A Randomized Prospective Controlled Trial to Study the Effects of Dexmedetomidine on Perioperative Hemodynamics of Patients in Laparoscopic Surgeries

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ABSTRACT

Introduction: Laparoscopic surgery has the advantages of avoiding large incisions and decreases blood loss, pain and enhances early postoperative mobilisation. These advantages are not free from disadvantages, as hemodynamic changes such as hypertension, tachycardia and other surgical-related complications are commonly observed intraoperatively. As a result, anaesthesia techniques for laparoscopic surgery must be tailored to anticipate these differences from open surgery. The aim of this study was to evaluate the effect of dexmedetomidine on perioperative hemodynamic in patients undergoing laparoscopic surgeries.

Material and methods: After obtaining ethical clearance, we performed a randomized controlled study on 60 patients of ASA I-II status divided into two groups; group C (control) and group D (dexmedetomidine). Patient received either normal saline or dexmedetomidine in group C and group D, respectively, depending upon the allocation. The infusion rate was adjusted according to; loading dose (0.5µg/kg) over 10 min and maintenance dose (0.5µg/kg/hr.) and perioperative hemodynamics were recorded. Routine general anesthesia was administered in all the patients with conventional technique as per our institutional protocols. Postoperatively, Rasmsay sedation score, and side effects if any were recorded.

Results: Demographic data were comparable among study groups ($p > 0.05$). Significant hemodynamic changes were observed in group C following intubation, during skin incision, throughout the pneumoperitoneum, during extubation and immediate post extubation period. Hemodynamic stress response in dexmedetomidine group was significantly attenuated. The requirement of intraoperative fentanyl was significantly higher in group C ($P<0.05$). Dexmedetomidine also provided better sedation in the immediate post extubation period and no significant side effects were noted.

Conclusion: Dexmedetomidine infusion in the dose of 0.5 µg/kg body weight as bolus over 10 min and 0.5µg/kg/hr. intraoperatively as maintenance dose provided a better hemodynamic profile in the perioperative period and effectively attenuated the stress response with no side effects in patient undergoing laparoscopic surgeries. Thus, dexmedetomidine can be used as an ideal anesthetic adjuvant during laparoscopic surgeries.

Keywords: Dexmedetomidine, Laparoscopic Surgery, Sedation, α_2 Agonist, Hemodynamic.

INTRODUCTION

Laparoscopic surgeries provide a major benefit to the patient like smaller incision size, reduced postoperative discomfort, lower incidence of postoperative wound infection and shortened recovery. All these factors contribute to various advantages such as shortened hospital stay, lesser postoperative pain and cosmetically appealing.[1] However laparoscopic surgeries associated with own specific risks due to individual laparoscopic technique or due to physiological changes associated with creation of the pneumoperitoneum with carbon dioxide[2] for visualisation of abdominal viscera. Both pneumoperitoneum and carbon dioxide cause adverse cardiovascular effects. Some of these effects are related to carbon dioxide and some due to increased abdominal pressure. The CO_2 from pneumoperitoneum can cause clinically relevant hypercapnia.[3,4]

Immediately after pneumoperitoneum plasma levels of epinephrine, norepinephrine and renin increases.[5] The renin-angiotensin-aldosterone system is also activated by increased catecholamine level. All these changes lead to elevated arterial pressure, increased systemic and pulmonary vascular resistance which leads to hypertension, tachycardia and reduced cardiac output.[6] The positioning of patient during the laparoscopic surgery also adds up to above pathophysiological changes further compromising the hemodynamics.[7] Further, steps in anaesthesia like laryngoscopy, intubation, extubation also associated with stimulation of sympathetic nervous system leading to unwanted hemodynamic changes. The hemodynamic changes predispose the myocardium to ischemia that may be life-threatening in the vulnerable patient. As a result, anaesthesia techniques for laparoscopic surgery must be tailored to anticipate these differences from open surgery. Modern anaesthesia practices, therefore, plan to prevent sympathetic discharge and provide better hemodynamic stability.

Various agents like opioids, benzodiazepines, beta-blockers, calcium channel blockers and vasodilators have been used

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to achieve hemodynamic stability. In recent years, a great interest has been shown towards the use of α2 agonists in anaesthesia practice because of their anxiolytic, sedative, sympatholytic and analgesic-sparing properties. Various studies have been conducted to know the effectiveness of dexmedetomidine in various doses for prevention of stress-induced hemodynamic response.[8,9]

Dexmedetomidine is a selective α_2 agonist with 8 times more affinity for α_2 adrenergic receptors compared to clonidine and possesses all properties of α_2 agonist without respiratory depression.[10,11] Dexmedetomidine by its central sympatholytic action provides better hemodynamic stability when used as an adjuvant in general anaesthesia. Hence the prospective randomized control trial was undertaken to study the effects of dexmedetomidine on perioperative hemodynamics in laparoscopic surgeries.

MATERIAL AND METHODS

This was prospective randomized double blind controlled study conducted in tertiary care teaching public hospital after obtaining ethical permission and well-informed written consent from the patients. The study was conducted over a period of one years from November 2016 to November 2017. We enrolled patients aged 18 to 70 years with American Society of Anesthesiologists (ASA) physical status I-II, body mass index < 30, posted for laparoscopic surgeries under general anaesthesia with minimum surgical duration of 120 minutes. We excluded patients ASA status III & IV, patients with heart block, pregnant females and currently breastfeeding women. The study protocol was given to respective operation theatre in-charge of anaesthesia along with randomization codes. He/she divided the group to which the patient belongs according to randomized computer-generated numbers. The study drug was prepared by a senior resident who was not involved in the study. Both observers as well as patients were blinded to the study. A total of 60 patients were included in the study. The identity and consent of the patient were confirmed prior to induction of anaesthesia.

A standard protocol has been followed for all the patients. Once the patient arrived in the operating room, the consent and fasting status was checked. Standard ASA monitors- pulse oximetry, non-invasive blood pressure (NIBP), electrocardiography, capnometer were attached and baseline reading was noted. Peripheral IV line was taken with 20G iv cannula and preloaded with 500ml of RL. Maintenance fluid was given at the rate of 4ml/kg/hr. Another 22G IV cannula was secured to administer the study drug infusion. All subjects were premedicated with iv ranitidine 1mg/kg IV, ondansetron 0.08mg/kg, followed by fentanyl 2 µg/kg. Group D received Dexmedetomidine loading dose of 0.5µg/kg & Group C received 0.9% saline over 10 minutes. Patients were induced with IV thiopental 5-7mg/kg and vecuronium 0.08mg/kg was administered to induce neuromuscular blockade to facilitate tracheal intubation. Group D received Dexmedetomidine maintenance infusion of 0.5µg/kg/hr, whereas Group C received 0.9% normal saline infusion at the same rate. Both loading and maintenance of both groups were prepared in 50ml syringe. Patients were mechanically ventilated to keep end tidal carbon dioxide ($ETCO_2$) 30-40 mmHg. Anaesthesia was maintained with sevoflurane. MAC was titrated to maintain a mean arterial pressure and heart rate within 20% of baseline.

All the patients were observed for vital parameters like heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP) at baseline, after study drug administration, after induction, after intubation, after skin incision, after pneumoperitoneum at 15mins interval and immediately after extubation.

Fentanyl top ups 0.5µg/kg were given in case of the rise of blood pressure above 20% of baseline. NTG was used in case of rise of mean blood pressure above 20% baseline despite increasing sevoflurane MAC to 2 and fentanyl top-ups. The group which received more fentanyl and NTG boluses were recorded. The study drug infusion was discontinued at the time of wound closure. Sevoflurane MAC was titrated and stopped at the beginning of the closure. At the end of surgery patients were allowed to breathe spontaneously and reversed with iv neostigmine 0.05mg/kg and iv glycopyrrolate 0.008mg/ kg and were extubated. Immediately after extubation sedation was assessed by Ramsay Sedation Scale as follows

Score 1 - anxious and agitated or restless, or both
Score 2 - cooperative, oriented and tranquil
Score 3 - Responding to commands only
Score 4 - Brisk response to the light glabellar tap
Score 5 - Sluggish response to the light glabellar tap
Score 6 - No response to glabellar tap.

All the patients were shifted to post-anaesthesia care unit and received oxygen under Hudson's mask, iv fluids and iv paracetamol 15mg/kg. The heart rate, systolic blood pressure, diastolic blood pressure, SPO_2, Sedation score were assessed every 15 minutes for 2 hours. Complications like postoperative nausea and vomiting, bradycardia, hypotension were recorded.

Sample size

The Sample size was calculated based on the study "Effects of dexmedetomidine on perioperative monitoring parameters and recovery in patients undergoing laparoscopic cholecystectomy" Chavan et al, Anaesth Essay Res. 2016 by the difference in a mean method at 80% power & 5% α error. Minimum sample size found to be 4, 3, 2, for perioperative HR, at 1 min after induction, after skin incision, after pneumoperitoneum respectively. So, we decided to go ahead with the minimum sample size of 30 in each group.

STATISTICAL ANALYSIS

After data collection, data entry was done in MS Excel 2016. Data analysis was done with the help of SPSS Software 20.0. Qualitative data were represented in form of frequency and percentage. Association between qualitative variables was assessed by chi-square test, with continuity correction for all 2×2 tables and by Fischer's Exact test for all 2×2 tables where chi-square test was not valid due to small counts. Quantitative data were represented using mean ± standard deviation. Comparison of the quantitative data between two groups was done using unpaired t-test. P<0.05 was taken as significant.

RESULTS

The age of all the patients in our study was above 18 years old in study population. The mean age of patients in Group D was 40.30±11.23 years and in Group C was 40.60±12.07 years. The mean weight of the patient in Group D and Group C were 61.30±4.03kg and 60.03±8.17kg respectively. The distribution of sex in our study was a total of 4 male patients (13.3%) and 26 female patients (86.7%) in Group D and 7 male patients (23.3%) and 23 females (76.7%) in group C. The ASA grade in Group D was 17 patients (56.7%) were ASA I and 13 patients (43.3%) were ASA II, in Group C 19 patients (63.3 %) were ASA grade I and 11 patients (36.7%) were ASA II. The both groups were comparable on the basis of age, weight, sex, ASA grade with P>0.05(Chi-square test). (Table 1)

The mean baseline heart rate was comparable in both groups. After a loading dose of dexmedetomidine fall in heart rate was noted in Group D but it was not statistically significant [p=0.078]. Following intubation significant rise in heart rate was noted in Group C. After skin incision and throughout the period of pneumoperitoneum heart rate was significantly higher in group C compared to group D (p<0.05). After deflation of pneumoperitoneum mean heart rate was significantly lower in group D than group C. Following extubation increase of heart rate was noted in both the groups but significantly higher in the control group (p<0.05). Post-operatively, heart rate at 15th minute and 30th minute was significantly lower in Dexmedetomidine group than Control group. No significant difference was noted in heart rate from 45 minutes to 120 minutes (p>0.05) after extubation. (Table 2)

The mean baseline systolic blood pressure was comparable in both groups. The mean SBP in group C did not show any significant change till laryngoscopy and intubation. The mean SBP showed significant rise following intubation, after skin incision, throughout the period of pneumoperitoneum in control group. After deflation of pneumoperitoneum mean SBP was significantly lower in group D than group C. Following extubation increase of SBP was noted in both the

characteristic	Group D	Group C	P value
Age	40.30±11.23 years	40.60±12.07 years	0.921
Weight	61.30±4.03kg	60.03±8.17kg	0.440
Sex Male/female	4/26	7/23	0.317
ASA I/ II	17/13	19/11	0.598
Type of Surgery			
Lap cholecystectomy	23	22	0.765
Lap appendectomy	2	5	0.237
Lap hernioplasty	5	3	0.447

Table-1: Demographic data and operative data

Heart rate (HR) (per minute)	Group D			Group C			P Value
	N	Mean	SD	N	Mean	SD	
Baseline	30	70.80	5.215	30	70.00	4.983	0.546
After study drug administration	30	67.20	5.215	30	69.67	5.441	0.078
1 min after induction	30	66.67	5.683	30	66.20	6.065	0.76
1 min after intubation	30	70.03	3.737	30	79.90	4.475	0.0001
After skin incision	30	72.00	3.965	30	81.07	5.349	0.0001
After pneumoperitoneum (0 mins)	30	75.03	4.832	30	85.17	5.266	0.0001
15 mins	30	73.87	6.323	30	84.13	5.631	0.0001
30 mins	30	71.93	5.445	30	81.73	4.250	0.0001
45 mins	30	70.20	6.525	30	79.53	4.257	0.0001
60 mins	30	69.03	5.798	27	78.59	4.885	0.0001
75 mins	20	70.30	5.232	16	77.25	4.837	0.0001
90 mins	1	72.00	-	1	80.00	-	-
After deflation	30	65.47	6.601	30	72.27	4.394	0.001
After extubation (1 min)	30	78.13	7.592	30	83.60	3.874	0.001
15 mins	30	71.07	6.902	30	78.27	4.479	0.0001
30 mins	30	70.10	4.366	30	75.77	4.825	0.0001
45 mins	30	70.00	6.497	30	72.33	5.640	0.143
60mins	30	69.70	7.724	30	70.07	6.507	0.844
120 mins	30	67.33	5.261	30	68.67	5.245	0.327

Table-2: Comparison of mean Heart rate between 2 groups

groups but significantly higher in the control group (p<0.05). Post-operatively, SBP at 15th minute and 30th minute was significantly lower in Dexmedetomidine group than Control group. No significant difference was noted from 45 minutes to 120 minutes (p>0.05) after extubation. (Table 3)

The mean baseline diastolic blood pressure was comparable in both groups. In control group, the mean DBP did not show any significant change initially till intubation. The mean DBP showed significant rise following intubation, after skin incision, throughout the period of pneumoperitoneum in control group. After deflation of pneumoperitoneum mean DBP was significantly lower in group D than group C. Following extubation increase of DBP was noted in both the groups but significantly higher in the control group (p<0.05). Post-operatively, DBP at 15 and 30 minutes was significantly lower in Dexmedetomidine group than Control group. No significant difference was noted from 45 minutes to 120 minutes (p>0.05) after extubation. (Table 4)

The baseline MAP was comparable in both the groups. A significant rise in MAP is noted following intubation, after skin incision, throughout the pneumoperitoneum in the control group. After deflation of pneumoperitoneum MAP was significantly lower in group D than group C. Following extubation increase of MAP was noted in both the groups

Systolic blood pressure (SBP) (mm Hg)	Group D			Group C			P Value
	N	Mean	SD	N	Mean	SD	
Baseline	30	126.23	6.470	30	125.60	5.021	0.674
After study drug administration	30	123.93	6.045	30	121.00	5.723	0.059
1 min after induction	30	108.40	6.896	30	107.53	4.805	0.574
1 min after intubation	30	126.47	5.374	30	130.93	3.591	0.0001
After skin incision	30	125.27	5.271	30	132.27	4.093	0.0001
After pneumoperitoneum (0 mins)	30	132.30	6.545	30	141.20	7.000	0.0001
15 mins	30	126.07	8.982	30	139.40	7.650	0.0001
30 mins	30	120.40	7.691	30	132.27	4.354	0.0001
45 mins	30	118.80	6.697	30	130.27	3.814	0.0001
60 mins	30	114.93	6.848	27	129.04	3.976	0.0001
75 mins	20	117.45	7.729	16	128.75	4.123	0.0001
90 mins	1	119.00	-	1	132.00	-	-
After deflation	30	113.40	6.750	30	122.73	5.669	0.0001
After extubation (1 mins)	30	125.73	5.819	30	134.80	4.350	0.0001
15 mins	30	124.00	6.170	30	128.33	3.717	0.0017
30 mins	30	123.13	4.289	30	126.00	4.859	0.0184
45 mins	30	120.27	5.112	30	120.93	5.795	0.642
60 mins	30	118.40	4.248	30	118.47	4.125	0.949
120 mins	30	117.67	6.013	30	117.93	5.212	0.858

Table-3: Comparison of mean systolic blood pressure between 2 groups

Diastolic blood pressure (DBP) (mm Hg)	Group D			Group C			P value
	N	Mean	SD	N	Mean	SD	
Baseline	30	77.80	4.909	30	77.60	4.215	0.866
After study drug administration	30	74.20	5.810	30	75.87	5.251	0.248
1 min after induction	30	69.47	5.532	30	68.87	4.058	0.634
1 min after intubation	30	77.60	4.910	30	84.73	4.941	0.0001
After skin incision	30	80.17	4.504	30	85.33	5.365	0.0001
After pneumoperitoneum (0mins)	30	83.43	6.345	30	91.27	6.918	0.0001
15 mins	30	79.97	5.660	30	89.77	6.123	0.0001
30 mins	30	77.40	5.562	30	85.40	4.987	0.0001
45 mins	30	75.40	5.805	30	83.33	4.373	0.0001
60 mins	30	74.53	5.463	27	82.15	3.840	0.0001
75 mins	20	74.85	5.040	16	80.63	4.303	0.001
90 mins	1	78.00	-	1	80.00	-	-
After deflation	30	71.47	5.728	30	76.17	4.316	0.001
After extubation (1 mins)	30	81.00	5.699	30	87.07	4.354	0.0001
15 mins	30	78.77	5.703	30	81.67	3.325	0.019
30 mins	30	75.67	6.970	30	79.60	4.297	0.011
45 mins	30	74.23	7.370	30	75.87	4.200	0.294
60mins	30	74.07	5.693	30	74.40	3.909	0.795
120 mins	30	71.67	5.122	30	72.20	3.537	0.643

Table-4: Comparison of mean diastolic blood pressure between 2 groups

Mean arterial pressure (MAP) (mm Hg)	Group D			Group C			P Value
	N	Mean	SD	N	Mean	SD	
Baseline	30	93.90	4.444	30	92.94	4.711	0.422
After study drug administration	30	90.10	4.736	30	91.06	4.877	0.439
1 min after induction	30	82.70	5.447	30	81.73	3.571	0.420
1 min after intubation	30	93.93	3.695	30	100.20	3.585	0.0001
After skin incision	30	95.23	3.803	30	101.03	4.047	0.0001
After pneumoperitoneum (0 mins)	30	99.83	5.490	30	107.90	6.488	0.0001
15 mins	30	95.40	6.201	30	106.37	5.988	0.0001
30 mins	30	91.90	5.013	30	101.53	5.077	0.0001
45 mins	30	89.90	5.026	30	99.00	3.259	0.0001
60 mins	30	88.00	5.330	27	97.78	2.913	0.0001
75 mins	20	89.05	4.947	16	96.63	3.384	0.0001
90 mins	1	92.00	-	1	97.00	-	-
After deflation	30	85.47	5.438	30	91.77	4.297	0.0001
After extubation (1 mins)	30	95.90	5.067	30	103.23	3.360	0.0001
15 mins	30	93.73	5.078	30	97.43	3.012	0.001
30 mins	30	91.47	5.348	30	94.60	3.147	0.007
45 mins	30	89.60	5.462	30	90.90	4.559	0.321
60mins	30	88.83	4.315	30	89.13	3.203	0.761
120 mins	30	86.97	3.192	30	87.40	3.265	0.608

Table-5: Comparison of mean arterial blood pressure between 2 groups

Ramsay Sedation score	Group D			Group C			P Value
	N	Mean	SD	N	Mean	SD	
15 mins	30	3.07	0.83	30	1.77	1.04	0.0001
30 mins	30	2.73	0.45	30	1.77	0.90	0.0001
45 mins	30	2.07	0.25	30	2.07	0.45	1.00
60mins	30	2	0	30	2	0	-
75 mins	30	2	0	30	2	0	-
90 mins	30	2	0	30	2	0	-
105 mins	30	2	0	30	2	0	-
120 mins	30	2	0	30	2	0	-

Table-6: Comparison of mean Ramsay sedation score at various time interval

but significantly higher in the control group ($p<0.05$). Post-operatively, MAP at 15th minute and 30th minute was significantly lower in Dexmedetomidine group than Control group. No significant difference was noted from 30 minutes to 120 minutes ($p>0.05$) after extubation. (Table 5)

The control group required significantly more fentanyl boluses (10) than those who received dexmedetomidine (3) and the hemodynamics were much more stable in the dexmedetomidine group. ($P<0.05$).

NTG bolus was used when mean blood pressure raised above 20% of baseline despite increasing sevoflurane MAC to 2 and fentanyl top-ups. No usage of NTG was noted in Group D, whereas NTG bolus was used 4 times in Group C. ($P<0.05$).

The comparison of postoperative oxygen saturation (SPO_2) at the various time intervals. There was no fall in O_2 saturation in either group and the data were statistically not significant. ($P>0.05$).

In group NS, 33.7% of patient had Ramsay Sedation Score (RSS) of three, 63.3% of patient has RSS of one at 15th min of post-extubation. In dexmedetomidine group, 26.6% of patient had RSS of four, 63.3% had RSS of three and 0.1% had RSS score of one at 15 minutes post-extubation. In control group, 53.3 % of patients had RSS of one, 16.6% of patients had RSS of two and 30 % of patients had RSS of three at 30 minutes' post extubation. In group D 73.3 % of patients had RSS of 3 and 26.7% of patients had RSS of 2 at 30 minutes post-extubation. The mean sedation score at 15 minutes and 30minute post-extubation was significantly higher in Group D than Group C ($p<0.05$). From 60 minutes to 120 minutes all the patients in either group attained a score of 2. (Table 6).

The incidence of post-operative nausea and vomiting was higher in Group C (16.67%) than Group D (3.33%). No significant bradycardia, hypotension noted in either groups.

DISCUSSION

The present study was conducted to study the effects of dexmedetomidine in perioperative hemodynamics and postoperative sedation of patients undergoing laparoscopic surgeries. The two groups, dexmedetomidine & saline under study were comparable to each other with respect to age, sex, weight, and ASA grading. The present study demonstrated that Dexmedetomidine at a dose of 0.5µg/

kg for 10 min followed by 0.5µg/kg/hr. infusion during the intraoperative period of laparoscopic surgeries provides better hemodynamic stability during various noxious stimuli like endotracheal intubation, pneumoperitoneum, during extubation and immediate post-extubation period. The baseline mean heart rate (HR) systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP) were comparable between two groups. But there was significant decrease in mean HR, SBP, DBP, and MAP following intubation, after skin incision, throughout the pneumoperitoneum, during deflation and during extubation and up-to 30 mins post extubation in those who received dexmedetomidine infusion (0.5 µg /kg/hr.)

Its hemodynamic effects are due to central sympatholytic effect. It causes a dose dependent decrease in HR and MAP associated with a decrease in serum norepinephrine concentrations. It activates receptors in the medullary vasomotor centre, reducing norepinephrine secretion and decreasing central sympathetic outflow, resulting in impairment in sympathetic function, thereby suppressing the hemodynamic response to various noxious stimuli during laparoscopic surgeries.

Chavan SG, et al.[12] studied the effects of dexmedetomidine on perioperative hemodynamics in patients undergoing laparoscopic cholecystectomy. They gave dexmedetomidine infusion (1µg/kg/hr.) in one group and normal saline infusion (0.5µg/kg/hr.) in other group throughout the surgery and compared the hemodynamics. They found that patients who received dexmedetomidine showed significant decrease of intraoperative as well as postoperative mean BP and HR. The observations made in their study are similar to our study findings intraoperatively in providing hemodynamic stability. We also observed a smooth transition

from the time of administration of reversal to the post-extubation phase in dexmedetomidine group due to central sympatholytic effect of dexmedetomidine, leading to high quality of extubation with minimum hemodynamic changes. Similar results have also been observed in other studies.[13]

In our study, fentanyl top ups of 0.5 µg/kg and NTG boluses were given intraoperatively whenever required to keep mean BP within 20% of baseline value. The hemodynamics were much more stable in dexmedetomidine group as these patients had lesser requirement of fentanyl and NTG boluses. In our study, Ramsay Sedation Score was recorded postoperatively after extubation every 15 minutes up-to 120 minutes. The mean sedation score at 15 minutes and 30minute post-extubation was significantly higher in Group D [3.07±0.83, 2.73±0.45] than Group C [1.77±1.04, 1.77±0.90] ($p<0.05$). Majority of the patients in Group C had the score of one but in group dexmedetomidine majority of the patients had score of three and eight patients had sedation score of four. Thus dexmedetomidine provided adequate, better sedation up to 30minutes post-extubation. The sedation caused by dexmedetomidine is mainly dose dependent.[14] The dexmedetomidine has similar properties of clonidine but with more affinity toward its receptor and absence of respiratory depression.[15] No significant difference in sedation score was seen after 30 minute post-extubation. From 60 minutes to 120 minutes all the patients in either group attained a score of 2. These results are in consistent with the study conducted by authors Manne GR et al[7] and Panchgar V, et al.[13] The sedative effect of dexmedetomidine is thought to be its action on endogenous sleep-promoting pathways, thus generating natural sleep patterns without respiratory depression.[16]

Complication such as respiratory depression was not observed in any of the group. Higher incidence of postoperative nausea and vomiting observed in control group (16.67%) and this may be due to more requirement of fentanyl top-ups. The patients in the dexmedetomidine group showed no side effects like bradycardia and hypotension. These drugs related cardiovascular side effects were related to dosage and the speed of administration of the drug. The studies with higher infusion rates had more incidences of adverse effects like hypotension and bradycardia.[17]

The findings of our study are in agreement with the findings of various investigators in that dexmedetomidine infusion intraoperatively is an effective agent to prevent the hemodynamic instability associated with laparoscopic surgery.

CONCLUSION

We conclude from this study that, dexmedetomidine IV infusion even in the lower loading dose of 0.5 µg/kg body weight over 10 min and subsequent maintenance infusion over 0.5 µg/kg/h also provides better hemodynamic stability in ASA I/II Class patients during laparoscopic surgeries with reduced requirement of fentanyl because of their sedative, hypnotic, anxiolytic, and sympatholytic properties. It also provides better sedation in the immediate post-extubation period with fewer incidences of post-operative nausea and vomiting (PONV) with no side effects like bradycardia.

Limitation

There were limitations associated to our study. Patients with controlled hypertension on beta-blockers were also included in the study which may influence the hemodynamics intraoperatively. Also, there was a lack of BIS monitoring to monitor intraoperative awareness. Further study is required to evaluate its effect on hemodynamic parameters in high risk ASA 111/1V patients undergoing laparoscopic surgical procedures.

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