

A COMPARATIVE EVALUATION OF DEXMEDETOMIDINE, PROPOFOL AND MIDAZOLAM FOR INTRAOPERATIVE SEDATION IN REGIONAL ANAESTHESIA

Kiwi Mantan¹, Anita Pareek², Rashmi Jain³, Anju Meena⁴, Pramila Soni⁵, Aditi Sharma⁶

¹Assistant Professor, Department of Anaesthesia, Sardar Patel Medical College and AG of Hospitals, Bikaner, Rajasthan.

²Professor, Department of Anaesthesia, Sardar Patel Medical College and AG of Hospitals, Bikaner, Rajasthan.

³Senior Registrar, Department of Anaesthesia, Sardar Patel Medical College and AG of Hospitals, Bikaner, Rajasthan.

⁴Senior Registrar, Department of Anaesthesia, Sardar Patel Medical College and AG of Hospitals, Bikaner, Rajasthan.

⁵Assistant Professor, Department of Anaesthesia, Sardar Patel Medical College and AG of Hospitals, Bikaner, Rajasthan.

⁶Intership Trainee, Lady Hardinge, MC New Delhi.

ABSTRACT

BACKGROUND

Sedation has been shown to increase patient's satisfaction during regional anaesthesia and may be considered as a mean to increase the patient's acceptance of regional anaesthetic techniques. The aim of the study is to compare dexmedetomidine, propofol and midazolam for intra- and post-operative sedation, haemodynamics and complications.

MATERIALS AND METHODS

The study was conducted on 80 patients in the Department of Anaesthesiology, Sardar Patel Medical College after taking permission from Institution Research Board. Both male and female patients ranging between the age group of 20 - 60 years belonging to ASA grades I and II, scheduled for elective lower limb or lower abdominal surgical procedure under regional anaesthesia were included. The patients were divided into 4 groups of 20 patients in each group and received intravenous infusion midazolam (Group I), propofol (Group II), dexmedetomidine (Group III) and normal saline (Group IV) as sedation.

RESULTS

Mean pulse rate reduced in all the four groups up to 90 mins following spinal anaesthesia. No clinical significance was seen at 90 mins, when intergroup comparison was made. The mean systolic and diastolic blood pressure in all the four groups were up to 90 mins. Intergroup comparison was significant ($p < 0.001$). The onset of sedation was earliest in group II and prolonged in group III as compared to group I. Intergroup comparison is highly significant ($p < 0.001$). Maximum mean postoperative analgesia was in group III followed by group I and II and IV respectively. Intergroup comparison shows highly significant difference in all groups ($p < 0.001$). Time taken to reach sedation score 5 was highest in group III followed by group I and II. Intergroup comparison was highly significant.

CONCLUSION

The onset of sedation was earlier in patient who received IV propofol infusion under spinal anaesthesia as compared to patients who receive IV infusion of midazolam or dexmedetomidine or normal saline. Postoperative analgesia was maximum in patients who receive IV dexmedetomidine infusion as compared to others.

KEYWORDS

Dexmedetomidine, Propofol, Midazolam, Infusion, Intravenous Sedation.

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BACKGROUND

Regional anaesthesia is popular and offers several benefits to the patient. The top three from the patient's point of view are staying awake, early family contact and early food intake.⁵ This shows that patients are interested in postoperative landmarks^{1,2} and their importance regarding patient's satisfaction. For the anaesthetist, cardiovascular and respiratory stability, rapid postoperative recovery and preservation of protective airway reflexes are the most

important advantages of regional anaesthesia. Some drawbacks linked with regional anaesthetic techniques are pain at the puncture site,¹ fear of needles³ and recall of the procedure.⁴ These factors stress the importance of sedation that offers analgesia, anxiolysis and amnesia. Sedation is part of the general management of a patient receiving a regional block and being awake during the whole surgical procedure. The aims include general patient comfort, freedom from specific discomfort and some amnesia for both the block procedure and the surgical operation. Ideal sedative agent should follow for rapid modification of sedation level by modification of dosage (titrable) and should not have depressant effect on cardiovascular and respiratory system.

Midazolam remains the most popular because of its predictable sedative, anxiolytic and amnesic properties irrespective of the route of administration (i.e. oral, topical or parenteral).^{5,6,7,8} Propofol, IV sedative hypnotic of choice at the present time has been found to be equivalent to

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Corresponding Author:

Dr. Anita Pareek,

4/E/188, J. N. Vyas Colony,

Bikaner, Rajasthan.

E-mail: dranitapareek23@gmail.com

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midazolam for providing adequate sedation and amnesia during regional anaesthesia.^{9,10,11,12} Dexmedetomidine is a new highly selective and potent alpha-2 adrenoceptor agonist offering sedation and anxiolysis, has analgesic qualities and reduce the stress response to surgery and intensive care procedure.

Aim and Objectives

To compare dexmedetomidine, propofol and midazolam in intraoperative and postoperative sedation in regional anaesthesia.

To provide better haemodynamic control and better sedation and analgesia in intra- and post-operative period with minimal complications.

To provide safety, comfort and amnesia for both the block and surgical procedure.

MATERIALS AND METHODS

This randomised, double-blind, controlled trial was conducted on 80 patients in the Department of Anaesthesiology, Sardar Patel Medical College and Associated Group of Hospitals, Bikaner, after taking permission from Institution Research Board. Both male and female patients ranging between the age group of 20 - 60 years belonging to ASA grades I and II, weighing 40 - 70 kg, scheduled for elective lower limb or lower abdominal surgical procedure which all anticipated to complete within 2 hours under regional anaesthesia were included in selection of patients.

80 adult patients of either sex were included, belonging to ASA grades I and II. They were randomised into 4 groups and efforts were made that the group do not significantly differ with respect to age, weight and height. Sample size was calculated considering two-sided alpha error at 5% and power of study 80% with formula $m = 2c/\delta + 1$ (where $c = 7.9$ for power 80% and δ in standardised effect size derived from prior studies as .9) and was 19.55 (rounded to 20) for each group.

Exclusion Criteria

Patient with history of allergic reaction to the study drugs; those with significant cardiac, pulmonary, hepatic or renal dysfunction; obese patients (> 130% ideal body weight); those with history of chronic use of sedative drugs; full stomach patients, pregnant patients and epileptic patients all were excluded from the study. Pre-anaesthetic checkup.

Pre-anaesthetic checkup was carried out the day before surgery. Routine lab investigations like haemogram, blood sugar, blood urea, serum creatinine, chest x-ray and ECG were done. Standard monitors were applied with non-invasive BP, PR, Heart rate and SPO2 were recorded. The patients were divided into 4 groups of 20 patients in each group.

Group I

Patients received spinal anaesthesia and IV sedation with midazolam infusion 0.5 mg/kg/hr.

Group II

Patients received spinal anaesthesia and IV sedation with propofol 6 mg/kg/hr.

Group III

Patients received spinal anaesthesia and IV sedation with dexmedetomidine infusion 0.6 microgram/kg/hr.

Group IV

Patients received spinal anaesthesia and IV infusion of normal saline.

Procedure

Patients were taken on operating table and baseline BP, Pulse rate, Respiratory rate and SPO2 were recorded. The patients were subsequently shifted to the operating room and were randomly allocated with the help of computer generated random number to receive either propofol 1 mg/mL (in 5% dextrose in 50 mL syringe) or midazolam 0.1 mg/mL (5% dextrose in 50 mL syringe) or dexmedetomidine 2 microgram/mL (in normal saline in 50 mL syringe) through intravenous infusion. Midazolam was started at an initial infusion rate of 0.5 mg/kg/hr or dexmedetomidine started at an infusion rate 0.6 microgram/kg/hr to achieve desired level of sedation score 4 was noted. The infusion rate was lowered or raised in order to maintain sedation score of 4. After achieving a sedation score of 4, subarachnoid block was instituted by injecting 2.5 mL of bupivacaine heavy 0.5% to achieve adequate sensory block. Sedation score, systolic BP, diastolic BP, HR and SPO2 were recorded 5 mins before intrathecal injection and every 5 mins after intrathecal injection for 30 mins, then every 15 mins after up to 90 mins till the surgery continues, then every 2 hours until the patient is under sedation.

Prediction of depth of sedation and anaesthesia was noted by observer's assessment of alertness/sedation score.

Score 5

Responsiveness- Respond readily to voice with normal tone.
Speech- Normal.
Facial Expression- Normal.
Eyes- Clear, No ptosis.

Score 4

Responsiveness- Respond slowly to voice with normal tone.
Speech- Mild slowing.
Facial Expression- Mild relaxation.
Eyes- Marked ptosis (less than half the eye).

Score 3

Responsiveness- Respond after calling loudly or repeatedly.
Speech- Prominent slowing or slurring.
Facial Expression- Marked relaxation.
Eyes- Marked ptosis (half the eye or more).

Score 2

Responsiveness- Respond after mild prodding or shaking.
Speech- Few recognisable words.
Facial Expression- No response.
Eyes- No response.

Score 1

Responsiveness- Does not respond to mild prodding or shaking.
Speech- No Response.
Facial Expression- No response.
Eyes- No response.

Score 0

Responsiveness- Does not respond to pain.
 Speech- No Response.
 Facial Expression- No response.
 Eyes- No response.

Time to reach postoperative analgesic drug required was noted. Analgesia score was assessed by Visual analgesia score (VAS).

The study data analysed by using Analysis of Variance (ANOVA) and Chi-square test SPSS software 10.0.

All patients were given supplementary oxygen via ventimask at 4 L/min.

Observations

Observation/ Statistical Analysis Tables from 1 to 9.

Mean Pulse	Group I		Group II		Group III		Group IV		CD5%	P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
0 Minute	87.80	10.58	82.30	6.22	88.75	13.09	90.70	16.58	1.738	0.166
5 Minutes	84.00	10.91	83.00	7.10	85.10	12.18	86.30	14.26	0.310	0.818
10 Minutes	81.15	11.70	79.15	8.32	83.15	12.35	85.25	14.40	0.971	0.411
15 Minutes	78.70	13.52	76.63	8.29	81.50	12.34	81.65	14.17	0.743	0.530
20 Minutes	79.45	12.91	74.58	8.73	79.05	12.55	82.80	15.15	1.396	0.251
25 Minutes	79.50	12.41	73.79	10.14	77.25	11.47	80.70	15.25	1.149	0.335
30 Minutes	77.10	9.01	72.11	8.01	75.90	9.56	79.05	15.58	1.000	0.398
45 Minutes	77.88	8.08	72.00	7.73	76.44	7.82	78.32	13.59	0.635	0.595
60 Minutes	75.00	3.00	71.33	6.25	74.86	8.40	75.17	9.89	3.779	0.021
75 Minutes	72.75	2.50	69.67	4.66	73.00	5.00	73.00	7.00	4.937	0.014
90 Minutes	72.00	2.45	62.25	2.21	72.00	0.00	73.50	0.071	1.446	0.309
2 Hours	80.10	7.33	76.80	6.30	80.40	6.60	78.60	12.33	0.753	0.524
4 Hours	81.00	7.83	78.40	7.33	82.50	6.65	81.10	12.03	0.770	0.514
6 Hours	82.30	5.40	81.30	7.79	84.70	5.96	82.30	11.88	0.627	0.600
8 Hours	81.60	6.89	82.30	8.57	81.90	6.88	81.90	10.33	0.024	0.995
12 Hours	82.30	6.50	81.80	8.48	80.70	7.06	81.30	9.18	0.151	0.929
24 Hours	82.30	4.96	80.20	7.11	81.80	7.05	83.20	9.25	0.776	0.511

Table 1. Showing Mean Pulse Rate at different Time Intervals in all the 4 Groups

Systolic BP (mmHg)	Group I		Group II		Group III		Group IV		CD5%	P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
0 Minute	124.65	12.58	122.50	12.22	130.85	12.89	137.85	10.95	6.420	0.001
5 Minutes	113.95	12.55	117.75	11.63	121.25	15.49	129.00	13.78	4.548	0.006
10 Minutes	110.00	12.54	111.10	13.91	116.05	17.14	128.15	15.15	6.321	0.001
15 Minutes	109.20	15.37	107.00	12.65	113.50	15.81	127.65	16.52	7.379	<0.001
20 Minutes	107.25	15.88	103.58	9.23	115.05	15.10	125.80	15.78	9.299	<0.001
25 Minutes	106.70	13.27	103.32	11.56	114.70	13.78	125.25	17.15	9.401	<0.001
30 Minutes	108.53	12.92	104.78	11.45	114.35	13.32	124.16	15.94	7.282	<0.001
45 Minutes	107.00	13.23	102.27	7.20	116.53	9.96	121.80	18.17	7.468	<0.001
60 Minutes	99.40	15.13	99.44	6.09	114.00	11.27	119.40	19.31	4.288	0.013
75 Minutes	94.75	7.09	100.33	6.50	103.33	7.57	119.00	15.59	5.054	0.013
90 Minutes	95.25	4.57	103.00	4.97	98.00	0.00	122.50	17.68	5.323	0.032
2 Hours	112.00	8.94	115.40	7.54	115.00	7.61	118.80	7.74	2.433	0.071
4 Hours	118.50	10.89	119.30	5.78	122.70	10.04	125.60	12.37	2.108	0.106
6 Hours	123.70	8.27	122.00	7.57	123.00	8.91	128.90	9.98	2.492	0.066
8 Hours	122.70	10.75	121.30	9.18	125.90	8.47	125.30	6.99	1.175	0.325
12 Hour	125.20	10.31	120.20	7.22	123.90	9.35	125.90	7.47	1.710	0.172
24 Hours	124.50	9.45	119.40	6.87	120.60	7.02	125.00	9.74	2.224	0.092

Table 2. Showing Mean Systolic Blood Pressure (mmHg) at different Time Intervals in all the 4 Groups

Diastolic BP (mmHg)	Group I		Group II		Group III		Group IV		CD5%	P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
0 Minute	82.80	8.69	80.70	6.84	84.40	10.03	84.55	8.00	0.896	0.447
5 Minutes	76.35	9.19	77.40	7.92	79.50	8.49	83.85	7.42	3.214	0.028
10 Minutes	73.20	9.27	73.35	8.68	76.25	8.72	80.50	6.75	3.304	0.025
15 Minutes	71.60	10.65	68.89	9.10	74.35	8.74	79.40	8.71	4.527	0.006
20 Minutes	70.00	9.02	66.63	7.80	75.90	9.14	78.70	9.91	7.251	<0.001
25 Minutes	70.30	7.08	66.42	9.47	74.30	7.95	78.65	10.34	6.989	<0.001
30 Minutes	70.05	7.34	67.00	10.57	74.95	9.11	79.70	10.33	6.716	<0.001
45 Minutes	70.29	8.76	64.20	8.01	76.12	8.07	78.69	10.54	8.208	<0.01
60 Minutes	63.60	11.08	63.11	10.01	76.29	9.34	78.67	10.34	5.561	0.004
75 Minutes	65.25	11.76	63.78	9.91	67.67	8.74	78.67	14.15	1.469	0.263
90 Minutes	64.75	6.70	61.00	7.79	68.00	0.00	82.00	15.56	2.568	0.137
2 Hours	76.00	5.98	77.20	5.89	77.80	6.15	79.60	6.54	1.191	0.319

4 Hours	77.40	7.95	77.00	4.66	80.40	6.34	81.50	6.80	2.294	0.085
6 Hours	79.50	7.31	81.40	5.59	81.90	7.41	82.80	6.82	0.834	0.479
8 Hours	81.40	5.15	79.90	6.60	81.30	7.85	84.60	6.09	1.873	0.141
12 Hours	82.60	6.36	80.70	4.78	80.50	5.91	83.30	5.78	1.173	0.326
24 Hours	82.60	5.66	80.30	3.85	82.70	9.32	84.00	5.66	1.142	0.338

Table 3. Showing Mean Diastolic Blood Pressure (mmHg) at different Time Intervals in all the 4 Groups

Respiratory Rate (min)	Group I		Group II		Group III		Group IV		CD5%	p
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
5 Minutes	15.65	0.75	15.65	0.67	15.95	60.60	15.70	1.56	0.434	0.729
10 Minutes	15.05	0.69	15.00	0.86	15.40	0.94	15.95	1.82	2.337	0.054
15 Minutes	14.80	1.01	14.84	0.96	14.95	0.76	15.55	1.43	2.120	0.105
20 Minutes	14.85	0.99	14.74	0.99	15.10	0.79	15.55	1.27	2.437	0.071
25 Minutes	15.00	0.79	14.58	0.90	14.90	0.79	15.35	1.27	2.140	0.102
30 Minutes	14.68	0.95	14.72	0.75	14.75	0.72	15.35	1.31	2.122	0.105
45 Minutes	14.56	0.63	14.47	1.06	14.88	0.86	15.26	1.19	2.391	0.077
60 Minutes	14.20	0.45	14.33	1.12	14.43	0.53	15.83	1.95	2.444	0.061
75 Minutes	13.50	1.00	14.33	0.71	14.33	0.58	13.67	1.52	1.060	0.395
90 Minutes	13.50	1.00	14.25	0.50	14.00	0.00	14.50	0.71	0.961	0.462
2 Hours	15.90	0.31	15.85	0.50	15.75	0.44	16.10	1.21	0.869	0.461
4 Hours	15.70	0.73	15.90	1.29	15.75	0.64	16.05	1.19	0.495	0.687
6 Hours	15.95	1.50	16.70	1.45	16.80	1.82	17.20	1.54	2.161	0.100
8 Hours	16.05	1.15	17.05	2.50	17.10	2.07	17.55	1.70	2.170	0.098
12 Hours	16.15	0.93	16.85	1.14	17.25	2.81	17.60	1.73	2.377	0.076
24 Hours	16.30	1.08	17.00	1.26	16.25	1.45	16.95	1.43	1.906	0.136

Table 4. Showing Mean Respiratory Rate (min) at different Time Intervals in all the 4 Groups

SPO ² (%)	Group I		Group II		Group III		Group IV		CD5%	P
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
5 Minutes	99.10	1.07	99.20	1.06	99.05	0.94	99.65	0.75	1.617	0.192
10 Minutes	98.85	1.04	98.95	1.36	98.65	0.99	99.55	0.83	2.621	0.057
15 Minutes	98.85	1.04	99.42	0.96	99.15	0.93	99.60	0.75	2.481	0.067
20 Minutes	99.15	0.93	99.26	1.59	99.45	0.99	99.80	0.70	1.336	0.269
25 Minutes	99.50	0.69	99.16	1.07	99.55	0.60	99.65	0.75	1.406	0.248
30 Minutes	99.47	0.77	99.17	0.99	99.60	0.60	99.70	0.80	1.584	0.201
45 Minutes	99.35	0.93	99.13	0.92	99.65	0.79	99.68	0.67	1.633	0.190
60 Minutes	99.00	1.22	98.78	1.20	99.00	1.15	99.50	1.00	0.783	0.513
75 Minutes	99.00	1.15	98.50	1.31	98.67	0.58	100.00	0.00	1.431	0.276
90 Minutes	99.25	0.96	99.25	0.96	99.00	0.00	99.50	0.71	0.071	0.974
2 Hours	97.20	0.70	97.70	1.22	97.80	1.28	97.25	0.44	1.974	0.125
4 Hours	97.15	0.37	97.65	1.09	97.35	0.81	97.45	0.51	1.546	0.209
6 Hours	97.20	0.41	97.65	1.09	97.40	0.88	97.45	0.51	1.141	0.338
8 Hours	97.25	0.44	97.40	0.50	97.30	0.47	97.60	0.60	1.863	0.143
12 Hours	97.25	0.44	97.45	0.76	97.10	0.72	97.40	0.50	1.297	0.282
24 Hours	97.30	0.47	97.80	1.06	97.30	0.47	97.45	0.60	2.313	0.083

Table 5. Showing Mean SPO² at different Time Intervals in all the 4 Groups

Onset of Sedation (Minutes)	Group I		Group II		Group III		Group IV	
	No.	%	No.	%	No.	%	No.	%
5-7	2	10	11	55	0	-	-	-
8-10	15	75	8	40	0	-	-	-
11-14	3	15.0	1	5	2	10.0	-	-
15-20	0	-	0	-	16	80	-	-
>20	0	-	0	-	2	10.0	-	-
Total	20	100	20	100	20	100	-	-
Mean	9.00		7.15		18.25		-	
SD	1.72		1.66		2.12		-	
					t	p		
	Group I vs II				3.461	=0.001		
	Group I vs III				15.145	<0.001		
	Group II vs III				18.399	<0.001		

Table 6. Showing Distribution of Cases according to Onset of Sedation in all the 4 Study Groups

Complications	Group I		Group II		Group III		Group IV		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Nil	15	75	16	80	15	75	16	80	62	77.5
Hypotension	0	-	2	10	0	-	0	-	2	2.5
Bradycardia	1	5	0	-	1	5	0	-	2	2.5
Nausea	1	5	0	-	1	5	1	5	3	3.7
Vomiting	1	5	0	-	1	5	1	5	3	3.7
Urinary Retention	2	10	2	10	2	10	2	10	8	10
Total	20	100	20	100	20	100	20	100	80	100
X ²	14.486									
P	0.106									

Table 7. Showing Distribution of Cases according to Complications in all Four Groups

Postoperative Analgesia (Hours)	Group I		Group II		Group III		Group IV	
	No.	%	No.	%	No.	%	No.	%
0 - 2	5	25	15	75	0	-	20	100
3 - 4	15	75	5	25	3	15	0	-
5 - 6	0	-	0	-	7	35	0	-
>6	0	-	0	-	10	50	0	-
Total	20	100	20	100	20	100	20	100
Mean	3.15		1.93		6.55		1.25	
SD	0.86		0.96		1.76		0.62	
					t		p	
Group I vs II					4.242		<0.001	
Group I vs III					7.757		<0.001	
Group I vs IV					8.025		<0.001	
Group II vs III					10.302		<0.001	
Group II vs IV					2.638		0.012	
Group III vs IV					12.698		<0.001	

Table 8. Showing Distribution of Cases according to Postoperative Analgesia in all the 4 Groups

Time Taken (Minutes)	Group I		Group II		Group III		Group IV		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
0 - 60	17	85	20	100	0	-	0	-	37	61.7
61 - 120	3	15	0	-	14	70	0	-	17	28.3
121 - 180	0	-	0	-	4	20	0	-	4	6.7
181 - 240	0	-	0	-	1	5	0	-	1	1.7
>240	0	-	0	-	1	5	0	-	1	1.7
Total	20	100	20	100	20	100	0	-	60	100
Mean	27.25		10.75		156.00		-			
SD	20.36		3.37		47.28		-			
					T		p			
Group I vs II					3.576		=0.001			
Group I vs III					11.185		<0.001			
Group II vs III					13.703		<0.001			

Table 9. Showing Distribution of Cases according to Time Taken to reach Sedation Score 5

RESULTS

There were no significant differences between the four groups with regard to age, weight and gender of the patients. We observed Pulse rate, Systolic blood pressure, Diastolic blood pressure and SPO₂ to various extent. There was gradual fall in the pulse rate upto 45 mins following spinal anaesthesia in each group. No significant change in pulse was seen when intergroup comparison was made between four groups till 90 mins. Comparison of mean systolic blood pressure at various intervals in 4 groups showed that the groups were statistically highly significant (p < 0.001) till 45 minutes. After 45 minutes the difference was statistically significant (p < 0.05). It was highly significant in group propofol till 45 minutes than other groups. The intergroup comparison of mean diastolic blood pressure showed that the groups were statistically significant (p < 0.05) till 15 mins and after 15 mins till 45 mins it was highly significant. No clinical significant changes in SPO₂ was seen when intergroup comparison was made between 4 groups.

We also observed time taken for onset of sedation, which was earliest in propofol group and prolonged in dexmedetomidine group as compared to midazolam group. The statistical intergroup comparison shows the highly significant difference in all the groups (p < 0.001).

Hypotension was seen in 2 patients in group propofol. Bradycardia was seen in 1 patient in each midazolam and propofol group, while nausea and vomiting was present in 1 case in each group of midazolam, dexmedetomidine and control group, while urinary retention was seen in 2 cases in all the 4 groups. This difference was statistically insignificant (p > 0.05).

Maximum mean postoperative analgesia was in group dexmedetomidine followed by group midazolam, propofol and control respectively. Intergroup comparison was highly significant in all groups (p < 0.001).

Time taken to reach sedation score 5 was lowest in group II propofol (10.75 +/- 3.37 minutes) and maximum in group III dexmedetomidine (156.00 +/- 47.28 minutes). Time taken in group I midazolam (27.25 +/- 20.36 minutes).

DISCUSSION

The use of spinal anaesthesia is often limited by the unwillingness of the patient to remain awake during surgery. Supplemental sedation with an intravenous agent is often required to allay fear and anxiety in patients subjected to spinal anaesthesia. Most widely used technique for administering sedation in regional anaesthesia is the intermittent intravenous bolus dose technique. This technique is associated with peaks and troughs in plasma concentration producing significant side effects and delayed recovery. Continuous infusions have been proved to produce lesser side effects, faster recovery and easy controllability over the desired level of sedation.

Mean pulse rate reduced in all the 4 groups upto 90 minutes. Magalhaes et al¹³ found that there were no statistical significant difference between dexmedetomidine and midazolam groups in heart rate variation. Celik et al¹⁴ also found that in comparison to propofol, dexmedetomidine achieved more stable haemodynamic parameters. Similar results were observed in our study.

Mean systolic blood pressure reduced in all 4 groups upto 90 minutes. Intergroup comparison significant (p < 0.001). The mean diastolic blood pressure also reduced in all 4 groups upto 75 minutes following spinal anaesthesia, which was statistically highly significant (p < 0.001). The study correlates well with Arain and Ebert,¹⁵ Magalhaes et al¹³ and Celik et al¹⁴ and Liang et al.¹⁶

Changes in SPO₂ were clinically insignificant among all groups (p > 0.05). Our study correlates with Patki and Shelgaonkar.¹⁷

The mean time for onset of sedation as assessed by OASS score was found to be 9.00 +/- 1.72 mins, 7.15 +/- 1.66 mins and 18.25 +/- 2.12 mins in group I, II and III. Studies by Arain and Ebert,¹⁵ Patki and Shelgaonkar¹⁷ and Liang et al¹⁶ correlates well with our study.

No significant complications were seen among groups. Our study favours studies by White and Smith¹⁸ and Patki and Shelgaonkar.¹⁷

Maximum mean postoperative analgesia was highest in group III (Dexmedetomidine) followed by group I (midazolam) and group II (propofol) and group IV (control). Celik et al¹⁴ found that time for first analgesic requirement was significantly longer in group dexmedetomidine as compared to midazolam. Kaya et al¹⁹ concluded that dexmedetomidine increased the time for first request for

postoperative analgesia compared with midazolam and saline. Our study correlates with above authors.

Time taken to reach complete awakening (Sedation Score 5) was highest in dexmedetomidine II group followed by midazolam I group and propofol II group. Intergroup comparison was significant. Our study corresponds with Yao et al.²⁰

CONCLUSION

Operative condition was good and comparable with good haemodynamic stability in all 4 groups. Midazolam is highly suitable with significantly less pain on injection, lower incidence of postoperative veno-irritation and its lower cost. Propofol is highly suitable as a sedative for spinal anaesthesia in spite of injection pain. It is superior to midazolam and dexmedetomidine, because of significantly early onset of sedation and shorter recovery time. Dexmedetomidine achieved similar level of sedation to midazolam and propofol in lower limb surgery under spinal anaesthesia. Patients sedated with dexmedetomidine could be easily aroused to cooperate with procedure without showing irritation. Adverse side effects of dexmedetomidine, midazolam and propofol are avoided by the slow infusion of drugs.

From the results of our clinical study we concluded that all the three drugs provide good sedation, stable haemodynamics, no respiratory depression and alertness with good cooperation. Midazolam is the drug of choice due to its cost benefit; propofol is preferred during ambulatory surgery under regional anaesthesia and dexmedetomidine is used as first option by the additional analgesic property.

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