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ORIGINAL ARTICLE

ATTENUATION OF HEMODYNAMIC RESPONSE TO DIRECT LARYNGOSCOPY AND INTUBATION USING 10% LIGNOCAINE SPRAY: A CLINICAL STUDY

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ABSTRACT: Hemodynamic response to Laryngoscopy and Intubation is a well-known problem since long time and there are many studies conducted to attenuate this presser response, the present study is undertaken to study the effect of 10% lignocaine spray for suppressing the cardiovascular responses to tracheal intubation. **METHODS:** Thirty nine Patients of either sex aged between 20-60years of age, belonging to ASA Grade I and II, undergoing elective surgery requiring General Anesthesia with endotracheal intubation were included for the study. After recording the baseline Heart Rate, Systolic Blood Pressure and Diastolic Blood Pressure lignocane spray 10% meter dose was used to anaesthetise glasoepiglotic fold before premedication. Anaesthesia induced with propofol and succinylcholine to assist direct laryngoscopy and intubation. Heart rate, systolic blood pressure, diastolic blood pressures were recorded after premedication, induction and immediately after intubation. **RESULTS:** Heart Rate, Systolic blood Pressure, Diastolic Blood Pressure and rate pressure product of 39 patients included in the study were analyzed and compared from baseline parameters to after intubation. **CONCLUSION:** Study concluded that 10% lignocaine spray is a simple and probably one of the most effective methods in attenuating hemodynamic response to laryngoscopy and intubation.

KEYWORDS: Haemodynamic response, Laryngoscopy and intubation, 10% lignocaine spray.

INTRODUCTION: Direct laryngoscopy and intubation leads to reflex release of catecholamines resulting in hemodynamic response meaning transient increase in heart rate, systolic blood pressure, diastolic blood pressure,[1-2] and occasionally cardiac arrhythmias.[3] It is a self-limiting in most of the patients however it can leads to morbidity and mortality in patients having coronary artery disease and raised intracranial tension.[4-5] Hence many attempts have been made to attenuate this presser response. Although this hemodynamic response is due to sympathetic adrenergic reflex to laryngoscopy and intubation, most of the studies or the approach using different agents are aimed at blocking the effect of the reflex rather than preventing the stimulation starting from inducing agents thiopentone, propfol[6] analgesics,[7] different opioids,[8-9] beta blockers,[10-11] calcium channel blockers,[12-13] sodium channel blocker[14] and of late alpha2 agonists.[15] Some attempts made to reduce the stimulation include different techniques of intubation, Blaind oral intubation,[16] fiber optic intubation.[17] Few attempts by anaesthetizing the posterior part of tongue and valecula are also made by nerve block(glossopharyngial, laryngeal and transtracheal nerve)[18-19] Lignocaine 2% viscus gargling,[20] topical spray 4%[21] and 10%[22] most of the methods used to attenuate the presser responses are effective. This study with lignocaine 10% aerosol metered dose spray is an attempt to provide simple effective and not very expensive method.

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METHODOLOGY: After taking ethical committee clearance and informed consent, 39 patients of either sex in the age group of 20-60 years of age, belong to ASA Grade I and II physical status undergoing different surgeries, requiring general anesthesia with endotracheal intubation, without any air way difficulties were included for the study.

The exclusion criteria included patients with Hypertension, diabetes mellitus, Ischemic heart disease, obesity and patients with any other co-morbid diseases.

Lignocaine 10% topical aerosol metered dose spray with 10mg/puff is used for the study. It is commercially available in 50 ml bottle containing 500metered doses with a dispenser nozzle which is long and convenient for the use, which can be sterilized with either antimicrobial liquids in gauze or boiled in the water for 5 minutes or by both. Each ml of formulation contains, Lignocaine USP 100mg, Ethanol I.P 30.4% v\v, Flavored base q s.

During pre-anaesthetic assessment, a detailed history and examination of each patient was carried out to optimize them prior to induction of anaesthesia. After placement of intravenous canula, all the patients were pre medicated with injection midazolam 1 mg, injection ondansetron 4mg and injection ranitidine 50 mg. Baseline Pulse rate, systolic BP and diastolic BP were recorded using L & T STAR PLUS turbo multichannel monitor in the pre-operative area.

Patients were explained about the procedure and made to sit on the bed with legs hanging down, person applying the spray was standing opposite to the patient and asked to open the mouth as widely as possible and put the tongue out so that tongue can be held in the left hand with gauze (right handed person) as in the indirect laryngoscopy. The spray applied twice or maximum three times with the nozzle pointing downwards and anterior, the objective being anaesthetizing posterior part of the tongue and glasoepiglotic fold the area which comes in contact with distal part of laryngoscope blade. In patients where posterior pharynx cannot be visualized, patients were asked to say 'AH' to get the tip of the nozzle in appropriate position before applying the spray. After three minutes patients were shifted to operation theatre.

On arrival in the operating room, all patients ECG, SPO2, Heart rate, systolic blood presser, Diastolic blood presser were recorded and injection Fentanyl 1-2 mcg/kg was administered 1-2 min before induction. After preoxygenation with 100% oxygen general anaestheia was induced with injection propafol 2- 2.5mg/kg till the loss of verbal commands. Neuromuscular blockade to facilitate endotracheal intubation was achieved by succinylcholine 100mg. After ventilating with 100% O2 for 1min, gentle laryngoscopy was done with No.3 size macinthosh blade and intubated with appropriate size oral endotracheal tube. Anaesthesia is maintained with Isoflurane in 60% N2O / 40% O2 mixture and vecuronium bromide 0.1 mg/kg. IPPV with Bain circuit.

Pulse rate, systolic B.P, diastolic B.P was recorded after induction and immediately after intubation. Results were compared with base line parameters.

RESULTS: To begin with since 1951several studies shown that there will be increase in heart rate, systolic B.P and diastolic B.P after laryngoscopy & intubation, Hence in this study placebo was excluded. More over the different parameters were compared from baseline parameters to after intubation parameters and analyzed:

- All the data's are presented in mean and SD.
- P values calculated, Percentage calculated for analysis.
- Pulse rate beats/min.

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	Base line	Pre Medication	Induction	Laryngoscopy & Intubation
Mean	83.28	86.15	86.26	97.28
Standard deviation	12.79	14.16	15.81	14.87

'P' value comparing baseline to laryngoscopy and intubation.

P > 0.0001 highly significant, but comparing the baseline to Laryngoscopy and intubation values, i.e. 83.28, SD 12.79 to 97.28, SD 14.87 in percentage terms is around 13% increase.

Systolic blood pressure in mmHg:

	Base line	Pre medication	Induction	Laryngoscopy & intubation
Mean	122.38	124.6	116.79	125.28
SD	10.30	14.88	14.00	20.87

'P' value comparing baseline to laryngoscopy and intubation.

P < 0.441 highly insignificant Comparing baseline to Direct laryngoscopy & intubation values, i.e. 122.38, SD 10.30 to 125.28, SD 20.87 in percentage terms it is around 2.25% increase.

Diastolic Blood pressure in mmHg:

	Base line	Pre medication	Induction	Laryngoscopy & intubation
Mean	75.87	76.23	72.59	78.10
S.D	9.83	10.01	12.79	15.50

'P' value comparing baseline to laryngoscopy and intubation.

P < 0.431, highly insignificant.

Comparing Baseline and direct laryngoscopy and intubation values i.e. 75.87, SD 9.83to 78.10, SD 15.50 in percentage terms, it is around 3% increases.

Rate Pressure Product:

	Base Line	Pre medication	Induction	Laryngoscopy & intubation
Mean	10240.8	10820.87	9795.08	1276.67
S.D	1836.04	1952.4	2786.94	3517.01

'P' value comparing to base line to laryngoscopy & intubation.

P > 0.006 significant.

Comparing Baseline and direct laryngoscopy and intubation values i.e. 10240.8 S.D 1836.04 to 12166.67 S.D 3517.01 in percentage terms increase is around 19%.

Although the results of the present study, attenuation of hemodynamic response to laryngoscopy and intubation can be compared with the results of the best results of the other studies conducted for the purpose with different agents, these results clearly show the Blood pressure part of the response was significantly blocked by 10% lignocaine spray, while anaesthetizing base of tongue

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and valecula. Heart rate response could not be blocked significantly because the spray did not anaesthetize the vocal cords and trachea below leading to significant increase in rate pressure product which is crucial in preventing the morbidity and mortality due to stress response to laryngoscopy and intubation. It is found in this study that increase in heart rate is more pronounced after inflation of the endotracheal tube cuff than intubation per se.

DISCUSSION: King[23] reported reflex response to laryngoscope and intubation in the form of increase in heart rate, increase in systolic and diastolic blood pressure in 1951. Hence a little about the nerve supply, superior and recurrent laryngeal nerve is the main sensory nerve supply of larynx arise from inferior ganglion of the vagus but receives a small branch from superior cervical sympathetic ganglion. Glosopharyngial nerve, supplys sensory to the posterior 1/3rd of the tongue and the superior surface of epiglottis.

Wyckoff in 1960[18] by giving transtracheal, bilateral superior laryngeal nerve blocks and spraying the pharynx, larynx and trachea, achieved lesser increase in MAP than without it.

Robert K. Slotting[20] achieved similar results by much easier way by using 2% lignocaine viscous mouth wash and gargle five minutes before induction concluded presser response was attenuated but the increase heart rate in response to tracheal intubation could not be blocked.

Richard A Kraut[21] in 1983 compared intravenous and topical laryngotracheal lignocaine and found topical laryngotracheal is the preferred way to control MAP than intravenous route to attenuate stress response to laryngoscope and intubation.

Smith.J E and colleagues[17] compared nasotracheal intubation by fiber optic and direct laryngoscope intubation in 1989, noted significantly lower arterial pressure but higher heat rate in fibro optic group confirming the force applied by the direct laryngoscopy is the main reason for increase in arterial blood pressure than intubation.

T. Pernestorfer et al[16] in 1995 compared direct laryngoscopy intubation and blind oral intubation found increase in B.P and noradrenalin is significantly increase in direct laryngoscopy and intubation than blind oral even though blind oral intubation taken longer duration to achieve possible explanation being the force applied by direct laryngoscopy.

A J Shribman and colleagues[24] in 1986 found, B.P increase was due to laryngoscopy even without intubation but tachycardia was mainly due to intubation while comparing the hemodynamic response to laryngoscopy with or without intubation. All these studies consistently found increase in blood pressur is mainly by laryngoscopy, is due to force applied by distal part of the laryngoscope blade and increase in heart rate is due to tracheal intubation. Even in the study conducted by me it is found tachycardia was due to endotrachealtube cuff inflation than intubation itself, Only logical explanation for this could be laryngoscopy lead to alpha adrenergic receptors stimulation producing the increase in blood pressure, incidentally GIT dominated by alpha receptors, intubation leads to stimulation of beta adrenergic receptors producing tachycardia, also respiratory tract is dominated by beta receptors.

In 1999, Mubarak Jain et al[22] used 10% lignocaine spray to attenuate hemodynamic response to laryngoscopy and intubation found significant success in that compared to normal saline spray, in that the method was total 10 times spray on the table 2 min before induction.

In this study 10% lignocaine spray was used only twice or maximum three times in the pre-operative area, 5-10min before induction and the most important is technique used to spray the

valecula is like the IDL (indirect Laryngoscopy) way will achieve the proper anaesthetization of posterior part of tongue and valecula resulting in better outcome.

CONCLUSION: From the present study it can be concluded that, marked rise in Heart rate, Systolic blood pressure, Diastolic blood pressure and Rate pressure product occur one minute following laryngoscopy and intubation. 10% lignocaine spray in the dose of one metered dose given 3-5 minutes before laryngoscopy and intubation blunts the cardiovascular response to intubation. The effect of lignocaine spray is more marked on the blood pressure changes rather than the heart rate changes.

One metered dose of 10 % lignocaine spray given 3-5 minutes before laryngoscopy and endotracheal intubation is helpful in attenuating the cardiovascular responses to intubation.

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