Original Research Article

Comparative study between topical nitroglycerine and intravenous lignocaine during laryngoscopy for attenuation of pressor response

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Abstract

Aim: The study was designed to find out pressor response during laryngoscopy and endotracheal intubation with or without pre-treatment of 2% topical nitroglycerine and intravenous lignocaine respectively. **Method:**150 normotensive patients with American Society of Anaesthesiology physical status I and II of both gender posted for surgery under general anaesthesia were divided into three groups of 50 each randomly i.e. control group, intravenous lignocaine group 1.5mg/kg(group I), 2% topical nitroglycerine, 5cm on forehead (group II) respectively. **Results:** incidence of increase in heart rate was seen in all three groups, at all stages of laryngoscopy and intubation. In group 1 increase of heart rate was 3.17% more than baseline as compared to group II where heart rate increased by 26.6% from baseline after 3 minutes of intubation. In case of blood pressure, it was seen that after induction with inj.1% propofol (2-3mg/kg), there was slight decrease in blood pressure from baseline in all three groups. But after 1 minute of laryngoscopy and endotracheal intubation increase in blood pressure was seen in all groups with maximum increase in control group. After 3 minutes of laryngoscopy and intubation, significant drop in blood pressure was sighted with maximum fall in group II by 10.7% from baseline as compared to group I with 2.28% fall. **Conclusion:** It can be concluded that either intravenous lignocaine(1.5mg/kg) or 2% topical nitroglycerine can be used to attenuate the pressor response during laryngoscopy and endotracheal intubation. 2% topical nitroglycerine is better choice where better control of blood pressure is required and where slight increase in heart rate is not a matter of concern, and is safe, inexpensive, easily available and easy to apply. Intravenous lignocaine is better choice when both heart rate and blood pressure have to be controlled but control of blood pressure is always lesser than topical nitroglycerine.

Key Word: Intravenous lignocaine, laryngoscopy, pressor response, topical nitroglycerine.

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Received Date: 23/01/2019 Revised Date: 10/02/2019 Accepted Date: 25/03/2019
DOI: https://doi.org/10.26611/10159320

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 26 March 2019

INTRODUCTION

Hemodynamic pressure response to airway instrumentation is a hazardous complication of general anaesthesia.[1] It leads to tachycardia and hypertension, which are usually variable and unpredictable. These changes are well tolerated by healthy patients but may be deleterious in patients with hypertension and coronary artery disease. Many pharmacological methods have been evaluated either in premedication or during induction to

How to site this article: Sandip Baheti *et al.* Comparative study between topical nitroglycerine and intravenous lignocaine during laryngoscopy for attenuation of pressor response. *MedPulse International Journal of Anesthesiology.* March 2019; 9(3): 255-259. http://medpulse.in/Anesthsiology/index.php

attenuate the adverse hemodynamic response to laryngoscopy such as deepening the anaesthesia, pre-treatment with vasodilators, adrenoreceptor blockers, calcium channel blocker, opiods with variable results[2,3.] Many studies have been conducted to evaluate the adverse effects during laryngoscopy and endotracheal intubation and also to attenuate such pressor responses. Ried and Brace(1940)postulated that the reflex circulating responses to laryngoscopy and intubation were mediated through vagus nerve and named it as "vasovagal reflexes"[5]. Investigations by Burstein *et al* in 1950 showed that 43 out of 109 patients developed sinus tachycardia, 1 had atrial fibrillation and 2 developed ventricular tachycardia at the time of intubation. This was attributed to reflex stimulation of sympathoadrenal system.[6] King *et al*.(1951)observed that a marked, though a transient rise in blood pressure was seen during laryngoscopy and manipulation of epiglottis. They stated that the impulses initiating the reflex are probably carried by the vagus nerve while the effector system is less clearly defined and may be due to decreased parasympathetic or increased sympathetic activity.[7] Miller Forbes and F.G. Dally (1970) observed acute hypertension during induction of anaesthesia and endotracheal intubation in normotensive patients.[8] Bidwai *et al* (1978) showed that when lignocaine is sprayed down the endotracheal tube, 60mg as 4% lignocaine 3.5 minutes before extubation, prevented coughing and cardiovascular stimulation.[9] In 1986 2% nitroglycerine was evaluated by S Karma *et al* for attenuation of laryngoscopic response. In double blind study it was seen that arterial pressure rise persisted for upto4minutes in control group but lasted only for 1minute in nitroglycerine group. Thus it was found to be safe, inexpensive, comfortable and effective means of attenuating pressorresponse.[10] Lignocaine was introduced in year 1948 and became the most widely used local anaesthetic.[11] In 1961, Bromage showed that its intravenous use blunted pressor response to intubation.[12] Lignocaine as i/v dose of 1.5mg/kg given 3 minutes prior to intubation showed near optimal results.[13] Robert K Stoelting 1977 studied pressor response with or without prior oropharyngeal viscous lidocaine and observed it attenuated the blood pressure but not heart rate response during laryngoscopy and intubation.[14] In this study we will compare the effects of i/v lignocaine(1.5mg/kg) and 2% topical nitroglycerine in attenuating the pressor response during laryngoscopy and endotracheal intubation.

MATERIAL AND METHOD

This study was carried out in department of anaesthesiology, B.J. Medical College, Pune, Maharashtra after ethical committee approval.

No. of cases: 150 normotensive patients were included and randomly divided into three groups:

Control Group: 50 cases with no pre-treatment before induction.

Group I: 50 cases with pre-treatment of intravenous lignocaine in dose of 1.5 mg/kg.

Group II: 50 cases with pre-treatment of 2% topical nitroglycerine 5 cm in length on forehead.

selection of cases

Inclusion Criteria

1. Patients in age group of 30 to 70 years.
2. Patients with ASA I and II.
3. Hemodynamic stable patients
4. Patients posted for surgeries under general anaesthesia.
5. willing to give consent to participate in the study.

Exclusion Criteria

1. Patients with anticipated cardiac, respiratory and renal disease.
2. Patients with difficult intubation.
3. Patients on prolong antihypertensive drugs, sedatives and hypnotic drugs.
4. Patients with allergy to any anaesthetic medication.
5. Obese patient.

All patients were thoroughly examined during pre-operative anaesthesia check-up and investigated to diagnose any systemic disorder. All routine investigations were done i.e. complete blood count, bleeding time, clotting time, PT/INR, LFT, RFT, Serum Electrolytes, ECG and Chest XRAY.

Procedure: suitable cases were selected and patients were explained about the procedure and a written consent was taken. All patients undergoing surgery with general anaesthesia and with ASA I and II of either gender were selected for study. On arrival of patient in pre-operative room, monitors were attached and baseline heart rate and systolic, diastolic and mean arterial pressure were recorded. Then patient was taken inside operative room and required monitors i.e. electrocardiographic leads, pulse oximetry and blood pressure cuff were attached and crystalloid fluid was started. Patients were pre-oxygenated for 3 minutes with 100% oxygen and pre-medicated with Inj. glycopyrrolate 0.2mgi/v. In control group, patients were induced with inj. 1% propofol (2-3mg/kg)i/v. Heart rate and blood pressure were recorded and continuous electrocardiographic and oxygen saturation were monitored. Then inj. suxamethonium 0.5 to 1mg/kg was given and patient was ventilated. Heart

rate and blood pressure were recorded. Patient was intubated with help of Macintosh laryngoscope blade and endotracheal tube was passed under vision. Heart rate and blood pressure were recorded 1minute and 3 minute after intubation. In group I after pre-oxygenation patient was given intravenous inj. lignocaine 1.5mg/kg which was followed by same procedure as done in control group with heart rate and blood pressure monitoring.In Group II, a 5cm length nitroglycerine ointment was applied and rubbed over forehead for 15 minutes prior to induction. To ensure a gap of 15 minutes between application of ointment and tracheal intubation, pre-oxygenation was commenced after a resting period of 5 minutes and regular intubation technique was followed as done in Control group. Heart rate and blood pressure were monitored accordingly.

STATISTICAL ANALYSIS: The statistical analysis was done by student unpaired t-test, a $p<0.05$ was considered statistically significant.

OBSERVATION

Readings of heart rate and blood pressure were taken at different time intervals, as follows.

B- observation before induction of general anaesthesia

P- observation after inj.1%propofol(2-3mg/kg) i/v.

S- observation after inj. suxamethonium(0.5-1mg/kg)i/v after stoppage of fasciculation

1-observation obtained 1 minute after intubation.

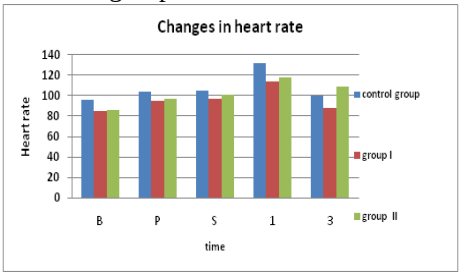
3-observation obtained 3 minute after intubation.

Table 1: Changes In Heart Rate

S.no.	Control group		Group I		Group II	
Time	Mean± S. D.	% of change	Mean± S. D.	% of change	Mean± S. D.	% of change
B	96.36±12.16		85.80±11.57		86.08±10.44	
P	104.12±9.99	+8.05%	95.80±9.60	+11.6%	97.56±7.66	+13.33%
S	105.60±9.99	+9.58%	97.80±9.60	13.98%	101.16±7.09	+17.51%
1	132.52±11.28	+37.5%	114.16±11.90	+33.055%	117.72±8.26	+36.8%
3	100.00±10.54	+3.77%	88.52±10.98	+3.17%	109.04±6.0	+26.6%

Heart rate between group I and II, t value of, P-1.81**, S-3.33**, 1-3.04**, 3-13.19***.
*No significance, ** P<0.01, ***P<0.001

From table 1 there is increase in heart rate at every step of induction in all three groups, but percentage of change is more in group II as compared to group I. The heart rate reached to baseline after 3 minutes of intubation in group I but it remained significantly high in group II(P<0.001).Also when group I and II are compared it is seen that heart rate at 1 minute following endotracheal intubation in both groups is significantly low as compared with control group, but when compared between group I and group II rise is less in group I (i/v lignocaine). Also it seen that after 3 minutes of intubation, rise in heart rate is more significant in group II.

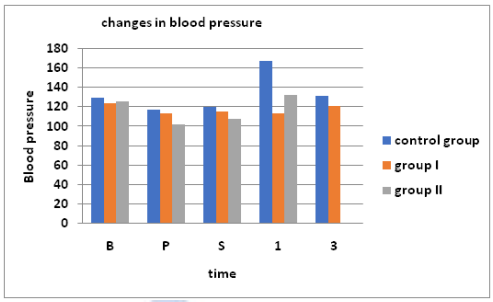


Blood pressure between group I and II t values, P-10.80***, S-8.83***, 1-6.95***, 3-7.08*** *No significance, ** P<0.01, ***P<0.001

Table 2 shows that blood pressure decreased following inj.1%propfol(2-3mg/kg) in all three groups. But after endotracheal intubation, there was significant rise in blood pressure in control group as compared to two other groups in study. Also it was seen that after induction with inj.1%propofol(2-3mg/kg), there was significant drop in blood pressure in group II as compared to group I. Also it is seen that there was significant rise in blood pressure after 1 minute of intubation in both groups but was less in group II as compared to I. After 3 minutes of intubation there was significant drop of blood pressure as compared to baseline in group II than group I.

Table 2: Changes In Blood Pressure

S.no.	Control group		Group I		Group II	
Time	Mean±S.D.	% of change	Mean ±S.D.	% of change	Mean±S.D.	% of change
B	129.94±10.57		124.04±10.19		125.48±11.36	
P	116.68±10.29	-9.71%	113.24±8.72	-8.7%	102.04±12.52	-18.6%
S	120.28±11.64	-6.93%	115.52±8.94	-6.865%	107.34±11.37	-14.4%
1	167.60±10.02	+29.68%	113.20±12.94	+11.41%	132.76±13.95	+5.80%
3	131.76±9.49	+1.94%	121.20±9.92	-2.28%	112.00±13.63	-10.7%



DISCUSSION

The use of laryngoscopy and endotracheal intubation has enabled safe administration of general anaesthesia but adverse effects from it are unavoidable. Several measures are taken to avoid such adverse effects for safe and hemodynamically stable state of patients. In this study, use of two drugs i.e. intravenous lignocaine 1.5mg/kg and 2% topical nitroglycerine 5 cm in length over forehead were used as pre medication treatment to find out pressor responses during laryngoscopy and intubation. In this study three groups were made i.e. control group, group I(i/vlignocaine) and Group II (topical nitroglycerine). In control group no pre-medications were given. It was seen that in control group, heart rate raised by 8.05% from base line and blood pressure decreased by 9.71% after induction with inj.1% propofol(2-3mg/kg). But maximum rise was seen after 1 minute of intubation, heart rate increased by 37.5% and blood pressure increased by 29.68% from baseline. After 3 minutes heart rate decreased slightly but still was on higher side from baseline by 3.77% and blood pressure returned to pre-induction value. In group I it was seen that after inj. 1% propofol(2-3mg/kg) systolic blood pressure decreased by 8.70% but heart rate increased by 11.6%. But after 1 minute intubation heart rate remain on higher side by 33.05% from baseline as well blood pressure raised by 11.41%. There was decrease seen in vitals after 3 minute of intubation in blood pressure by 2.28% but heart rate was still higher by 3.17% from baseline. In group II there was no significant decrease in heart rate at any stage of laryngoscopy and endotracheal intubation. After 1 minute significant rise in heart rate was observed by 36.8% rise as compared to baseline. Also after 3 minutes of intubation heart rate was 26.6% above than baseline. But blood pressure was significantly lower than baseline in almost all stages of laryngoscopy and endotracheal intubation except after 1 minute of intubation, 5.80% high from base line.

CONCLUSION

It can be concluded that either intravenous lignocaine(1.5mg/kg) or 2% topical nitroglycerine can be used to attenuate the pressor response during laryngoscopy and endotracheal intubation. 2% topical nitroglycerine is better choice where better control of blood pressure is required and where slight increase in heart rate is not a matter of concern, and is also, safe, inexpensive, easily available and easy to apply. Intravenous lignocaine is better choice when both heart rate and blood pressure have to be controlled but control of blood pressure is always lesser than topical nitroglycerine.

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Source of Support: None Declared
Conflict of Interest: None Declared