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Comparison of Intravenous Clonidine with Intravenous Lignocaine for Attenuation of Endotracheal Intubation Induced Haemodynamic Response

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Abstract

Background: Endotracheal intubation is the standard practice for general anaesthesia inspite of many supraglottic airway devices have arrived. Various drugs have been used till date to attenuate the hemodynamic response to endotracheal intubation. This study compared the effects of intravenous Clonidine (2.5 μg/kg) and Lignocaine (1.5 mg/kg), for attenuation of hemodynamic response in laryngoscopy and endotracheal intubation. *Methods*: Ninety patients of ASA class I & II were divided into two groups of 45 each. Group L patients received injection Lignocaine and Group C patients received injection Clonidine. Hemodynamic parameters were monitored by using multiparameter monitor before intubation and at 1, 3, 5 and 10 minutes after endotracheal intubation. *Results:* No significant difference between two groups was observed in terms of hemodynamic parameter including heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure. Pretreatment with injection Clonidine is equally better alternative to lignocaine with similar advantages for blunting the undesirable hemodynamic response associated with laryngoscopy and intubation.

Keywords: Clonidine; Lignocaine; Hemodynamic response; Intubation.

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Introduction

Laryngoscopy and tracheal intubation predictably leads to hypertension and tachycardia first described by Reid and Brace in 1940 [1]. The rise in pulse rate and blood pressure is usually transient, variable and unpredictable. Usually these changes are well tolerated by healthy individuals but may increase morbidity and mortality in patients with hypertension, coronary artery disease or intracranial hypertension. Various measures like local anaesthetic spray, nerve blocks, I.V. drugs like lignocaine, magnesium sulphate and recently α_2 agonist clonidine have been tried to prevent this undesired response of endotracheal intubation.

The hemodynamic response can be attenuated by intravenous administration of narcotics like fentanyl [2]. Intravenous lignocaine may be used to 'blunt' the laryngoscopy response, although some studies have called the effectiveness of lignocaine in this setting into doubt [3]. Hypotensive agents, including sodium nitroprusside, nitroglycerine, hydralazine, β-blocker, and calcium channel blocker have also shown to effectively attenuate

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the transient sympathetic stimulation. Clonidine an α_2 agonist, has been successfully used to blunt laryngoscopy response, but the adequate dose and time of administration is still not validated. If a small dose of clonidine, administered shortly before intubation, can prevent this hemodynamic response, it is worth trying. In this study we will compare the effects of intravenous clonidine (2.5 μg/kg) and intravenous lignocaine (1.5 mg/kg), for attenuation of hemodynamic response in laryngoscopy and endotracheal intubation.

Methods

Randomized double blinded clinical trial was performed on ninety patients of either of ASA grade I & II within age group of 18 to 60 years, undergoing elective abdominal surgery under general anaesthesia. For this study written informed consent was taken from hospital's ethical committee and patients as well. Patients having any abnormality in airway, history of allergy to study drug and taking drugs affecting autonomic nervous system were excluded from the study. Preoperative heart rate, blood pressure, respiratory rate were noted down. The patients were randomly distributed into two groups each having 45 patients. Group L patients received intravenous Lignocaine (1.5 mg/kg) andgroup C patients received intravenous Clonidine (2.5 ug/kg). Randomization was by means of computer generated codes. All members of the surgical team, the patients, and the anaesthetist were unaware of group allocation.

The patients were taken in preoperative room 1 hour prior to surgery and intravenous infusion was started with a cannula of 18G. NIBP, ECG and pulse oxymeter probe were connected and baseline readings of all the vitals were recorded. Patients were preoxygenated with 100% oxygen for 3 minutes. Study drug was injected intravenously slowly after then patient was induced with intravenous thiopentonein incremental doses until loss of eyelash reflexes followed by injection vecuronium 0.12 mg/kg. Ventilation was done with 100% oxygen up to 90 seconds and then patients were intubated with endotracheal tube and bilateral air entry was confirmed tube was fixed and secured. At fifteen minutes, fentanyl (2.5 μg/kg) was given and after 20 minutes surgery was allowed to commence. Anaesthesia was maintained with N_2O:O_2 (2:1) with 0.5% isoflurane with IPPV.

Hemodynamic parameters like HR, SBP, DBP, and MAP were recorded by using multiparameter monitor before intubation and 1, 3, 5, and 10 minutes afterwards. After completion of surgery neuromuscular block was reversed by neostigmine and glycopyrrolate combination in titrated doses intravenously. After adequate recovery patient was extubated following suction. Bradycardia (HR<60) and hypotension (SBP <90) were also recorded. All the statistical analysis was performed using the SPSS package (version 19, SPSS, Chicago, II). The statistically significant level was P< 0.05.

Results

Ninety patients were randomly distributed in two groups Clonidine and Lignocaine of either sex between 18 to 60 years with ASA I & II grade.

Table 1: Demographic data distribution in different groups

	Clonidine Group	Lignocaine Group	P value
Age (Years) (Mean ± SD)	42.88±8.92	36.4±11.06	> 0.05
Weight (Kgs) (Mean ± SD)	54.13±7.08	50.9±6.89	> 0.05
Gender (M/F)	25/15	19/21	> 0.05

Data expressed as Mean ± SD

As evident from the Table 1, both the groups were statistically comparable in terms of age, weight and sex distribution. (p value >0.05).

There was no statistically significant difference between the two groups of patients regarding HR, SBP, DBP and MAP before intubation and 1,3,5 and 10 minutes after tracheal intubation(Tables 2-5).

Table 2: Comparison of Mean Heart Rate between the study groups (n = 45)

Heart Rate/min	Clonidine Group	Lignocaine Group	P value
Before Intubation	92.3±15.02	89.7±12.1	>0.05
I minute after intubation	95.4±13.0	102.5±16.3	>0.05
3 minutes after intubation	87.5±14.3	99.3±14.7	>0.05
5 minutes after intubation	82.8±12.0	93.7±13.5	>0.05
10 minutes after intubation	80.2±15.6	89.8±15.5	>0.05

Data expressed as Mean ± SD.

Table 3: Comparison of Systolic Blood Pressure between the study groups (n = 45)

Systolic Blood Pressure(mmHg)	Clonidine Group	Lignocaine Group	P value
Before Intubation	117.4 ± 8.9	118.7± 5.2	>0.05
I minute after intubation	120.7± 5.4	138.8±17.6	>0.05
3 minutes after intubation	115.8 ±7.3	125.3±11.7	>0.05
5 minutes after intubation	110.8±6.6	120.7±7.5	>0.05
10 minutes after intubation	105.7±7.9	119.7±6.6	>0.05

Data expressed as Mean ± SD

Table 4: Comparison of Diastolic Blood Pressure between the study groups (n = 45)

Diastolic Blood Pressure(mmHg)	Clonidine Group	Lignocaine Group	P value
Before Intubation	74.9±4.5	76.8±4.1	>0.05
I minute after intubation	78.8±5.6	86.6±7.7	>0.05
3 minutes after intubation	73.9±4.9	84.5±6.5	>0.05
5 minutes after intubation	72.6±4.4	81.3±5.7	>0.05
10 minutes after intubation	72.9±4.8	77.7±3.3	>0.05

Data expressed as Mean ± SD

Table 5: Comparison of Mean Blood Pressure between the study groups (n = 45)

Mean Blood Pressure(mmHg)	Clonidine Group	Lignocaine Group	P value
Before Intubation	88.3±6.0	90.6±4.4	>0.05
I minute after intubation	92.0±5.5	100.8±11.2	>0.05
3 minutes after intubation	87.6±5.7	97.6±8.2	>0.05
5 minutes after intubation	84.5±5.1	94.5±6.3	>0.05
10 minutes after intubation	83.1±5.8	91.2±4.4	>0.05

Data expressed as Mean ± SD

Discussion

Intubation is associated with a cardiovascular response of elevated blood pressure and pulse, occasional dysrhythmia, coughs reflex, increase intracranial pressure, and increased intraocular pressure. Various efforts have been made to attenuate this adverse phenomenon. The present study showed that both intravenous clonidine and lidocaine were equally effective in reducing the hemodynamic stress responses (HR, SBP, DBP, and MAP) to laryngoscopy and tracheal intubation.

Endotracheal intubation is a stressful noxious stimulus, resulting in a marked increase in the sympathetic amines (adrenaline and noradrenaline) leading to complications, especially in patients with cardiovascular diseases. These complications include increases in blood pressure and heart rate that may cause tachyarrhythmia. In normal patients, these hemodynamic responses are generally well-tolerated, whereas in patients with cardiovascular diseases, they may cause cerebral haemorrhage, left ventricular failure, and in rare conditions, myocardial ischemia [4,5,6].

Our study confirm and extend the results of other investigators who showed that clonidine and lidocaine separately were effective in blunting reflex tachycardia and hypertensive responses associated with intubation and laryngoscopy in patients undergoing general anaesthesia [7,8,9-16].

Idit Matot et al. [17] used oral clonidine 300 µg and noted significant decrease in HR, SBP, DBP, and MAP after laryngoscopy and intubation. In our study we found increase in HR, SBP, DBP, & MAP in a dose of 2.5 ug/kg this may be due to difference in dose and route of administration.

Davies DS et al. [18] showed that clonidine has been tried in various oral doses and infusion forms. As bioavailability after oral intake varies between 70% and 90%, we choose the IV route of administration to relate pharmacodynamic effects. So our study was designed to find out its efficacy for attenuation of haemodynamic response through IV bolus dose. Furthermore as an intravenous route is available therefore this route is preferable for its 100% bioavailability.

A study conducted by Routray et al. [19] which compared fentanyl-lidocaine with fentanyl-clonidine on hemodynamic responses to tracheal intubation in 40 hypertensive patients. No significant differences were found between the hemodynamic parameters of two groups and concluded that both the fentanyl clonidine and fentanyl lidocaine combinations effectively decreased the stress response to endotracheal intubation. Our study correlated positively with this study.

A study conducted by Kumari et al. [20] compared clonidine and midazolam as premedication agents. Administration of clonidine before induction and intraoperatively improves perioperative hemodynamic stability. Lignocaine has been found to attenuate the hemodynamic response to endotracheal intubation. Clonidine premedication is considered to be safe without episodes of hypotension, bradycardia, and nausea and vomiting. In present study, both clonidine and lignocaine lower the hemodynamic response to intubation but clonidine was found to be more effective in attenuating the sympathetic response.

Conclusions

Pretreatment with both clonidine 2.5 ug/kg and lignocaine 1.5 mg/kg five minutes before intubation can be used effectively in clinical practice to attenuate the hemodynamic response to laryngoscopy and endotracheal intubation. Though lignocaine has widespread application, the study proves that pretreatment with injection clonidine is

equally a better alternative to lignocaine with similar advantages. This simple readily available method blunts the undesired hemodynamic side effects associated with laryngoscopy and intubation.

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