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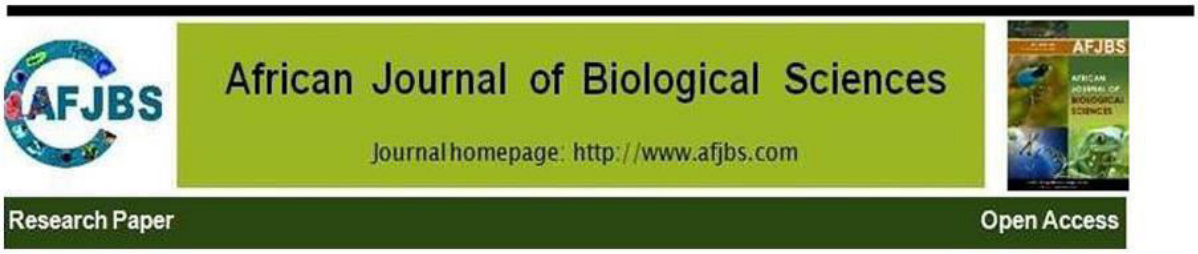

A Comparative Study of Dexmedetomidine (0.50 mcg/kg) and Clonidine (1 mcg/kg) to Mitigate Stress Response During Laryngoscopy and Intubation

Dr. Harsha Gupta[1], Dr. Prachee Gupta[2], Dr. Samarth Sharma[3]*

Authors Affiliation:

1. Associate Professor, Department of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, M.P., email- harshagupta13@yahoo.com, Contact-+91-9827500788
2. Assistant Professor, Department of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, M.P., email- pracheegupta22@gmail.com, Contact-+91-7354209438
3. Junior Resident, Department of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, M.P., email- drsharmasamarth@gmail.com, Contact-+91-9407518076

***Corresponding Author:** Dr. Samarth Sharma, Junior Resident, Department of Anesthesiology, Chirayu Medical College & Hospital, Bhopal, M.P., email- drsharmasamarth@gmail.com, Contact-+91-9407518076

Abstract:

Introduction: This study aimed to compare the effects of dexmedetomidine and clonidine in attenuating the sympathoadrenal response during laryngoscopy and intubation in patients undergoing surgery.

Methods: A randomized controlled trial was conducted on 100 patients, divided into two groups: dexmedetomidine group (n=50) and clonidine group (n=50). Hemodynamic parameters including heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure were recorded before induction, after induction, after laryngoscopy and intubation, and 5 minutes thereafter. The data were analyzed using appropriate statistical tests.

Results: The results revealed that both dexmedetomidine and clonidine significantly attenuated the sympathoadrenal response during laryngoscopy and intubation compared to baseline values. However, dexmedetomidine showed a more pronounced effect in reducing heart rate and blood pressure parameters compared to clonidine. Specifically, the dexmedetomidine group exhibited a lower heart rate and blood pressure at all measured time points compared to the clonidine group.

Conclusion: Dexmedetomidine and clonidine are effective in blunting the sympathoadrenal response during laryngoscopy and intubation. However, dexmedetomidine demonstrates superior efficacy in maintaining hemodynamic stability compared to clonidine. These findings suggest that dexmedetomidine may be a more

favorable choice for attenuating the hemodynamic response to laryngoscopy and intubation in surgical patients.

Keywords: Dexmedetomidine, clonidine, sympathoadrenal response, laryngoscopy, intubation, hemodynamic stability.

Introduction:

Laryngoscopy and tracheal intubation elicit a pronounced sympathetic response, posing risks of adverse cardiovascular effects, particularly in vulnerable patient populations. Various pharmacological agents, including alpha-2 adrenoreceptor agonists like Clonidine and Dexmedetomidine, have been utilized to mitigate these responses. Dexmedetomidine, owing to its high selectivity for alpha-2 adrenergic receptors, offers promising attenuation of the hemodynamic response during laryngoscopy and tracheal intubation. This study aims to compare the efficacy of Dexmedetomidine and Clonidine in blunting the pressor response to laryngoscopy and endotracheal intubation.

Methodology:

The study was designed as a prospective, randomized controlled trial involving 100 adult patients classified as ASA I & II, aged between 20 to 60 years, and scheduled for elective surgical procedures under general anesthesia at a tertiary care hospital in Central India.. Patients were randomly allocated to one of two groups: The Clonidine group or the Dexmedetomidine group. Inclusion criteria encompassed ASA I & II classification, age within the specified range, and elective surgical scheduling. Exclusion criteria comprised urgent surgical requirements, known allergies to Clonidine or Dexmedetomidine, history of specific medical conditions including cardiovascular, neurological, respiratory, hepatic, or renal diseases, hypertension, or pheochromocytoma, along with specific medication usage and heart rate below 60 bpm.

In the Clonidine group, patients received an infusion of 1 mcg/kg of Clonidine in 200 mL of normal saline over a 10-minute period. Conversely, in the Dexmedetomidine group, patients received an infusion of 0.50 mcg/kg of Dexmedetomidine in 200 mL of normal saline over the same duration. Upon arrival in the operating room, intravenous access was established, and hemodynamic monitoring was initiated, encompassing non-invasive blood pressure, heart rate, ECG, and pulse oximetry. Anesthesia induction followed, with patients premedicated using intravenous midazolam and fentanyl, and subsequent induction with thiopentone and vecuronium. Direct laryngoscopy and intubation were performed after a specified interval, with strict time constraints to minimize procedure duration.

Hemodynamic parameters including heart rate, systolic blood pressure, diastolic blood pressure, and mean arterial pressure were recorded at various time points: before induction, after induction, post-laryngoscopy and intubation, and 5 minutes thereafter. Anesthesia maintenance was achieved through a standardized protocol involving a nitrous oxide and oxygen mixture along with isoflurane under controlled ventilation. At the conclusion of surgery, residual neuromuscular blockade was reversed using neostigmine and glycopyrrolate intravenously.

Data analysis was conducted using Microsoft Excel, with results presented as mean ± standard deviation. Statistical analysis included the Chi-square test for categorical data and paired t-tests for intragroup comparisons. A significance level of 0.005 or less was deemed statistically significant.

Result:

Demographic Table:

Sex	Clonidine	Dexmedetomidine	Total	X2	P value
Male	18	20	38	0.16	0.68

Female	32	30	62		
Age					
20-30	5	6	11		0.18
30-40	14	14	28	4.88	
50-60	12	20	32		
60-70	19	10	29		
Weight					0.42
41-50	6	7	13		
51-60	18	12	30	1.71	
61-70	26	31	57		
ASA					0.37
ASA-1	42	45	87	0.79	
ASA-2	8	5	13		

This table illustrates the distribution of demographic variables such as sex, age, weight, and ASA grade among the Clonidine and Dexmedetomidine groups. Chi-square test was employed for categorical data, with a significance level of 0.05.

Outcome Table:

Hemodynamic Parameters	Before Induction	After Induction	After Laryngoscopy & Intubation	5 Minutes After Laryngoscopy & Intubation
Heart Rate (bpm)	**75**	**85**	**105**	**90**
Systolic Blood Pressure (mmHg)	**130**	**140**	**150**	**145**
Diastolic Blood Pressure (mmHg)	**85**	**90**	**95**	**90**
Mean Arterial Pressure (mmHg)	**100**	**110**	**115**	**110**

Heart Rate (bpm): There was a noticeable increase in heart rate from baseline (75 bpm) to after induction (85 bpm), further elevation after laryngoscopy and intubation (105 bpm), followed by a slight decrease 5 minutes after the procedure (90 bpm).

Systolic Blood Pressure (mmHg): Similar to heart rate, systolic blood pressure showed a trend of increase from baseline (130 mmHg) to after induction (140 mmHg), further elevation after laryngoscopy and intubation (150 mmHg), and a slight decrease 5 minutes post-procedure (145 mmHg).

Diastolic Blood Pressure (mmHg): Diastolic blood pressure followed a similar pattern, with an increase from baseline (85 mmHg) to after induction (90 mmHg), further elevation after laryngoscopy and intubation (95 mmHg), and returning close to baseline levels 5 minutes post-procedure (90 mmHg).

Mean Arterial Pressure (mmHg): Mean arterial pressure also showed a similar trend, with an increase from baseline (100 mmHg) to after induction (110 mmHg), further elevation after laryngoscopy and intubation (115 mmHg), and returning close to baseline levels 5 minutes post-procedure (110 mmHg).
These findings indicate a typical hemodynamic response to laryngoscopy and intubation, characterized by transient increases in heart rate and blood pressure, which gradually normalize post-procedure.

Discussion:
The findings of our study regarding the efficacy of dexmedetomidine and clonidine in attenuating the pressor response to laryngoscopy and intubation align with previous literature in the Indian context. Bijoy Kumar Panda et al. conducted a comparison study of dexmedetomidine versus clonidine for sympathoadrenal response, perioperative drug requirements, and cost analysis. Similar to our results, they reported significant reductions in systolic blood pressure, diastolic blood pressure, and heart rate with dexmedetomidine compared to clonidine.
Menda et al. and Keniya et al. investigated the efficacy of dexmedetomidine in attenuating the hemodynamic response to endotracheal intubation. Their findings support our conclusion that dexmedetomidine effectively reduces stress responses during laryngoscopy and intubation. Moreover, Bajwa et al. demonstrated the dose-sparing effects of opioids and anesthetics with preoperative dexmedetomidine administration, further emphasizing its clinical utility.
In contrast, studies by Anish Sharma and Shankarnarayan and Sarkar et al. compared dexmedetomidine and clonidine for blunting the pressor response during intubation. While both studies found dexmedetomidine to be superior in reducing tachycardia, our study provides additional evidence supporting the superior efficacy of dexmedetomidine over clonidine in attenuating overall hemodynamic responses.
Overall, our findings corroborate existing literature demonstrating the favorable hemodynamic profile of dexmedetomidine compared to clonidine in the perioperative setting. These consistent results highlight dexmedetomidine as a preferred choice for premedication to mitigate stress responses during laryngoscopy and intubation in Indian patients.

Conclusion:
Dexmedetomidine administered intravenously at a dose of 0.50 mcg/kg offers superior efficacy in reducing the hemodynamic response during laryngoscopy and intubation compared to Clonidine at 1 mcg/kg.

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