Research Article

Efficacy of standard bier's block using lignocaine and lignocaine with dexmedetomidine

Rajesh S Kavlas[1*], Bhagwan M Patil[2]

[1,2]Associate Professor, Department of Anaesthesia, MIMSR Medical College and Hospital, Latur, Maharashtra, INDIA.
Email: kavlasraj@gmail.com

Abstract

Introduction: Alpha-2 adrenergic receptor agonists have been the focus of interest for the sedative, analgesic and perioperative sympatholytic and cardiovascular stabilizing effects with reduced anaesthetic requirements. Dexmedetomidine, a potent alpha-2 adrenergic receptor agonist has been shown to decrease the anaesthetic requirement by up to 90% and induce analgesia. Present study was done to study and compare the effect of standard Bier's Block i.e. intravenous regional anaesthesia with 0.5% lignocaine and 0.5% lignocaine with dexmedetomidine in the patients posted for upper limb surgery. **Methods:** The present study was a prospective randomised, single blinded study. The study population was patients posted for surgeries of upper limb of duration <45 minutes. Age group included was 18-65 years of either sex with normal baseline ECG rhythm and ASA grade I and II subjects. Subjects were randomly divided in two groups: Group L- inj 0.5% lignocaine + normal saline and Group LD- inj 0.5% lignocaine + dexmedetomidine + normal saline. Parameters noted were: Onset of sensory loss, Onset of motor loss, Motor recovery time and Post-operative analgesia and sedation. **Results:** Mean age of subjects of Groups L and LD was 33.37 ± 11.9 years and 32.7 ± 10.8 years respectively while the mean weight was 67.7 ± 7.6 kg and 68.3 ± 8.8 kg respectively. Onset of both sensory (6.5 vs. 4.3 minutes) and motor loss (16.1 vs. 12.4 minutes) was significantly quicker while motor recovery time (7.6 vs. 4.8 minutes) was significantly more in subjects injected with both lignocaine and dexmedetomidine compared to lignocaine alone ($p<0.001$). Post-operative analgesia requirement was significantly earlier in subjects with lignocaine alone (101.1 vs. 370.6 minutes). Post-operative sedation score was significantly more in LD group compared to subjects of Group L (2.46 vs. 1.74), while post-op VAS score was significantly lower (3.17 vs 5.13). **Conclusions:** With addition of dexmedetomidine, there is shortening of sensory and motor block onset time and prolongation of the duration of analgesia. So, dexmedetomedine can be used as an additive to lignocaine in IVRA.

Keywords: Dexmedetomidine, Lignocaine, Motor recovery time, Post-operative analgesia.

[*]**Address for Correspondence:**
Dr. Rajesh S Kavlas, Associate Professor, Department of Anaesthesia, MIMSR Medical College and Hospital, Latur, Maharashtra, INDIA.
Email: kavlasraj@gmail.com

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INTRODUCTION

Intravenous regional anaesthesia (IVRA) is a regional anaesthesia technique in which analgesia and muscle relaxation are produced by the injection of adequate local anaesthesia solution into a vein of the extremity to be operated upon. The flow of blood is prevented by a proximally applied tourniquet [1]. It is a safe and effective way to provide analgesia for upper limb surgeries. But its limitations are the lack of postoperative analgesia, tourniquet pain and the time limit to surgical procedure[2]. Intravenous regional anaesthesia (IVRA) was first described by Bier in 1908, is technically simple and reliable, with success rates between 94% and 98% [3]. To improve the quality of IVRA block, the addition of various opioids to local anaesthetics has been investigated with controversial results. A meta-analysis concluded that opioids lack significant effects.[4] Alpha-2 adrenergic receptor agonists have been the focus of interest for the sedative, analgesic and perioperative sympatholytic and cardiovascular stabilizing effects with reduced anaesthetic requirements. Dexmedetomidine, a potent alpha-2 adrenergic receptor agonist has been shown to decrease the anaesthetic requirement by up to 90% and induce analgesia [5-7]. Present study was done to study and compare the effect of standard Bier's Block i.e. intravenous regional anaesthesia with 0.5% lignocaine and 0.5% lignocaine with dexmedetomidine in the patients posted for upper limb surgery.

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MATERIAL AND METHODS

The present study was a prospective randomised, single blinded study undertaken to determine the efficacy of intravenous regional anaesthesia with 0.5% lignocaine with dexmedetomidine. The study was done in department of Anaesthesia of a tertiary care centre. The study period was 24 months. September 2012 to August 2014. The study population was patients posted for surgeries of upper limb at department of anaesthesia at tertiary care centre. Sample size was 60 patients (30 in each group). Inclusion criteria: Patients posted for upper limb surgeries of duration <45 mins between the age of 18-65 years, of either sex with normal baseline ECG rhythm and ASA grade I and II. Exclusion criteria: Allergy to local anaesthetic, Allergy to dexmedetomidine and lignocaine, Contraindications for tourniquet application example sickle cell disease, Reynaud's phenomenon, ASA grade III and above and patients with uncontrolled hypertension, uncontrolled diabetes mellitus, heart disease e.g valvular heart disease, arrythmias or heart block etc. The study protocol was approved by the institutional ethics committee of the medical college. All the patients fulfilling the selection criteria were selected for the study after taking prior informed consent and randomly divided into two groups: Group L- inj 0.5% lignocaine + normal saline. Group LD- inj 0.5% lignocaine + dexmedetomidine + normal saline. A detailed history and complete clinical examination was carried out for all patients. Written and informed consent was taken prior to scheduled operation. Patients were explained about the procedure of intravenous regional anaesthesia. Parameters noted were: Onset of sensory loss, Onset of motor loss, Motor recovery time and Post-operative analgesia, sedation and Visual analogue scale (VAS)[8].

RESULTS

Mean age of subjects of Groups L and LD was 33.37 ± 11.9 years and 32.7 ± 10.8 years respectively while the mean weight was 67.7 ± 7.6 kg and 68.3 ± 8.8 kg respectively. Following observations were made during the study.

Table 1: Comparison of onset of sensory and motor loss among study groups

Onset of Sensory loss (Min)			
Group	Mean	Standard Deviation	p-value
Group L	6.4	1.11	<0.001
Group LD	4.1	0.98	
Onset of Motor Loss (Min)			
Group	Mean	SD	p-value
Group L	16.1	3.30	<0.001
Group LD	12.4	2.51	

Inference: Onset of both sensory (6.5 vs. 4.3 minutes) and motor loss (16.1 vs. 12.4 minutes) was significantly quicker in subjects injected with both lignocaine and dexmedetomidine compared to lignocaine alone ($p<0.05$).

Table 2: Comparison of motor recovery time among study groups

Motor recovery time (Min)			
Group	Mean	SD	p-value
Group L	4.8	1.32	<0.001
Group LD	7.6	1.89	

Inference: Motor recovery time (7.6 vs. 4.8 minutes) was significantly more in subjects injected with both lignocaine and dexmedetomidine ($p<0.001$).

Table 3: Comparison of time required for rescue analgesia among study groups

Requirements of rescue Analgesic (Min)			
Group	**Mean**	**SD**	**p-value**
Group L	101.1	6.69	<0.001
Group LD	370.6	34.50	

Inference: Rescue analgesia requirement was significantly earlier in subjects injected with lignocaine alone (101.1 vs. 370.6 minutes).

Table 4: Comparison of post-operative sedation and VAS score among study groups after 6 hours of induction

Post –operative sedation score			
Group	**Mean**	**SD**	**p-value**
Group L	1.74	0.43	<0.001
Group LD	2.46	0.44	
Post-op VAS score			
Group	Mean	SD	p-value
Group L	5.13	0.44	<0.001
Group LD	3.17	0.41	

Inference: Post-operative sedation score was significantly more in LD group compared to subjects of Group L (2.46 vs. 1.74), while post-operative VAS score was significantly lower (3.17 vs. 5.13) in LD group.

DISCUSSION

In our study, onset of both sensory and motor loss was significantly quicker. In the study by Alok K *et al*., it was observed that onset of sensory loss was quicker in dexmedetomedine group [9]. Similar results were observed by Memis *et al*.,[10] and Kol lo *et al*[11]. Onset of motor loss was significantly quicker in subjects injected with both lignocaine and dexmedetomidine. Similar results were observed by Alok K *et al*.[9] where the results showed shortened motor block onset times in dexmedetomidine groups. Motor recovery time was significantly greater in subjects injected with both lignocaine and dexmedetomidine. Memis *et al*.[9] showed recovery time were statistically prolonged in dexmedetomidine group.

Post-operative analgesia requirement was significantly earlier in subjects injected with lignocaine alone. Injection diclofenac sodium 75 mg intravenous diluted in 20 ml normal saline given to the patients. Kol *et al*.[11] also showed that duration of analgesia for tourniquet were prolonged in the dexmedetomidine group compared with the control group. Post-operative sedation score was significantly more in LD group compared to subjects of Group L. The results of our study were supported by observation made by Alok k *et al*[9]. In present study post-operative VAS score was significantly lower in dexmedetomidine group. Similarly, Alok k *et al*.[9] showed decreased VAS score in their study in dexmedetomidine. Kol *et al*[11] found that postoperatively median VAS scores were lower during the first 12 hours in the dexmedetomidine group compared with the control group. Our study demonstrated that the addition of dexmedetomidine to lignocaine for IVRA not only improved quality of anaesthesia and postoperative analgesia without causing significant side effects but also shortened the onset of sensory and motor block as compared to lignocaine alone.

CONCLUSIONS

With addition of dexmedetomidine, there is shortening of sensory and motor block onset time and prolongation of the duration of analgesia. So, dexmedetomedine can be used as an additive to lignocaine in IVRA.

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