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Efficacy of Intravenous Clonidine Versus Dexmedetomidine for Maintaining Haemodynamic Stability in Patient Undergoing Laparoscopic Surgery

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Abstract

Background: During laparoscopic surgeries immediately after pneumoperitoneum, hemodynamic alterations, which include decreased cardiac output (25%-35%), elevated mean arterial pressure & Increased systemic / pulmonary vascular resistance are seen. Present study was aimed to evaluate and compare the effect of intravenous clonidine versus dexmedetomidine for maintaining haemodynamic stability in patient undergoing laparoscopic surgery. **Material and Methods:** Present study was hospital based prospective study, conducted in patients of age group 18 - 60 years, of either sex, with ASA physical status I & II, undergoing laparoscopic surgery under general anaesthesia. On the day of surgery, patients were randomly allocated into two groups as group C (received 2µg/kg of clonidine) & group D (received 1 µg/kg of dexmedetomidine) 10 mins prior induction of GA. **Results:** On comparison of age, gender, weight and duration of surgery in both the groups, p Values were insignificant ($p > 0.05$). In our study, post-extubation SBP values increased by 9.8% and 8.4% in Group D and Group C respectively. There was significant difference between the two groups ($P < 0.05$) at T_{105}, T_{110}, T_{115}, T_{120} and Extubation respectively. There was significant difference between the two groups ($P < 0.05$) at T_{95}, $T_{100}T_{105}$, T_{110}, T_{115}, T_{120} and Extubation respectively. Group D more effectively controlled the dip than group C. There was significant difference between the MAP of two groups ($P < 0.05$) at T_{85}, T_{90}, $T_{95}T_{100}$, T_{110}, T_{115}, T_{120} and Extubation respectively. Regarding hypotension, bradycardia & tachycardia among both the groups, difference was not statistically significant. **Conclusion:** Our study has shown that, dexmedetomidine blunts haemodynamic response to laryngoscopy and tracheal intubation as well as it also improves intraoperative haemodynamic stability, causes postoperative sedation and decreases analgesic requirement just as clonidine.

Keywords: dexmedetomidine, haemodynamic response, clonidine, laparoscopy.

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Introduction

Premedication forms an integral part of anaesthetic management and some form of premedication is universally administered before any anaesthesia. Laparoscopic surgeries

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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.[1]

Immediately after pneumoperitoneum, plasma level of norepinephrine, epinephrine and plasma renin activity is increased. Increased catecholamine level activates the renin-angiotensin-aldosterone-system (RAAS) leading to hemodynamic alterations, which include decreased cardiac output (25%-35%), elevated mean arterial pressure & Increased systemic / pulmonary vascular resistance.[2] These alteration causes various adverse effects on the cardiovascular system such as decreased cardiac output, elevated arterial pressure and increased systemic and pulmonary vascular resistance leading to hypertension and tachycardia.[3]

To attenuate the hemodynamic response, many techniques have been tried but none is ideal. Clonidine, a centrally acting α2 agonist used for premedication to reduce sympathetic activity, to reduce incidence of shivering, to decrease anaesthetic and analgesic requirement and to minimize post-operative pain, nausea, and vomiting.[4,5] Dexmedetomidine is an alpha-2-adrenergic agonist, which modulates the hemodynamic changes induced by pneumoperitoneum by inhibiting the release of catecholamines and vasopressin. [6] Present study was aimed to evaluate and compare the effect of intravenous Clonidine and Dexmedetomidine for attenuating the laparoscopic response.

Material And Methods

Present study was hospital based prospective study, conducted in department of Anaesthesiology, Pravara Rural College, Loni, Maharashtra, India. Study duration was of 2 years (October 2019 to October 2021). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of age group 18 - 60 years, of either sex, with ASA physical status I & II, undergoing laparoscopic surgery under general anaesthesia, duration of procedure lasting more than 90 mins., willing to participate in present study

Exclusion criteria

- Patients with uncontrolled diabetes mellitus, hypertension or psychiatric illness.
- Patients who are on antipsychotics, anxiolytics and/or antiepileptic drugs.
- Patients with history of allergy to the drugs used in the study.
- Patients undergoing emergency intubation & emergency surgery.
- Pregnant and lactating women.

Study was explained to patients in local language & written consent was taken for participation & study. A day prior to surgery pre-operative evaluation of patients was done, a detailed medical history, Clinical and demographic characteristics including age, sex, weight, ASA physical status with a through clinical examination including assessment of airway was conducted.

On the day of surgery, patients were randomly allocated into two groups.

- ❖ Group C: Patients that were administered 2µg/kg of clonidine diluted in 10 ml of normal saline given slowly intravenous infusion over 10 mins prior to induction of GA.
- ❖ Group D: Patients that were administered 1 µg/kg of dexmedetomidine dilute in 10 ml normal saline given slow intravenous infusion over 10 mins prior induction of GA.

On arrival to the operation theatre (O.T), IV access using 18G cannula on the non-dominant hand was secured. All the subjects were connected with the multiparameter monitor for recording, non-invasive Blood pressure (NIBP), heart rate (HR) and Pulse oximetry(spo2). All patients were pre-medicated with intravenous ondensetron 4 mg,

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glycopyrrolate 0.2 mg and fentanyl 2μg/kg. After preoxygenation, general anaesthesia was induced with propofol 2 mg/kg by weight and endotracheal intubation was facilitated by vecuronium bromide 0.1 mg/kg intravenously and anaesthesia was maintained with oxygen and nitrous oxide in ratio of 1:2 and with Isoflurane maintained MAC value with 1-1.3. End tidal carbon dioxide was maintained in between 35-45 mm Hg. Muscle relaxation was maintained by vecuronium bromide0.02 mg/kg intermittently thereafter. Intra-abdominal pressure (IAP)was not allowed to exceed 15 mm Hg throughout the surgical procedure. After pneumoperitoneum, ventilator settings (tidal volume, respiratory rate) were adjusted to maintain normocarbia.

Intraoperative monitoring was documented during the pre-induction, after the loading dose of Dexmedetomidine and clonidine, at the induction of anaesthesia, during and at pneumoperitoneum and then every 5 min till the end of surgery and continued during extubation and post operatively of extubation and postoperatively. At the end of surgery, the infusion of study drug was stopped, and neuromuscular blockade was reversed with injection neostigmine 50μg/kg plus injection glycopyrrolate10μg/kg intravenously. Sustained head lift for five seconds was used as extubation criteria. Patients were extubated after complete reversal of neuromuscular blockade and restoration of spontaneous respiration and patients were then transferred to recovery room. Any untoward complications such as hypotension and bradycardia during induction were noted. Patients were observed in the post-operative room till VAS score of 5.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi-square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

Results

Present study was concluded with 146 patients comprising of 73 patients each in both the groups. On comparison of age, gender, weight and duration of surgery in both the groups, p Values were insignificant ($p > 0.05$).

Table 1: General characteristics

	Group D (N = 73)	**Group C (N = 73)**	**p Value**
Age groups (in years)			
18 - 44	46 (63.0 %)	47 (64.4 %)	
45 - 60	27 (37.0 %)	26 (35.6 %)	
Mean age (mean ± SD)	41.1± 11.2	39.7± 9.9	0.42
Gender			
Male	5 (6.8 %)	8 (10.9 %)	0.9572
Female	68 (93.2 %)	65 (89.1 %)	0.7337
Other			
Weight (Kg)	61.3 ± 8.5	59.6 ± 6.6	0.18
Duration of surgery (hrs.)	2.03 ± 0.12	2.008 ± 0.05	0.15

In our study, post-extubation SBP values increased by 9.8% and 8.4% in Group D and Group C respectively. There was significant difference between the two groups ($P < 0.05$) at T_{105}, T_{110}, T_{115}, T_{120} and Extubation respectively.

Table 2: Comparison of Systolic Blood Pressure (mm Hg) at different time frame

Time	**Group D (N = 73)**	**Group C (N = 73)**	**pValue**

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Baseline	138.0 ± 9.8	139.0 ± 12.0	0.55
Premedication	134.5 ± 9.6	134.0 ± 11.7	0.74
Intubation	129.4 ± 9.9	130.2 ± 12.1	0.68
Induction	127.0 ± 12.1	129.1 ± 13.8	0.33
T_5	119.6 ± 11.0	118.2 ± 9.1	0.42
T_{10}	116.7 ± 10.0	115.2 ± 9.0	0.33
T_{15}	115.8 ± 8.9	113.8 ± 7.5	0.15
T_{20}	114.7 ± 8.4	112.3 ± 7.8	0.07
T_{25}	114.1 ± 8.8	114.1 ± 9.3	0.99
T_{30}	113.9 ± 8.8	114.2 ± 8.3	0.84
T_{35}	113.5 ± 9.2	113.2 ± 8.7	0.77
T_{40}	111.8 ± 9.1	112.3 ± 10.2	0.93
T_{45}	112.6 ± 9.2	112.7 ± 9.0	0.77
T_{50}	112.3 ± 8.4	112.7 ± 8.6	0.79
T_{55}	111.3 ± 7.9	111.7 ± 9.7	0.37
T_{60}	110.6 ± 7.6	111.8 ± 8.4	0.7
T_{65}	111.7 ±8.2	112.3 ± 9.1	0.38
T_{70}	111.9 ± 6.6	112.8 ± 7.3	0.39
T_{75}	111.0 ± 5.3	111.8 ± 6.9	0.35
T_{80}	112.7 ± 6.0	111.8 ± 6.2	0.34
T_{85}	112.7 ± 7.4	113.9 ± 7.2	0.95
T_{90}	115.4 ± 7.4	115.5 ± 6.3	0.24
T_{95}	112.3 ± 6.4	114.3 ± 6.5	0.06
T_{100}	112.1 ± 6.0	113.3 ± 6.3	0.24
T_{105}	112.4 ± 6.1	114.5 ± 5.7	0.02
T_{110}	111.2 ± 6.0	115.9 ± 6.6	0.001
T_{115}	112.7 ± 6.3	116.5 ± 5.7	0.001
T_{120}	112.6 ± 4.4	117.4 ± 6.4	0.001
Extubation	123.7 ± 5.1	127.2 ± 6.6	0.001

There was significant difference between the two groups ($P < 0.05$) at T_{95}, $T_{100}T_{105}$, T_{110}, T_{115}, T_{120} and Extubation respectively. Group D more effectively controlled the dip than group C. At the time of extubation, sharp increase of DBP values was observed in group D (10.1%) and group C (7.0%). No incidence of hypotension was recorded in any of the group and hence none required intervention.

Table 3: Comparison of Diastolic Blood Pressure (mm Hg) at different time frame

Time	**Group D (N = 73)**	**Group C (N = 73)**	**pValue**
Baseline	84.5 ± 12.1	82.4 ± 9.4	0.26
Premedication	84.0 ± 11.4	80.3 ± 8.6	0.76
Intubation	81.8 ± 11.4	79.1 ± .9	0.11
Induction	81.6 ± 11.5	80.5 ± 9.3	0.53
T_5	75.5 ± 10.6	73.0 ± 6.9	0.13
T_{10}	71.7 ± 9.4	69.1 ± 6.6	0.06
T_{15}	72.3 ± 9.0	70.2 ± 6.3	0.1
T_{20}	72.8 ± 7.9	71.1 ± 9.8	0.15
T_{25}	69.9 ± 8.8	70.2 ± 9.0	0.83
T_{30}	70.9 ± 8.5	70.3 ± 10.0	0.66
T_{35}	69.2 ± 8.6	70.2 ± 9.7	0.51
T_{40}	70.2 ± 8.2	69.8 ± 9.2	0.78

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T_{45}	69.8 ± 8.2	70.2 ± 9.4	0.82
T_{50}	70.3 ± 8.4	69.7 ± 7.7	0.71
T_{55}	68.8 ± 7.9	70.1 ± 8.0	0.32
T_{60}	68.5 ± 7.9	69.5 ± 7.9	0.45
T_{65}	68.7 ± 8.5	69.8 ± 6.1	0.42
T_{70}	70.1 ± 6.9	70.3 ± 6.4	0.85
T_{75}	69.1 ± 6.4	70.1 ± 6.3	0.33
T_{80}	70.1 ± 7.1	69.8 ± 5.6	0.76
T_{85}	70.6 ± 6.4	71.3 ± 6.5	0.51
T_{90}	72.1 ± 6.9	72.9 ± 7.2	0.46
T_{95}	68.4 ± 7.7	73.6 ± 7.2	0.001
T_{100}	68.6 ± 8.2	73.4 ± 7.0	0.001
T_{105}	70.0 ± 6.5	73.2 ± 6.2	0.001
T_{110}	69.0 ± 5.4	72.8 ± 9.3	0.001
T_{115}	69.5 ± 5.1	73.3 ± 5.4	0.003
T_{120}	69.6 ± 6.3	74.5 ± 4.4	0.001
Extubation	76.6 ± 4.0	80.0 ± 4.8	0.001

There was significant difference between the MAP of two groups ($P < 0.05$) at T_{85}, T_{90}, $T_{95}T_{100}$, T_{110}, T_{115}, T_{120} and Extubation respectively.

Table 4: Comparison of Mean Arterial Pressure (mm Hg) at different time frame

Time	**Group D (N = 73)**	**Group C (N = 73)**	**pValue**
Baseline	98.3 ± 10.8	97.5 ± 11.0	0.65
Premedication	95.3 ± 12.1	93.6 ± 11.2	0.37
Intubation	92.8 ± 12.8	91.9 ± 13.9	0.67
Induction	93.1 ± 14.6	92.3 ± 14.7	0.72
T_5	87.7 ± 13.9	84.9 ± 11.8	0.19
T_{10}	83.6 ± 10.6	82.2 ± 9.6	0.42
T_{15}	82.3 ± 10.4	81.2 ± 8.9	0.5
T_{20}	83.4 ± 10.7	82.2 ± 10.0	0.5
T_{25}	81.6 ± 10.8	82.5 ± 11.3	0.61
T_{30}	81.2 ± 10.7	81.4 ± 10.4	0.9
T_{35}	80.1 ± 9.9	80.7 ± 10.4	0.69
T_{40}	80.5 ± 10.5	80.6 ± 11.0	0.95
T_{45}	78.5 ± 9.6	79.3 ± 10.8	0.63
T_{50}	79.1 ± 8.9	80.7 ± 10.5	0.33
T_{55}	76.6 ± 9.2	78.0 ± 10.1	0.39
T_{60}	75.6 ± 9.0	78.1 ± 10.9	0.13
T_{65}	77.4 ± 8.8	78.4 ± 9.5	0.48
T_{70}	77.1 ± 8.2	79.0 ± 12.5	0.29
T_{75}	77.2 ± 11.4	79.4 ± 8.7	0.11
T_{80}	75.9 ± 7.9	78.4 ± 7.2	0.12
T_{85}	77.4 ± 8.0	80.1 ± 7.7	0.03
T_{90}	75.5 ± 7.8	80.2 ± 6.2	0.001
T_{95}	76.9 ± 8.9	81.0 ± 6.9	0.01
T_{100}	77.0 ± 7.0	80.4 ± 7.5	0.001
T_{105}	75.9 ± 10.4	80.2 ± 5.6	0.001

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T_{110}	74.7 ± 6.6	80.5 ± 5.5	0.001
T_{115}	76.1 ± 5.9	81.4 ± 4.4	0.001
T_{120}	78.9 ± 12.0	82.1 ± 5.2	0.009
Extubation	85.3 ± 2.8	89.3 ± 5.6	0.001

Post intubation, the heart rate fell to 85.9 ± 14.3 and 87.1 ± 13.8 from 92.8 ± 12.4 and 94.9 ± 13.1 in group D and group C respectively. Though the difference was statistically insignificant. These dip in values continued till T_{120}minute, it was almost linear for both the group with marginally decrease in values. However, there was a steep increase in values at extubation by 9.3% and 9.8% in dex and clonidine group respectively. At extubation, the heart rate was lower by 16.3% and 15.1% in group D and group C respectively with respect to baseline values.

Table 5: Comparison of Heart Rate (beats/min) at different time frame in both the group.

Time	Group D (N = 73)	Group C (N = 73)	pValue
Baseline	92.8 ± 12.4	94.9 ± 13.1	0.33
Premedication	89.6 ± 11.1	91.2 ± 12.1	0.41
Intubation	85.9 ± 14.3	87.1 ± 13.8	0.62
Induction	84.4 ± 15.2	83.9 ± 14.2	0.83
T_5	79.3 ± 13.8	79.3 ± 13.6	0.98
T_{10}	76.8 ± 13.9	76.4 ± 12.6	0.85
T_{15}	76.1 ± 13.8	75.1 ± 11.9	0.62
T_{20}	74.6 ± 14.	73.5 ± 11.5	0.59
T_{25}	74.6 ± 13.1	74.2 ± 11.4	0.85
T_{30}	73.0 ± 11.7	73.5 ± 11.0	0.78
T_{35}	72.5 ± 12.7	72.8 ± 11.3	0.9
T_{40}	71.8 ± 10.5	72.8 ± 10.8	0.58
T_{45}	71.9 ± 9.6	72.3 ± 9.7	0.81
T_{50}	71.4 ± 8.5	72.5 ± 9.3	0.44
T_{55}	70.8 ± 8.3	72.3 ± 9.4	0.3
T_{60}	70.3 ± 7.8	72.5 ± 9.5	0.13
T_{65}	71.2 ± 7.4	73.2 ± 9.5	0.17
T_{70}	71.1 ± 6.8	74.2 ± 9.1	0.55
T_{75}	71.0 ± 7.7	72.9 ± 9.1	0.15
T_{80}	70.6 ± 7.3	71.8 ± 8.9	0.37
T_{85}	71.9 ± 7.5	73.6 ± 9.3	0.20
T_{90}	73.6 ± 7.3	75.1 ± 7.6	0.23
T_{95}	72.2 ± 6.4	71.4 ± 8.5	0.52
T_{100}	72.5 ± 6.5	70.8 ± 8.3	0.15
T_{105}	71.3 ± 6.1	70.3 ± 7.8	0.39
T_{110}	71.1 ± 7.1	71.3 ± 6.7	0.82
T_{115}	70.4 ± 6.3	71.0 ± 6.6	0.58
T_{120}	71.1 ± 5.9	73.4 ± 4.2	0.009
Extubation	77.7 ± 3.7	80.6 ± 4.8	0.001

Regarding hypotension, bradycardia & tachycardia among both the groups, difference was not statistically significant.

Table 6: Total number of events of recorded

Complication	Group D (N = 73)	Group C (N = 73)	pValue
Hypotension	3	5	0.56
Tachycardia	1	1	---

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Bradycardia	2	3	0.79

The time taken to reach Ramsay Sedation Score of 1 in group D was 4.9 ± 1.03 hours while it was 5.2 ± 1.5 in group C, difference was not statistically significant.

Also, time taken to achieve Visual Analogue Score of 5 in group D and group C was 5.1 ± 0.7 and 4.9 ± 1.5 hours respectively, difference was not statistically significant.

Table 7: Sedation score & Pain score

Variable	Group D (N = 73)	Group C (N = 73)	Significance
Ramsay Sedation Score	4.9 ± 1.03	5.2 ± 1.5	0.17
Visual Analogue Score	5.1 ± 0.7	4.9 ± 1.5	0.42

Discussion

Laparoscopic surgeries are very popular nowadays due to various advantages such as the shorter length of stay in the hospital, lesser postoperative pain, and cosmetically appealing. The challenge in anaesthesia is to maintain a balance between the stress of the laryngoscopy, tracheal intubation, and surgical procedure with the cardiorespiratory depressant effects of deeper levels of anaesthesia.

In terms of decreased tissue damage, early ambulation, and reduced analgesic needs, laparoscopic surgical procedures found to have several benefits towards the patients.[7,8] The hallmark of laparoscopy is the creation of pneumoperitoneum with carbon dioxide (CO2) .Pneumoperitoneum used for laparoscopic procedures is a complex pathophysiologic phase with significant hemodynamic variation.[9]

To reduce these hemodynamic responses during laparoscopic surgeries, a wide variety of agents are being used as premedication and induction agent. Various α_2 agonists are used in modern anaesthesia practice because of several benefits like sedation, analgesia, attenuation of stress response and reduction in anaesthetic drug requirement. It has been observed that reduction in the heart rate, blood pressure, systemic vascular resistance (SVR) and cardiac output was found with Clonidine .Clonidine an imidazoline derivative which is a selective alpha-2 adrenergic agonist and a potent antihypertensive drug.[10,11,12] Both clonidine and dexmedetomidine have been shown to reduce sympathetic nervous system activity and plasma catecholamine concentrations. The present study was designed in order to investigate the effect of dexmedetomidine (group D) and clonidine (group C) on the changes in blood pressure and heart rate (HR) observed during laparoscopy.

In this study, there was increment in SBP at the time of extubation in clonidine which was not seen with dexmedetomidine and it was revealed that SBP stabilizing effect of dexmedetomidine lasted till extubation while clonidine was less effective in preventing the hemodynamic response to extubation. Similarly, clonidine and dexmedetomidine reduces the DBP and prevents its rise during early periods of procedure. These results with the studies done by S. Kumar *et al.*[13]

A significant difference was observed between both the group at T_{120} minute and at extubation ($P<0.05$) with Group D more effectively controlled the dip than group C, it was statistically significant but clinically non-significant. Similar drop in HR (8.65%) from baseline to one minute after intubation values was observed in dexmedetomidine group by Trikhatri Y *et al.*[14] Manne G *et al.*,[15] noted at 1min after intubation recorded a significant fall in MAP (5.76%) and HR (3.96%) in dexmedetomidine group (0.4µg/kg/hr), In Bhanderi *et al.*[112] found later to be more effective than former in reducing heart rate at the end of pneumoperitoneum and after reversal.

Kumar S*et al.*[12] and Bhanderi *et al.*[16] used both the drugs only before induction while Anjum *et al.*[17] used both the drugs not only before induction but throughout operation as well.

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Dexmedetomidine being a short acting drug (elimination half time is 4 times less and distribution half time 2 times less) in comparison to clonidine, requires a continuous infusion to demonstrate sustainable effects.

On the contrary, Tripathi *et al.*[18] found that Clonidine, 2 mg/ kg intravenously, 30 min before induction is safe and effective in preventing the hemodynamic stress response during laparoscopic cholecystectomy. In our study neither clonidine nor dexmedetomidine delayed the recovery. The differences in heart rate in comparison to the other studies might be due to the type of inhalational agent used and its concentration variation and use of different dose.

Good postoperative analgesia is an important component of adequate perioperative care. This is associated with improved outcome, improve patient satisfaction, reduction in perioperative stress, and coupled with a reduction in analgesic consumption and fewer adverse effects. In the present study, time taken to achieve Visual Analogue Score of 5 in group D and group C was 5.1 ± 0.7 and 4.9 ± 1.5 hours respectively and again the difference was statistically insignificant (P>0.05). Similar findings to our study, Kumar S *et al.*[19] compared the effects of dexmedetomidine and clonidine premedication in 60 patients undergoing laparoscopic cholecystectomy and found that both the drugs were effective in attenuating the hemodyanamic response to pneumoperitoneum with equal efficacy. Anjum *et al.*[17] too found both dexmedetomidine and clonidine to be equally effective. Similar to our results LiBY *et al.*[20] and So-Young Kwon *et al.*[21] also noted that dexmedetomidine does not prolong the recovery time.

There was no major complication noted in the study and did not require any intervention. None of the patient had rebound hypertension. Therefore, both the drugs were found to be safe. Chiruvella *et al.*[22] studied IV 1 mcg/kg of dexmedetomidine and clonidine for attenuation of stress responses during laparoscopic cholecystectomy and found dexmedetomidine more effective than clonidine however chances of hypotension and bradycardia were more with dexmedetomidine. These differences in findings can be explained by different regimens used by all the authors. LiBY *et al.*[20] and So-Young Kwon *et al.*[21] also noted that dexmedetomidine neither prolong the recovery time and nor with significant complications.

Major limitations of present study were, small study group, patients with ASA physical status I and II, no measurement of stress mediators such as endogenous plasma catecholamines or cortisol values perioperatively.

Conclusion

Our study has shown that, dexmedetomidine blunts haemodynamic response to laryngoscopy and tracheal intubation as well as it also improves intraoperative haemodynamic stability, causes postoperative sedation and decreases analgesic requirement just as clonidine. Therefore, both the drugs were found to be safe and it can be said that dexmedetomidine can be used as it also provides reliable postoperative analgesia and sedation.

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