

# A randomized study of comparison between Intravenous infusion of 0.5 mcg/kg of clonidine and 1 mcg/kg of clonidine on hemodynamic stress response to pneumoperitoneum and intubation response during laparoscopic surgeries in a tertiary care hospital in a sub urban population



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Submission: 04-07-2022

Revision: 02-10-2022

Publication: 01-11-2022

## ABSTRACT

**Background:** The laparoscopic surgical procedure has made remarkable changes in the surgical field. Conditions, such as pneumoperitoneum, has an impact on several homeostatic systems. To prevent them, different anesthetic techniques such as general anesthesia, spinal, intra dural, epidural, and at times combination of different techniques were used, Clonidine has various beneficial effects during the perioperative period, and they improve hemodynamic stability in response to intubation and surgical stress.

**Aims and Objectives:** The present study was to investigate that the randomized study of comparison between Intravenous infusion of 0.5 mcg/kg of Clonidine and 1 mcg/kg of Clonidine on hemodynamic stress response to pneumoperitoneum and intubation response during laparoscopic surgeries in a tertiary care hospital in a sub urban population.

**Materials and Methods:** This study was conducted as a randomized single-blinded control trial to compare Intravenous infusion of 0.5 mcg/kg of Clonidine and 1mcg/kg of Clonidine on hemodynamic stress response to pneumoperitoneum and intubation response during laparoscopic surgeries. **Results:** Post-operative pain score in the Clonidine 1 mcg/kg group was found to be significantly lower compared to Clonidine 0.5 mcg/kg group and hemodynamic parameters such as pulse rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, and saturation levels were slightly lower in the group which was administered with Clonidine 1 mcg/kg compared to the other group which received Clonidine 0.5 mcg/kg however. **Conclusion:** The study highlights the importance of delivery of clonidine 1 mcg/kg facilities better outcomes in laparoscopic surgeries with lesser post-operative pain and lesser disturbance in hemodynamic parameters.

**Key words:** Clonidine; Hemodynamic and anesthesia; Incubation period

## INTRODUCTION

The laparoscopic surgical procedure has made remarkable changes in the surgical field. The pneumoperitoneum, on

the other hand, has an impact on several homeostatic systems, causing changes in cardiovascular physiology and pulmonary physiology, acid-base balance, and also in the stress responses. The respiratory and cardiac

### Access this article online

**Website:**

<http://nepjol.info/index.php/AJMS>

**DOI:** 10.3126/ajms.v13i11.46414

**E-ISSN:** 2091-0576

**P-ISSN:** 2467-9100

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changes that occur during laparoscopy are complicated, and they are dependent on a combination of the patient's pre-existing cardio pulmonary status, anesthetic technique, and several surgical factors such as intra-abdominal pressure, carbon dioxide absorption, patient position, and surgery duration.<sup>1,2</sup> The hemodynamic changes associated with pneumoperitoneum have been suppressed with a variety of pharmacological agents.<sup>3,4</sup> Clonidine and other 2-adrenoceptor agonists have a number of beneficial effects during the perioperative period. Sedation, anxiolysis, and analgesia are all central sympatholytic effects, and they improve hemodynamic stability in response to intubation and surgical stress. They also reduce the need for anesthetics and opioids, which may be beneficial in the prevention and treatment of perioperative myocardial ischemia. Clonidine doses range from 2 to 5 mcg/kg before administration.<sup>5</sup> There were various studies to support the use of clonidine that was beneficial like Joris et al.,<sup>6</sup> (1998) conducted a study and reported that use of clonidine before PNP could help in reducing the release of catecholamine and also attenuate hemodynamic changes during the laparoscopy procedure, in their study, Laisalmi et al., (2001)<sup>7</sup> performed a study and reported that clonidine provides significant attenuation in hemodynamic parameters, in their study. Indian studies conducted by Banerjee et al., (2018)<sup>5</sup> compared the hemodynamic attenuation of oral clonidine and oral pregabalin among cases under going laparoscopic cholecystectomy. They reported that heart rate, blood pressure, and mean arterial blood pressure changes were comparatively low in oral clonidine group compared to the oral prgabalin group. Hence, a similar finding was found in both Indian and foreign studies.

### Aims and objectives

Present study is a randomized single-blinded control trail to compare Intravenous infusion of 0.5 mcg/kg of Clonidine and 1mcg/kg of Clonidine on hemodynamic stress response to pneumoperitoneum and intubation response during laparoscopic surgeries.

## MATERIALS AND METHODS

This was a randomized study done in Department of Anesthesiology in Meenakshi Medical College Hospital and Research Institute, a tertiary care teaching hospital located in Enathur, Kanchipuram, after getting necessary permission and ethical committee clearance, a total of 60 cases undergoing laparoscopic surgery were included in which 30 participants were randomized to Group A and the rest 30 participants were randomized to Group B using computer generated random numbers. Group A received 0.5 mcg/kg of clonidine in normal saline (Total

volume of 100 ml) over 15 min before induction and before pneumoperitoneum whereas Group B received 1 mcg/kg of Clonidine in 100 ml normal saline over 15 min before induction and before pneumoperitoneum. Statistical analysis was done using SPSS24.

### Tools used

1. Post-operative mean pulse rate, mean blood pressure, visual analog scale score for pain, nausea, and vomiting score.
2. Aldrete score for recovery room discharge and any complications such as hypotension and bradycardia were recorded every 15 min initially for 2 h and after that hourly for 24 h.

## RESULTS

Age of 60 people attending the present study. There were 4 (6.7%) patients in the age group of <30 years in Group A and 5 (8.3%) patients in the age group <30 years who underwent surgery in Group B. 12 (20%) and 10 (16.7%) patients were in the age group of 31–40 years in Groups A and B, respectively, from the study participants. In the age group of 41–50 years, 11 (18.3%) and 10 (16.7%) participants were seen in Groups A and B, respectively. Three patients in the age group of 51–60 years in Group A and five participants in Group B were observed (Table 1).

Gender of 60 people attending the present study in which 17 (28.3%) males in Group A and 16 (26.7%) males in Group B. Female patients were found to be 13 (21.7%) and 14 (23.3%) in Groups A and B, respectively (Table 2).

The mean post-operative pain score among Group A participants was  $6.6 \pm 2.5$  and  $5.3 \pm 1.7$  among Group B participants. The difference in mean post-operative pain

**Table 1: Age-wise distribution of patients in each group**

Age group	Group A	Group B	Total	P-value
<30 years	4 (6.7)	5 (8.3)	9 (15)	0.839
31–40 years	12 (20)	10 (16.7)	22 (36.7)	
41–50 years	11 (18.3)	10 (16.7)	21 (35)	
51–60 years	3 (5)	5 (8.3)	8 (13.3)	
Total	30 (50)	30 (50)	60 (100)	

**Table 2: Gender-wise distribution of the patients**

Sex	Group A	Group B	Total	P-value
Male	17 (28.3)	16 (26.7)	33 (55.0)	0.7952
Female	13 (21.7)	14 (23.3)	27 (45.0)	
Total	30 (50)	30 (50)	60 (100)	

was found to be statistically significant between the groups ( $P=0.022$ ) (Table 3).

Mean SpO<sub>2</sub> in Group A patients at baseline was  $97.2\pm 1.2$ , at 5 min the SpO<sub>2</sub> was  $97.3\pm 1.3$  and at the end of surgery, the SpO<sub>2</sub> was  $97.3\pm 1.3$ . In Group B patients, the mean SpO<sub>2</sub> at baseline was  $97.3\pm 1.4$ , it was  $97.5\pm 1.6$  at 5 min of surgery and  $97.6\pm 1.3$  at the end of surgery. In this present study, there was no much significant difference in the mean value and standard deviation of SpO<sub>2</sub> between patients who received 0.5 mcg/kg Clonidine and 1 mcg/kg Clonidine (Table 4).

## DISCUSSION

This study was done as a randomized single-blinded control trial with 30 patients in each group. Group A includes 30 patients who received 0.5 mcg/kg Clonidine and in Group B, there were 30 patients who received 1 mcg/kg Clonidine. There were 17 (28.3%) males in Group A and 16 (26.7%) males in Group B. Female patients were found to be 13 (21.7%) and 14 (23.3%) in Groups A and B, respectively. In this study, the mean post-operative pain score among Group A participants was  $6.6\pm 2.5$  and  $5.3\pm 1.7$  among Group B participants. The difference in mean post-operative pain was found to be statistically significant between the groups. The baseline mean arterial pressure in Group A and B was  $69.2\pm 4.4$  and  $67.7\pm 3.2$ , respectively. At the end of the

**Table 3: Post-operative pain score in both the groups**

Variable	GroupA (Mean±SD)	GroupB (Mean±SD)	P-value
Mean Post-operative Painscore	6.6±2.5	5.3±1.7	0.022*

**Table 4: SpO<sub>2</sub> among the participants in both the group**

SpO <sub>2</sub>	GroupA	GroupB
Baseline	97.2±1.2	97.3±1.4
Infusion	97.2±1.3	97.2±1.4
Intubation	97.1±1.3	97.6±1.6
Atincision	97.4±1.5	97.4±1.5
At2 min	97.3±1.6	97.2±1.4
At5 min	97.3±1.3	97.5±1.6
At10 min	97.2±1.6	97.2±1.5
At15 min	97.4±1.5	97.2±1.3
At20 min	97.3±1.6	97.6±1.2
At30 min	97.5±1.3	97.2±1.2
At40 min	97.2±1.4	97.5±1.6
At50 min	97.2±1.5	97.5±1.5
At60 min	97.3±1.4	97.5±1.4
Atendofthesurgery	97.3±1.3	97.6±1.3
Atpost-operativeward	97.5±1.5	97.3±1.3

laparoscopic surgery, the mean arterial pressure was  $68.3\pm 5.5$  in Group A participants who received 0.5mcg/kg Clonidine and  $65.5\pm 2.0$  in Group B participants who received 1 mcg/kg Clonidine. Likewise at post-operative ward, patients mean arterial blood pressure was found to be  $70.3\pm 5.7$  in Group A and  $67.5\pm 3.6$  in Group B patients. Findings of the following studies were comparable with the findings of this study. Joris et al.,<sup>6</sup> conducted a study and reported that among the cases with peritoneal insufflations, there was statistically significant decrease in cardiac output and rise in mean arterial pressure and also in both systemic and pulmonary vascular resistances. Other studies done by Singh et al.,<sup>6</sup> and Laisalmi et al.,<sup>7</sup> reported that the hemodynamic parameters were found to be more stable in oral clonidine group compared to the placebo group.

### Limitations of the study

Clonidine is a dose-dependent and age-dependent responses, not studied or established well. Adverse effect of Clonidine was shown previous studies such as cardiovascular and respiratory effects are limited to ingestions of greater than 10 mcg/kg to 20 mcg/kg.

## CONCLUSION

We infer, Clonidine 1 mcg/kg is effective and safe with better reduction in pain and notably without significantly disturbing the hemodynamic parameters and causing adverse events compared to Clonidine 0.5 mcg/kg, in cases undergoing laparoscopic surgery with PNP.

## ACKNOWLEDGMENT

We acknowledge our management of Meenakshi Medical College, Hospital and Research Institute for providing the facility to conduct the present work, and staffs who are involved in the research work.

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<https://doi.org/10.1007/s004640090126>

**Authors Contribution:**

**SS-** Concept and design of the study and **SP-** Interpreted the results, reviewed literature, and manuscript preparation.

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**Source of Support:** Nil, **Conflicts of Interest:** None declared.