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Original Research Article

Comparison of two doses of Dexmedetomidine on hemodynamic parameters of patients undergoing spinal anesthesia

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ABSTRACT

Background: Dexmedetomidine is considered as safe adjuvant as it does not cause depression of the respiratory system. Whether it can be used in the dose of 5 mcg or 10 mcg needs evaluation. Objective of the study was to compare two doses of dexmedetomidine on hemodynamic parameters of patients undergoing spinal anesthesia.
Methods: Present study was hospital based follow up study. 80 patients were studied who were of age 18-60 years. These patients were operated using spinal anesthesia. History in detail was taken. They were examined thoroughly and investigated. Informed written consent is taken. Two groups were made. One group with 30 patients received dexmedetomidine 5 mcg. Second group with 50 patients received 10 mcg dexmedetomidine.
Results: All baseline parameters were similar in two group patients. Heart rate at various intervals was also similar in two groups patients. Systolic blood pressure at various intervals was also similar in two groups patients. Diastolic blood pressure at various intervals was also similar in two groups patients. Highest level of sensory block was also similar in two groups patients. Patients in 5 mcg group had both the sensory and motor block more compared to patients in 10 mcg group. All other parameters were similar in two group of patients.
Conclusions: Dexmedetomidine in doses of 5 mcg and 10 mcg has been found to have similar effect on hemodynamic parameters of the patients. So, it can be used in any of these two doses without affecting the hemodynamic parameters.

Keywords: Comparable, Dexmedetomidine, Groups, Heart rate, Hemodynamic parameters

INTRODUCTION

Regional anaesthesia has emerged as an important technique, with simplicity, effectiveness and safety as its added advantages.[1, 2]

Spinal anesthesia is "Regional anaesthesia obtained by depositing drug into subarachnoid space and blocking nerves." Spinal anesthesia has many advantages. It is simple. The action is rapid. It is economical. Side effects are less. More number of patients can be operated.[3]

But there are some challenges. The action is of short duration. The action is fixed. The patient feels uncomfortable after surgery. Hence, the drug used should be used in low doses and its action should last longer and at the same time should have less side effects. For such properties, various agents or drugs were tried till now. But if one drug has action which lasts long has got more side effects. Hence there is need for a good drug.[4]

Central Neuraxial opioids, give good amount of analgesia. But there are many side effects like itching,

vomiting, retention of urine, depression of respiration etc.[5] Dexmedetomidine, a highly selective α_2-AR agonist with a relative high ratio of α_2/α_1 activity (1620:1) possesses all these properties but lack respiratory depression, making it a safe adjuvant.[6,7]

This study was designed to compare the effect of two doses of dexmedetomidine on hemodynamic parameters for spinal anesthesia.

METHODS

A total of 80 patients were studied. They were aged 18-60 years. They were undergoing surgeries under spinal anesthesia.

Present study was carried out in Malla Reddy Narayana Multi-specialty Hospital from July 2017 to October 2018.

Institutional ethical committee approval was taken.

Present study was hospital based follow up study. 80 patients were studied who were of age 18-60 years. These patients were operated using spinal anesthesia. History in detail was taken. They were examined thoroughly and investigated. Informed written consent is taken. Two groups were made. One group with 30 patients received dexmedetomidine 5 mcg. Second group with 50 patients received 10 mcg dexmedetomidine.

Inclusion criteria

- Patients with 18-60 years and ASA grade I and II
- Willing patients
- Patients undergoing surgery under spinal anesthesia.

Exclusion criteria

- Not willing patients and ASA grade III and IV
- If patient was using narcotics or had history of allergy to drugs
- Any other serious issues related to health.

Method of study

All patients underwent appropriate check-up before anesthesia as a routine protocol including surgical profile investigations. Assessment of the airway was done. Examination of the spinal cord to rule out any abnormalities of the spinal column was done.

Patients were asked to remain nil by mouth before surgery. Patient was explained about the procedure of spinal anesthesia. At nighttime before surgery day, they were given ranitidine 150 mg. During surgery all vital and hemodynamic parameters were recorded at regular intervals. Sensory blockade was assessed using standard methodology. Motor blockade was assessed using standard methodology. Vas score was used to assess the pain. Belzarena scale was used to assess the quality of intraoperative analgesia.

Statistical analysis

Students t test was used to compare means of two groups. Chi square test was used to compare the proportions of two groups. As usual p value was considered significant if it was less than 0.05.

RESULTS

Table 1 shows comparison of baseline characteristics among the two groups. The mean age in the two groups did not differ significantly. The mean height in the two groups did not differ significantly. The mean weight in the two groups did not differ significantly. The proportion of males and females in the two groups did not differ significantly. Thus, all the baseline parameters were comparable in the two groups.

Table 2 shows comparison of onset of sensory and motor block in two groups. The mean duration of the sensory onset was found out to be statistically significant more in patients who belonged to dexmedetomidine 5 mcg group compared to the patients who belonged to the dexmedetomidine 10 mcg groups.

The mean duration of the motor onset was found out to be statistically significant more in patients who belonged to dexmedetomidine 5 mcg group compared to the patients who belonged to the dexmedetomidine 10 mcg groups.

Table 3 shows comparison of highest level of sensory block in two groups. At t4 level the proportion of patients in two groups did not differ in two groups significantly. At t6 level the proportion of patients in two groups did not differ in two groups significantly. At t7 level the proportion of patients in two groups did not differ in two groups significantly. At t8 level the proportion of patients in two groups did not differ in two groups significantly. At t10 level the proportion of patients in two groups did not differ in two groups significantly.

Table 4 shows comparison of recovery parameters and duration of analgesia in two groups. Time for two segment regression did not differ significantly in the two groups. Motor recovery did not differ significantly in the two groups. Sensory recovery did not differ significantly in the two groups. Duration of complete analgesia did not differ significantly in the two groups. Duration of effective analgesia did not differ significantly in the two groups.

Table 5 shows comparison of quality of intraoperative analgesia in two groups. Highest sensory level at level 2 did not differ in the two groups significantly. Highest sensory level at level 3 did not differ in the two groups

significantly. Highest sensory level at level 4 did not differ in the two groups significantly.

Table 1: Comparison of baseline characteristics among the two groups.

Baseline characteristics		Dexmedetomidine 5 mcg	Dexmedetomidine 10 mcg	T value	P value
Age (years)		38.40±9.55	38.58±10.64	0.0761	0.9396
Height (feet)		5.49±0.31	5.42±0.31	0.9778	0.3312
Weight (kg)		54.50±6.50	55.48±6.99	0.6230	0.5351
Sex	Male	16 (53.3%)	30 (60%)	0.341	0.5592
	Female	14 (46.7%)	20 (40%)		

Table 2: Comparison of onset of sensory and motor block in two groups.

Characteristics	Dexmedetomidine 5 mcg	Dexmedetomidine 10 mcg	T value	P value
Sensory onset (min)	3.33±0.96	2.13±0.22	8.58074	0.0001
Motor onset (min)	6.13±1.31	3.86±0.50	11.0235	0.0001

Table 3: Comparison of highest level of sensory block in two groups.

Highest sensory level	Dexmedetomidine 5 mcg		Dexmedetomidine 10 mcg		Chi square	P value
	Number	%	Number	%		
T4	2	6.7	2	4	1.037	0.9041
T6	16	53.3	25	50		
T7	2	6.7	2	4		
T8	9	30	19	38		
T10	1	3.3	1	2		
Total	30	100	50	100		

Table 4: Comparison of recovery param ETERS and duration of analgesia in two groups.

Recovery parameters	Dexmedetomidine 5 mcg	Dexmedetomidine 10 mcg	T value	P value
Time for two segment regression	125.33±7.23	126.72±7.24	0.8318	0.4081
Motor recovery	286.30±16.35	279.94±19.57	1.4936	0.1393
Sensory recovery	318.00±14.77	310.88±19.94	1.6949	0.0941
Duration of complete analgesia	341.33±23.78	337.48±24.76	0.6823	0.4965
Duration of effective analgesia	357.83±64.79	367.7±26.57	0.9547	0.3427

Table 5: Comparison of quality of intraoperative analgesia in two groups.

Highest sensory level	Dexmedetomidine 5 mcg		Dexmedetomidine 10 mcg		Chi square	P value
	Number	%	Number	%		
2	1	3.3	1	2	0.083	0.9593
3	9	30	13	26		
4	20	66.7	26	52		
Total	30	100	50	100		

Table 6 shows comparison of heart rate in two groups. The heart rate at 0 min did not differ significantly in two groups. The heart rate at 5 min did not differ significantly in two groups. The heart rate at 10 min did not differ significantly in two groups. The heart rate at 15 min did not differ significantly in two groups. The heart rate at 20 min did not differ significantly in two groups. The heart rate at 30 min did not differ significantly in two groups. The heart rate at 120 min did not differ significantly in two groups.

Table 7 shows comparison of systolic blood pressure in two groups. The systolic blood pressure at 0 min did not differ significantly in two groups. The systolic blood pressure at 5 min did not differ significantly in two groups. The systolic blood pressure at 10 min did not differ significantly in two groups. The systolic blood

pressure at 15 min did not differ significantly in two groups. The systolic blood pressure at 20 min did differ significantly in two groups. The systolic blood pressure at 30 min did not differ significantly in two groups. The systolic blood pressure at 120 min did not differ significantly in two groups.

Table 8 shows comparison of diastolic blood pressure in two groups. The diastolic blood pressure at 0 min did not differ significantly in two groups. The diastolic blood pressure at 5 min did not differ significantly in two groups. The diastolic blood pressure at 10 min did not differ significantly in two groups. The diastolic blood pressure at 15 min did not differ significantly in two groups. The diastolic blood pressure at 20 min did differ significantly in two groups. The diastolic blood pressure at 30 min did not differ significantly in two groups. The diastolic blood pressure at 120 min did not differ significantly in two groups.

Table 6: Comparison of heart rate in two groups.

Time Interval in (min)	Dexmedet-omidine 5 mcg	Dexmedet-omidine 10 mcg	T value	P value
0	82.0±7.4	79.28±7.34	1.5998	0.1137
5	77.1±8.7	76.14±8.20	0.4955	0.6216
10	73.9±7.8	71.88±8.68	1.0458	0.2989
15	71.0±7.5	68.06±8.13	1.6111	0.1112
20	70.5±7.31	67.86±7.47	1.5425	0.1270
30	73.1±5.4	71.6±5.67	1.1659	0.2472
120	75.2±4.8	75.68±4.82	0.4319	0.6670

Table 7: Comparison of systolic blood pressure in two groups.

Time Interval in (min)	Dexmedetomidine 5 mcg	Dexmedetomidine 10 mcg	T value	P value
0	130.1±9.7	129.76±10.46	0.1446	0.8854
5	120.1±12.1	121.4±10.78	0.4987	0.6194
10	112.5±11.6	110.88±10.87	0.6293	0.5310
15	110.9±11.7	118.84±84.93	0.5093	0.6123
20	112.4±9.7	107.4±10.33	2.1436	0.0352
30	114.0±9.0	111.2±9.01	1.3462	0.1821
120	120.5±8.8	119.86±8.41	0.4757	0.6356

Table 8: Comparison of diastolic blood pressure in two groups.

Time interval in min	Dexmedetomidine 5 mcg	Dexmedetomidine 10 mcg	T value	P value
0	81.2±7.94	80.68±7.16	0.3019	0.7636
5	72.5±8.4	74.44±8.76	0.9736	0.3332
10	67.5±9.4	67.32±8.35	0.0890	0.9293
15	66.5±8.3	65.18±7.70	0.7209	0.4731
20	68.5±6.7	65.16±7.27	2.0475	0.0440
30	71.0±4.5	69.82±5.30	1.0183	0.3117
120	76.5±4.4	75.56±4.93	0.8587	0.3931

DISCUSSION

In this study, mean time for onset of sensory block in group 5 mcg was 3.33 min and in group 10 mcg was 2.13 min.

The mean time for onset of motor block in group 5 mcg was 6.13 min and in group 10 mcg was 3.86 min. this difference was found to be statistically significant. But Gupta R et al in their study found that the difference in dexmedetomidine and fentanyl groups was statistically not significant.[8]

Similarly Subhi M et al, in their study found that the difference in dexmedetomidine and fentanyl groups was statistically not significant.[9] Similarly Routray SS et al, in their study found that the difference in dexmedetomidine and fentanyl groups was statistically not significant.[10]

In our study the highest sensory level attained in patients of group 5 mcg is 30% achieved T8 level, 53.3%

achieved T6 level, 6.7% achieved T7 and 3.3% achieved T10 level. In group 10 mcg 38% achieved T8 level, 50% achieved T6 level, 4% achieved T7 level and 4% achieved T4 level. This difference was statistically not significant. Similar observation was recorded by Al-Ghanem SM et al, Gupta R et al, and Routray SS et al.[9-10]

Varghese LA et al, conducted a study on 90 patients to evaluate the effect of adding dexmedetomidine versus fentanyl to intrathecal bupivacaine on spinal block, in their study concluded that dexmedetomidine group patient had highest sensory level of T5 (T4) and in fentanyl group it was T6 (T4-T8). There was statistically no significant difference between the two groups ($p > 0.05$).[11]

Our study correlates with above mentioned studies. The time of two segment regression was considerably slower in group 5 mcg with 125.33 min compared to group 10 mcg which was 126.73 min, and not different significantly ($p > 0.001$). Similar observation was recorded by Gupta R et al, Tarbeeh GA et al, Similar observation was recorded by Tarbeeh GA et al, who found that this mean time was 300 min in patients who belonged to dexmedetomidine group and it was 198 min in patients who belonged to fentanyl group. Present study correlates with this study.[8,12]

But Gupta R et al found this mean time as 476 min in patients who belonged to dexmedetomidine group and it was 187 min in patients who belonged to fentany l group which was statistically significant ($p < 0.001$).[8] The two groups were comparable at various time intervals in terms of heart rate.

Gupta R et al, in their study concluded that one patient developed bradycardia in dexmedetomidine group and no patient developed bradycardia in fentanyl group, which was statistically not significant.[8] Tarbeeh GA et al in their study showed that no statistically difference in heart rate in both groups.[12]

The mean SBP in two groups did not differ significantly as found in the present study. The mean DBP in two groups did not differ significantly as found in the present study. In this study the two groups did not differ significantly with respect to change in mean systolic and mean diastolic pressure.

CONCLUSION

Comparison of onset of sensory and motor block in two groups revealed that it was significantly more in the 5 mcg group compared to the 10 mcg group. Dexmedetomidine in doses of 5 mcg and 10 mcg has been found to have similar effect on hemodynamic parameters of the patients. So it can be used in any of these two doses without affecting the hemodynamic parameters.

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