

A Clinical Study of 10% Lignocaine Spray For Attenuation of Hemodynamic Response to Direct Laryngoscopy

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Abstract

Introduction: Hemodynamic response to Laryngoscopy is a well-known problem since long time and there are many studies conducted to attenuate this pressure response, the present study is undertaken to study the effect of 10% lignocaine spray for suppressing the cardiovascular responses to tracheal intubation.

Methods: Sixty Patients of either sex aged between 18-60 years of age, belonging to ASA Grade I and II, undergoing elective surgery requiring General Anaesthesia with endotracheal intubation were included for the study. After recording the baseline Heart Rate, Systolic Blood Pressure and Diastolic Blood Pressure, lignocaine spray 10% was used to anaesthetise glottic 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 of 60 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, 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 lead 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 pressure 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, propofol^[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, Blind oral intubation^[16], fiber optic intubation. Few attempts by anaesthetizing the posterior part of tongue and valecula are also made by nerve block(glossopharyngial, laryngeal and transtracheal nerve)^[17,18], Lignocaine 2% viscus gargling^[19], topical spray 4%^[20] and 10%^[21], most of the methods used to attenuate the pressure responses are effective. This study with lignocaine 10% aerosol metered dose spray is an attempt to provide simple effective and not very expensive method.

Methods

After taking ethical committee clearance and informed consent, 60 patients of either sex in the age group of 18-60 years of age, belong to ASA Grade I and II physical status undergoing different surgeries, requiring general anaesthesia 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. 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 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 glassoepiglottic 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. In the operation theatre, ECG, SPO2, Heart rate, systolic blood pressure, Diastolic blood pressure were recorded and injection tramadol 2 mg/kg was administered 1-2 min before induction. After preoxygenation with 100% oxygen general anaesthesia was induced with injection propofol 2-2.5mg/kg till the loss of verbal commands. Neuromuscular blockade to facilitate endotracheal intubation was achieved by succinylcholine 2mg/kg. After ventilating with 100% O2 for 1min, gentle laryngoscopy was done with appropriate size macintosh blade and intubated with appropriate size oral endotracheal tube. Anaesthesia is maintained with Isoflurane in 60% N2O / 40% O2 mixture and vecuronium bromide, 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

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.

Table 1: Pulse rate beats/min.

	Base	Pre	Inductio	Laryngoscop
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	line	Medicatio n	n	y
Mean	80.3 4	85.76	86.89	95.78
Standard deviatio n	11.6 5	13.78	14.76	14.63

‘P’ value comparing baseline to laryngoscopy and intubation. $P > 0.0001$ highly significant, but comparing the baseline to Laryngoscopy and intubation values, i.e. 80.34, SD 11.65 to 95.78, SD 14.63 in percentage terms is around 13% increase.

Table 2: Systolic blood pressure in mmHg:

	Baselin e	Premedicati on	Inductio n	Laryngosco py
Mean	122.64	124.54	116.67	125.64
Standar d deviatio n	10.40	14.55	14.10	19.98

‘P’ value comparing baseline to laryngoscopy and intubation. $P < 0.441$ highly insignificant Comparing baseline to Direct laryngoscopy & intubation values, i.e. 122.64, SD 10.40 to 125.64, SD 19.98 in percentage terms it is around 2.25% increase.

Table 3: Diastolic Blood pressure in mmHg:

	Base line	Premedicatio n	Inductio n	Laryngoscop y
Mean	75.6 7	76.45	72.67	78.31
Standar d	9.78	10.14	12.56	15.45

d deviatio n				

‘P’ value comparing baseline to laryngoscopy and intubation. $P < 0.431$, highly insignificant. Comparing Baseline and direct laryngoscopy and intubation values i.e. 75.67, SD 9.78 to 78.31, SD 15.45 in percentage terms, it is around 3% increases.

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 and valecula. Heart rate response could not be blocked significantly because the spray did not anaesthetise the vocal cords and trachea below. 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^[22] 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^[17] 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^[10] achieved similar results

by much easier way by using 2% lignocaine viscous mouth wash and gargle five minutes before induction concluded pressure response was attenuated but the increase heart rate in response to tracheal intubation could not be blocked. Richard A Kraut^[20] 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. A J Shribman and colleagues^[23] 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 pressure 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 our study it is found tachycardia was due to endotracheal tube 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, intubation leads to stimulation of beta adrenergic receptors producing tachycardia, In 1999, Mubarak Jain et al^[21] 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 volacula is like the IDL (indirect Laryngoscopy) way will achieve the proper anaesthetization of posterior part of tongue and volacula 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 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.

References

1. Russell WJ, Morris RG, Frewin DB, et al. Changes in plasma catecholamine Concentration during endotracheal intubation. *Br J Anaesth* 1981; 53: 837-9.
2. Derbyshire DC, Chemielewski A, Fell D, et al. Plasma catecholamine responses to tracheal intubation. *Br J Anaesth* 1983; 55: 855-
3. Gibbs JM. The effects of endotracheal intubation on cardiac rate and rhythm. *N Z Med J* 1967; 66: 465.
4. Fox EJ, Sklar GS, Hill CH, et al. Complications related to the pressor response to endotracheal intubation. *Anaesthesiology* 1977; 47: 524-5.
5. Edwards DN, Alford AM, Dobson PMS, Peacock JE, Reilly CS. Myocardial ischaemia during tracheal intubation and extubation. *Br J Anaesth* 1994; 73: 537-539.
6. Mustola ST, Baer GA, Metsa-Ketela T, Laippala P. Haemodynamic and plasma catecholamine responses during total intravenous anaesthesia for laryngomicroscopy. Thiopentone compared with propofol. *Anaesthesia* 1995; 50: 108-13.
7. Riad W, Moussa A. Lornoxicam attenuates the hemodynamic response to laryngoscopy and intubation in elderly. *Eur J Anaesthesiol* 2008; 25: 732-6.

8. Miller DR, Martineau RJ, O'Brien H, et al. Effects of alfentanil on the hemodynamic and catecholamine response to tracheal intubation. *Anesth Analg*; 1993; 76 (5): 1040-6.
9. Thompson JP, Hall AP, Russell J, Cagney B, Rowbotham DJ. Effect of remifentanil on the haemodynamic response to orotracheal intubation. *Br J Anaesth* 1998; 80: 467-9.
10. Miller DR, Martineau RJ, et al. Bolus administration of esmolol in controlling the hemodynamic response to tracheal intubation. *The Canadian Multicentre Trial. Can J Anaesthesia* 1991.
11. Coleman AJ and Jordan C. Cardiovascular responses to anaesthesia, influence of beta adrenoceptor blockade with metoprolol. *Anaesthesia* 1980; 35: 972-8.
12. Mikwa K, Obra H, Kusunoki, et al. Effect of nicadepin on the cardiovascular response to tracheal intubation. *Br J Anaesth*; 1990; 64: 240-2.
13. Mikawa K, MNishina k, Maekawa N, et al. Comparison of nicardipin, diltiazem and verapamil for controlling the cardiovascular response to tracheal intubation. *Br J Anaesth* 1996; 76: 221-26.
14. Manjunath HG, Venkatesh GS, Prima V, Jennifer Leigh V, Sathees BC Chandra. Can calcium and sodium channel blockers attenuate hemodynamic responses to endotracheal intubation? *Eur J Gen Med* 2008; 5 (4): 198-207.
15. Bajwa SS, Kaur J, Singh A, Parmar SS, Ssingh G, Kulashrestha A, et al. Attenuation of pressor response & sparing of opioids and anaesthetics with pre-operative dexmedetomidine. *Indian J Anaesth.* 2012; 56: 123-8.
16. Pernerstorfer T, Krafft P, Fitzgerald RD, et al. Stress response to tracheal intubation: direct laryngoscopy compared with blind Oral intubation. *Anaesthesia* 1995; 50: 17-22.
17. Wycoff CC. Endotracheal intubation: effects on blood pressure and pulse rate. *Anesthesiology* 1960; 21: 153-158.
18. Denlinger JK, Ellison N, Ominsky AJ. Effects of intratracheal lidocaine on circulatory response to tracheal intubation. *Anaesthesiology* 1974; 41 (4): 409-12.
19. Stoelting RK. Circulatory response to laryngoscopy & tracheal intubation with or without prior oropharyngeal lidocaine. *Anaesth Analg* 1977; 56: 618-621.
20. Richard A Kraut. A comparison of intravenous and laryngotracheal lidocaine before endotracheal intubation. *Anaesthesia progress* 1983; 2: 34-36.
21. Mubrak J, et al. Efficacy of topical lignocaine spray (10%) applied before the induction of anaesthesia in attenuating the pressor response to direct laryngoscopy and endotracheal intubation in controlled hypertensive patients. *The internet journal of anaesthesiology* 2009; 20: 2
22. King BD, Harris LC, Greifenstein FE, Elder MD, Dripps RD. Reflex circulatory responses to direct laryngoscopy and tracheal intubation performed during general anesthesia. *Anesthesiology* 1951; 12: 556-566.
23. Shribman AJ, Smith G, Achola KJ. Cardiovascular and catecholamine response to laryngoscopy with and without endotracheal intubation. *Br J Anaesth* 1987; 59: 295-9.60.