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ORIGINAL ARTICLE

PRE-MEDICATION WITH I.V. LIDOCAINE VS I.V. CLONIDINE IN ATTENUATING THE PRESSOR RESPONSE DURING LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION

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ABSTRACT AIM OF STUDY: This randomized prospective study is done to compare the effects of single premedication dose of I.V lignocaine with IV clonidine in attenuating pressor response to laryngoscopy & endotracheal intubation. **METHOD:** Patients were randomly divided into 2 groups of 50 each. Group I patients received lignocaine 1.5mg/kg and Group II patients received Clonidine 3mcg/kg 15 min before laryngoscopy. HR (Heart Rate), SBP (Systolic blood pressure), DBP (Diastolic BP), MAP (Mean Arterial Pressure) were monitored at 1, 3, 5, 7 and 10 minute intervals from the onset of laryngoscopy. Respectively. Patients were maintained with O2, N2O, Isoflurane and vecuronium at titrated doses. Results the rise in heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure in group I is significantly high compared to group II. **INTERPRETATION AND CONCLUSION:** Clonidine in a dose of 3 microgms/kg was more effective than lidocaine 1.5 mg/kg for attenuating haemodynamic responses to laryngoscopy and intubation.
KEYWORDS: Clonidine; Lidocaine; Laryngoscopy & endotracheal intubation; Attenuation of haemodynamic response; Heart rate; Systolic blood pressure; Diastolic blood pressure; Mean arterial pressure.

INTRODUCTION: Direct laryngoscopy and endotracheal intubation following induction of anaesthesia is commonly associated with hemodynamic changes like hypertension and tachycardia due to reflex sympathetic stimulation[1,2,3] these changes have been reported as early as 1950 when intubation under light anaesthesia was started. However the rise in the pulse rate and blood pressure is usually transient, variable and unpredictable. Usually these changes are well tolerated by healthy individuals. However, these changes may be fatal in patients with hypertension, coronary artery disease or intracranial hypertension[4]

Intravenous anaesthetic induction agents alone do not adequately suppress the circulatory responses evolved by endotracheal intubation therefore various pharmacological and non - pharmacological methods were used to attenuate these changes.[5] The non - pharmacological methods like smooth & gentle intubation with a shorter duration of laryngoscopy, Insertion of LMA in place of endotracheal intubation & blocking Glossopharyngeal & superior laryngeal nerves pharmacological measures like use of volatile anaesthetics,[6] topical and intravenous lidocaine[7,8,9] opioids[10,11,12] vasodilators–SNP (Sodium nitroprusside),[13] NTG (Nitroglycerine),[14] Calcium channel blockers[15,16,17] and β-blocker[18,19,20] have been tried by various authors.

Besides minimizing the cardiovascular response, anaesthesia induction for patients at risk must also satisfy the following requirements: it must be applicable regardless of patient group, prevent impairment of cerebral blood flow and avoid awareness of the patient; it should neither be time consuming nor affect the duration or modality of the ensuing anaesthesia and also should not have any effect on the recovery characteristics.

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Among the recommended procedures, intravenous lidocaine is used quite reliably and intravenous clonidine which also fulfill criteria is a new option which can be used.[21]

Clonidine, a central alpha–2 agonist has been tried for Blunting haemodynamic responses to laryngoscopy and intubation. Further clonidine has sedative, analgesic, antihypertensive actions in addition to reducing the anesthetic drugs requirement might be helpful in attenuation of haemodynamic responses to laryngeal stimulation.

OBJECTIVES:

- To compare the efficacy of IV clonidine in attenuating of haemodynamic responses during laryngoscopy & endotracheal intubation in comparison with IV plain lidocaine.
- Any associated side effects.

METHODOLOGY:

Study Population: One hundred patients, scheduled for various elective surgical procedures under GA were included, this study was done in Navodaya medical college, hospital and research centre Raichur between December 2009 to June 2010.

Inclusion Criteria: Patients belonging to ASA class I and II were included in the study after obtaining ethical committee clearance as well as informed consent from all patients. The patients were normotensive with age varying from 18 to 40 years.

Exclusion Criteria: Unwilling Patients**,** Patients with hypertension, with heart rate less than 60bpm, systolic blood pressure less than 100mm of Hg, presence of 1st, 2nd or 3rd degree heart block, patients with difficult airway and hyperthyroid patients.

Data collection: Patients were randomly divided into 2 groups of 50 each. Group I patients received lignocaine 1.5mg/kg 3minutes before laryngoscopy and Group II patients received clonidine 3mcg/kg 15 min before laryngoscopy. On the day of surgery, an 18-gauge intravenous cannula was inserted and an infusion of Ringer lactate was started. The patients were connected to multichannel monitor which records Heart rate, non-invasive measurements of SBP, DBP, MAP, EtCO2 and continuous ECG monitoring and oxygen saturation. The baseline systolic, diastolic blood pressure, mean arterial pressure and heart rate were recorded.

The cardiac rate and rhythm were also monitored from a continuous visual display of electrocardiogram from lead II. The study drug was prepared by the senior anaesthesiologist who was not involved with the study and both observer. All the patients were premedicated with injection glycopyrrolate 0.2mg, injection midazolam 1mg and injection tramadol 100mg IV before preoxygenation. Then patients were preoxygenated for 3 minutes via a face mask with Bains circuit. Anaesthesia was induced with thiopentone 5mg/kg as a 2.5% solution. Endotracheal intubation was facilitated with inj. Vecuronium bromide 0.1mg/kg. Laryngoscopy was done using rigid laryngoscope with standard Macintosh blade. Intubation was done with appropriate sized, disposable, high volume low pressure cuffed endotracheal tube and after confirmation of bilateral equal air entry, the endotracheal tube was fixed Laryngoscopy and intubation was done within 15 seconds.

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The heart rate, arterial blood pressure (Systolic, diastolic and mean), were recorded at seven specified intervals, namely, Pre induction-before giving premedication, post Induction, One, three, five seven and ten minutes after intubation.

In group-I, IV 2% Lidocaine 1.5mg/kg was administered 3 minutes before laryngoscopy and intubation.

In group-II, IV Clonidine 3μgm/ kg was administered 15 minutes before laryngoscopy and intubation.

Anaesthesia was maintained with oxygen (33%), N2O (66%), Isoflurane 1% and non-depolarising muscle relaxant vecuronium bromide and IPPV.

EtC02 was maintained within 35±5 mmHg to avoid effects of hypercarbia or hyperventilation on the haemodynamic variables. And SPO2 was maintained at 99-100%. ECG was monitored continuously for arrhythmias and ischemia No surgical or any other stimulus was applied during 15 minutes of study period.

An observation was made related to adverse effects of drugs and anaesthesia related problems and were attended to appropriately.

Incidences of side effects such as Hypertension, Hypotension, Tachycardia, Bradycardia Sedation and any dysrrhythmia like any ventricular or supraventricular beat or any other rhythm other than sinus were recorded in both groups.

SEDATION SCORING AS PER RAMSAY SEDATION SCALE:

Ramsay Sedation Scoring:

Score	Response
1	Anxious or restless or both
2	Cooperative, oriented and tranquil
3	Responding to commands
4	Brisk response to stimulus
5	Sluggish response to stimulus
6	No response to stimulus

Statistical Methods Employed:

- Descriptive statistics (To measure mean, standard deviation)
- Independent sample 't' test (to measure difference between two groups i.e., intergroup comparison)
- Paired sample 't' test (To measure difference within the group i.e. intragroup comparison)
- Repeated measure ANOVA (Groups Vs. sessions together)
- Contingency table analysis (For association between the rows and columns)
- $p<0.05$ was considered as significant and $p<0.01$ was considered as highly significant.

RESULTS: The demographic data (Age, sex, weight and surgical procedures and duration of surgical procedures) were similar in both the groups ($p>0.05$).

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	Group I (control)	Group II (clonidine)	p-value
Pre-induction	79.7 ± 6.1	81 ± 6.63	p>0.05
Post-induction	82.9 ± 6.13	79 ± 8.01	p<0.05
1min	105.2 ± 7.87	92.4 ± 8.2	p<0.001
3min	103 ± 7.9	86.7 ± 6.4	p<0.001
5min	91.1 ± 5.53	81.08 ± 8.39	p<0.001
7min	86.6 ± 5.78	80.4 ± 6.7	p<0.01
10min	81.9 ± 5.13	78.2 ± 5.9	p<0.05

Table 1: Changes in Mean Heart Rate at various time Intervals

At 1 minute i.e., immediately after the laryngoscopy and intubation, the rise in the heart rate was maximum in both the groups. The mean heart rate rise was 25.5 bpm from the basal heart rate in the lidocaine group compared to of 11.4 bpm in clonidine group (p<0.001). It gradually decreased and it reached to the preinduction level in clonidine group by the end of 5 minutes and took 10 minutes in lidocaine group. (p<0.001).

Figure. 1: Changes in mean Heart rate at various time intervals.

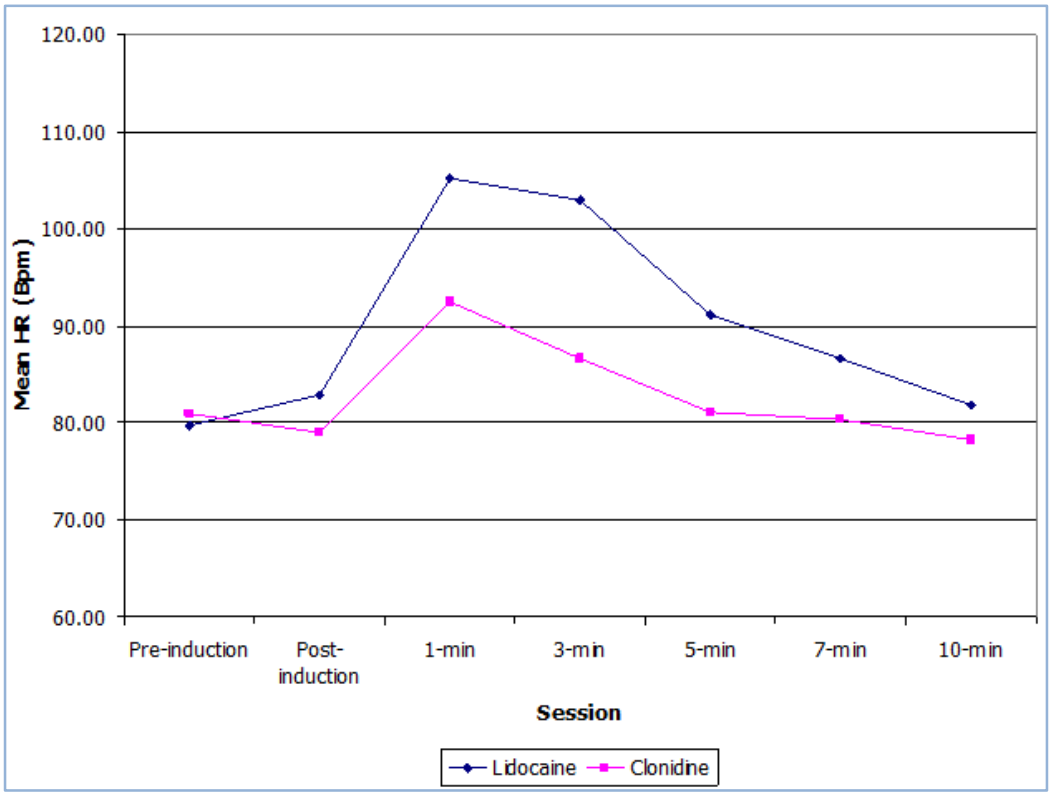

Figure 1

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	Group L (Lidocaine)	Group C (Clonidine)	p-value
Pre-Induction	128.4 ± 10.95	125.4 ± 11.48	P>0.05
Postinduction	124.98 ± 11.34	121.2 ± 11.64	p>0.05
1min	151.6 ± 11.76	137.4 ±8.392	P<0.001
3min	149 ± 12.32	128 ± 12.52	P<0.001
5min	138.2 ± 9.88	125.1 ± 9.31	P<0.001
7min	130.6 ± 10.22	120 ± 9.1	P<0.001
10min	129.6 ± 10.23	118.6 ± 9.57	P<0.001

Table 2: Changes in mean systolic blood pressure (mmHg) at various time intervals

At 1 minute i.e., immediately after the laryngoscopy and intubation, the rise in the mean systolic pressure was maximum in both the groups. The mean systolic pressure rise was 23.2mm of Hg in the lidocaine group compared to of 12mm of Hg in clonidine group (p<0.001). And reached the preinduction levels in 5 minutes in clonidine group and took 7 minutes in lidocaine group.

Figure. 2: Changes in mean systolic blood pressure at various time intervals.

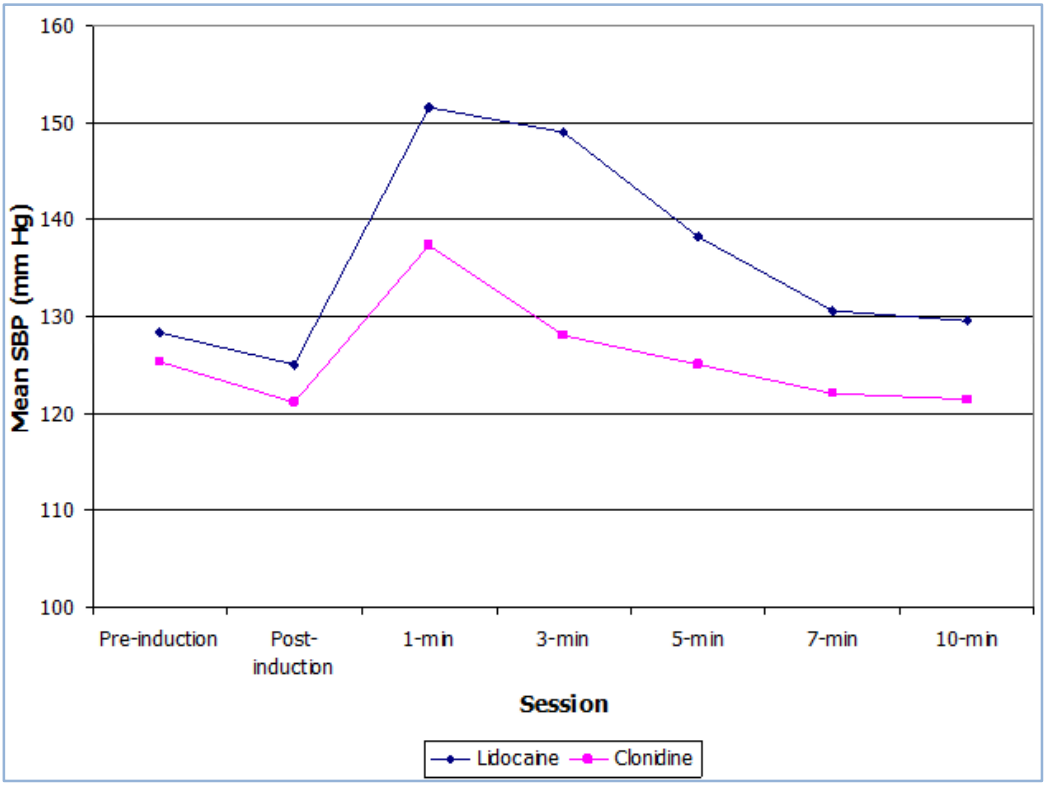

Figure 2

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	Group L (Control)	Group C (clonidine)	p-value
Preinduction	77.6 ± 4.65	79.4 ± 6.68	p>0.05
Postinduction	76.3 ± 5.47	77.2 ± 8.55	p>0.05
1min	87.1 ± 3.51	84.6 ± 4.7	P<0.01
3min	85.4 ± 5.27	80 ± 6.7	P<0.01
5min	81.3 ± 3.01	77 ± 7.7	P<0.01
7min	77.4 ± 3.97	75.2 ± 6.78	P<0.05
10min	76.7 ± 4.4	72.4 ± 6.88	P<0.01

Table 3: Changes in mean diastolic blood pressure (mmHg) at various time intervals

Maximum rise in mean DBP was 11.5mm of Hg in Lidocaine group and 5.2mm of Hg after 1min of laryngoscopy and intubation, and gradually decreased to the pre-induction level by the end of 5 minutes in clonidine group and 7 minutes in lidocaine group.

Figure. 3: Changes in mean diastolic blood pressure at various time intervals.

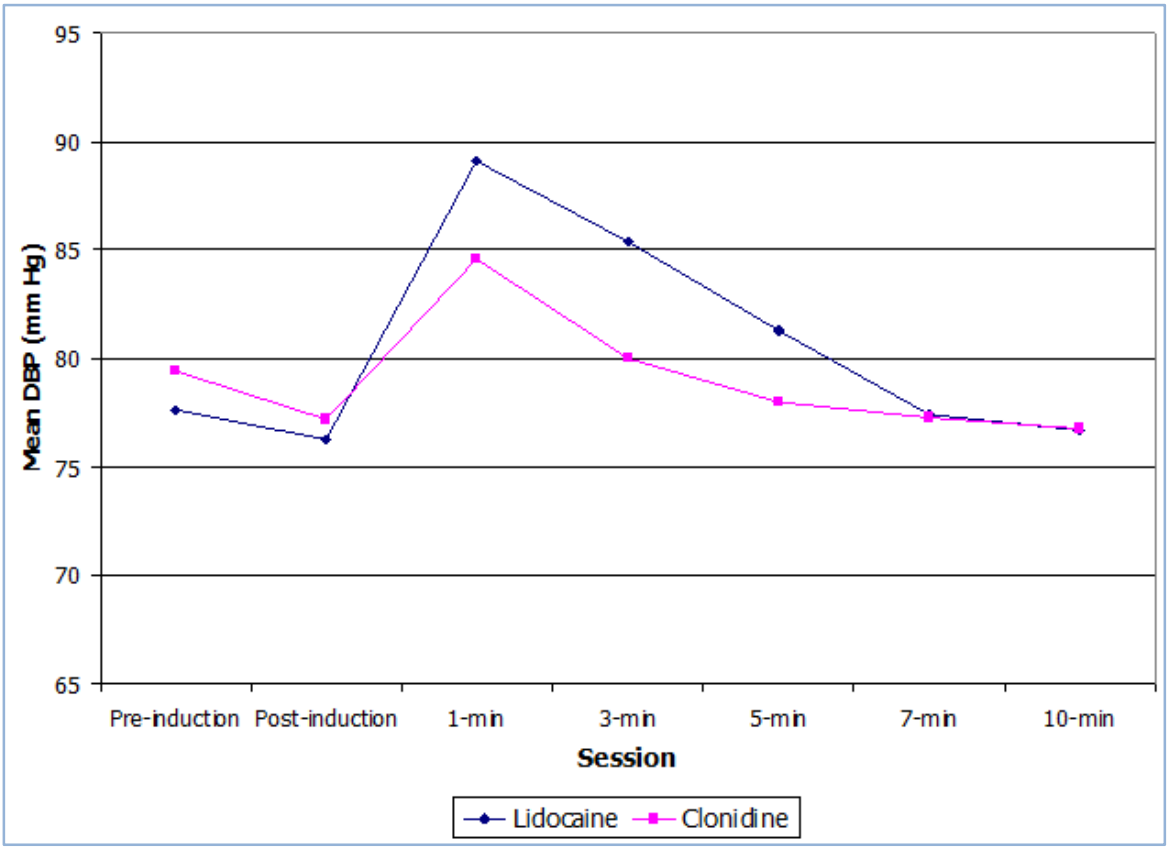

Figure 3

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	Group L (Control)	Group C (Clonidine)	p-value
Preinduction	94.6 ± 6.09	92.6 ± 6.8	T=1.56 p>0.05
Postinduction	94.3 ± 5.31	89.7 ± 7, 04	T=3.68 P<0.01
1min	107 ± 6.43	102.3 ± 4.3	T=4.58 P<0.01
3min	106 ± 6.4	94.1 ± 6.4	T=9.30 P<0.001
5min	97.5 ± 4.27	90.4 ± 8.06	T=5.58 P<0.001
7min	94.1 ± 5.57	89.4 ± 4.9	T=4.47 P<0.01
10min	93.1 ± 4.82	88.2 ± 6.46	T=4.33 P<0.01

Table 4: Changes in mean arterial blood pressure (mmHg) at various time intervals

Mean MAP increase in Lidocaine group after 1min of laryngoscopy and intubation was 13 mm of Hg whereas in clonidine it was 9.7mm of Hg. Which reduce to preinduction level in 5 minutes in clonidine group and 7 minutes in lidocaine group.

Figure. 4: Changes in mean arterial blood pressure at various time intervals.

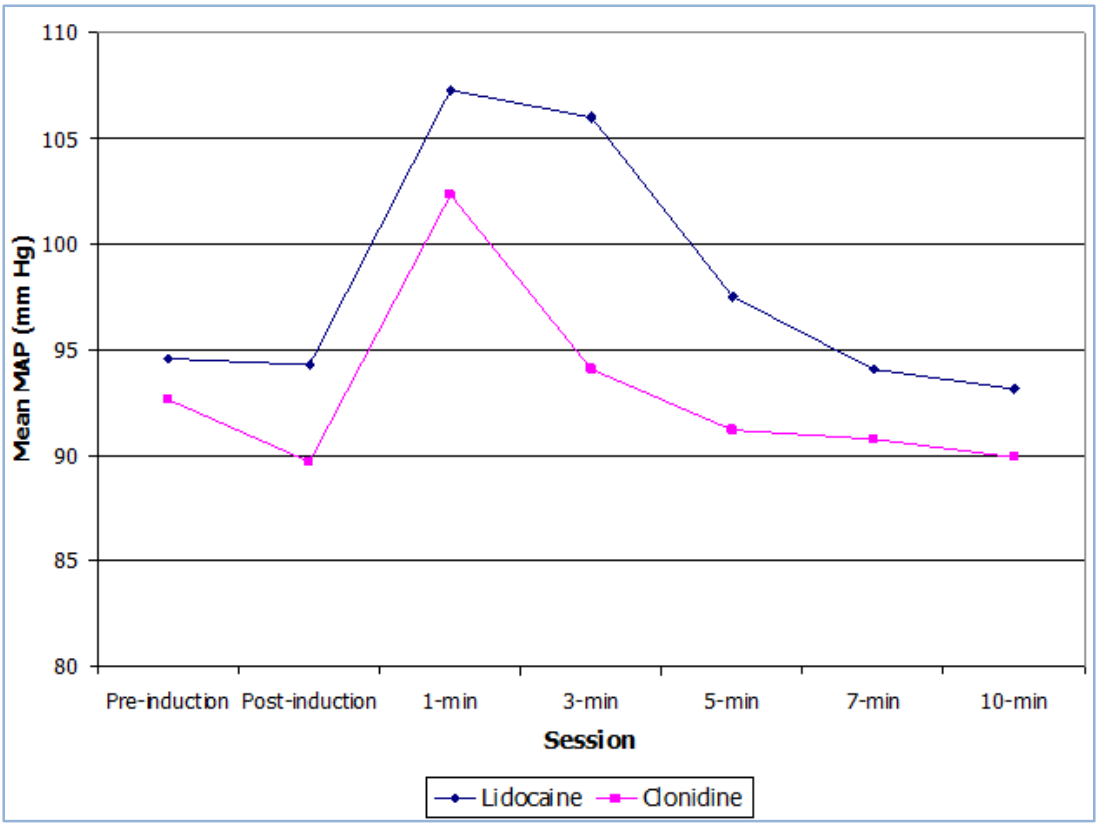

Figure 4

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DISCUSSION: Laryngoscopy and endotracheal intubation are considered as the most critical event during general anaesthesia. They provoke a transient, but marked sympathetic and sympathoadrenal response manifesting as hypertension and tachycardia. These responses are transitory, variable and may not be significant in otherwise normal individuals. But in sick patients can result in potentially harmful effects. Therefore many methods have been tried for attenuation of haemodynamic responses to laryngoscopy and tracheal intubation. But all such maneuvers had their own limitations. For example, with opioids respiratory depression and non-availability leads to other alternatives, use of halothane was associated with dysrrhythmias, calcium channel blockers produced reflex tachycardia, direct acting vasodilators needed invasive haemodynamic monitoring and lidocaine did not give consistent results. Clonidine, an α–2 agonist, can blunt both the heart rate and blood pressure response to laryngoscopy and intubation, without having any adverse effects like respiratory depression and post-operative nausea and vomiting.

Lidocaine was used in dose of 0.75, 1.5 and 2mg/kg to attenuate haemodynamic response. It was noted 1.5mg/kg of lignocaine 2% provided better attenuation of responses to intubation than 0.75mg/kg of intravenous lignocaine.[22,23,24] Clonidine was used in the dose of 0.625, 1.25, 3 and 6μg/kg to attenuate the intubation response. Clonidine at 0.625 and 1.25μg/kg was not or partially effective for blunting the haemodynamic response to laryngoscopy and intubation.[25,26] Doses greater than 3μg/kg caused an increase in blood pressure and peripheral vascular resistance with reduction in cardiac output because of clonidine action on peripheral α 2- receptors.[27]

Hence we used 3μg/kg of body weight of clonidine to compare with lidocaine in dose of 1.5mg/kg to obtund the haemodynamic response lidocaine was used at 1min 2min 3min and 5min before laryngoscopy for attenuating haemodynamic responses it was noted that intravenous lignocaine attenuated the increase in Heart rate (HR) and Arterial Blood Pressure (ABP), only when given 3 min, before intubation and did not give any protection when given at 1 min, 2 min and 5 min before intubation. From the pharmacokinetic profile, it is seen that the distribution half-life of intravenous clonidine is approximately 11 minutes.[28] It has also been found that the maximum effect of intravenous clonidine occurs approximately 15 minutes after its administration In view of this clonidine was given 15 minutes before laryngoscopy and intubation.[29,30.31,32]

The patients in both the groups did not show any statistically significant differences in their age or sex distributions. We selected the optimal age range of 18 to 40 years. All the groups were similarly premedicated regarding anxiolysis. The preinduction values of HR, SBP, DBP and MAP did not show any statistically significant difference in both the groups. In our study during laryngoscopy and intubation HR, SBP, DBP, MAP increased in both the groups.

The magnitude of increase in HR and blood pressure during laryngoscopy and intubation was higher in lidocaine group when compared to clonidine group and this was statistically significant. Both the blood pressure response and the heart rate were attenuated more effectively in the clonidine group as compared to lidocaine group.

CONCLUSION: from the present study it is concluded that clonidine in the dose of 3μg/kg IV, given 15 minutes before laryngoscopy and intubation can be alternative and better choice than IV lidocaine in attenuating the haemodynamic responses to laryngoscopy and intubation without any side effects.

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