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COMPARING INTRAVENOUS CLONIDINE AND NALBUPHINE FOR ATTENUATING HEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND IMPROVING PERIOPERATIVE OUTCOMES IN LAPAROSCOPIC SURGERIES

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ABSTRACT

The Department of Anaesthesia at SPMC Bikaner approved the trial and it was carried out during laparoscopic surgery OT with proper informed written permission. The study was a double-blind, randomised, prospective interventional trial. The study comprised 60 (ASA) Classes I and II patients between the ages of 18 and 60 who were scheduled for elective laparoscopic cholecystectomy. Using a computer-generated random number sequence, patients were divided into two groups of 30 each: Group A received 1.5 mg/kg of clonidine, whereas Group B received.2 mg/kg of nalbuphine in a 50 ml NS solution. Prior to administering the study drug, five minutes after premedication, hemodynamic parameters were recorded. Double-blind administration of the study medication occurred more than 10 minutes before anaesthesia onset. Hemodynamic parameters were recorded following the administration of the study medication, 1 and 5 minutes after intubation, prior to pneumoperitoneum, 5 minutes, 10 minutes, 20 minutes, 30 minutes, and 40 minutes after pneumoperitoneum, and finally following extubation. following 1 minute and 5 minutes after intubation (and following pneumoperitoneum at 5 minutes, 10 minutes, 20 minutes, and post extubation), it was discovered that there was a substantial difference in heart rate, SBP, DBP, and MAP between Group A and Group B. In our investigation, hemodynamics related to heart rate were improved with clonidine. Based on the results of our study and other earlier research conducted by different authors, we came to the conclusion that both clonidine and nalbuphine, when administered 5 minutes prior to intubation in patients undergoing laparoscopic surgery, attenuated the hemodynamic response to intubation and pneumoperitoneum during the surgery. The difference in heart rate, systolic and diastolic blood pressure, and mean arterial pressure is much less with clonidine than with nalbuphine, which leads us to the conclusion that clonidine produced greater hemodynamic response than nalbuphine.

INTRODUCTION

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Direct laryngoscopy and tracheal intubation are noxious stimuli that stimulate sympathetic and sympatho-adrenal activity as a result of mechanical stimulation of the larynx and trachea. The most typical side effects of laryngoscopy and intubation are an increase in heart rate and blood pressure. This phenomenon is influenced by how long it takes for the laryngoscopy and intubation. These side effects are temporary, but they can cause cardiac arrhythmia, myocardial ischemia, and cerebral haemorrhage, particularly in those with cardiovascular illness [1-2].

Pneumoperitoneum, which increases intra-abdominal pressure, is created during the laparoscopic surgery operation by insufflating a gas (CO_2). In order to maintain intraabdominal pressure between 12 and 14 mmHg, gas is insufflated initially at a rate of 4-6 L/min. A continuous gas supply between 200 and 400 ml per minute keeps it operating [3]. The decrease in FRC, cardiovascular, pulmonary, and pneumoperitoneal physiology are all impacted by pneumoperitoneum. Reverse Trendelenburg is the posture used during laparoscopic surgery [3]. This causes hypercapnia, the release of catecholamines, the stimulation of the renin-angiotensin system, and an increase in systemic and pulmonary vascular resistance. These effects raise blood pressure, heart rate, myocardial contractility, and cardiac output while decreasing blood pressure and systemic and pulmonary vascular resistance are also caused. GFR and renal blood flow both decline as cardiac output is reduced [4].

To mitigate these hemodynamic alterations to the laryngoscopy, intubation, and pneumoperitoneum and make laparoscopic cholecystectomy safer for patients, several medications and procedures have been utilized. These include deepening the level of anaesthesia, omitting cholinergic medications, pretreatment with Nitroglycerine, Lidocaine, Alpha2-adrenergic agonist [5], Beta-blockers [6], Calcium channel blockers, Gabapentin, Opioid like Fentanyl, Nalbuphine and Remifentanyl, using low pressure pnemoperitoneum [7] or alternatively not using pneumoperitoneum at all such as in abdominal wall lift (AWL) method [8].

Alpha – 2 agonists, clonidine has sympatholytic action that acts centrally and lessens the negative cardiovascular effects of CO_2, pneumoperitoneum, and offers intra- and post-operative analgesia. In doing so, it lowers systemic vascular resistance and promotes hemodynamic stability by inhibiting the release of norepinephrine and lowering catecholamine release [9]. The mu, kappa, and delta receptors are the targets of nalbuphine, an opioid agonist antagonist. The hemodynamic reaction to laryngoscopy and intubation is tempered by the cardiovascular stability it brings. It further offers analgesia with reduced respiratory depression [9]. The purpose of the current study, which was conducted at SPMC Medical College in Bikaner, is to examine the clinical efficacy of two distinct classes of medications—Clonidine and Nalbuphine—on the hemodynamic profiles of patients having laparoscopic procedures while under general anaesthesia.

The purpose of the study is to compare the effectiveness of intravenous clonidine versus intravenous nalbuphine as premedication on attenuating hemodynamic response during laryngoscopy, intubation, pneumoperitoneum, and post extubation period in both groups and side effects and complications of the drug, if any.

MATERIALS AND METHODS

Place of Study: This study was conducted in Laparoscopic surgery OT in the Department of Anaesthesia, SPMC Bikaner after taking approval from institutional ethical committee and valid informed written consent from all patients and their close relatives.

Study Design: Hospital based Prospective, randomized, double blinded, interventional study.

Sample Size: The study was conducted in following two groups of patients. Each group will consist of 30 patients each.

Groups	Drugs	Volume of drug	No. of patients
Group A	Inj. Clonidine1.5 mcg/kg	50 ml	30
Group B	Inj. Nalbuphine 0.2 mg/kg	50 ml	30

Data analysis: To collect required information from the eligible patients a prestructured proforma was used. All the statistical analysis was done with appropriate computer based statistical software SPSS by Chi-square test and Student t- test.

INCLUSION CRITERIA

- Age group- 18 to 60 years.
- ASA grade I-II
- Elective laparoscopic surgeries.

EXCLUSION CRITERIA

- Patient's refusal.
- Patients with unanticipated difficult airway i.e more than 1 attempt of intubation or more than 20 seconds intubation time.
- Patients having known allergy to drug used in study. History of medications affecting heart rate and blood pressure.
- Patients with history of hypertension, diabetes, hepatic disease, renal disease, adrenal insufficiency, asthma, psychiatric, endocrine illness, cardiopulmonary disease, obesity, Bleeding disorder.
- Heart rate <60 beats per minutes

METHOD

In this study, 60 patients with ASA Health Status Classes I and II who were scheduled for elective laparoscopic cholecystectomy between the ages of 18 and 60 were examined. Two groups of 30 patients each, Group A (Clonidine group) and Group B (Nalbuphine group), were randomly chosen from the patient pool (computer-generated random number sequence). Fasting status, written informed consent, and a pre-anesthesia checkup were all done when the patient entered the operating room. Standard monitoring, such as NIBP, ECG, and baseline parameters including heart rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and oxygen saturation, were documented. Ringer Lactate was started intravenously at 4-6 ml/kg/hour once the intravenous line was secured. Five minutes before the study medicine was administered, patients received premedication by IV injections of Ranitidine 50 mg, Metoclopramide 10 mg, Glycopyrrolate 0.004 mg/kg, and Midazolam 0.02 mg/kg.

Following premedication for five minutes (and right before the study drug was injected), hemodynamic parameters were recorded. The distribution of the study medication followed the groupings. Patients from Group-A got injuries. group-B patients got injections and clonidine 1.5 mcg/kg IV. In a double-blind fashion, nalbuphine 0.2 mg/kg iv was administered over a 10-minute period before the onset of anaesthesia. Both medications were diluted with 50 ml of sterile water. After delivering the study medication, hemodynamic parameters were recorded.

Before pneumoperitoneum, at 1 and 5 minutes after intubation, at 5 minutes, 10 minutes, 20 minutes, 30 minutes, and 40 minutes after extubation, as well as at 1 and 5 minutes after extubation, hemodynamic parameters were measured. During the intraoperative phase, any side effects brought on the test medications, such as bradycardia and hypotension, were observed.

The patient was sent to a post-anesthesia care facility, where she was monitored for any hemodynamic abnormalities, respiratory depression, postoperative shivering, nausea, or vomiting, as well as other side effects, for two hours after the procedure.

RESULTS AND DISCUSSION

No statistically significant difference in distribution of cases based on age, gender and ASA scores in both the groups.

Fig. 1: Comparison of mean heart rate

The mean base line heart rate of patient in Group A was 87.77 ± 11.82 beats/min and Group B was 86.03±7.72 beats /min.

The baseline heart rate was comparable in both groups (p-value = 0.504). The difference of heart rate between Group A and Group B was found significant after 1 min and 5 min of intubation (p-values=0.023 and 0.025 respectively) and after pneumoperitoneum at 5 min, 10 min, 20 min and post extubation (p-value = 0.025, 0.016, 0.038 and 0.001 respectively Clonidine provided better stability of heart rate in our study.

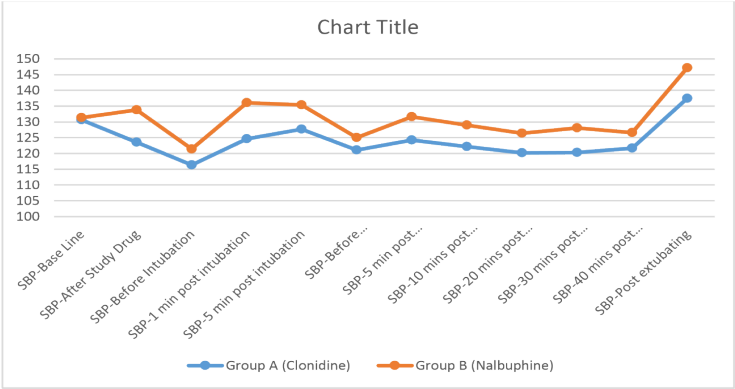

Fig. 2: Comparison of mean systolic blood pressure

The mean base line systolic blood pressure of patient in Group A was 130.7 ± 11.07 mm Hg and Group B was 131.33±11.08 mm Hg. The baseline systolic blood pressure was comparable in

both groups (p-value = 0.826). The difference of systolic blood pressure between Group A and Group B was found significant after 1 min and 5 min of intubation (p-values = 0.001 and 0.009 respectively) and after pneumoperitoneum at 5 min, 10 min, 20 min and 30 min (p-value = 0.024, 0.022, 0.007 and 0.001 respectively). The difference between the two groups was also significant post extubation. Clonidine provided better stability of systolic blood pressure in our study.

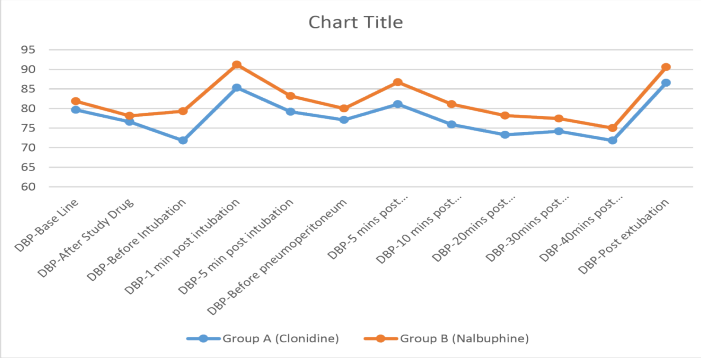

Fig. 3: Comparison of mean diastolic blood pressure

The mean base line diastolic blood pressure of patient in Group A was 79.67± 7.923 mm Hg and Group B was 81.90 ±6.48 mm Hg. The baseline diastolic blood pressure was comparable in both groups (p-value = 0.237). The difference of diastolic blood pressure between Group A and Group B was found significant after 1 min and 5 min of intubation (p-values = 0.005 and 0.012 respectively) and after pneumoperitoneum at 5 min, 10 min, 20 min and 30 min (p-value = 0.012, 0.039, and 0.015 respectively). The value was also significant post extubation (p-value=0.002). Clonidine provided better stability of diastolic blood pressure in our study.

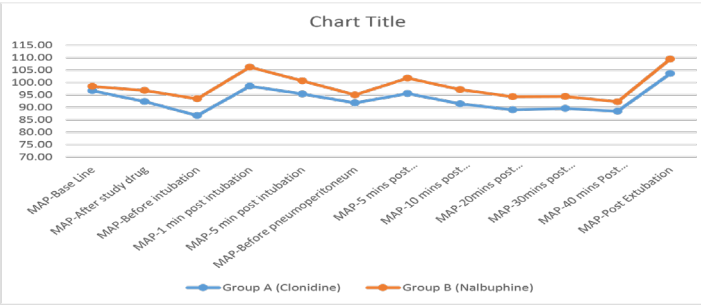

Fig. 4: Comparison of mean arterial pressure

The mean base line mean arterial pressure of patient in Group A was 96.68± 8.04 mm Hg and Group B was 98.38 ± 7.02 mm Hg. The baseline mean arterial pressure was comparable in both groups (p- value = 0.381). The difference of mean arterial pressure between Group A and Group B was found significant after 1 min and 5 min of intubation (p-values = 0.001 and 0.020 respectively) and after pneumoperitoneum at 5 min, 10 min, 20 min, 30 min and 40 min (p-value= 0.05, 0.025, 0.003, 0.007 and 0.009 respectively). The difference was also found significant post extubation (p-value=0.001). Clonidine provided better stability of mean arterial pressure in our study.

Side effects: No major complication like hypotension, bradycardia, nausea and vomiting were found in any patients intraoperatively and post extubation.

CONCLUSION

This investigation was carried out at the Laparoscopic Surgery OT SPMC Bikaner. The institution's research review board and ethics committee approved the study before it could be carried out. This study was a prospective, randomized, double-blind, interventional trial. We split our 60 patients evenly into two groups: Group A took clonidine, and Group B received nalbuphine. Age and gender differences between the two groups were determined to be inconsequential. following 1 minute and 5 minutes after intubation (and following pneumoperitoneum at 5 minutes, 10 minutes, 20 minutes, and post extubation), the difference in heart rate, SBP, DBP, and MAP between Group A and Group B was shown to be significant.

In our investigation, clonidine offered improved hemodynamics in terms of heart rate. From our study and taking into account other earlier studies conducted by different authors, we came to the conclusion that both clonidine and nalbuphine, when used in patients undergoing laparoscopic surgery, provided attenuation of hemodynamic response to intubation and pneumoperitoneum during the surgery, when given 5 min before the intubation. The difference in heart rate, systolic and diastolic blood pressure, and mean arterial pressure is much less with clonidine than with nalbuphine, indicating that clonidine produced a superior hemodynamic response than nalbuphine. Furthermore, there is no discernible rise in the frequency of adverse effects across all groups. In comparable situations, Clonidine is a more effective cardiac stable medication than Nalbuphine.

FINANCIAL ASSISTANCE

Nil

CONFLICT OF INTEREST

The authors declare no conflict of interest

AUTHOR CONTRIBUTION

Neha Chahar and Anita Pareek contributed in conceptualizing, data curating and formal analysis. T. Agalya contributed in writing original draft. Kiwi Mantan contributed in investigation and supervision of whole study. Sandeep Kothari contributed in writing, reviewing and editing the manuscript. Rakesh and Gaurav Joshi contributed in accessing resources and reviewing and editing the manuscript. All authors read and approved the manuscript.

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