



COMPARATIVE STUDY OF HEMODYNAMIC PRESSURE RESPONSE TO LARYNGOSCOPY AND INTUBATION WITH ORAL SPRAY OF NITRO-GLYCERINE AND OROPHARYNGEAL SPRAY OF LIGNOCAINE

Anaesthesiology

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ABSTRACT

Introduction: Endotracheal intubation has become an integral part of anaesthetic management and critical care of the patient. Laryngoscopy and tracheal intubation are noxious stimuli that evoke a transient, but marked sympathetic response manifesting as an increase in heart rate and blood pressure. Therefore, attenuation of hemodynamic response to laryngoscopy and tracheal intubation is an important anaesthetic goal. The aim of present study is undertaken with an objective to compare the attenuation of the haemodynamic responses during laryngoscopy and intubation between Nitro-glycerine spray and Lignocaine spray. **Material and method:** 72 patients were divided into two groups of 36 each. Group A - Nitro-glycerine Group (n=36) - received oral nitro-glycerine spray 800 mcg and Group B Lignocaine group (n=36) - received oropharyngeal Lignocaine 10 puffs 10% before induction. Hemodynamic parameters i.e. heart rate (HR), Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean arterial pressure (MAP) were noted initially (baseline), after premedication, after Study drug was given, just before intubation, at 1 min, 3min, 5min and 10 minutes after intubation. **Observation and Results:** NTG spray decreases SBP and DBP more effectively as compared to lignocaine following laryngoscopy and intubation. The lignocaine group had an increase in mean arterial pressure and the nitro-glycerine group had a decrease in mean arterial pressure. **Conclusion:** Nitro-glycerine oral spray in the dose of 800 mcg as compared to lignocaine oral spray is better in attenuating the haemodynamic responses to laryngoscopy and intubation without adverse side effects.

KEYWORDS

Nitro-glycerine, Lignocaine, Laryngoscopy, Heart rate, Haemodynamic, Blood Pressure.

INTRODUCTION

Endotracheal intubation has become an integral part of the anaesthetic management and critical care of the patient. Laryngoscopy and tracheal intubation are noxious stimuli that evoke a transient, but marked sympathetic response manifesting as an increase in heart rate, blood pressure and arrhythmias. Therefore, obtunding hemodynamic response to laryngoscopy and tracheal intubation is an important anaesthetic goal.

The pressure response to laryngoscopy and endotracheal intubation has been recognized since long. In 1940, Reid and Brace first described hemodynamic response to laryngoscopy and intubation^[1]. It has both sympathetic and parasympathetic element. The effect is transient occurring within 30 seconds after intubation and lasting for less than 10 minutes thereafter. It is of great concern for anaesthesiologist especially in patients with pre-existing hypertension, myocardial ischemia, and cerebral pathologies with raised intracranial pressure as sudden rise in HR & BP may cause high incidence of arrhythmias, myocardial ischemia and cerebral haemorrhage^[2]. Such finding emphasizes the requirement for an anaesthetic induction technique which can avoid this increase in cardiovascular activity.

Many pharmacological & non-pharmacological methods have been used to attenuate the hemodynamic response to laryngoscopy & endotracheal intubation. The non pharmacological methods like smooth & gentle intubation with a shorter duration of laryngoscopy, insertion of LMA in place of endotracheal intubation have been used to attenuate the cardiovascular response to laryngoscopy & endotracheal intubation.

In pharmacological methods, numbers of drugs have been used in an attempt to attenuate these undesirable hemodynamic responses. These includes lignocaine^[3], beta blockers^[4], Nitro-glycerine^[5], Calcium channel blockers^[6], opioids^[7], Magnesium sulphate^[8].

NTG has been used by intravenous, intranasal and topical routes. Recently it has been advocated that sublingual spray form is reported to be effective. The present study is undertaken with an objective to compare the attenuation of the haemodynamic responses during laryngoscopy and intubation between Nitro-glycerine spray and Lignocaine spray. In our study, we have used 800mcg of oral spray of NTG and 10 puffs (1 puff equals to 10 mg of 10% lignocaine) of 10% lignocaine, based on result of previous studies.

Aim of study:

To compare the effectiveness of oral spray of NTG and oropharyngeal spray of Lignocaine in attenuating hemodynamic response to laryngoscopy and intubation in normotensive patients undergoing elective surgery under general anaesthesia with the primary objective variation of hemodynamic parameters Heart Rate (HR), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP) and Mean Arterial Pressure (MAP).

MATERIAL AND METHOD:

The present randomised study was conducted in a total 72 patients (ASA Grade I & II) posted for elective surgery under GA requiring tracheal intubation. Patients were randomly allocated into two groups (36 patients in each group) Randomization was done by sealed envelope method.

Group A (n=36) - Patients received 800 mcg. (Oral spray nitro-glycerine)

Group B (n=36) - Patients received 10 puffs of 10% lignocaine (Oropharyngeal Spray).

Procedure

After arrival in the operation theatre, fasting status, written informed consent and PAC were checked. Routine non-invasive monitors attached and baseline parameters i.e. HR, SBP, DBP, MAP, and SpO₂ were noted. Intravenous line was secured and I.V. fluid was started. Patients were premedicated with Inj Glycopyrolate 0.004mg/kg and Inj Midazolam 0.05mg/kg. Data was collected 10 minutes after premedication (just prior to spray of study drug). Study drug was given and data was collected just before intubation.

Induction was done with Inj. Thiopentone sodium 5mg/kg I.V. followed by Inj. Succinylcholine 2mg/kg I.V. followed by IPPV with 100% oxygen for 3 minutes. Direct laryngoscopy was done and patient was intubated after three minutes of spray of study drug. Patients intubated after more than 1 attempt or more than 30 seconds were excluded from the study. Inj. Atracurium 0.5mg/kg I.V. loading dose given & Data was collected at 1 min, 3min, 5min and 10 minutes after intubation. Then surgery was allowed to commence after 15 minutes of intubation & anaesthesia was maintained with 60% Nitrous Oxide and 40% Oxygen, 1% isoflurane/sevoflurane and inj. Atracurium 0.1 mg/kg I.V. SOS. EtCO₂ monitoring was done throughout the procedure. At the end of the surgery patient was reversed with Inj.

Neostigmine (0.05 mg/kg I.V.) and Inj. Glycopyrrolate (0.008mg /kg I.V.) & extubation was done. Patient was shifted to recovery room. Patient was observed for any side effects.

Statistical Analysis:

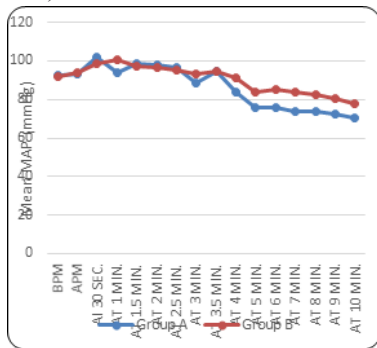
All the data was entered into a Microsoft excel spreadsheet and was analyzed statistically using SPSS statistical software, version 21 for Windows statistical software package (SPSS Inc., Chicago II, USA). The categorical data was presented as numbers (per cent) and compared among groups using Chi square test. The quantitative data were presented as mean and standard deviation and compared by Student t-test.

Observation And Results

Demographic data like Patient's age, weight, sex, ASA grade were statistically comparable among groups. NTG 800 mcg and Lignocaine groups had equal number of subjects with ASA grade I and II.

base line heart rate was comparable between the groups (P>0.05). After premedication, there was increase in HR in all groups, however there was no significant difference among the groups (P>0.05). After intubation, the HR was significantly higher in lignocaine group as compared to NTG 800 mcg group (P<0.001). There after the HR decreased in all groups, difference in HR till 10minutes after intubation was statistically significant at most times(P<0.05).

The mean baseline variables (HR, SBP, DBP & MAP) were statically comparable in both groups (table no.1). After premedication, in both groups mean SBP, DBP, and MAP were increased from baseline value. Among the groups, difference was statistically non-significant. After intubation, in both groups mean SBP, DBP & MAP increased from baseline value but maximum increase was seen in lignocaine group (table no.1). In NTG group mean SBP, & MAP returned to baseline 1 min after intubation and DBP returned to baseline after 3 minutes, but in lignocaine group all parameter remained consistently high from base line (table no.1). Among the groups, difference was statistically significant in SBP, DBP and MAP.



Graph 1: Intergroup comparison of Mean Arterial Pressure (MAP)

Table no.1 Intergroup comparison of hemodynamic parameters.

	Mean heart rate			Mean SBP mmHg			Mean DBP mmHg			Mean arterial pressure in mmHg		
	Group A	Group B	p-value	Group A	Group B	p-value	Group A	Group B	p-value	Group A	Group B	p-value
Pre	81.44(±11.50)	79.25(±10.09)	0.992	124.56(±12.65)	123.31(±14.38)	0.694	76.67(±6.71)	76.50(±10.87)	0.942	92.61(±6.34)	92.11(±11.55)	0.832
Induction	87.61(±11.41)	88.44(±9.07)	0.633	126.72(±12.08)	126.39(±12.05)	0.907	76.39(±6.09)	77.31(±6.00)	0.653	93.22(±6.91)	93.67(±6.67)	0.831
1min	108.56(±14.99)	91(±11.53)	0.001	120.72(±12.20)	137.06(±9.73)	0.009	80.59(±7.88)	81.44(±6.36)	0.019	93.93(±6.00)	100.36(±6.65)	0.001
3min	98.94(±9.23)	92.89(±9.20)	0.006	119.00(±12.57)	125.84(±13.10)	0.031	74.39(±6.15)	80.14(±10.57)	0.025	88.50(±6.40)	93.44(±10.98)	0.025
5min	93.88(±8.53)	89.00(±9.07)	0.027	119.92(±10.42)	120.61(±12.57)	0.799	61.47(±6.34)	68.73(±6.05)	0.006	73.94(±6.05)	83.94(±6.85)	P<0.001
10min	88.26(±9.87)	87.28(±9.64)	<0.001	101.81(±6.68)	111.86(±11.73)	P<0.001	54.53(±6.81)	60.94(±6.31)	0.006	70.33(±6.67)	77.92(±6.07)	P<0.001

DISCUSSION

Most of the general anaesthetic procedures in the modern anaesthesia practice are carried out with endotracheal intubation. The hemodynamic response to laryngoscopy and intubation, comprising of elevation in heart rate and rise in systolic and diastolic pressure, are well known. The magnitude of hemodynamic changes observed may depend on various factors such as depth of anaesthesia, whether any measure has been taken prior to airway manipulation, the anaesthetic agent used, the duration of laryngoscopy and attempt of intubation.

Laryngoscopy and intubation cause sympathetic stimulation leading to pressor response characterized by approximately 20% rise in HR and 40-50% rise in blood pressure^[9] which can be tolerated well by normal patients but may cause deleterious effects in patients with hypertension or ischemic heart disease (IHD)^[10].

Nitro-glycerine is available for various routes of administration such as intravenous, sublingual tablet, ointment and pen spray. Kailash Chandra Sharma *et al* in 2015^[11] used Nitroglycerine sublingually to attenuate pressor response due to laryngoscopy and intubation. Other studies have reported effective attenuation of pressor response to NTG by intra nasally ointment, intravenously as bolus and infusion. Indira Kumara *et al* in 2016^[12] used Nitro-glycerine lingual spray for attenuation of pressor response following intubation. In view of above studies, we employed oral spray of Nitro-glycerine due to ease of administration.

Richard A Kraut^[13] in 1983 compared intravenous and topical laryngotracheal lignocaine and found that topical laryngotracheal is the preferred way to control MAP than intravenous route to attenuate stress response to laryngoscopy and intubation. Robert K. Stoelting^[14] used 2% lignocaine viscous mouth wash and gargles five minutes before induction and concluded that pressor response was attenuated. Lignocaine has been tried as intravenous administration prior to laryngoscopy, mouth gargles in various concentration of sprays. The mechanism of action of lignocaine in blunting pressor response differs according to the method of administration. Local administration like gargles and sprays may be effective due its local anaesthetic property at the base of tongue and pharyngeal walls preventing the receptor stimulation. In view of this, in the present study we employed oropharyngeal lignocaine and Nitro-glycerine spray.

There was a significant rise in pulse rate during laryngoscopy and endotracheal intubation in both groups, heart rate rises with NTG and lignocaine but more rise with NTG was statistically significant. The mean heart rate did not come to the pre induction levels even by 10th minute both group. We observed that NTG and lignocaine spray does not attenuate the rise in HR. Mikawa K *et al*^[15], Williams D O *et al*^[16], Dich-Nielsen J *et al*^[17], Grover VK, Sharma S *et al*^[18] have also documented that NTG and lignocaine does not attenuate the rise in HR after intubation which can be attributed to reflex tachycardia produced by vasodilation.

In the present study, SBP was significantly reduced in NTG groups compared to the control group at 1 minutes and post-induction from base line and in lignocaine SBP rise at 1 and 3 min and reduced at 5 min. The statistical analysis showed a significant decrease in SBP in the NTG group compared to the lignocaine group. Madhuri Gopal V *et al*^[19], Manjusha JR *et al*^[20] have also documented significant decrease in SBP in the NTG group compared to the lignocaine group.

DBP decreased with NTG within 3 min but with lignocaine DBP rise up to 5 min which was statistical significant. The statistical analysis showed a significant decrease in DBP in the NTG group compared to the lignocaine group. These results was also similar with previous studies of Madhuri Gopal V *et al*^[19] and Manjusha JR *et al*^[20].

In the present study after laryngoscopy and endotracheal intubation, the lignocaine group had an increase in mean arterial pressure and the nitro-glycerine group had a decrease in mean arterial pressure. So, as per study, NTG spray decreases the MAP statistically significantly as compared to lignocaine following laryngoscopy and endotracheal intubation. Among the two drugs studied in the present study, NTG spray proved to be the better choice for attenuation of hemodynamic responses to laryngoscopy and endotracheal intubation. Kumari I *et al*^[21], Madhuri Gopal V *et al*^[19], Manjusha JR *et al*^[20], Van den Berg AA *et al*^[22] and Ravindra B Jalkote *et al*^[23] have also documented that NTG spray proved to be the better choice for attenuation of hemodynamic responses to laryngoscopy and endotracheal intubation.

CONCLUSION

Nitro-glycerine spray 2 puffs (800 mcg) orally before induction, effectively attenuated arterial pressure response to laryngoscopy and intubation as compared to lignocaine spray 10 puffs 10%. Hence, it is concluded that Nitro-glycerine oral spray in the dose of 800 mcg, given before induction can be a better alternative in attenuating the haemodynamic responses to laryngoscopy and intubation without adverse side effects.

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