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ORIGINAL RESEARCH

To Compare Clinically Dexmedetomidine Vs Clonidine for Hemodynamic Stability in Laparoscopic Surgeries and Evaluation of Complications During Perioperative Period

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ABSTRACT

Introduction: Laparoscopic surgeries has revolutionized abdominal surgeries, however, this procedure is not risk free. Hence, the present study was designed to evaluate the efficacy of dexmedetomidine versus clonidine in prevention of such hemodynamic changes.

Materials and Method: 60 patients of age group 20 to 60 years, of ASA grade I & II were selected and divided into two groups (each group containing 30 patients); group I Inj. Dexmedetomidine 2 mcg /kg IV was administered and in group II Inj. Clonidine 2 mcg /kg IV was administered. All 60 patients were intubated with cuffed endotracheal tube of appropriate size. All vital data (PR, NIBP, RR, SPO_2, temp) were recorded. Pulse rate, blood pressure, SPO_2, $EtCO_2$ before and after intubation and throughout surgery was observed and recorded. Statistical analysis was done using student's 't' test and Chi-square test, result considered significant if p value <0.05.

Results: Changes in mean pulse rate were significant after intubation, intra operative period of 25min,50 min and 60min with mean pulse rate being higher in group-2 than group-1 with p-value <0.05.. Changes in MBP was significant after intubation, intraoperatively at 1min, 20 min with MBP being higher in group-2 than group-1 with p-value <0.05. Postoperatively MBP of both groups were compared at 0, 15,30,60,90 min. Changes in MBP at these intervals in both groups were similar and comparable with p-value >0.05.

Conclusion: After study we conclude that Dexmedetomidine was more potent in case of hemodynamic stability during intubation and pneumoperitoneum at 2 µg /kg IV in laparoscopic surgery then clonidine 2 µg /kg IV without any significant complication.

Keywords: Clonidine; Dexmedetomidine; Hemodynamic Stability; Laparoscopic Surgeries.

INTRODUCTION

Laparoscopic surgery is a modern surgical technique involving insufflation of gas (usually CO2) into the peritoneal cavity, under pressure, to separate the organs within the abdominal

cavity.[1]paroscopic cholecystectomy is one of the most commonly undertaken procedures in general surgery, with overall complication rate being less than 1.5% and the overall mortality rate of less than 0.1%.[2] However pneumoperitoneum (PNP) required for this procedure affects several systems leading to alterations in cardiovascular, respiratory, stress response and acid-base physiology.[1]

These surgeries require creation of pneumoperitoneum which is often produced by insufflations of carbon dioxide in the abdominal cavity by using automated flow controlled carbon dioxide insufflators which supply gas till the required intrabdominal pressure is reached, inflation pressure can be varied from 0- 30 mm hg whereas the total gas flow volume can be set from 0-9.9L/min.[3-5]Aho et al[6] used α_2 adrenergic receptor agonist for prevention of hemodynamic responses associated with laparoscopic surgery. They found that dexmedetomidine effectively reduces the maximum heart rate response after intubation and pneumoperitoneum. Clonidine inhibits the release of catecholamine and vasopressin and thus modulates the hemodynamic changes induced by pneumoperitoneum.

Considering all these observations, the present study was designed to evaluate the efficacy of dexmedetomidine versus clonidine in prevention of such hemodynamic changes.

MATERIALS AND METHODS

After obtaining institutional ethical committeeapproval and written informed consent, 60 patient of age group 20 to 60 years, of ASA grade I & II, of either sex posted for elective laparoscopicprocedures during 2010-2011, selected and divided into two groups (each group containing 30 patients); group I Inj. Dexmedetomidine 2 mcg /kg IV was administered and in group II Inj. Clonidine 2 mcg /kg IV was administered.Patients Allergy to study medications, patients with heart conduction block, patients with significant morbid obesity, advanced diabetic disease, advanced renal disease, Psychiatric illness or history, inability to comply with study assessment, pregnancy, respiratory failure were excluded from the study.

All patients were assessed for their preoperative condition on the previous day and routine investigations were done. Patients were fasted for 10 hrs before time of operation.After shifting of patient into the operating room vital data like Pulse, BP, ECG, SPO2, were recorded before giving premedication. All patients of group I & II were given IV injection of glycopyrrolate (4 microgram/kg) 10 min before administration of study drug.

After receiving premedication all patients were given study drug according to their group. Patients of Group I was given inj. Dexmedetomidine 2mcg/kg diluted in 10 ml Normal Saline slowly over 10 min.Patients ofGroup II were given inj. Clonidine 2mcg/kg diluted in 10 ml Normal Saline slowly over 10 min. Vitals were taken in all patients, before and after study drug was given.

All 60 patients were preoxygenated with 100% O_2 for 5 min on operative table by facemask with Mapelson A circuit.All 60 patients of group I & II were induced with injection Sodium thiopental 3 – 5mg/kg IV slowly and injecction Succinylcholine 1.5-2mg/kg IV stat

All 60 patients were intubated with cuffed endotracheal tube of appropriate size.All 60 patients of both groups were maintained with O_2+N_2O+ intermittent positive pressure ventilation + Inj. vecuronium.All vital data (PR, NIBP, RR, SPO_2, temp) were recorded before induction after induction and at regular intervals throughout the surgery and postoperatively for 2 hr. ECG monitoring was done using schillarcardioscope ECG monitor.Reversal of anaesthesia was achieved using inj. neostigmine 0.05mg/kg + inj. glycopyrrolate 8 mcg/kg given IV. Pulse rate, blood pressure, SPO_2, $EtCO_2$ before and after intubation and throughout surgery was observed and recorded. Statistical analysis was done using student's 't' test and Chi-square test, result considered significant if p value <0.05.

RESULTS

Table-1 and Fig 1 shows mean pulse rates/min of both groups compared statistically using unpaired-t test. Mean pulse rate of both groups was compared intraoperatively for 120 min and postoperatively for 90 min as shown in table 2. Difference between the two groups was considered significant if P-Value <0.05. Before study drug mean pulse rate of group-1 was 92.66 (±7.84) while in group-2 it was 93.73 (±7.99) with P-value of 0.60. So, the groups were comparable with regard to mean pulse rate. After study drug mean pulse rate of group-1 was 63.86 (±6.07) while in group-2 it was 70.26 (±6.90) with p-value of 0.0003. On inter group comparison changes in mean pulse rate after study drug were statistically highly significant between group-1 and group-2. Changes in mean pulse rate was highly significant before intubation, intraoperatively at 1min, 5 min, 10min,15 min, 20 min, 30 min, with mean pulse rate being higher in group-2 than group-1 with p-value < 0.0001as shown in the table-2. Changes in mean pulse rate were significant after intubation, intra operative period of 25min,50 min and 60min with mean pulse rate being higher in group-2 than group-1 with p-value <0.05 as shown in the table-2. Changes in mean pulse rate was comparable at intra operative period of 40 min, 90 min, 120 min with p-value >0.05 as shown in table-2.

Postoperatively mean pulse rates of both groups were compared at 0, 15,30,60,90 min. Changes in mean pulse rates at these intervals in both groups were similar and comparable with p-value >0.05 as shown in table 1.

Table 2 and Fig 2 shows mean blood pressures (MBP) of both groups. Before study drug MBP of group-1 was 91.15(±3.95), while of group-2 it was 92.51 (±4.09) with p-value 0.1953 (>0.05) when compared by unpaired-t test. Both groups were comparable with regards to MBP before study drug and there was no significant difference between the two groups. MBP of both groups were compared intraoperatively for 120min and postoperatively for 90 min as shown in table 2. Changes in MBP was not significant in both groups after study drug, before intubation and intra operatively at 5min, 10min, 15min, 25min, 30min, 40min, 50min, 60min with p-value >0.05 as shown in the table 2. Changes in MBP was significant after intubation, intraoperatively at 1min, 20 min with MBP being higher in group-2 than group-1 with p-value <0.05 as shown in the table 2. Postoperatively MBP of both groups were compared at 0, 15,30,60,90 min. Changes in MBP at these intervals in both groups were similar and comparable with p-value >0.05 as shown in table 2.

Table 3 and Fig 3 show mean EtCO2 in both groups in intra-operative period. There was no significant difference in both groups regarding mean EtCO2 (P>0.05). Comparison between both groups was done by Chi-square test. No significant complications were noted in any patients. Only three patients in group1 and two patients in group 2 complained temporary dry mouth. No patient developed hypotension, hypertension, dysrrythmia, bradycardia, tachycardia, cardiac arrest, respiratory depression in post operative period.

Table1: Showing Mean Pulse Rate/min of both groups

		Group 1	Group 2	P value	Inf
Before IV dex/cloni	**Range**	78-110	80 - 112		
	Mean	92.66	93.73		
	SD	7.84	7.99	0.60	NS
AfterIV dex/cloni	**Range**	58 - 80	58 - 82		
	Mean	63.86	70.26		
	SD	6.07	6.90	0.0003	HS
Before intubation	**Range**	58 - 72	60 - 78		
	Mean	64.26	68.13		
	SD	3.43	5.45	0.0017	HS
After intubation	**Range**	68 - 80	66 - 86		
	Mean	70.93	74.46		

	SD	3.43	5.42	0.0038	S
Post operative pulse					
1 min	**Range**	78 - 90	78 - 92		
	Mean	84.93	85.66		
	SD	3.13	3.64	0.4	NS
15 min	**Range**	80 - 90	80 - 92		
	Mean	84.4	85.26		
	SD	3.03	3.12	0.28	NS
30 min	**Range**	78 - 88	78 - 92		
	Mean	83.6	84.13		
	SD	2.74	3.67	0.53	NS
60 min	**Range**	78 - 88	78 - 90		
	Mean	83.33	83.36		
	SD	3.07	3.57	0.97	NS
90 min	**Range**	78 - 92	78 - 88		
	Mean	83.2	83.2		
	SD	3.17	3.22	1	NS

NS= Not significant

Fig 1: Showing Mean Pulse Rate/min of both groups.

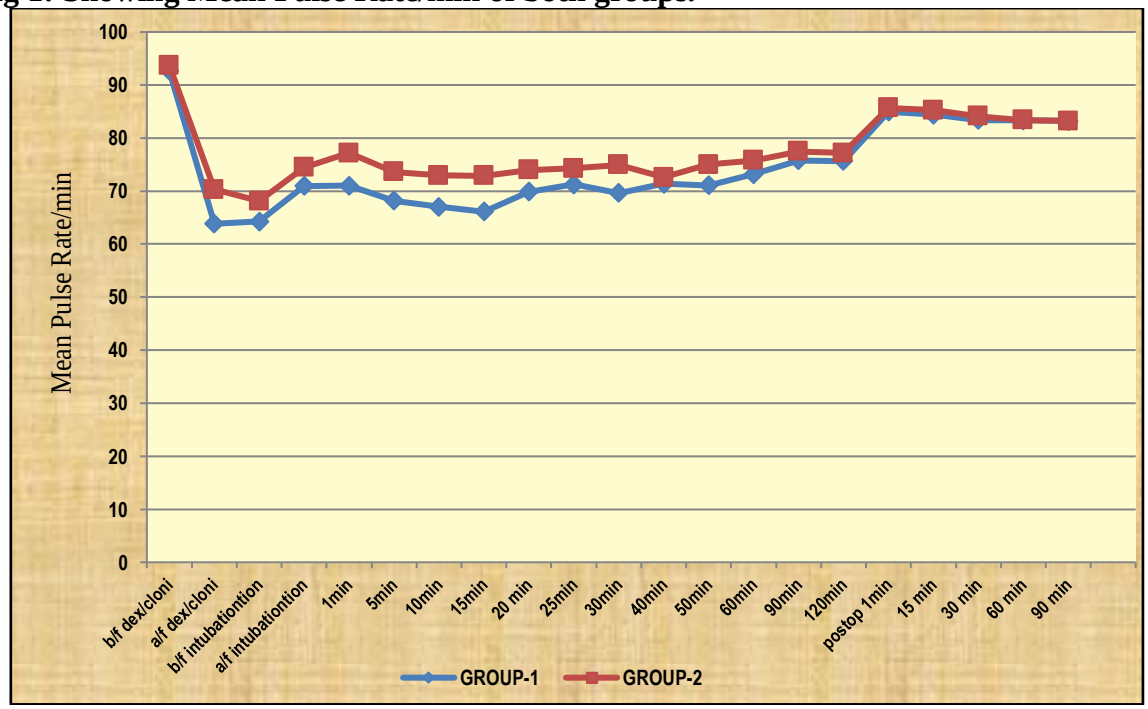


Table 2: Showing Mean Blood Pressure (mmhg) of both groups.

		Group 1	**Group 2**	**P value**	**Inf**
Before IV dex/cloni	**Range**	82 – 97.33	83.33– 100.66		
	Mean	91.15	92.51		
	SD	3.95	4.09	0.1953	NS
AfterIV dex/cloni	**Range**	85.33 – 95.33	82 – 95.33		
	Mean	90.11	88.88		
	SD	2.38	3.99	0.1524	NS

Before intubation	**Range**	82 – 95.33	77.33 – 95.33		
	Mean	89.8	88.02		
	SD	3.47	5.25	0.1268	NS
After intubation	**Range**	82 - 96	77.33 - 98		
	Mean	89.64	91.95		
	SD	3.45	5.16	0.04	S
1 Min.	**Range**	83.33 – 93.33	80 – 97.33		
	Mean	89.46	91.75		
	SD	2.99	4.33	0.02	S
5 Min.	**Range**	82 – 93.33	77.33 –97.33		
	Mean	88.88	90.8		
	SD	3.25	4.32	0.0566	NS
10 Min.	**Range**	83.33 – 94.66	82 – 93.33		
	Mean	88.95	89.55		
	SD	3.89	3.22	0.51	NS
15 Min.	**Range**	80.66 – 95.33	80 – 95.33		
	Mean	89.4	87.77		
	SD	4.36	3.86	0.13	NS
20 Min.	**Range**	79.33 – 95.33	82 – 95.33		
	Mean	87.68	89.64		
	SD	3.49	3.88	0.04	S
25 Min.	**Range**	83.33 - 98	79.33 – 95.33		
	Mean	90.75	88.53		
	SD	3.96	4.03	0.0574	NS
30 Min.	**Range**	82 – 100.66	78 – 95.33		
	Mean	90.04	87.97		
	SD	4.52	4.06	0.067	NS
40 Min.	**Range**	80.66 – 95.33	77.33 – 93.33		
	Mean	89.17	87.35		
	SD	4.18	3.91	0.0869	NS
50 Min	**Range**	82 – 99.33	80 – 85.33		
	Mean	89.6	88.2		
	SD	4.30	3.99	0.19	NS
60 Min.	**Range**	77.33 – 99.33	80.66 – 94.66		
	Mean	89.44	88.33		
	SD	5.58	3.55	0.30	NS
90 Min.	**Range**	79.33 – 97.33	83.33 – 93.33		
	Mean	89.88	90.54		
	SD	5.00	3.18	0.65	NS
120 Min.	**Range**	83.33 – 99.33	89.33 - 94		
	Mean	91.66	92.26		
	SD	5.57	2.13	0.8	NS
Post operative BP					
1 min	**Range**	90.66 - 100	88 – 99.33		
	Mean	95.22	94.51		
	SD	2.65	2.62	0.30	NS
15 min	**Range**	90.66 – 98.66	88 - 98		
	Mean	94.35	93.46		

	SD	2.52	2.48	0.17	NS
30 min	**Range**	90.66 – 102.66	88 – 100		
	Mean	94.66	93.46		
	SD	2.67	2.51	0.07	NS
60 min	**Range**	90 - 100	88 – 98.66		
	Mean	94.86	92.95		
	SD	2.57	2.57	0.10	NS
90 min	**Range**	83.66 – 100.66	88 – 98.66		
	Mean	94.26	92.8		
	SD	2.84	2.68	0.25	NS

S= Significant, NS= Not significant

Fig 2: Showing Mean Blood Pressure (mmhg) of both groups.

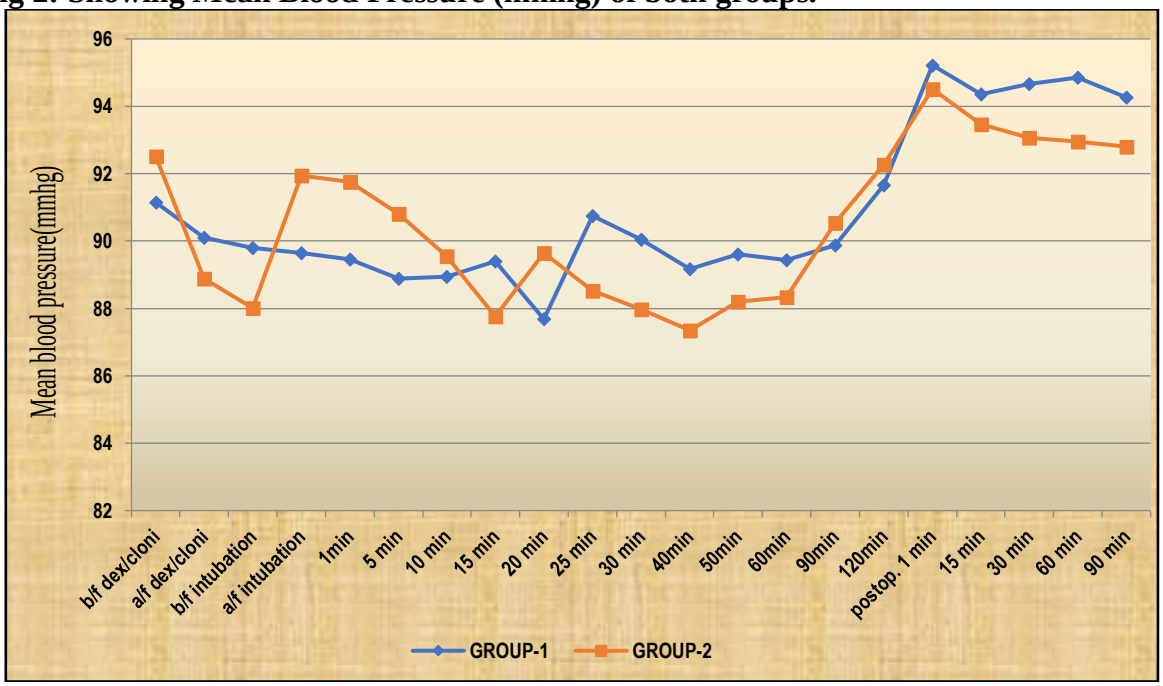
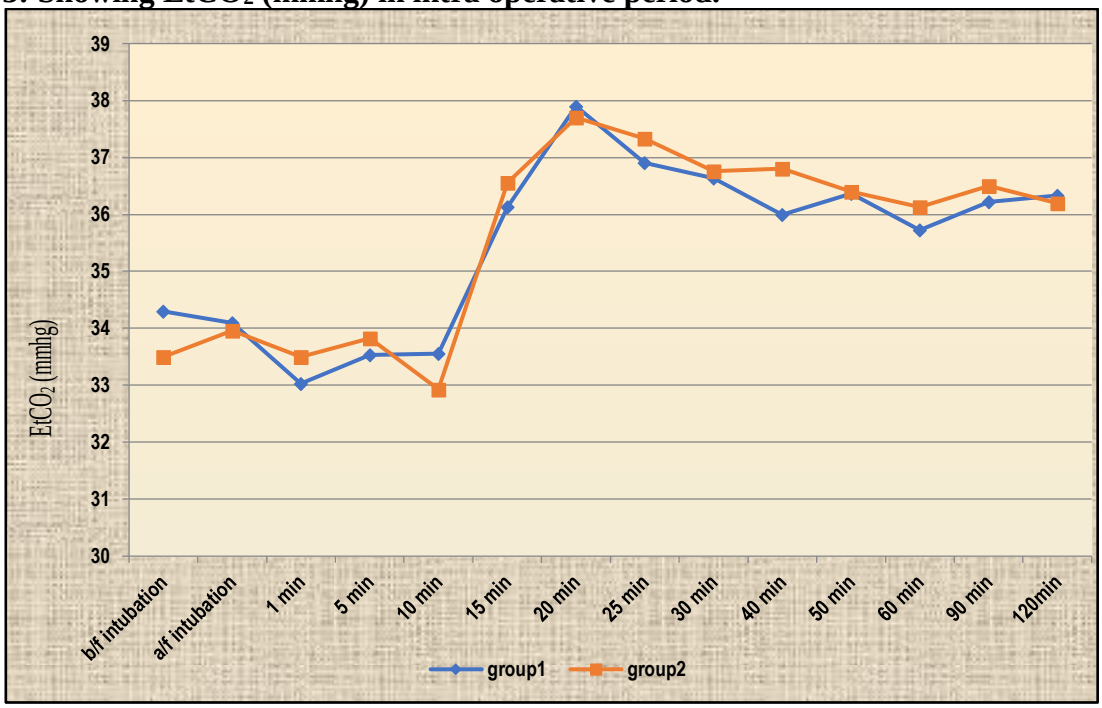


Table 3: Showing $EtCO_2$ (mmhg) in intra operative period.

	Group 1	**Group** 2	**P value**	**inf**
Before intubation	34.3±1.59	33.5±1.77	0.07	NS
After intubation	34.1±1.56	33.96±1.35	0.71	NS
1 min	33.03±1.56	33.5±1.48	0.2	NS
5 min	33.53±1.83	33.83±1.39	0.4	NS
10 min	33.56±1.55	32.93±1.26	0.08	NS
15 min	36.13±2.2	36.56±1.77	0.4	NS
20 min	37.9±2.84	37.7±2.60	0.77	NS
25 min	36.9±2.89	37.33±2.26	0.52	NS
30 min	36.63±3.38	36.76±2.17	0.85	NS
40 min	36±3.02	36.8±1.74	0.21	NS
50 min	36.36±2.84	36.4±1.86	0.94	NS
60 min	35.73±2.74	36.13±2.19	0.53	NS
90 min	36.22±2.39	36.5±1.78	0.70	NS
120 min	36.33±1.36	36.2±0.83	0.85	NS

NS- not significant

Fig 3: Showing $EtCO_2$ (mmhg) in intra operative period.



DISCUSSION

Laparoscopic surgeries are now a days common in practice. These surgeries offers many benefits than conventional surgeries, however, this procedure is not without risk. Our study results indicate that dexmedetomidine blunt hemodynamic response of pneumoperitoneum in laparoscopic surgeries as well as of intubation more effectively than clonidine.Similarly, Aho M et al[6] evaluated hemodynamic and endocrine effects of three different doses of dexmedetomidine, arterial blood pressure and heart rate increased after endotracheal intubation and during laparoscopy in all groups, but the maximal mean arterial pressure after tracheal intubation was lower in the dexmedetomidine 2.4- µg/kg group (104 mm Hg [SD19]) than in the saline solution group (130 mm Hg [SD12]).In our study, 60 patient of age group 20 to 60 years, of ASA grade I & II, of either sex posted for elective laparoscopic procedures selected and divided into two groups (each group containing 30 patients). In group 1 inj. dexmedetomidine 2 mcg /kg IV injected over 10 min. before 10 min of induction. In group 2 inj. clonidine 2 mcg/kg injected IV over 10 min. before 10 min of induction. Mean Blood Pressure and mean pulse rate were decrease in both group 1 and 2 after giving respective drug either inj. dexmedetomidine or inj. clonidine.

On comparison dexmedetomidine decreases mean pulse rate, statistically highly significant difference was found when compared with clonidine after respective drug was given. Dexmedetomidine 2 µg/kgattenuated the mean pulse rate after intubation 70.93(±3.43) compared with clonidine 2 µg/*kg* 74.46(±5.42), with statistically significant difference (p value- 0.0038).On inter group comparison we observed no significant difference between dexmedetomidine and clonidine regarding mean blood pressure after respective drug was given. Dexmedetomidine 2 µg/kg attenuated the mean blood pressure after intubation 89.64 (±3.45) compared with clonidine 2 µg/*kg* 91.95 (±5.16), with statistically significant difference (p value- 0.04).

In contrast to above study our study no incidence of bradycardia (heart rate ≤40 beats/min) in our study. Yildiz M et al[7]done a similar study to evaluate the effect of a single pre-induction intravenous dose of dexmedetomidine 1 µg/kg on cardiovascular response resulting from laryngoscopy and endotracheal intubation, need for anaesthetic agent and perioperative

hemodynamic stability and found that preoperative administration of a single dose of dexmedetomidine resulted in progressive increases in sedation, blunted the hemodynamic responses during laryngoscopy, and reduced opioid and anaesthetic requirements. Furthermore, dexmedetomidine decreased blood pressure and heart rate as well as the recovery time after the operation. In another study by Das M et al[8]reported that clonidine premedication provides perioperative hemodynamic stability.Similar to above literature, we had done this study for evaluation of the efficacy of inj. dexmedetomidine 2mcg IV with that of inj. clonidine 2mcg IV in laparoscopic surgeries in regard to hemodynamic stability, quality and duration of analgesia and sedation and possible complication.Changes in MBP was significant after intubation, intraoperatively at 1min, 20min with MBP being higher in group-2(cloni group)[than group-1(dex group) with p-value <0.05. There was no need to start nitroglycerine drip in both groups. Furthermore, Kholi AV et al[9] also found that dexmedetomidine causes better attenuation of presser response and provides better analgesia and sedation than clonidine.

In our study regarding hemodynamic stability, dexmedetomidine was more potent than clonidine at similar dose of 2 μg/kg intravenously, given before induction in laparoscopic surgeries. Dexmedetomidine significantly decreases mean pulse rate varied from 64.26±3.43 to 76.06±3.66 intraoperatively then clonidine varied from 68.13±5.45 to 77.2±4.47. Upon statistical comparison in two groups of patients, highly significant variation was observed throughout the intraoperative period except for the after intubation, 25min, 50min, 60min value wheresignificant difference($p<0.05$) was observed. Changes in mean blood pressure was significant after intubation, intraoperatively at 1min, 20min with mean blood pressure being higher in group-clonidine then dexmedetomidine ($p>0.05$). In our study, results shows that dexmedetomidine (2 μg/kg) IV more potent then clonidine (2 μg/kg) IV in blunting of hemodynamic response in laparoscopic surgeries.It is known that dexmedetomidine had a significant dose-response relationship with bradycardia. However, the median effective dose (ED50) of intravenous dexmedetomidine conducing significant bradycardia in elderly patients remains undetermined.[10]De Cassai A et al[11] carried meta-analysis and reported that patients receiving premedication with dexmedetomidine for tracheal intubation, compared with no dexmedetomidine, have a lower blood pressure and heart rate, however, the risk of bradycardia and hypotension is relevant and its use during daily practice should be cautiously evaluated for each patient.

CONCLUSION

After study we conclude that Dexmedetomidine was more potent in case of hemodynamic stability during intubation and pneumoperitoneum at 2 μg /kg IV in laparoscopic surgery then clonidine 2 μg /kg IV without any significant complication.

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