

# Efficacy of preanesthetic single dose intravenous dexmedetomidine versus intravenous clonidine in patient undergoing elective surgery under general anesthesia: Changes in blood pressure

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## Abstract

Surgeries involving general anaesthesia where airway manipulation occurred during laryngoscopy and endotracheal intubation produces stimulation of epipharynx and laryngopharynx giving rise to haemodynamic alteration due to catecholamine surge or response. Haemodynamic changes are accentuated in high risk cardiac patient. After obtaining approval from the institutional ethical committee patients fulfilling the inclusion/exclusion criteria were included in the study after obtaining informed consent. A preanesthetic evaluation of history of surgical and medical illness, drug allergies previous anaesthetic exposure and Baseline investigations of blood, ECG, radiograph of chest and airway examination was done. Patient was kept nil by mouth for at least 8hrs prior to surgery. All patients were premedicated with injection Pantoprazole 40mg (IV) one hour prior to surgery. Preoperative vital parameters like baseline pulse, blood pressure were noted. Systolic blood pressure in significantly lower in Group D patient after 40 minutes of intubation continues to be low at 6th, 8th, 10th, 15th and 20th minutes compared to Group C.

**Keywords:** Dexmedetomidine, clonidine, blood pressure

## Introduction

Hemodynamic stability during laryngoscopy and endotracheal intubation and perioperative period is of paramount importance as there are patients who have compromised cardiovascular and hypertensive disease and on treatment. Critical events during induction, laryngoscopy and intubation and surgical stimulus initiates sympathoadrenal response and metabolic response need to be considered and attended.

In recent past these manipulation during general anaesthesia were considered to cause haemodynamic instability <sup>[1, 2]</sup>.

Surgeries involving general anaesthesia where airway manipulation occurred during laryngoscopy and endotracheal intubation produces stimulation of epipharynx and laryngopharynx giving rise to haemodynamic alteration due to catecholamine surge or

response. Haemodynamic changes are accentuated in high risk cardiac patient.

These pathophysiological haemodynamic changes can be attenuated or prevented by vasodilating agents,  $\alpha_2$  adrenergic receptor agonists, P-blocking agents and high dose opioids<sup>[3]</sup>.

The  $\alpha_2$  agonists including clonidine and Dexmedetomidine, decrease central sympathetic outflow and modify intraoperative cardiovascular response to laryngoscopy, intubation and surgical stimuli. The reduction in tachycardia and hypertension & sympathetic activity may benefit inpatient at risk of myocardial ischemia.

Clonidine is a centrally acting selective partial  $\alpha_2$  agonists which has elimination half-life of 6-10 hrs. It is known to induce sedation, decrease anaesthetic drug requirement and improve haemodynamics by attenuating blood pressure and heart rate responses to laryngoscopy and intubation and protect against perioperative myocardial ischemia<sup>[4]</sup>.

Dexmedetomidine is highly selective, potent and specific  $\alpha_2$  agonist and is 8-10 times more selective for  $\alpha_2$  receptors compared to Clonidine. It has for  $\alpha_2$  receptor compared to clonidine. It has an elimination half-life of 2-3 hrs as compared to 6-10 hrs for clonidine. Similar to clonidine, dexmedetomidine also attenuated haemodynamic response to tracheal intubation, decrease plasma catecholamine concentration during anaesthesia and decrease perioperative requirements of inhaled anaesthetics<sup>[5]</sup>.

Dexmedetomidine has analgesic, anxiolytic and sedative effects in intensive care unit after IV administration.  $\alpha_2$  adrenergic mechanism cause dose dependent reduction in BP and HR, Dexmedetomidine is proved to have antinociceptive effects and reduce neurohumoral properties<sup>[6]</sup>.

## Methodology

### Source of data

Data from the patients admitted and undergoing major elective surgeries at Medical College and Hospital.

**Study design:** Prospective Double blind randomized comparative study.

**Place of study:** Patients admitted and undergoing major elective surgery at Dr. B.R. Ambedkar medical college and hospital, Bangalore.

**Sample size:** Hospital based study of 60 patients who fulfilled the inclusion criteria.

### Inclusion criteria

- Patient aged between 18 to 60 years.
- ASA Physical status 1 and 2.
- Both sexes.
- Undergoing major elective surgery under general anaesthesia.

### Exclusion criteria

- Patients with cardiac disease.
- Severe pulmonary disease.
- Psychiatric illness.
- Severe renal derangement.
- Uncontrolled hypertension.
- Diabetes mellitus.
- Pregnancy.
- Liver failure.

After obtaining approval from the institutional ethical committee patients fulfilling the inclusion/exclusion criteria were included in the study after obtaining informed consent.

A preanesthetic evaluation of history of surgical and medical illness, drug allergies previous anaesthetic exposure and Baseline investigations of blood, ECG, radiograph of chest and airway examination was done. Patient was kept nil by mouth for at least 8hrs prior to surgery. All patients were premedicated with injection Pantoprazole 40mg (IV) one hour prior to surgery. Preoperative vital parameters like baseline pulse, blood pressure were noted.

Study was undertaken in patients planned for elective surgeries under General Anaesthesia. Patient were selected between 18 to 60yrs of Age with ASA 1 and ASA 2 grades. They were divided into 2 groups of 30 each and allocated randomly. All patients were explained about the procedure and its complication and informed consent obtained.

## Results

**Table 1:** Systolic Blood Pressure

SBP (mm Hg)	Group C	Group D	Total	P Value
Base line BP	123.50±7.21	121.33±5.86	122.72±6.56	0.360
before intubation	122.86±10.01	117.90±7.13	120.38±8.97	0.031•
2 min	117.16±5.83	119.06±7.92	118.11±6.96	0.295
4 min	121.70±6.72	115.43±6.97	118.56±7.49	<0.001
6 min	120.90±7.15	110.50±5.01	115.70±8.06	<0.001
8 min	122.76±6.55	111.00±5.58	116.88±8.46	<0.001
10 min	131.26±7.41	121.53± 10.01	126.40±10.02	<0.001
15 min	126.46±7.89	114.10±8.18	120.28± 10.12	<0.00 1
20 min	125.50±10.51	113.03±12.77	119.26±13.19	<0.001
25 min	110.67±8.32	109.86±11.64	110.26±10.04	0.761
30 min	115.86±13.78	114.26±9.70	115.06± 11.84	0.605

Systolic blood pressure is significantly lower in Group D patient after 40 minutes of intubation continues to be low at 6th, 8th, 10th, 15th and 20th minutes compared to Group C.

**Table 2:** Diastolic Blood Pressure

DBP	Group C	Group D	Total	P Value
Base line BP	78.20±5.41	78.96±4.77	78.58±5.07	0.563
before intubation	76.80±5.93	76.00±7.29	76.40±6.60	0.643
2min	74.33±7.02	75.13±7.70	74.73±7.32	0.676
4min	81.30±7.12	72.53±6.19	76.91±7.95	<0.001
6min	79.76±6.54	72.10±5.72	75.93±7.21	<0.001
8min	78.06±6.63	71.53±4.89	74.80±6.65	<0.001
10 min	81.20±6.97	75.93±5.93	78.56±6.94	0.003
15min	78.43±8.17	72.23±5.48	75.33±7.57	<0.001
20min	78.56±10.05	69.03±7.20	73.80±9.91	<0.001
25min	70.96±6.80	69.00±6.01	69.93±6.44	0.240
30min	72.10±6.17	73.46±8.78	72.78±7.56	0.489

In group D (dexmedetomidine) diastolic blood pressure is significantly lower at 4 minutes, 6 minutes, 8 minutes, 10 minutes, 15 minutes, 20 minutes after intubation compared to Group C (clonidine).

In our study, we did not encounter episodes of hypotension in any case of both study group but we did see 2 cases of Bradycardia in dexmedetomidine group (Group-D) and 1 case in clonidine group (Group C) which required atropine.

## Discussion

The  $\alpha$ -2 agonists including Clonidine and Dexmedetomidine, decrease central sympathetic outflow and modify Cardiovascular responses favourably to Laryngoscopy and intubation.

Both Dexmedetomidine and Clonidine have been shown to reduce sympathetic Nervous system activity and plasma catecholamine concentration.

Dexmedetomidine with an elimination half-life of 2.3hrs is highly selective, potent, specific  $\alpha$ -2 agonist ( $\alpha$ -2:  $\alpha$ -1 = 1620: 1) and is 7-10 times more selective for  $\alpha$ -2 receptors compared to Clonidine and has shorter duration of action.

It is said to have complete agonistic action at  $\alpha$ -2 receptors compared to Clonidine which is considered as to be partial agonist at  $\alpha$ -2 receptor.

Clonidine which has elimination half-life of 6-10 hrs is a centrally acting drug which is selective. partial agonist ( $\alpha$ -2:  $\alpha$ -1= 220: 1). It causes sedation, decrease anaesthetic requirement and improve haemodynamic after laryngoscopy and intubation by attenuating blood pressure and heart rate response.

Ganesh Nikam <sup>[7]</sup> *et al.* in the year 2017 conducted a comparative study between clonidine and dexmedetomidine in attenuation of presser response to endotracheal intubation with Intravenous clonidine 1mcg/kg & Intravenous dexmedetomidine before. intubation and found that the clonidine group had higher readings of HR, SBP, DBP and MAP compared to dexmedetomidine group after intubation up to 3 min which was statistically significant.

In our study, we found that HR, SBP, DBP and MAP were high in. the clonidine group compared to the dexmedetomidine group 4 min after intubation which continues to maintain 30 min after intubation.

Salony Agarwal <sup>[8]</sup> *et al.* in the year 2016 has done a comparative evaluation of dexmedetomidine with Clonidine as pre-medication for attenuation of hemodynamic response after laryngoscopy using IV clonidine 1 mcg/kg and IV dexmedetomidine 1 mcg/kg and found that there fall in HR inpatient of dexmedetomidine group compared to clonidine group which was statistically insignificant P-value (<0.05). But in our study, we found that HR fall in the dexmedetomidine group was more than clonidine group after 4 min of laryngoscopy which was statistically significant.

Shirsendu Mondal <sup>[9]</sup> *et al.* in the year 2014 did a comparative study of dexmedetomidine and clonidine for attenuation of sympathoadrenal responses and anaesthetic requirements to laryngoscopy and endotracheal intubation using dexmedetomidine 1 mcg/kg and clonidine 2 mcg/kg found that attenuation of cardiovascular and catecholamine responses to tracheal intubation was significantly more with dexmedetomidine group compared to clonidine group with a quicker return to baseline <sup>[10]</sup>.

## Conclusion

In our study we found that SBP and DBP were significantly less if premedication given with Dexmedetomidine after Laryngoscopy and endotracheal intubation for 1st 25 minutes period when compared to premedication given with clonidine.

## References

1. Stoelting RK, Hiller SC. Pharmacology and physiology in Anaesthetic Practice: 4th ed.
2. Ellis H, Feldman S. Anatomy for anaesthetists, 8th ed. Oxford, Blackwell Scientific, 1993.
3. Adewale L. Anatomy and assessment of the pediatric airway. Pediatric Anesthesia. 2009 Jul;19:1-8.
4. Khalid KJ. Comparison of haemodynamic responses to laryngeal mask airway in section

- and laryngoscopy with endotracheal intubation in adults undergoing elective surgery at Muhimbili (Doctoral dissertation, Muhimbili University of Health and Allied Sciences).
5. Adnet F, Barron SW, Lapostolle F, Lapandry C. The three axis alignment theory and the "sniffing position": perpetuation of an anatomic myth? *The Journal of the American Society of Anesthesiologists*. 1999 Dec;91(6):19-64.
  6. Jerry A Dorsch, Susan E Dorsch. *Understanding Anesthesia Equipment, Laryngoscopes*, 5th Edition, New Delhi, Wolters Kluwer (India) Pvt Ltd, Lippincott Williams & Wilkins, 2008, 520-560.
  7. Ganesh Nikam, Madhukrishna N. A comparative study between clonidine and dexmedetomidine in attenuation of pressor response during endotracheal intubation. *IJA* 2018;5(2):244-248.
  8. Salony Agarwal, Kumkum Gupta, Singh VP, Deepak Shanna, Pandey MN. Comparative evaluation of dexmedetomidine with clonidine as premedication for attenuation of hemodynamic responses during laryngoscopy and endotracheal intubation under general anaesthesia. *Int J Res Med Sci*. 2016 Sep;4(9):4026-4032.
  9. Shirsendu Monda, Hindo Mondal, Ritaban Sarkar, Musfikur Raliaman. Comparison of dexmedetomidine and clonidine for attenuation of sympathoadrenal responses and anesthetic requirements to laryngoscopy and endotracheal intubation. *IJBCP*, 2014, 3(3).
  10. Sanjeev Singh. A comparative clinical study of oral clonidine versus intravenous clonidine on haemodynamic changes due to laryngoscopy and Endotracheal intubation *pharmaceutical science and technology*. 2019;3(2):34-39.

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