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EFFECTS OF DEXMEDETOMIDINE ON INTRAOPERATIVE HEMODYNAMICS IN LAPROSCOPIC SURGERIES IN CONTROLLED HYPERTENSIVE PATIENTS

Anaesthesiology

Dr Sneh Shikha	MBBS DNB
Dr Sushil Bhatacharya	MBBS MD
Dr Nishi Kulshrestha	MBBS MD
Dr Raktavarna Shrey	MBBS DA DNB

ABSTRACT

Introduction: Even though laparoscopic surgery has many advantages, the major hemodynamic changes make anesthesia management a constant issue. For the same, several pharmaceutical substances have been utilized with varying degrees of success. Apart from its sympatholytic properties, dexmedetomidine also reduces the need for anesthetics during surgery, such as propofol. **Objectives:** To evaluate the efficacy of Dexmedetomidine in the dose of 0.7µg/kg as a single bolus over 10 minutes followed by 0.3µg/kg infusion dose attenuating hemodynamic response to laryngoscopy, tracheal intubation and carboperitoneum creation in controlled hypertensive patients. **Methodology:** Sixty patients undergoing laparoscopic procedures were randomly allocated to receive either dexmedetomidine (Group A; n = 30) or normal saline (Group B; n = 30). In Group A, dexmedetomidine 0.7 µg/kg intravenous preloading over 10min., 0.3 µg/kg/hour intravenous infusion was performed during surgery. Various parameters such as T-Ctrl, T-Load, T-Ind ,T-Int, T-Inc, T-Ins ,T-Ins15s T-Ins30, T-Exs, T-Rev, T-Ext and side effects were monitored. **Results:** After intubation, MAP values in Group A were lower than in Group B at all time – points. Not a single patient experienced any problems in the study group, but 13.3% of patients in the control group experienced nausea or vomiting, with a statistically significant difference (p value < 0.05). **Conclusion:** In order to promote perioperative hemodynamic stability and enable a smooth emergence from anesthesia, dexmedetomidine in a loading dosage of 0.7µg/kg followed by an infusion of 0.3µg/kg/hr is advised as an anesthetic adjuvant during laparoscopic surgeries. Dexmedetomidine has the unique benefit of having opioid sparing qualities, which helps people avoid the unpleasant side effects of opioids.

KEYWORDS

Dexmedetomidine, hemodynamics, laparoscopic cholecystectomy, fentanyl

INTRODUCTION

Laparoscopy has significantly increased in volume and scope from the early 1970s with the introduction of diagnostic procedures and the late 1980s with the first laparoscopic cholecystectomy procedures.[1] Laparoscopic surgery is becoming more and more successful because, when compared to open procedures, it offers multiple benefits. These include less trauma to the patient, disruption of homeostasis, morbidity, mortality, recovery time, and hospital stay, all of which lead to lower healthcare costs. There has been an attempt to employ the laparoscopic technique for treatments related to the gastrointestinal tract (colonic, gastric, splenic, and hepatic surgery), gynecology (hysterectomy), urology (nephrectomy, prostatectomy), and vascular system (aortic). [2,3]

Even though laparoscopic surgery has many advantages, its effective anesthetic management is always difficult because of the substantial change in hemodynamics that occurs from the combination of the effects of anesthesia, patient positioning, pneumoperitoneum, and hypercapnia from the absorbed CO2 that causes pneumoperitoneum. An immediate reaction to the formation of pneumoperitoneum (higher intra-abdominal pressure) is an increase in plasma renin activity and norepinephrine and adrenaline plasma levels.[4] Moreover, the renin-angiotensin-aldosterone pathway is triggered. Together, these alterations cause a rise in arterial pressure, a rise in pulmonary and systemic vascular resistance, and a fall in cardiac output.[5]

Numerous medications, including isoflurane, propofol, β-blockers, and antihypertensives, have been employed to mitigate hemodynamic alterations linked to laparoscopic surgery that have varying outcomes. The FDA approved dexmedetomidine, the pharmacologically active dextro-isomer of medetomidine, in 1999 as a more recent and highly selective α2-adrenergic agonist.[6] Compared to clonidine, it exhibits a ten-fold increase in α2:α1 receptor selectivity and a shorter half-life. Without causing a noticeable respiratory depression, it has hypnotic, sedative, anxiolytic, sympatholytic, and analgesic qualities. Additionally, it reduces the need for anesthetics and analgesics (including propofol) during surgery. It is theoretically a good medication to utilize in an anesthetic regimen because of these qualities.[7]

Dexmedetomidine is a significantly more selective α2-adrenoceptor agonist than Clonidine, which may allow it to be used at relatively large doses for analgesia and sedation without having to activate α1-receptors, which might have undesirable vascular effects. Atipamezole, a medication that reverses the sedative effect of dexmedetomidine, is another benefit. It also has a shorter half-life than clonidine. Because of these characteristics, dexmedetomidine can be used for premedication, as an anesthetic adjunct for general and regional anesthesia, and as a postoperative sedative and analgesic for the entirety of the perioperative period. [2-5]

Extensive research is required to determine whether dexmedeto midine, which was recently introduced in India in 2009, is effective in blunting the hemodynamic response in conjunction with the opioid sparing effect. In the current study, we are evaluating the effects of dexmedetomidine in controlled hypertensive patients who receive an intravenous bolus dose of dexmedetomidine (0.7µg/kg) given ten minutes before intubation, followed by a 0.3µg/kg infusion, in reducing the hemodynamic response to laryngoscopy, intubation, the formation of carboperitoneum, and the need for opioids during laparoscopic surgeries. This is because patients with hypertension have an exaggerated hemodynamic response.

Aims And Objectives

Primary Objective

1. To evaluate the efficacy of Dexmedetomidine in the dose of 0.7µg/kg as a single bolus over 10 minutes followed by 0.3µg/kg infusion dose in attenuating hemodynamic response to laryngoscopy, tracheal intubation and carboperitoneum creation in controlled hypertensive patients.

Secondary Objective

1. To study the effect of Dexmedetomidine in decreasing the requirements of the opioid agent, fentanyl citrate.
2. To study any adverse effects of Dexmedetomidine in the perioperative period such as hypotension, bradycardia.

Methodology

The present study was an observational comparative study conducted from January-2018 to October-2019 in the Department of

Anesthesiology, Batra Hospital Medical Research Centre. After approval by the hospital ethics committee and written consent, 60 adult patients of either sex, Of ASA status II, undergoing elective laparoscopic surgeries under general anesthesia were included in this study.

Sample size was calculated using MedCalc Software version 11.5.0.0. (MedCalc Software bvba, Acacialaan 22, 8400 Ostend, Belgium) using the following formula-

$n = (\sigma_1^2 + \sigma_2^2) X [Z 1-\alpha/2 + Z 1-\beta]2/(M_1 - M_2)^2$

Where

- M_1 = Mean of the outcome variable in Group A
- M_2 = Mean of the outcome variable in Group B
- σ_1 = Standard deviation of the outcome variables in Group A
- σ_2 = Standard deviation of the outcome variable in Group B
- Z1-α/2 and Z1-β are probability of two errors.

Based on minimum mean difference of 25% in parameters with α =0.01 and β =0.20, sample size for each group was estimated as 28. Rounding up this figure, it was decided that 30 patients will be considered in each group. Randomization of the subjects were done by computer-based method by random picking of patients under study. Including one study drug (dexmedetomidine) or excluding it from the control group does not affect the standard of care while providing balanced anesthesia in either groups. In the study group (Group A), Dexmedetomidine (0.7 µg/kg intravenous preloading over 10min., 0.3 µg/kg/hour intravenous infusion) was administered while in the control group (Group B), Normal Saline was administered at the same rate.

Inclusion Criteria

1) Patient of either sex of age group 30 to 60 years, 2) ASA physical status II, 3) Controlled hypertensive patients with BP less than 140/90 requiring laparoscopic surgery

Exclusion Criteria

1) Patient not giving consent, 2) Pregnant and lactating females, 3) Morbidly obese patients, 4) Age <30 and >60 years, 5) Major organ dysfunction : respiratory or cardiac or neurological, 6)History of medications like hypnotics, narcotic analgesics, antihypertensive agents, 7)History of known allergy to an anaesthetic agent used in study, 8) ASA physical status grade III, IV, V, 9) Anticipated difficult intubation, 10) Patient intubated after more than 1 attempt or more than 20 seconds, 11) Anemia, impaired LET or RFT, 12) Preoperative hypotension (MAP <60 mmHg), bradycardia (Heart rate <60 beats/min), or dysrhythmia

Pre-operative Anesthesia Check-up:

In addition to obtaining a thorough medical history that included any prior severe illnesses or diseases, each patient also underwent a systemic and general physical examination to ensure overall health and rule out any serious medical conditions. On the day prior to surgery, every patient received an examination and an explanation of the anesthetic method and post-operative care. According to hospital procedure, all standard biochemical, hematological, and radiological investigations were carried out.

Preparation And Premedication:

Routine preoperative preparation consisted of fasting for 6-8 hours prior to surgery. All the patients were premedicated with tablet alprazolam 0.5 mg night before surgery. A test dose infusion was carried out in both the groups (A: 200 µg/2mL dexmedetomidine in 48mL NS= 50mL solution (4µg/mL) and B: 50 mL NS)

All the monitoring was done on anesthesia work station —Datex-Ohmeda with IntelliVue MP 20 monitor calibrated to measure all the hemodynamic parameters required for the study. The important parameters to be monitored at the time of laryngoscopy, intubation and intraoperative period consisted of: Heart rate and rhythm by 3-lead ECG, noninvasive blood pressure (SBP, DBP and MAP), Oxygen saturation by pulse oximeter, End tidal concentrations of anesthetic agents and C02 level by capnograph, Temperature and neuromuscular monitoring, These parameters were measured at following intervals: Baseline (T-Ctrl), Just after test drug preloading (T-Load), Just before intubation(T-Ind), Just after intubation (T-Int), At skin incision (T-Inc), Just after insufflation (T-Ins) and at 15 min interval (T-Ins15s T-Ins30), Just after exsufflation (T-Exs), Just after reversal (T-Rev), Just after extubation (T-Ext).

After securing the IV line, Ringer Lactate (RL) drip was started. Test drug preloading (0.7 micrograms/kg i.v. infusion over 10 min.) via infusion pump was done followed by test drug infusion @0.3micrograms/kg/hour. The infusion continued till the removal of scope from the abdominal cavity. Every patient was given injection fentanyl citrate (2µg/kg intravenous) along with pre-oxygenation with 100% oxygen for 3 minutes before starting induction of anesthesia. Induction was done using injection propofol (1-2 mg/kg i.v.) infused slowly until the absence of eye-opening in response to verbal command followed by injection of vecuronium bromide (0.1mg/kg i.v.) to facilitate tracheal intubation. Intubation was done with appropriate size cuffed endotracheal tube after direct laryngoscopy for airway management. Tube position was checked by auscultation. 50% O_2 + 50% N20 and isoflurane was used to maintain the heart rate and blood pressure within 20% of the baseline value. Muscle relaxation was provided by subsequent doses of Inj. vecuronium bromide (0.25mg/kg i.v. as per neuromuscular monitoring). End tidal carbon dioxide was kept between 30-35 mm Hg in both the groups. Intra-abdominal pressure was monitored throughout the surgery and maintained at or below 14mm Hg. Inj. diclofenac sodium 1.5 mg/kg (max dose of 75 mg) was given i.v. in both the groups at the time of skin closure. Inj. ondansetron hydrochloride 0.1 mg/kg i.v.was given intra operatively 30-45 minutes prior to the extubation. All infusions were stopped as soon as the scope was taken out of the abdominal cavity.

Extra requirement of fentanyl citrate (0.5-1 mcg/kg) was administered depending upon the clinical conditions (movement, swallowing, lacrimation, sweating and alteration of hemodynamic parameters like a 20 % increase in the SBP or heart rate from the base line values) and was noted. Reversal was done with i.v. neostigmine (0.05 mg/kg) + inj. glycopyrrolate (0.01 mg/kg) only after onset of spontaneous respiration. Extubation was done after full satisfaction with patient recovery (ability to open the eyes, ability to obey anaesthesiologist's verbal commands and ability to maintain a regular breathing pattern) (end point of study).

For the purpose of this study, a provision was made for recording and treatment of following side effects. 1) Hypotension (reduction in blood pressure by <20% MAP baseline value) was to be treated with fluid challenge in aliquots of 5-10ml/kg of RL & if there is no response to it, then inj. ephedrine i.v.to be given & if still no response to it, then vasopressor like dopamine 5-10 µg/kg/min i.v. 2) Hypertension (rise in MAP of baseline on 2 or more readings in 2-3 minutes) was tackled by deepening the level of anaesthesia, maintaining $EtC0_2$. $SP0_2$ and by N TG infusion if required. 3) Bradycardia (reduction in heart rate < 50) was to be treated with inj. atropine 0.01 mg/kg i.v. Any complications such as laryngospasm, bronchospasm or desaturation were managed according to the standard protocols, Patients were shifted to recovery and any immediate post-operative complication e.g. nausea, vomiting, shivering, respiratory depression, sedation, restlessness, hypotension, bradycardia etc. were managed accordingly.

Statistical Analysis:

Statistical testing was conducted with the statistical package for the social science system version SPSS 25.0. Continuous variables are presented as mean ±SD, and categorical variables are presented as absolute numbers and percentage. The comparison of normally distributed continuous variables between the groups was performed using Student's t test. For within the group comparisons, paired t test was used to compare variables (Heart Rate, SBP, DBP and MAP) at different time points from baseline. Nominal categorical data between the groups were compared using Chi-squared test or Fisher's exact test as appropriate. P value <0.05 was considered statistically significant.

OBSERVATIONS AND RESULTS

Table 1: Demographic data

	Group A	V	*p* Value
Number of Patients	30	30	
Age (years.)	41.63 ± 6.82	39.77 ± 6.83	0.247
Sex (percentage)	M:F::23.3:76.7	M:F::23.3:76.7	1.00
Weight (kgs.)	57.50 ± 6.71	59.53 ± 6.27	0.148
Duration of Surgery (minutes)	46.67 ± 4.35	47.43 ± 3.96	0.478
Volume of I.V. fluids (ml)	830 ± 132.94	863 ± 133.14	0.346
Extubation Times (minutes)	6.77 ± 0.73	7.00 ± 0.58	0.184
Response to oral commands (minutes)	8.59 ± 0.7	8.78 ± 0.72	0.304

Adverse Complications (if any)	Hypotension	None	None	
	Hypertension	None	None	
	Bradycardia	None	None	
	Nausea/ Vomiting	None	4	0.038
Number of fentanyl citrate top-ups (percentage)		0 : 1 : 2 :: 93.3% : 6.7% : 0	0 : 1 : 2 :: 0 : 83.3% : 16.7%	<0.001

Table 2: Average of MAP (± SD) at different time – points in both the groups (mmHg)

MAP	Group A	Group B	*p* Value
	Mean ± SD	Mean ± SD	
Baseline (T-ctrl)	100.68 ± 1.46	100.26 ± 1.64	0.325
Just after test dose preloading (T-load)	99.29 ± 6.46	99.63 ± 3.17	0.793
Just before intubation (T-Ind)	91.93 ± 3.70	93.38 ± 4.38	0.218
Just after intubation (T-Int)	98.41 ± 3.97	105.96 ± 3.94	<0.001
At skin incision (T-Inc)	96.43 ± 2.70	103.32 ± 4.32	<0.001
Just after insufflation (T-Ins)	101.37 ± 3.17	110.03 ± 3.81	<0.001
15min after insufflation (T-Ins15)	99.08 ± 2.94	109.41 ± 4.34	0.001
30 min after insufflation (T-Ins30)	98.93 ± 2.87	108.23 ± 4.29	<0.001
At exsufflation (T-Exs)	93.37 ± 4.20	97.04 ± 5.10	<0.001
Just after reversal (T-Rev)	94.19 ± 4.46	98.48 ± 6.32	0.001
Just after extubation (T-Ext)	96.47 ± 5.40	97.64 ± 6.86	0.923

Table 2 shows the average of MAP (in mm Hg) at different time – points in both the groups. Baseline MAP in both groups was comparable. (p –value > 0.05). After intubation, MAP values in Group A (Study) were lower than in Group B (Control) at all time - points, differences being significant (p value < 0.05) just after intubation, at skin incision, just after insufflation, 15 min and 30 min after insufflation, at exsufflation and just after reversal.

Table 3: Comparison of fentanyl citrate (0.5 µg/kg) required intraoperatively

Fentanyl top-up (0.5 µg/kg)	Group A		Group B		*p* Value
	Frequency	%	Frequency	%	
0	28	93.3%	0	0.0%	<0.001
1	2	6.7%	25	83.3%	
2	0	0.0%	5	16.7%	

Table 4: Peri-operative complications

Fentanyl top-up (0.5 µg/kg)	Group A		Group B		*p* Value
	Frequency	%	Frequency	%	
Bradycardia	0	0.0%	0	0.0%	-
Hypotension	0	0.0%	0	0.0%	-
Hypertension	0	0.0%	0	0.0%	-
Nausea/Vomiting	0	0.0%	4	13.3%	0.038

Table 4 shows the preoperative complications among both the groups. In dexmedetomidine group not a single patient had any complications where as in control group 13.3% patients had nausea / vomiting and it was found to be statistically significant (p value < 0.05)

DISCUSSION

It is commonly known that laparoscopic surgery causes significant sympathetic stimulation, which can lead to hemodynamic changes such as an increase in heat rate and a rise in systolic, diastolic, and mean arterial pressure. It's also widely known that a response of this kind may have potentially fatal consequences. Numerous medications and techniques have been researched to stop hemodynamic changes brought on by anesthesia and surgical stress.

Dexmedetomidine has been used by many authors like Jalonen J et al[8], Bhattacharjee DP et al[9], Aantaa R et al[10], Kang WS et al[11], Scheinin B et al[12], Jaakola ML et al[13], Levanen J et al[14], Guler G et al[15], Yildiz M et al[16], Tanskanen PE et al[17], Bajwa SS Et al[18], Gupta K et al[19] etc. for attenuation of hemodynamic responses in various doses and along with various anaesthetic regimens for various types of surgeries. Although the authors have been fairly successful in their efforts and have discovered that dexmedetomidine is useful in attenuating the responses, more evidence is required to support their findings, and the use of dexmedetomidine in laparoscopic cholecystectomy has to be assessed.

The reverse Trendelenburg posture is used during laparoscopic cholecystectomy procedures. This specific posture reduces venous return, which in turn causes the cardiac output to drop even more. A healthy heart can handle the rise in afterload brought on by a number of factors. However, pneumoperitoneum may cause changes in afterload that patients with impaired heart function may not be able to handle, potentially negatively impacting their hemodynamics. In our investigation, minute ventilation was regulated to preserve normocapnia after pneumoperitoneum with carbon dioxide. Throughout the procedure, intra-abdominal pressure (LAP) was kept under observation and kept below 14 mm Hg.

Patients selected in present study belonged to age between 30- 60 years and weight between 40-70 kg. The absence of a statistically significant age or weight difference between the two groups enabled us to assess the clinical significance of our investigation, as medication distribution, metabolism, excretion, and action clearly change between age groups. Consequently, age variation that is clinically insignificant only served to reduce these confounding variables. Other factors like sex distribution, duration of surgery and volume of intravascular fluids administered intraoperatively were also comparable in both groups (p-value > 0.05).

In Group B , there was a significant fall in the average of MAP below baseline after induction (p-value < 0.05), but it increased significantly above baseline after intubation (p-value < 0.05) and thereafter, remained above baseline at all-time points with significant differences in the insufflation, 15 and 30 min after insufflation, after extubation, just after reversal and just after extubation (p-value < 0.05). Similar trend was observed by Bhattacharjee DP et al[9] in their study.

The average of MAP in Group A deceased after the pre-loading infusion, but the change was not found to be statistically significant (p-value>0.05). Kabukcu HK et al[20] in their study also found similar decrease in mean of MAP after loading infusion of Dexmedetomidine which was statistically non-significant which was consistent with the findings of studies by Bhattacharjee DP et al[9], Bajwa SS et al[18], Gupta K et al[19] and Sen S et al[21]. On the contrary, Kang WS et al[11] revealed a brief rise in MAP after receiving an injection of dexmedetomidine preloading. They ascribed it to the predominant hemodynamic effect of dexmedetomidine at higher dosages through postsynaptic α2B-mediated vasoconstriction in contrast to the vasodilatory effect of remifentanil at the study's dosages. Additionally, they proposed that the group receiving adjuvant dexmedetomidine may have had less of a propofol-induced vasodilatory impact due to the lower dosage of propofol. In present study, after induction, MAP decreased further, which may be attributed to additive hypotensive effect of induction agents over sympatholytic effect of dexmedetomidine. This fall in MAP after induction was statistically significant (p-value <0.05). Similar results were also obtained in studies by Bhattacharjee DP et al[9], Kang WS et al[11], Kabukcu HK et al[20], Bajwa SS et al[18], Gupta K et al[19] and Sen S et al[21].

The average of MAP gradually increased and crossed baseline just after insufflation. After exsufflation, it decreased below baseline, only to increase again after reversal and cross Baseline just after extubation. Similar rise-fall rise trend for MAP was observed by Bhattacharjee DP et al[9] and Gupta K et al[19] in their respective studies, except that MAP remained below baseline at all-time points. Increase in MAP after reversal was also reported in a study by Bajwa SS et al[18] Joris JL et al[22] studied the hemodynamic changes during laparoscopic cholecystectomy. They found that mean arterial pressure increased significantly (±35%), cardiac index decreased significantly (±20%), and systemic and pulmonary vascular resistances increased significantly (±65% and ±90%) after peritoneal insufflation. Similarly, there was increase in HR. SBP, DBP and MAP in our study after pneumoperitoneum in both the groups, but the rise was lower in the study group as compared to the control group.

In contrast to present study, Bhattacharjee DP et al[9] found the MAP values in the study group were significantly lower after induction compared to the control group. The study group may have experienced this because they administered the same amount of propofol (2 mg/kg) for induction in both groups, which may have contributed to the additive sympatholytic impact of dexmedetomidine above the hypotensive effect of propofol. Additionally, they discovered that, in contrast to the current study's suggestion of no significant difference, MAP values were considerably lower in the study group than in the control group following preloading infusion of dexmedetomidine or 0.9% saline.

Laryngoscopy, intubation, and the operative time are as important as the recovery from anesthesia and extubation. As we saw in the majority of our patients in the study group, dexmedetomidine suppresses CNS sympathetic activity, allowing a seamless transition from the time of administration of reversal to the post-extubation phase. This results in a high quality of extubation with minimal hemodynamic changes.

When compared to the baseline parameters in group B; HR, SBP, DBP and MAP were significantly higher at the time of extubation as compared to baseline, whereas in Group A, SBP, DBP and MAP were comparable to the baseline parameters Above data suggests that hemodynamics were much more stable in dexmedetomidine group than control group during extubation. We also observed the hemodynamics during emergence from anaesthesia i.e. time for extubation and time to respond to oral commands and found that it was similar in both the groups. Bhattacharjee DP et al[9] compared the infusion of normal saline (0.2g/kg/hr) and dexmedetomidine (0.2g/kg/hr) in patients undergoing laparoscopic cholecystectomy. The results showed that there was no difference in the extubation time or response to oral commands between the two groups, and that the hemodynamics in the dexmedetomidine group were significantly more stable during extubation than in the placebo group. These findings are similar to our study results.

We observed in our study that none of the patients had any episode of bradycardia and hypotension in Group A and Group B. Studies using dexmedetomidine have commonly reported cardiovascular side effects such as bradycardia, sinus arrest and hypotension mainly because of sympatholytic effect. But none of the patient in our study had an episode of bradycardia or hypotension which could be because we used lower loading dose of 0.7µg/kg followed by 0.3 µg/kg/hr maintenance dose. In several study reports, dexmedetomidine infusion rates ranging from 0.1 to 10 µg/kg/hr have been used. The studies with higher infusion rates had more incidences of adverse effects like hypotension and bradycardia. Also, no significant respiratory depression, apnea, muscle rigidity or decrease in SpO_2 was seen in any of our patients. In our study, none of the patients in dexmedetomidine group had nausea or vomiting in the post-operative period, whereas 4 patients (13%) in group B(control) had nausea and vomiting (p-value 0.038).

Our research confirms the findings of the other authors (Massad IM et al[23], Tufanogulari B et al[24] Turgut N et al[25]) namely that intraoperative dexmedetomidine infusion is a useful tool for minimizing hemodynamic changes related to laparoscopic surgery. Additionally, it lowers the frequency of post-operative nausea and vomiting.

In our study fentanyl citrate top-ups of 0.5µg/kg were given intraoperatively whenever required to keep mean blood pressure within 20% of baseline value. In group B, 6.7% patients (only 2) required single dose of fentanyl top up while in Group A 83.3% required single top u, 5 patients (16.75%) required 2 top ups. Thus, those patients who received dexmedetomidine infusion had lesser requirement of fentanyl and the hemodynamic parameters were much more stable than control group.

In order to preserve MAP within 20% of the baseline value, Kenya VM et al. [26] also utilized fentanyl in injection increments of 0.5µg/kg. They reported that patients receiving intraoperative dexmedetomidine required 33% less fentanyl and 32% less isoflurane than the placebo group. Dexmedetomidine has the potential to replace fentanyl in the intraoperative management of blood pressure and heart rate during open gastric bypass surgery, as demonstrated by Feld et al. [27].

In order to promote perioperative hemodynamic stability and enable a smooth emergence from anesthesia, dexmedetomidine in a loading dosage of 0.7µg/kg followed by an infusion of 0.3µg/kg/hr is advised as an anesthetic adjuvant during laparoscopic surgeries. Dexmedetomidine has the unique benefit of having opioid sparing qualities, which helps people avoid the unpleasant side effects of opioids. An further benefit of dexmedetomidine is its ability to lessen post-operative symptoms including nausea and vomiting.

Limitations

The surgeries conducted were of short duration (around one hour) and on small sample. More studies are required to establish the effect of dexmedetomidine on surgeries of longer duration and on large number of patients. Moreover, the study was done on ASA II patients with controlled hypertension, but the usefulness will of immense help in high risk cardiac patients and relatively uncontrolled hypertensive patients especially coming for emergency surgeries. Nonetheless, more research is advised to assess its impact on hemodynamic parameters in patients in the high-risk category who are having laparoscopic surgery and have impaired cardio-respiratory function. Further studies are required to modify dosage of dexmedetomidine in order to have wider margin of safety in terms of hemodynamic variations without affecting its analgesic or sedative potentials.

CONCLUSION

Our study concludes that the rise in hemodynamic response associated with the creation and maintenance of pneumoperitoneum during laparoscopy surgical procedures can be reduced by administering dexmedetomidine intravenously at a dose range of 0.7µg/kg followed by maintenance at 0.3µg/kg/hr. This difference is statistically significant. Therefore, because of their sedative, hypnotic, anxiolytic, and sympatholytic qualities, it offers perioperative hemodynamic stability in controlled hypertension patients undergoing laparoscopic procedures.

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