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Original Research Article

COMPARISON OF ONSET OF MOTOR AND SENSORY BLOCK BETWEEN LEVOBUPIVACAINE AND LEVOBUPIVACAINE WITH DEXMEDETOMIDINE IN INFRAUMBILICAL SURGERIES UNDER SPINAL ANAESTHESIA

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Abstract

Background & Methods: The aim of the study is to Comparison of onset of motor and sensory block between levobupivacaine and levobupivacaine with dexmedetomidine in infraumbilical surgeries under spinal anaesthesia. In the operating room, appropriate equipment for airway management and emergency drugs were kept ready. The horizontal position of the operating table was checked. Patients were shifted to the operating room and positioned.

Results: We found 56% Male in Group L whereas 68% in Group LD, 44% Female in Group L & 32% Group LD. ASA Grade 1 72% in Group L & 60% in Group LD with P (0.021). We found maximum side effect in Hypotension 32% whereas 24% in Bradycardia in Group LD with P (0.037).

Conclusion: We concluded that the supplementation of Dexmedetomidine as an adjuvant to 0.5% levobupivacaine in infraumbilical surgeries under spinal anaesthesia produces longer duration of sensory and motor block but takes slightly more time to attain complete motor block as compared to Buprenorphine. Dexmedetomidine also provides an additional benefit of providing conscious sedation with fewer side effects.

Keywords: onset, motor, sensory, levobupivacaine, dexmedetomidine & infraumbilical surgeries.

Study Design: Comparative Study.

1. INTRODUCTION

Lower limb orthopaedic surgeries, both traumatic and non-traumatic are commonly performed under spinal anaesthesia. Hyperbaric bupivacaine is the most commonly used drug for intrathecal administration. Its easy availability, low cost and absence of side effects like transient neurological symptoms lead to widespread use. But the association of bupivacaine with side effects like dense motor blockade for prolonged duration and difficulty in micturition led to the development of alternatives such as ropivacaine and levobupivacaine.[1] Ropivacaine has a slightly distinct pharmacokinetic profile which possesses two third sensory anaesthesia but only fifty per cent motor blockade when compared with bupivacaine in a similar dosage. This made ropivacaine less desirable for surgeries requiring muscle relaxation. Being a pure S- enantiomeric form, Levobupivacaine

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filled this lacuna with almost similar pharmacokinetic profile as bupivacaine but with lesser cardiac and neurotoxicity.[2]
Hyperbaric levobupivacaine has been studied to a lesser extent for lower limb orthopaedic surgeries[3]. Hence, we conducted this study to compare the efficacy of hyperbaric levobupivacaine with bupivacaine in lower limb orthopaedic surgeries in terms of sensorimotor profile and analgesic properties. Levobupivacaine, an enantiomer of bupivacaine, being less cardiotoxic has a better safety profile over conventionally used bupivacaine. Studies on use of intrathecal levobupivacaine have suggested extended duration of analgesia[4].
Peripheral nerve blocks are widely used in upper limb surgery because they improve postoperative pain control and reduce the possibility of delirium or cognitive dysfunction [1]. The infraclavicular technique has the potential benefit of a compact anatomical distribution of plexus structures, allowing for a single injection of local anesthetics (LAs) and reducing the risk of pneumothorax[5].
On the other hand, because the length of the sensory block following a single injection of LAs is often insufficient to obviate the need for postoperative opioids, several adjuvants have been used to extend the duration of nerve blocks. Dexmedetomidine is an alpha-2 adrenergic receptor agonist used as an adjuvant to LAs [6]. The effectiveness of dexmedetomidine in developing the time of a brachial plexus block during upper limb surgery has been investigated in several studies. It was hypothesized that it has a synergistic effect with LAs and extends the duration of their activity [7]. However, the optimal dose of dexmedetomidine for brachial plexus blockade is a matter of debate.

2. MATERIAL AND METHODS

Each group had 25 patients, present study was conducted at Shridevi Institute of Medical Sciences and Hospital, Tumkur for 03 months. ASA physical status, duration of surgery, duration of sensory blockade, the onset of sensory blockade, duration of motor blockade, the onset of motor blockade, time to the first request for postoperative rescue analgesia, total postoperative morphine sulfate needs, were normally distributed. In contrast, data on VAS were not normally distributed. Nominal data were expressed as percentages; differences between all groups under study were detected using the chi-square test.
The patients were divided into two groups Group L and Group LD. (n=25 each group)
Group L patients received 3 ml 0.5% Levobupivacaine (15 mg)
Group LD patients received 3 ml of 0.5% isobaric Levobupivacaine (15 mg) and Dexmedetomidine (10 μg) intrathecally.
Inclusion Criteria:
1. Patient those who have consent
2. Patients with contraindication to regional anesthesia, patients on calcium channel blockers, β blockers and with heart blocks were all excluded from the study.

3. RESULT

Table No. 1: Gender of Patients and ASA Grade (No.=50)

S. No.	Gender	Group L		Group LD		P Value
1	**Male**	14	56	17	68	

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2	**Female**	11	44	08	32	**0.637**
	ASA Grade					
1	**ASA grade 1**	18	72	15	60	
2	**ASA grade 2**	07	28	10	40	**0.021**

We found 56% Male in Group L whereas 68% in Group LD, 44% Female in Group L & 32% Group LD. ASA Grade 1 72% in Group L & 60% in Group LD with P (0.021)

Table No. 2: Mean Weight & Duration of Surgery

S. No.	Parameter	Group L		Group LD		P Value
		Mean	SD	Mean	SD	
1	**Weight (Kg)**	85.1	4.53	88.3	2.37	
						0.412
1	**Duration of Surgery (hours)**	2.2	0.87	1.7	0.79	**0.046**

Table No. 3: Time & Duration of onset of sensory block (in mins)

S. No.	Parameter	Group L		Group LD		P Value
		Mean	SD	Mean	SD	
1	**Time of onset of sensory block**	3.47	0.67	2.59	1.50	
						0.039
1	**Duration of sensory block**	331	9.81	498.36	6.27	
						0.034

Table No. 4: Time & Duration of onset of motor block (in mins)

S. No.	Parameter	Group L		Group LD		P Value
		Mean	SD	Mean	SD	
1	**Time of onset of motor block**	3.83	0.87	4.11	0.91	
						0.029
1	**Duration of motor block**	297.3	31.3	431.67	8.45	
						0.042

Table 5: Adverse effects

S. No.	Adverse effects	Group L		Group LD		P Value
1	**Hypotension**	08	32	00	00	
2	**Bradycardia**	06	24	06	24	
3	**Shivering**	03	12	00	00	

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4	**Nausea &Vomiting**	03	12	00	00	**0.037**
5	**Total cases with adverse effects**	20	80	06	24	
6	**Total cases without adverse effects**	05	20	19	76	
	Total	25	100	25	100	

We found maximum side effect in Hypotension 32% whereas 24% in Bradycardia in Group LD with P (0.037).

4. DISCUSSION

Spinal anesthesia is the most popular anesthesia technique in infraumbilical surgeries due to its simplicity, reliability and cost-effectiveness. Howeer, many a times there is requirement of adding adjuvants to local anesthetics in spinal anesthesia so as to intensify the block in the intraoperative period, to prolong the duration of postoperative analgesia and also to reduce the volume of local anesthetics so as to minimize its adverse effects[8].

Dexmedetomidine, the d-enantiomer of medetomidine belongs to the imidazole subclass of α2 receptor agonists and being more selective to α2 receptor than α1 receptor has emerged as an wonder drug in anaesthetic armamentarium. Our results agreed with those of Balakrishnan et al. [9], who conducted a study on 120 patients divided into four groups and administered plain levobupivacaine and 30-μg, 60-μg and 100-μg dexmedetomidine along with levobupivacaine. They found that the 100-μg dexmedetomidine group had a statistically significant increase in sensory and motor blockade durations, a decrease in onset time, and a prolongation of analgesia duration compared with the other three groups.

Reddy et al. [10] also evaluated two doses of dexmedetomidine, 50 μg and 100 μg, added to 0.5% levobupivacaine, on 120 patients undergoing upper limb surgeries under supraclavicular brachial plexus block. They reported that adding 100-μg dexmedetomidine to 0.5% levobupivacaine lengthened the duration of sensory and motor blocks and accelerated their onset. Rescue analgesia in the form of diclofenac sodium injection was required in 20 patients (33.33%) in the 50-μg group and nine patients (15%) in the 100-μg group.

Furthermore, a recent meta-analysis that included 18 randomized controlled trials (*n*= 1,014) conformed to the current findings on adding dexmedetomidine (50– 100 μg) to LAs in brachial plexus block. They have found that in patients who received 100-μg dexmedetomidine, the mean sensory block duration increased by 257 min, the mean motor block duration increased by 242 min, and the mean time to the first demand for analgesia increased by 266 min. A comparable meta-analysis by Hussain et al. [11] on 18 studies (*n* = 1,092) found that the addition of dexmedetomidine to LAs increased the duration of sensory (261.41 min) and motor (200.9 min) blocks, reduced the onset of sensory (3.19 min) and motor (2.92 min) blocks, increased the duration of analgesia (289.31 min), and significantly reduced postoperative analgesic requirement 24 h after the block compared with the control; however, three studies have found no significant difference between the dexmedetomidine and control groups.

Likewise, Zhang et al. [12] found a prolonged duration of analgesia in patients who received a higher dose of dexmedetomidine (100 μg) in 40-mL 0.33% ropivacaine than in patients who

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received 50-µg dexmedetomidine in axillary brachial plexus block. According to Keplinger et al., [8] 50-, 100-, and 150-µg dexmedetomidine increased the duration of sensory block by 60%, 72%, and 57%, respectively, compared with ropivacaine alone ($p < 0.05$). Moreover, Abdulatif et al. [13] concluded that adding 50- and 75-µg dexmedetomidine was associated with an increase in the duration of sensory and motor blocks, a decrease in the time to the onset of sensory and motor blocks, an increase in the time to the first request of morphine, and a decrease in postoperative morphine consumption. The total postoperative morphine requirement was lower in the 75-µg and 50-µg groups than in the control group. However, Aksu R et al. anesthetized 50 patients with a supraclavicular block using 30-mL plain bupivacaine versus bupivacaine plus dexmedetomidine and found no difference in the onset of sensory or motor block, duration of analgesia, or duration of sensory or motor block. This is most likely because dexmedetomidine group received 15-mL 0.33% bupivacaine and 1-µg/kg dexmedetomidine vs. control group, received 30-mL 0.33% bupivacaine.

5. CONCLUSION

We concluded that the supplementation of Dexmedetomidine as an adjuvant to 0.5% levobupivacaine in infraumbilical surgeries under spinal anaesthesia produces longer duration of sensory and motor block but takes slightly more time to attain complete motor block as compared to Buprenorphine. Dexmedetomidine also provides an additional benefit of providing conscious sedation with fewer side effects.

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