Research Article

A comparative study of hemodynamic changes in bier's block using lignocaine and lignocaine with dexmedetomidine

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Abstract

Introduction: Dexmedetomidine is a potent alpha-2-adrenoceptor agonist and is much more selective towards the α-2-adrenoceptors compared to clonidine. It has been shown to reduce anaesthetic requirements by up to 90% and to induce analgesia. Present study was done to study and compare the hemodynamic changes in 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 study design was a randomised, single blinded study. The study subjects were patients posted for upper limb surgeries of duration less than 45 minutes. Subjects of either sex in the age group of 18 to 65 years were included. All the subjects had normal baseline ECG rhythm and were ASA grade I and II subjects. They were randomly allotted in two groups: Group L- injection 0.5% lignocaine plus normal saline and Group LD- injection 0.5% lignocaine plus dexmedetomidine plus normal saline. Parameters noted were: heart rate, blood pressure, respiratory rate and oxygen saturation. **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. The baseline pulse rate was 72.40 and 71.6 per minute in Group L and LD respectively. On comparing the mean pulse rate in subjects of both groups during the surgery, there was no significant difference between the groups. Also, no baseline or intra-operative difference was found between the groups on the basis of systolic and diastolic BP, respiratory rate and SpO_2. **Conclusions:** With addition of dexmedetomidine, there was no hypotension, bradycardia, hypoxia in any one of the patient. So, dexmedetomedine can be safely used as an additive to lignocaine in Intravenous regional anaesthesia.
Keywords: Dexmedetomidine, Lignocaine, Bradycardia.

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INTRODUCTION

Alpha-2 adrenergic receptor agonists have sedative, analgesic action and also have perioperative sympatholytic and cardiovascular stabilizing effects with reduced anaesthetic requirements. Dexmedetomidine is a potent alpha-2-adrenoceptor agonist and is much more selective towards the α-2-adrenoceptors compared to clonidine. It has been shown to reduce anaesthetic requirements by up to 90% and to induce analgesia[1-3]. Since Dexmedetomidine has been introduced in India only in 2009 not many studies have been done in our country regarding its use in Intravenous regional anaesthesia (IVRA), there is a need to study the safety and effectiveness of Dexmedetomidine[4]. Present study was done to study and compare the hemodynamic changes in 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 study design was a randomised, single blinded study. The study was done in department of Anaesthesia of a tertiary care centre. The study period was 24 months from September 2012 to August 2014. The study subjects were patients posted for upper limb surgeries of duration less

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than 45 minutes. Subjects of either sex in the age group of 18 to 65 years were included. All the subjects had normal baseline ECG rhythm and were American society of anaesthesiologists (ASA) grade I and II subjects. Exclusion criteria were allergy to local anaesthetic, allergy to dexmedetomidine and lignocaine, contraindications for tourniquet application like sickle cell disease, Reynaud's phenomenon, ASA grade III and above subjects and patients with uncontrolled hypertension, uncontrolled diabetes mellitus, heart disease e.g. valvular heart disease, arrhythmias or heart block etc. Sample size was 60 patients (30 in each group). They were randomly allotted in two groups: Group L- injection 0.5% lignocaine plus normal saline and Group LD- injection 0.5% lignocaine plus dexmedetomidine plus normal saline. 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. 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: heart rate, blood pressure, respiratory rate and oxygen saturation.

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 Pulse Rate among study groups

Pulse (per min)	Group	Mean	SD	p-value
Baseline	Group L	72.40	7.94	0.72
	Group LD	71.60	7.51	
0 Min.	Group L	70.08	7.80	0.87
	Group LD	70.48	9.10	
5 Min.	Group l	70.20	6.87	0.44
	Group LD	68.40	9.24	
10 Min	Group L	70.08	7.34	0.12
	Group LD	66.32	9.28	
15 Min	Group L	71.76	7.47	0.42
	Group LD	69.24	9.27	
20 Min.	Group L	69.24	7.25	0.24
	Group LD	69.40	9.75	
25 Min.	Group L	69.88	8.35	0.12
	Group LD	66.80	8.85	
30 Min.	Group L	68.56	8.44	0.32
	Group LD	66.00	9.70	
35 Min	Group L	68.45	8.07	0.11
	Group LD	64.27	8.42	
40 Min	Group L	66.33	4.81	0.09
	Group LD	62.29	8.29	
45 Min.	Group L	67.50	1.41	0.56
	Group LD	65.22	10.77	
50 Min.	Group L	65.67	4.97	0.45
	Group LD	68.67	6.11	
55 Min.	Group L	69.50	1.41	0.48
	Group LD	67.20	10.77	
60 Min.	Group L	66.25	4.97	0.45
	Group LD	68.32	6.11	

SD: Standard Deviation

Inference: The baseline pulse rate was 72.40 and 71.6 per minute in Group L and LD respectively. On comparing the mean pulse rate in subjects of both groups during the surgery, there was no significant difference between the groups (p>0.05).

Table 2: Comparison of variation in systolic blood pressure among study groups

Systolic B.P (mm of Hg)	Group	Mean	SD	p-value
Baseline	Group L	125.12	7.42	0.72
	Group LD	126.08	6.74	
0 Min.	Group L	119.68	8.14	0.87
	Group LD	119.76	8.31	
5 Min.	Group l	114.56	8.5	0.44
	Group LD	113.92	7.67	
10 Min	Group L	115.52	6.36	0.12
	Group LD	115.44	6.23	
15 Min	Group L	116.08	9.3	0.42
	Group LD	118.32	6.47	
20 Min.	Group L	114.45	6.41	0.24
	Group LD	116.67	6.94	
25 Min.	Group L	113.78	7.14	0.12
	Group LD	114.48	6.31	
30 Min.	Group L	115.61	7.5	0.32
	Group LD	115.81	6.48	
35 Min	Group L	114.56	7.96	0.11
	Group LD	114.45	8.23	
40 Min	Group L	115.9	8.98	0.09
	Group LD	113.92	7.42	
45 Min.	Group L	115.12	7.36	0.56
	Group LD	114.42	6.83	
50 Min.	Group L	114.98	8.35	0.45
	Group LD	115.18	7.45	
55 Min.	Group L	115.12	7.96	0.48
	Group LD	115.56	8.23	
60 Min.	Group L	115.11	8.98	0.45
	Group LD	115.91	7.42	

SD: Standard Deviation.

Inference: The baseline systolic blood pressure was 125.12 ± 7.42 and 126.08 ± 6.74 per mm of Hg in group L and LD respectively. On comparing the mean systolic blood pressure in subjects of both groups at baseline and during the procedure, there was no significant difference between the groups, (p value >0.05)

Table 3: Comparison of variation in diastolic pressure among study groups

Diastolic BP (mm of Hg)	Group	Mean	SD	p-value
Baseline	Group L	71.52	6.64	0.97
	Group LD	71.6	8.64	
0 Min.	Group L	66.72	6.43	0.68
	Group LD	67.6	8.52	
5 Min.	Group l	63.6	7.33	0.99
	Group LD	63.6	7.19	
10 Min	Group L	62.4	7.68	0.36
	Group LD	60.32	8.3	
15 Min	Group L	64.24	8.7	0.72
	Group LD	65.04	8.53	
20 Min.	Group L	70.42	6.69	0.44
	Group LD	68.64	7.78	
25 Min.	Group L	67.78	7.32	0.58
	Group LD	66.61	7.52	
30 Min.	Group L	64.89	7.73	0.87
	Group LD	65.12	7.29	
35 Min	Group L	61.98	7.58	0.71
	Group LD	62.78	7.56	
40 Min	Group L	64.78	8.79	0.81
	Group LD	65.14	8.12	
45 Min.	Group L	62.67	7.78	0.52
	Group LD	61.37	8.45	
50 Min.	Group L	64.94	7.76	0.83
	Group LD	64.23	7.58	
55 Min.	Group L	64.93	7.71	0.77
	Group LD	65.21	7.33	
60 Min.	Group L	62.01	7.6	0.69
	Group LD	62.83	7.54	

SD: Standard Deviation.

Inference: On comparing the mean diastolic blood pressure in subjects of both groups at baseline and during the procedure, we found no significant difference between the group (p value >0.05).

Table 4: Comparison of variation in respiratory rate among study groups

Respiratory rate (per min.)	Group	Mean	SD	p-value
Baseline	Group L	13.23	1.16	0.81
	Group LD	13.03	1.13	
0 Min.	Group L	13.33	0.92	0.95
	Group LD	13.23	0.85	
5 Min.	Group l	13.23	1.04	0.98
	Group LD	13.2	1.03	
10 Min	Group L	13.3	1.12	0.56
	Group LD	12.93	0.86	
15 Min	Group L	13.8	0.89	0.67
	Group LD	13.63	0.61	
20 Min.	Group L	13.47	0.78	0.83
	Group LD	13.2	0.55	
25 Min.	Group L	13.63	3.7	0.34
	Group LD	13.43	0.62	
30 Min.	Group L	13.57	0.81	0.78
	Group LD	13.37	0.71	
35 Min	Group L	13.6	0.77	0.81
	Group LD	13.43	0.62	
40 Min	Group L	13.47	0.86	0.91
	Group LD	13.37	0.67	
45 Min.	Group L	13.17	0.79	0.39
	Group LD	12.83	0.78	
50 Min.	Group L	13.23	0.63	0.98
	Group LD	13.2	0.48	
55 Min.	Group L	13.1	0.45	0.77
	Group LD	12.93	0.43	
60 Min.	Group L	13.47	0.68	0.93
	Group LD	13.43	0.73	

SD: Standard Deviation.

Inference: On comparing the mean respiratory rate in subjects of both groups at baseline and during the procedure, we found no significant difference between the groups (p value>0.05).

Table 5: Comparison of variation in SpO_2 among study groups

SpO_2 (%)	Group	Mean	SD	p-value
Baseline	Group L	98.67	0.48	0.95
	Group LD	98.63	0.49	
0 Min.	Group L	98.67	0.48	0.97
	Group LD	98.65	0.48	
5 Min.	Group l	98.67	0.5	0.98
	Group LD	98.66	0.5	
10 Min	Group L	98.4	0.5	0.96
	Group LD	98.3	0.5	
15 Min	Group L	98.6	0.5	0.96
	Group LD	98.57	0.5	
20 Min.	Group L	98.43	0.34	0.96
	Group LD	98.4	0.33	
25 Min.	Group L	98.83	0.5	0.92
	Group LD	98.79	0.5	
30 Min.	Group L	98.4	0.43	0.92
	Group LD	98.47	0.42	
35 Min	Group L	98.7	0.47	0.93
	Group LD	98.76	0.47	
40 Min	Group L	98.7	0.47	0.94
	Group LD	98.67	0.47	
45 Min.	Group L	98.7	0.47	0.96
	Group LD	98.75	0.31	
50 Min.	Group L	98.7	0.31	1.00
	Group LD	98.7	0.48	
55 Min.	Group L	98.9	0.43	1.00
	Group LD	98.9	0.43	
60 Min.	Group L	98.77	0.47	0.93
	Group LD	98.7	0.43	

SD: Standard Deviation.

Inference: On comparing the mean SpO_2 in subjects of both groups at baseline and during the procedure, we found no significant difference between the group (p value >0.05).

DISCUSSION

In our study, we found no baseline or intra-operative difference between the groups on the basis of mean pulse rate, systolic and diastolic BP, respiratory rate and SpO2. Our results are in accordance with the findings of Alok k *et al*.[5] where duration of surgery was similar in the groups and no treatment was required in any of the group for bradycardia or any other complications. Also, their study showed that there was no significant difference in systolic and diastolic pressure between the two groups. Similar results were obtained by other researchers who conclude that addition of dexmedetomidine to lignocaine for IVRA does not produce any significant side effects[6,7]. Study by Jaakola ML[8] reported that there is no significant difference in SpO2 of both groups. Our study demonstrated that the addition of dexmedetomidine to lignocaine for IVRA does not significantly affect the mean pulse rate in subjects during surgery. Also, no baseline or intra-operative difference was found between the groups on the basis of systolic and diastolic BP, respiratory rate and SpO2.

CONCLUSIONS

With addition of dexmedetomidine, there was no hypotension, bradycardia, hypoxia in any one of the patient. So, dexmedetomedine can be safely used as an additive to lignocaine in Intravenous regional anaesthesia.

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