Esmaoglu et al,[11] found statistically significant difference in the meantime made for a maximum sensory barrier between levobupivacaine and 3µgdexmedetomidine along with Isobaric levobupivacaine (GroupL 13.4±5.8min GroupLD 8.3±3.3min.P<0.001)

In our study the maximum level of sensory blockade achieved was T6. All the patients in both groups had attained T6 level of block. There was no statistically significant difference in the maximum level of sensory blockade. Similarly Esmaoglu et al,[11] observed statistically no significant difference between group L (T 8.6±1.0) and group LD (T 8.2±2.0) P=0.340.

In our study the time taken for two-segment regression was 101.67±7.81 mins in Group L and 184.67±12.03 mins in Group LD. There was a statistically highly significant increase in the duration of two-segment regression in Group

LD (p=<0.001). Similarly in the study conducted by Esmaoglu et al,[11] there was a statistically significant difference between two groups in two segment regression time (Group L-83.0±18.9, GroupLD-125.3±22.8 P<0.001). In the study conducted by EidHEA et al et al,[3] there was statistically significant difference between two groups in two segment regression time Group N-76.9±26.8mins (Hyperbaric Bupivacaine 15mg), GroupD10-103±28.7mins where dexmedetomidine 10µg added to bupivacaine, Group D15 200.6±30.9mins where dexmedetomidine 15µg added to bupivacaine.

The time taken for regression of sensory block to S1 in the present study was 233.00±11.03mins in Group L and 380.83±14.09mins in Group LD. It was highly significant increase in the meantime taken for regression of sensory block to S1 in Group LD (p=<0.001), Similarly in the study conducted by Esmaoglu et al,[11] there was a statistically significant difference between two groups in the time taken for regression to S1 segment(Group L-226.6±26.4 mins, GroupLD-356.3±35.2mins P<0.001). In the study conducted by Al Mustafa MM et al,[14] there was a statistically significant difference between two groups in the time taken for regression to S1 segment (GroupN-165.5±32.9mins (Isobaric Bupivacaine 12.5mg), GroupD10-302.9±36.7mins where dexmedetomidine 10µg added to bupivacaine, Group D5 246.43±25.7mins where dexmedetomidine 5µg added to bupivacaine.

The mean duration of time at which rescue analgesics required in the present study was 237.67±23.44mins in Group L and 429±18.45 mins Group LD. There was a highly significant increase in the duration of analgesia in Group LD (p<0.001). Similarly in a study conducted by Gupta R et al,[12] the time for rescue analgesia in the control group (Isobaric Ropivacaine 0.75% 15mg) was 241.7± 21.7 min and in group D it was 478.4±20.9min (Dexmedetomidine 5µg was added to ropivacaine).

In a study conducted by Hala E A Eid et al,[13] shown significant prolongation of the duration of spinal blockade by intrathecal administration of dexmedetomidine as an adjunct to hyperbaric bupivacaine. Patients in the groups that received dexmedetomidine had reduced postoperative pain scores and a longer analgesic duration than those who received spinal bupivacaine alone. This effect appears to be dose-dependent and more pronounced with the prescription of 15g. Fifteen g dexmedetomidine but not 10g was associated with lower 24-hours analgesic requirements and desired level of sedation.

In our study the meantime for onset of motor block was 8.53±1.14min in Group L and 5.40±1.04 in Group LD. There was statistically significant difference in the meantime for start of motor blockade in the two groups (p<0.001). Similarly in a study conducted by Esmaoglu et al,[11] reported that mean time taken for onset of motor blockade was 3.5±1.5min in group L and 1.7±0.6min in group LD (P<0.001).

The mean time is taken for the maximum motor blockade in our study was17.00±1.62 mins in Group L and 17.03±1.56mins in Group LD. There was no statistically significant difference in the time made for the maximum motor blockade in the two groups (p=0.936). The grade of motor blockade in the study groups did not differ. Both the groups had a motor blockade of Bromage grade 3. similarly in a study conducted by Esmaoglu et al,[11] reported that meantime for the maximum motor blockade was 3.5±1.5min in group L and 1.7±0.6min in group LD (P<0.001).

In our study the mean duration of motor blockade (Regression time to Bromage 0) was 220.17±12.7 mins in Group L and322.17±15.01mins in Group LD.

There was a statistically highly significant increase in the duration of motor blockade in Group LD (p<0.001). Similarly in the study conducted by Esmaoglu et al,[11] there was a statistically significant difference between two groups in the time taken for regression to Bromage 0 (Group L-201.0±26.9 mins, Group LD-332.0±36.7 mins P<0.001). In the study conducted by Al Mustafa MM et al,[14] there was statistically significant difference between two groups in the time taken for regression to Bromage scale 0 (Group N-140.1±32.3 mins (Isobaric Bupivacaine 12.5mg), GroupD10-338.9±44.8mins where dexmedetomidine 10µg added to bupivacaine, Group D5 277.1±23.2 mins where dexmedetomidine 5µg added to bupivacaine.

There are statistically significant changes in pulse rate between two groups in first 60min. 2 Patients in group L and group LD developed bradycardia similarly in the study conducted by Esmaoglu et al,[11] reported 3 patients in group L and 2 patients in group LD developed bradycardia

In the present study two patients in Group LD had hypotension of more than 20% fall in basal blood pressure similar to a survey conducted by Esmaoglu et al,[11] wherein 2 patients in group LD developed hypotension of more than 20% fall in basal value.

In the current study none of our patients had any evidence of respiratory depression, sedation, episodes of nausea, vomiting, shivering, hypersensitivity reactions to any of the study drug whereas Esmaoglu et al,[11] reported 1 patient with nausea and 1 patient with vomiting in Levobupivacaine group and one patient with nausea and 2 patient with nausea and 1 patient with vomiting in dexmedetomidine group.

Hemodynamics were preserved both intraoperatively and postoperatively. However there was a small percentage of patients who developed a significant fall in blood pressure and bradycardia which were easily managed without any untoward effect. Two patients in Group L developed adverse effects (Bradycardia-2), and Four patients in Group LD (Hypotension 2, Bradycardia 2)

In the present study the efficacy of adding dexmedetomidine to levobupivacaine in spinal anesthesia was compared with levobupivacaine 0.5% alone and we noticed that combination of intrathecal dexmedetomidine and levobupivacaine was better than levobupivacaine alone with regards to the quality and duration of analgesia, faster onset, duration of sensory and motor blockade.

No patient had respiratory depression, nausea, vomiting, shivering or hypersensitivity reactions in either of the groups. To conclude patients who received dexmedetomidine 3µg along with levobupivacaine showed a better quality faster onset prolonged duration of sensory and motor block with better hemodynamic stability.

Conclusion

Dexmedetomidine when used as an adjuvant with

levobupivacaine, offers faster onset, better quality and prolonged postoperative analgesia sensory block and motor block as compared to levobupivacaine alone with minimal adverse effects. But the bradycardia response was more pronounced in the dexmedetomidine group which requires constant vigilant monitoring. Finally we conclude that dexmedetomidine is an essential agent in the armamentarium of various adjuvants to the local anesthetic being used for lower limb surgeries.

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References

1. David LB. Spinal, Epidural and Caudal Anaesthesia. Millers Anaesthesia. 7th Edition. Philidelphia: Churchill Livingstone Elsevier; 2010.
2. Burlacu CL, Buggy DJ. Update on local anesthetics: focus on levobupivacaine. Ther. Clin. Risk Manag. 2008;4(2):38192.
3. Sanford M, Keating GM. Levobupivacaine: a review of its use in regional anaesthesia and pain management. Drugs. 2010;70(6):76191.
4. Bajwa SJS, Kaur J. Clinical profile of levobupivacaine in regional anesthesia: Asystematic review. J. Anaesthesiol. Clin. Pharmacol. 2013;29(4):5309.
5. Burm AG, Meer AD, Kleef JW, Zeijlmans PW, Groen K. Pharmacokinetics of the enantiomers of bupivacaine following intravenous administration of the racemate. Br. J. Clin. Pharmacol. 1994;38(2):1259.
6. Kanazi GE, Aouad MT, Jabbour-Khoury SI, Al Jazzar MD, Alameddine MM, Al-Yaman R, et al. Effect of low-dose dexmedetomidine or clonidine on the characteristics of bupivacaine spinal block. Acta Anaesth Scand. 2006;50:2227
7. Axelsson K, Anil G. Local anaesthetic adjuvants: neuraxial versus peripheral nerve block. Current Opinion in Anaesthesiology 2009; 22 (5): 649-654.
8. Sathitkarnmanee, Thepakorn, et al. A comparison of spinal isobaric levobupivacaine and racemic bupivacaine for lower abdominal and lower extremity surgery. J Med Ass Thai Cho. 2011;94(6):716-720.
9. Mantouvalou M. Spinal anesthesia: comparison of plain ropivacaine, bupivacaine and levobupivacaine for lower abdominal surgery. Acta Anæ Bel. 2008;59(2):65.
10. Lee YY, Muchhal K, Chan CK. Levobupivacaine versus racemic bupivacaine inspinal anaesthesia for urological surgeries. Anaesth Intensive Care. 2003;31(6):637-41.
11. Esmao lu A, Türk S, Bayram A, Akn A, Uur F, Ulgey A. The effects of dexmedetomidine added to spinal levobupivacaine for transurethral endoscopic surgery. Balkan Med J 2013. Jun;30(2):186-190.
12. Gupta R, Bogra J, Verma R, Kohli M, Kushwaha JK, Kumar S. Dexmedetomidine as an intrathecal adjuvant for postoperative analgesia. Indian J Anaesth 2011;55(4):347-351.
13. Eid HEA, Shafie MA, Youssef H. Dose-Related Prolongation of Hyperbaric Bupivacaine Spinal Anesthesia by Dexmedetomidine. Ain Shams Jou Anes. 2011;4(2):83-95
14. Al-Mustafa MM, Abu-Halaweb SA, Aloweidi AS, Mursbidi MM, Ammari BA, Awawad ZM, et al. Effect of Dexmedetomidine added to spinal Bupivacaine for Urological procedures. Saudi Med J 2009;30(3):365-370.

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