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Research Article

A PROSPECTIVE COMPARATIVE STUDY OF LIGNOCAINE JELLY VERSUS LIGNOCAINE SPRAY IN ATTENUATING THE HEMODYNAMIC STRESS RESPONSE DURING LARYNGOSCOPY AND INTUBATION

KHURANA T *

North DMC Medical college and Hindu Rao Hospital Delhi 110007.

Corresponding Author: Dr. **Khurana T**

ABSTRACT

Background: Laryngoscopy and tracheal intubation can cause sympathoadrenal stimulation and cause fluctuations in heart rate, rhythm and arterial pressure. These can be detrimental in patients with critically balanced cardio-respiratory system. An attempt was made to look for simple yet effective means to blunt the stress response. **Method** : Ninety patients requiring orotracheal general anesthesia were studied. Premedication, induction agent and anesthesiologist was constant in all patients. In Group 1, Lignocaine jelly 2% was applied on endotracheal tube tip and cuff. In Group 2, six puffs of lignocaine 10% was sprayed to larynx and vocal cords . Group 3 was the control group. **Result**: Rise in mean heart rate from operation theatre baseline value during laryngoscopy and intubation was 18% in group 1, 20.65% in group 2, 17.6% in group 3 .One minute after, a rise of 24.7%, 22.8%, 24.2% was noted in the three groups respectively($p<0.001$). Rise in mean systolic blood pressure of 6.6%, 11.90%, 8.10% was observed during laryngoscopy in the three groups respectively. One minute after, a rise of 12.4%, 13.6%, 13.2% respectively was recorded ($p<0.001$). Diastolic blood pressure also rose significantly.**Conclusion**: Magnitude of response was similar in lignocaine jelly and control group. In lignocaine spray group, the stress response noted at first laryngoscopy was similar to other groups. A further increase was observed at second laryngoscopy. Stress response seen in all the three groups was more at one minute after laryngoscopy than during laryngoscopy. Thus neither lignocaine jelly application nor lignocaine spray done via direct laryngoscopy was effective.

KEY WORDS: Hemodynamic stress response, Lignocaine jelly, Lignocaine spray

INTRODUCTION

Laryngoscopy and tracheal intubation can cause sympathoadrenal stimulation and cause fluctuations in heart rate, rhythm and arterial pressure. These fluctuations are the manifestations of stress on the body in response to mechanical stimuli of laryngoscopy and tracheal intubation. Subarachnoid hemorrhage, [1] cardiac failure, [2] myocardial ischemia are reported as some of the grave consequences. Several preventive measures have been proposed to attenuate the pressor response. A number of drugs such as Nitroglycerin, Sodium Nitroprusside, Morphine, Fentanyl and its congeners, Esmolol , Midazolam , Clonidine, Lignocaine jelly, Lignocaine spray , intravenous Lignocaine have been tried to blunt the stress response with varying success rate. An attempt was made to look for simple yet effective means to ameliorate the hemodynamic stress response especially for patients on multiple drug therapy.

MATERIAL AND METHODS

ETHICAL APPROVAL

The procedures followed were in accordance with the ethical standards of the responsible institutional committee on human experimentation and with the latest revision of Helsinki Declaration. Informed consent was obtained from all patients

This clinical study was conducted on ninety adult patients belonging to ASA class I or II of either sex in the age group 25-65 years and weighing between 45-70 kgs. These patients were scheduled for elective surgery of one to three hours duration from various specialties like general surgery, urology, orthopedics, oto-rhino-laryngology and gynecology. Patients with cardiovascular disease, systemic hypertension, endocrine disorders, allergic diathesis and those on long term steroid therapy or beta- blockers were excluded from the study.

Each patient was examined thoroughly by the Anesthesiologist during the Pre-anaesthetic check up. Weight, basal heart rate, blood pressure, electrocardiogram and chest x-ray were obtained for each patient in addition to other required investigations. Informed consent was obtained from all patients. They were premedicated uniformly with intramuscular injection of Morphine 0.2mg/kg body weight, Promethazine 0.5mg/kg body weight and a uniform dose of Atropine 0.6mg together one hour before the proposed induction of anesthesia. All patients were divided into three groups of thirty each according to the method attempted to suppress the intubation stress as follows:

Group 1 Lignocaine jelly group : Lignocaine jelly 2% was applied on endotracheal tube tip and cuff

Group 2 Lignocaine spray group : Lignocaine spray 10%, six puffs of lignocaine 10%, total 60 mg was sprayed to larynx and vocal cords

Group 3 Control group : None of the above mentioned methods were used to suppress the intubation stress response.

All anesthetic and monitoring equipment were checked. Appropriate size of endotracheal tube kept ready, the cuff inflated and inspected for leaks. In patients of group 1 the tip and cuff of the endotracheal tube were lubricated with 2% Lignocaine jelly. The patient was received into the operation theatre. Multiparameter monitor (Hewlett Packard M3 Virdia M3046A) and blood pressure cuff were attached. Electrocardiogram leads were fixed and connected to the cardiac monitor (Lifepak 20 Medtronics). Basal recordings of heart rate and blood pressure were noted before intravenous infusion was started. Then an intravenous line was started using eighteen gauge cannula. Preoxygenation of the patient for three minutes, at a flow of six liters/minute, via a non-rebreathing circuit was done. All patients were induced with slow intravenous injection of Thiopentone sodium four mg/kg body weight. Lungs were inflated gently adding Nitrous oxide six liters to three liters Oxygen flow, while observing the vital parameters. After the eyelash reflex of the patient disappeared, check ventilation was done and then Suxamethonium 1.5 mg/kg was administered intravenously. One minute after Suxamethonium injection the head was gently tilted back and laryngoscopy and intubation performed with a proper size of endotracheal tube lubricated with Lignocaine jelly in group 1 patients. Heart rate, systolic and diastolic blood pressure readings were recorded before, during and at one minute, five minute and fifteen minutes following laryngoscopy and intubation. In patients of Group 2, thirty seconds after Suxamethonium, laryngoscopy was performed and six puffs of 10% Lignocaine(total 60mg) sprayed to larynx

and vocal cords using Astra Zeneca Pharma India (Bangalore, India) spray . Then laryngoscope was removed and subsequently the patient was manually ventilated for another thirty seconds. Laryngoscopy was performed again and intubation done. Heart rate, systolic and diastolic blood pressure were noted just before, during and at one minute, five minute and fifteen minutes after intubation. In group 3 patients, one minute after Suxamethonium, laryngoscopy and tracheal intubation was performed. Neither Lignocaine jelly nor Lignocaine spray was used. Hemodynamic parameters were noted during and at one minute, five minute and fifteen minutes after intubation.

The breathing circuit was connected and 1% Isoflurane added to the breathing mixture of O2:N20. Vecuronium bromide 0.08 mg/kg intravenously was administered to ensure adequate skeletal muscle relaxation. Subsequently, all patients were mechanically ventilated by Datex Ohmeda 7000 ventilator at tidal volume of ten ml/kg and respiratory rate of fourteen per minute. At the end of surgery, relaxant effect was reversed by Atropine 1.2 mg and Neostigmine 2.5 mg given intravenously as a single injection. Extubation was carried out when ventilation and muscle tone were clinically adequate. The results were compiled and analyzed statistically using appropriate tests.

Statistical analysis

Chi square test was applied for the cross tabulations between the groups for age, sex, weight and ASA class Paired sample test was applied to compare the baseline value with all subsequent values Student t test was done to compare the data in each group with respect to other groups for all the parameters

RESULTS

The age, sex, body weight and ASA Class distribution is comparable among the three groups. The demographic data is presented in the table for all the three groups [Table 1].

Table 1: Patient demographic data

PARAMETERS RECORDED	LIGNOCAINE JELLY	LIGNOCAINE SPRAY	CONTROL GROUP
	n=30	n=30	n=30
MEAN AGE IN YEARS	38.5	40	40
MEAN BODY WEIGHT IN KGS	57.93	58.83	59.3
SEX M:F	13:17	12:18	10:20
ASA CLASS I:II	22:08	24:06	21:09

A consistent rise in all the parameters—Heart Rate, Systolic and, Diastolic Blood Pressure was noted in all the three groups ($p<0.001$). Rise in mean heart rate, systolic and diastolic blood pressure from baseline value(when patient was received in the operation theatre) both in terms of absolute and percentage value was calculated and is presented in the tables given below [Table 2,3,4].

Table 2: Rise in Mean Systolic Blood Pressure (SBP) both in absolute and percentage from Operation Theatre(OT) baseline value

RISE IN SBP FROM OT BASELINE	LIGNOCAINE JELLY GP	LIGNOCAINE SPRAY GP	CONTROL GP
DURING LARYNGEAL SPRAY(L1)		7 6%	
DURING LSCOPY & INTUBATION(L2)	8 6.60%	14 11.90%	10 8.10%
1MIN AFTER L2	15 12.40%	16 13.60%	16 13.20%

Table 3: Rise in Mean Diastolic Blood Pressure (DBP) both in absolute and percentage from Operation Theatre (OT) baseline value

RISE IN DBP FROM OT BASELINE	LIGNOCAINE JELLY GP	LIGNOCAINE SPRAY GP	CONTROL GP
DURING LARYNGEAL SPRAY(L1)		4 5%	
DURING LSCOPY & INTUBATION(L2)	4 5.10%	9 11.30%	5 6.10%
1MIN AFTER L2	8 10.10%	11 13.80%	10 12.20%

Table 3: Rise in Mean Heart Rate (HR) both in absolute and percentage from Operation Theatre(OT) baseline value

RISE IN HR FROM OT BASELINE	LIGNOCAINE JELLY GP	LIGNOCAINE SPRAY GP	CONTROL GP
DURING LARYNGEAL SPRAY(L1)		13 14.10%	
DURING LSCOPY & INTUBATION(L2)	16 18%	19 20.65%	16 17.60%
1MIN AFTER L2	22 24.70%	21 22.80%	22 24.20%

The magnitude of hemodynamic stress response was similar in lignocaine jelly and control group. In lignocaine spray group, the stress response noted at the time of first laryngoscopy was similar to other groups. A further increase in heart rate and blood pressure was observed at second laryngoscopy. The increase in parameters when compared to baseline values in operation theatre is highly significant clinically and statistically ($p<0.001$). The magnitude of stress response seen was more at one minute after laryngoscopy than during laryngoscopy. Also all the parameters returned to baseline value within fifteen minutes in all the three groups. Thus neither lignocaine jelly application nor lignocaine spray done via direct laryngoscopy was effective in attenuation of the stress response to laryngoscopy and intubation. None of the patients showed any alarming tachycardia calling for emergency resuscitative measure .

DISCUSSION

Stress during direct laryngoscopy and tracheal intubation and means of ameliorating it has been a topic of constant research and study. The mechanical stimulus of laryngoscopy induces autonomic stimulation leading to tachycardia, hypertension, alteration in bronchomotor tone. These may not be of serious consequence in healthy adults but can be disastrous in patients with coronary artery disease, intra-cranial vascular anomalies, hypertensives and in patients with hypersensitive airway. To alleviate such responses, various methods have been adopted in the past. Use of pharmacological agents both intravenous and topical, limiting duration of laryngoscopy, choice of laryngoscopic blades, deepening plane of anaesthesia are measures adopted to meet that end. In the present clinical study, an attempt was made to compare the efficacy of topical anesthesia by lignocaine jelly or lignocaine spray, in attenuation of stress response to laryngoscopy and intubation. The study tried to focus on circulatory changes at various time intervals starting from basic levels when patient was well settled in the operation theatre, through induction, laryngoscopy and intubation Values obtained at each stage were compared with the baseline value.

During laryngoscopy a consistent rise in mean heart rate, systolic blood pressure, diastolic blood pressure was seen in the different groups. The rise in parameters during laryngoscopy and one minute thereafter was very close and comparable in the three groups. Lignocaine jelly applied to the endotracheal tube tip and cuff did not make any difference compared with the control group. In the case of laryngeal spray, where laryngoscopy was done twice, the first laryngoscopy itself resulted in stress response which was further enhanced by second laryngoscopy. The response at second laryngoscopy was even more compared with any other group suggesting that topical local spray done via direct laryngoscopy is not an effective means to attenuate the stress response. May be with a larger dose the response could have been different.

Hypertension and tachycardia during laryngoscopy and tracheal intubation is due to increased sympathetic nervous system activity. This is supported by the finding of Tomori and Widdicombe. [3] They observed that mechanical stimulation of four areas of the airway caused the circulatory changes of which epipharynx was most susceptible. Laurito [4] CE et al evaluated haemodynamic parameters in forty patients .He concluded that lignocaine given intravenously or by aerosol route did not blunt the stress response. Derbyshire [5] D R et al (1987) studied thirty patients who received 4% lignocaine 160 mg using either a Forrester Spray or `Laryng-o-jet' or an equal volume of saline administered by Forrester Spray. In all these groups there were similar and statistically significant increases in mean arterial pressure one minute after intubation, with diminution of these responses by five minutes after intubation . They concluded that topical lignocaine by either spray or jet is ineffective as a measure of ameliorating the pressor response. Their finding is similar to our observation. Mostafa[6] SM et al (1999) observed that systolic blood pressure increased by 18% after intubation in group which received direct laryngeal/tracheal lignocaine spray but no significant change was noted in the group which received orolaryngeal lignocaine spray before induction of anaesthesia. Diastolic blood pressure increase was 28% and 24% respectively in the two groups. Thus topical lignocaine administration as an orolaryngeal spray before induction of anaesthesia is more effective than direct laryngeal spray in reducing but not abolishing the pressor response. Sklar [7] BZ et al concluded that the heart rate and blood pressure response to intubation with lignocaine inhalation was dose dependant. He used 40 mg and 120 mg of lignocaine while in our study 60 mg of lignocaine was used as spray which did not attenuate the stress response. May be higher dose would have proved to be more effective. Venus [8] B et al (1984) observed that lignocaine aerosol (6 ml, 4% for 5 min) prevented hypertension and tachycardia during laryngoscopy and tracheal intubation when compared with saline control. Higher dose for a longer duration than our study could be the reason. Kautto [9] UM et al (1982) concluded that lignocaine dose aerosol or gargling by viscous lignocaine attenuated the magnitude of the pressor response to laryngoscopy and endotracheal intubation but had no effect on the heart rate response. Thus very variable results have been seen in the various studies. Many different administration routes and doses of lignocaine may be responsible for the variable results. Lignocaine is a very versatile drug which can be administered by many routes in various doses for different purposes. The small number of patients in each group in our study might have precluded our ability to detect differences between the groups. Further studies are required to be done encompassing different administration routes of lignocaine in appropriate doses.

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REFERENCES

1. Bedford RF, Feinstein, B. Hospital admission blood pressure: a predictor for hypertension following endotracheal intubation. Anaesth.Analg 1980; 59:367-70.
2. Wycoff CC. Endotracheal intubation: Effects on blood pressure and pulse rate. Anesthesiology; 21:153-8.
3. Tomori Z, Widdicombe JG. Muscular bronchomotor and cardiovascular reflexes elicited by mechanical stimulation of the respiratory tract. J physiol (Lond.) 1969; 200:25 (quoted by Prys Roberts et al 1971).
4. Laurito CE, Baughman VL, Becker GL, Polek WV, Riegler FX, VadeBoncouer TR. Effects of aerosolized and/or intravenous lidocaine on hemodynamic responses to laryngoscopy and intubation in outpatients. Anaesth Analg. 1988 Apr; 67(4):389-92.
5. Derbyshire DR, Smith G, Achola KJ. Effect of topical lignocaine on the sympathoadrenal responses to tracheal intubation. Br J A. 1987 Mar;59(3):300-04.
6. Mostafa SM, Murthy BV, Barrett PJ, McHugh P. Comparison of the effects of topical lignocaine spray applied before or after induction of anaesthesia on the pressor response to direct laryngoscopy and intubation. Eur J. Anaesthesiol.1999Jan; 16(1):7-10.
7. Sklar BZ, Lurie S, Ezri T, Krichelli D, Savir I, Soroker D. Lidocaine inhalation attenuates the circulatory response to laryngoscopy and endotracheal intubation.J. Clin Anaesth. 1992 Sep-Oct; 4(5): 382-5.
8. Venus B, Polassani V, Pham CG. Effects of aerosolized lidocaine on circulatory responses to laryngoscopy and tracheal intubation. Criti. Care Med.1984 Apr;12(4): 391-94.
9. Kautto UM, Heinonen J. Attenuation of circulatory response to laryngoscopy and tracheal intubation: a comparison of two methods of topical anaesthesia. Acta Anaesthesiol Scand.1982 Dec;26(6)599-602.