

Study of Comparison of Dexmedetomidine and Clonidine Premedication in Preoperative Haemodynamic Stability and Post op Analgesia in Laparoscopic Cholecystectomy at a Tertiary Care Hospital

Simple Chahar¹, Vijay Kumar Dahiya^{2*}

¹MBBS, MD (Anesthesiology), Senior Resident, Department of Anesthesiology, Maulana Azad Medical College & Lok Nayak Hospital, Delhi, India.

²MBBS, MS (Orthopaedics), Fellow Spine Surgery, Central Institute of Orthopaedics, VMMC and Safdarjung Hospital, Delhi, India.

ABSTRACT

Background: Laparoscopic surgery is a modern surgical technique involving insufflation of gas (usually CO₂) into the peritoneal cavity, under pressure, to separate the organs from the abdominal cavity. The present study was conducted to compare dexmedetomidine and clonidine premedication in preoperative haemodynamic stability and post op analgesia in laparoscopic cholecystectomy.

Materials and Methods: A prospective study was conducted to compare dexmedetomidine and clonidine premedication in preoperative haemodynamic stability and post op analgesia in laparoscopic cholecystectomy. This study was carried out on 80 adult patients scheduled for laparoscopic surgeries and all were randomly allocated to following groups of 40 each: 1. Group 1: Patients were given i.v. clonidine 1mcg/kg over 15 minutes 30 minutes before the induction, Group 2: Patients were given i.v. dexmedetomidine 1mcg/kg over 15 minutes 30 minutes before the induction. Thereafter measurements of HR, SBP, DBP, ETCO₂ were recorded before induction of anesthesia, before and after Pneumoperitoneum. The statistical analysis was done using statistical software SPSS for windows (Version 23.0). P-value <0.05 is considered as statistically significant.

Results: In the present study 80 adult patients were selected for the study and all were randomly allocated to following groups of 40 each: 1. Group 1: Patients were given i.v. clonidine 1mcg/kg over 15 minutes 30 minutes before the induction, Group 2: Patients were given i.v. dexmedetomidine

1mcg/kg over 15 minutes 30 minutes before the induction. HR before induction, before and after pneumoperitoneum was more in group 2. SBP before induction, before and after pneumoperitoneum was more in group 2. DBP before induction and before pneumoperitoneum was more in group 2. EtCO₂ before induction and after pneumoperitoneum was more in group 2. PCO₂ before induction and after pneumoperitoneum was more in group 2.

Conclusion: The present study concluded that 1mcg/kg of dexmedetomidine showed better control of haemodynamics as compared to 1mcg/kg of clonidine.


Keywords: Dexmedetomidine, Clonidine, Haemodynamic Stability, Laparoscopic Cholecystectomy.

*Correspondence to:

Dr. Vijay Kumar Dahiya,
MBBS, MS (Orthopaedics),
Fellow Spine Surgery,
Central Institute of Orthopaedics,
VMMC and Safdarjung Hospital, Delhi, India.

Article History:

Received: 13-08-2019, **Revised:** 07-09-2019, **Accepted:** 22-09-2019

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.5.071	

INTRODUCTION

In terms of decreased tissue damage, early ambulation, decreased hospital stay and reduced analgesic needs, laparoscopic surgical procedures found to have several benefits towards the patients. The hallmark of laparoscopy is the creation of pneumoperitoneum with carbon dioxide (CO₂) which leads to stimulation of the sympathetic nervous system resulting in pathophysiological changes. These changes are characterized by increase in arterial pressure, systemic and pulmonary vascular

resistance seen early after the beginning of intra-abdominal insufflation with little change in heart rate. This can become a risk factor for adverse cardiologic events in patients with pre-existing essential hypertension, ischemic cardiac disease, or increased intra-cranial or intraocular pressure.^{1,2} The anaesthesiologist's traditional approach to anesthesia for laparoscopic cholecystectomy has been the emphasis on maintaining hemodynamic stability by avoiding hypertension, hypotension or

tachycardia.³ Clonidine, with elimination half-life of 6-10 h, is a centrally acting selective partial α_2 agonist (220:1 α_2 to α_1). It is known to induce sedation, decrease anesthetic drug requirement and improve perioperative hemodynamics by attenuating blood pressure and heart rate (HR) responses to surgical stimulation, and protect against perioperative myocardial ischemia. It provides sympathoadrenal stability and suppresses renin-angiotensin activity. There are studies indicating benefits of using clonidine for maintenance of hemodynamic stability in laparoscopic cholecystectomy.⁴ Dexmedetomidine, with elimination half-life of 2-3 h, is a highly selective and potent α_2 agonist (1620:1 α_2 to α_1) and is seven to ten times more selective for α_2 receptors compared to clonidine and has a shorter duration of action. Dexmedetomidine is considered full agonist at α_2 receptors as compared to clonidine, which is considered a partial agonist. Similar to clonidine, dexmedetomidine, also attenuates the hemodynamic response to tracheal intubation, decreases plasma catecholamine concentration during anesthesia and decreases perioperative requirements of inhaled anesthetics.⁴ The present study was conducted to compare dexmedetomidine and clonidine premedication in preoperative haemodynamic stability and post op analgesia in laparoscopic cholecystectomy.

MATERIALS AND METHODS

A prospective study was conducted to compare dexmedetomidine and clonidine premedication in preoperative haemodynamic stability and post op analgesia in laparoscopic cholecystectomy. Before the commencement of the study ethical approval was taken from the Ethical committee of the institute and all patients or their relatives signed an informed consent. Patients included in the study were Patients scheduled for elective laparoscopic surgery, with I-gel as airway device, Patients aged between 30 and 70 years of either sex. Patients excluded from the study were patients with upper respiratory tract infection, restrictive or obstructive lung disease, anticipated difficult airway with mouth opening less than 2 cm, Hiatus hernia, Gastro-oesophageal reflux disease, History of allergy to silicone and elastomer, more than three attempts of unsuccessful I-Gel placement for securing airway. This study was carried out on 80 adult patients scheduled for laparoscopic surgeries and all were randomly allocated to following groups of 40 each: 1. Group 1: Patients were given i.v. clonidine 1mcg/kg over 15 minutes 30 minutes before the induction, Group 2: Patients were given i.v. dexmedetomidine 1mcg/kg over 15 minutes 30 minutes before the induction. It included pre-anaesthetic check-up, a clinical examination and Airway examination, investigations. Pre-anaesthetic re-evaluation was done on the previous day of surgery. All patients were pre-medicated with Tab. Alprazolam 0.25mg orally, Tab. Ranitidine 150mg orally and Tab. Metoclopramide 10mg orally on the night before surgery and 2hrs prior to surgery. A peripheral intravenous line with 18 gauge cannula was secured in one of the upper limb. Before arriving at the operation room all patients were preloaded with 500ml of Lactated Ringer solution. Patients of group 1 received i.v. clonidine and group 2 received i.v. dexmedetomidine @ 1mcg/kg 30 minutes before induction respectively. In the operating room base line readings of Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and End Tidal CO₂(ETCO) was measured. Thereafter measurements of HR, SBP, DBP, ETCO₂ were recorded. Patients were induced

with 1% of Inj. Propofol 2mg/kg and depth of anaesthesia was monitored by loss of following verbal commands. Inj. Vecuronium 0.1mg/kg was administered. After bag and mask ventilation for three minutes, the appropriately sized airway device (I-Gel) was inserted. Pneumoperitoneum will be created by insufflation of carbon dioxide and operation table will be tilted 15degree reverse Trendelenburg position. Where the rate of gas (CO₂) inflation was 6 litres/min to achieve an intraabdominal pressure of 10-14 mm of Hg. Pneumoperitoneum is maintained by a constant gas flow of 200 to 400ml/min. Any regurgitation of fluid through the gastric channel or airway tube was noted. Heart rate (HR), non-invasive Systolic blood pressure (SBP), Diastolic Blood pressure (DBP), oxygen saturation (SpO₂), end tidal carbon dioxide (EtCO₂) will be recorded after insertion of device. At the end of surgery residual neuromuscular block was reversed with appropriate dose of Inj. neostigmine and Inj. glycopyrrolate intravenously. After reversal patients were monitored in the post anaesthesia care area. The statistical analysis was done using statistical software SPSS for windows (Version 23.0). Chi-square test was used for categorical variables. For comparing two groups of mean Student's t test was used. P-value <0.05 is considered as statistically significant.

RESULTS

In the present study 80 adult patients were selected for the study and all were randomly allocated to following groups of 40 each: 1. Group 1: Patients were given i.v. clonidine 1mcg/kg over 15 minutes 30 minutes before the induction, Group 2: Patients were given i.v. dexmedetomidine 1mcg/kg over 15 minutes 30 minutes before the induction. HR before induction, before and after pneumoperitoneum was more in group 2. SBP before induction, before and after pneumoperitoneum was more in group 2. DBP before induction and before pneumoperitoneum was more in group 2. EtCO₂ before induction and after pneumoperitoneum was more in group 2. PCO₂ before induction and after pneumoperitoneum was more in group 2.

DISCUSSION

During premedication and induction, to reduce these hemodynamic responses during laparoscopic surgeries, a wide variety of agents are being used. Various authors have conducted studies using beta blockers, α_2 agonists, magnesium sulphate, opioid, vasodilators, and gasless approach to negate the hemodynamic variations. In the current study, the two most commonly used α_2 agonist in the anaesthetic practice were taken into consideration and comparison was done regarding their efficacy in reducing stress response and hemodynamic changes associated with laparoscopy and in postoperative pain relief.^{5,6}

In the present study 80 adult patients were selected for the study and all were randomly allocated to following groups of 40 each: 1. Group 1: Patients were given i.v. clonidine 1mcg/kg over 15 minutes 30 minutes before the induction, Group 2: Patients were given i.v. dexmedetomidine 1mcg/kg over 15 minutes 30 minutes before the induction. HR before induction, before and after pneumoperitoneum was more in group 2. SBP before induction, before and after pneumoperitoneum was more in group 2. DBP before induction and before pneumoperitoneum was more in group 2. EtCO₂ before induction and after pneumoperitoneum was more in group 2. PCO₂ before induction and after pneumoperitoneum was more in group 2.

Table 1: Haemodynamic parameters

Parameters	Group 1 Mean±SD	Group 2 Mean±SD	p-value
HR			<0.05
HR before ind	77.45±4.95	81.56±8.56	
HR bef_penu	65.45±6.45	69.34±7.87	
HR_aft_pneu	67.34±4.69	74.87±7.98	
SBP			
SBP_bef_ind	122.34±8.98	123.65±8.78	
SBP_bef_penu	110.45±6.45	112.87±7.73	
SBP_aft_pneu	114.32±5.76	121.98±3.76	
DBP			
DBP_bef_ind	79.65±6.54	76.96±7.54	
DBP_aft_pneu	71.62±3.67	75.76±6.93	
DBP_bef_penu	70.97±7.85	67.83±6.92	
EtCO2			
EtCO2_bef_ind	26.34±3.76	27.87±3.46	
EtCO2_bef_penu	28.45±2.98	26.09±2.86	
EtCO2_aft_pneu	37.56±3.02	38.43±4.32	
PCO2			
PCO2_bef_ind	26.65±2.43	31.54±3.91	
PCO2_bef_penu	30.28±2.76	30.09±2.56	
PCO2_aft_pneu	39.67±2.34	40.65±8.76	

Dexmedetomidine, and α -2 adrenoreceptor agonist is approved for sedation of initially intubated and mechanically ventilated patients by continuous infusion for only less than 24 h in intensive care setting. α -2 adrenoceptor agonists are being increasingly used in anesthesia and critical care as they not only decrease sympathetic tone and attenuate the stress responses to anesthesia and surgery; but also cause sedation, analgesia, and anxiolysis. The bolus of 1 μ g/kg Dexmedetomidine initially results in a transient increase of the blood pressure and a reflex fall in HR, especially in younger, healthy patients.⁷

Talke et al. in 1995 in their study showed that both HR and SBP reduced in response to the 1 h Dexmedetomidine infusion to the targeted plasma conc. of 0.45 ng/ml, which appears to benefit peri-operative hemodynamic management in patients undergoing vascular surgery.⁸

Chiruvella et al 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.⁹

On the contrary, Kumar S¹⁰ and Anjum¹¹ found both dexmedetomidine and clonidine to be equally effective, whereas Bhandari¹² found later to be more effective than former in reducing heart rate at the end of pneumoperitoneum and after reversal. These differences in findings can be explained by different regimens used by all the authors. Kumar S and Bhandari used both the drugs only before induction while Anjum used both the drugs not only before induction but throughout operation as well.

CONCLUSION

The present study concluded that 1mcg/kg of dexmedetomidine showed better control of haemodynamics as compared to 1mcg/kg of clonidine.

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Source of Support: Nil.

Conflict of Interest: None Declared.

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Cite this article as: Simple Chahar, Vijay Kumar Dahiya. Study of Comparison of Dexmedetomidine and Clonidine Premedication in Preoperative Haemodynamic Stability and Post op Analgesia in Laparoscopic Cholecystectomy at a Tertiary Care Hospital. *Int J Med Res Prof*. 2019 Sept; 5(5): 307-10.
DOI:10.21276/ijmrp.2019.5.5.071