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ORIGINAL ARTICLE

Prophylactic Intravenous Vs Topical Lidocaine to Blunt Stress Response During Laryngoscopy

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ABSTRACT

Background: The stress response is a common phenomenon occurred during laryngoscopy. Although this response can be transient and less harmful in healthy individuals, it might be hazardous among the many patients with underline disorders.

Aim of the study: The purpose of the study was to compare the two different routes for lidocaine to determine the blunt stress response during laryngoscopy.

Study design: A randomized control study was designed.

Method: This randomized control study design was performed in the Department of Anesthesia, Critical Care, and Pain Medicine at Aziz Bhatti Shaheed Teaching Hospital, Gujrat. The duration of the study was from February 2021 to Jun 2022. The participant of this study was 70 in number having age between 30-60 years and was divided into two groups via a computer-generated randomization sheet. The first group name, group-A contains 35 patients, single dose of 200mg intravenous lidocaine was given before the laryngoscopy procedure. The second group was group B consisted of 35 patients who had to receive the topical (spray) lidocaine in a single dose of 200mg.

Results: Group-A patients who had received the IV, lidocaine had a systolic blood pressure mean ± SD value of 120.03 ± 9.72 with a p-value of 0.021 which indicate the systolic was under control. Diastolic pressure means ± SD value was 75.81 ± 10.46 with a P-value of 0.012 which shows the significant effect of lidocaine to reduce the pressure. Arterial pressure was measured with mean ± SD = 75.34 ± 9.61 value. Group B patients who received the topical lidocaine dose, shows a 140 ± 10.87 mean ± SD value of systolic blood pressure and diastolic blood pressure mean ± SD value was 85.42 ± 11.01 recorded. Arterial pressure with mean ± SD = 98.34± 9.13 value and significant p-value shows the higher arterial pressure. The use of topical lidocaine was not effectively controlling heart rate as indicated by mean ± SD = 99.87±10.14.

Conclusion: Overall, the study suggests that prophylactic intravenous given laryngoscopy will provide a significantly positive response to handle the blunt stress response in a better way as compared to topical use of lidocaine.

Keywords: laryngoscopy, Intravenous lidocaine, Topical lidocaine, Stress response

INTRODUCTION

Generally, laryngoscopy is a critically essential step of general anesthesia and is used to see the larynx, and structure, often used for intubation through vocal cords. However, the view of vocal cords might be impacted few factors such as forward displacement of the larynx and backward displacement of the tongue.[1-2] Laryngoscopy is associated with anesthesia which can enhance the plasma concentration of catecholamine.[3] In some patients, the inadequate blunt stress response can cause hypertension and dysrhythmias, which further can be a reason for myocardial infarction or cerebrovascular accidents.[4] More, laryngoscopy and intubation both are considered noxious with stress responses where hemodynamic responses can be tolerated by patients who have no history of hypertension, cerebrovascular disease, coronary artery disease, and intracranial aneurysms that can have injurious effects such as pulmonary oedema, myocardial ischemia, left ventricular failure as well as cerebral haemorrhage.[5] On the other hand, haemodynamic stress response as a result of laryngoscopy can increase the heart rate as well as mean arterial pressure.[6]

Multiple strategic efforts have been done to attenuate the stress responses associated with laryngoscopy by administration of different drugs through intravenous and topical ways including lidocaine, opioids, vasodilators, and calcium channel blockers.[7]

Lignocaine is commonly knowns as lidocaine which is an essential drug listed by World Health Organization. Clinically, it's frequently used for anesthesia and to get antiarrhythmic benefits that enable the clinician to safely prescribe lidocaine in various clinical settings.[8] Moreover, Lidocaine manifested the aminoethylamide and prototype based on local anesthetics. Mostly, it is administered via intravenous route before intubations to mitigate or suppress the hemodynamic response. Partial suppression has been reported with the post-intubation spike in systolic blood pressure.[9-10]

Hence, this study was conducted to assess the blunt stress response of intravenous (IV) lidocaine verse topical application of lidocaine during the laryngoscopy.

METHODOLOGY

This randomized control study design was performed in the Department of Anesthesia, Critical Care, and Pain Medicine at Aziz Bhatti Shaheed Teaching Hospital, Gujrat. The duration of the study was from February 2021 to Jun 2022.

Study sample size: The participant of this study was 70 in number having age between 30-60 years and were divided into two groups via a computer-generated randomization sheet. The first group name, group-A contains 35 patients, single dose of 200mg intravenous lidocaine was given before the laryngoscopy procedure. The second group was group B consisted of 35 patients who had to receive the topical (spray) lidocaine in a single dose of 200mg. All the participants were voluntarily become part of the study by signing the written consent before subjecting them to the screening test. The consent was spoken (in their language) about their choice to be voluntary or leave at any time by elucidating the entire procedure of laryngoscopy.

Exclusion criteria: After gaining the medical history, screening visit including physical examination as well as laboratory tests. The patients who had a medical history of hepatic, renal, and cardiac function impairment, allergic patients to lidocaine, diabetes mellitus, chronic respiratory disorders, asthma, and bronchitis were excluded from the study. More, pregnant, lactating, and women who underwent urine pregnancy tests were also not part of the study. Patients who had attempted intubation more than one were removed.

Statistical analysis: Statistical analysis was conducted using statistical software statistics.8.1 version. Data were presented in the form of mean ± Standard Deviation and percentage. The Mann-Whitney-U test and ANOVA were constructed to determine

the level of significance. P-value lowers than 0.05 indicated significant results while higher than 0.05 showed the non-significant data. On the other hand p-value, less than 0.01 shows the higher significant data of the study.

RESULTS

The demographical variables of 70 patients of two groups (A and B) were shown in table 1, where the mean age of group A patients was 31 ± 10.78, males were16 (45.7%), females were 19 (54.2%), mean weight was measured 59.69 ± 6.70, mean height ± SD (cm) was 160.23 ± 3.45 and mean BMI ± SD kgm^{-2} was 24.51 ± 1.04. Group B patients were with a mean age of 32 ± 10.89, numbers of female patients were 18 (51.4%), and males were 17 (45.7%), mean height ± SD (cm) was 160.63 ± 4.45, mean weight (kg) was 60.87 ± 8.51 and mean BMI ± SD kgm^{-2} was 23.61 ± 1.04. There was no statistically significant difference measured in demographical parameters between both groups.

For the laryngoscopy of group-A patients who had received the IV, lidocaine had a systolic blood pressure mean ± SD value of 120.03 ± 9.72 with a p-value of 0.021 which indicate the systolic was under control. Diastolic pressure means ± SD value was 75.81 ± 10.46 with a P-value of 0.012 which shows the significant effect of lidocaine to reduce the pressure. Arterial pressure was also found under control with mean ± SD = 75.34 ± 9.61 value and a significant p-value. The use of IV lidocaine also effectively manipulate heart rate which was measured with mean ± SD = 76.78 ±7.71 and significant statistical results. Oxygen saturation was in the normal range with mean ± SD = 96.38 ±1.31. So, measured values for this group show, that IV lidocaine had an effective response. (Table.2)

The patients of group B who received the topical lidocaine dose, shows a 140 ± 10.87 mean ± SD value of systolic blood pressure and diastolic blood pressure mean ± SD value was 85.42 ± 11.01 with a P-value of 0.012, which indicates that the blunt pressure was not significantly reduced. Arterial pressure with mean ± SD = 98.34± 9.13 value and significant p-value shows the higher arterial pressure. The use of topical lidocaine was not effectively controlling heart rate as indicated by mean ± SD = 99.87±10.14. Oxygen saturation was normal with mean ± SD = 89.98 ± 2.32. So, a comparison of both IV and topical lidocaine indicates a better control response of stress during laryngoscopy.

Table 1: Demographical Characteristics of 70 patients of current study

Characteristics	Group A, N=35	Group-B, N=35	P-value
Mean Age ± SD(years)	31 ± 10.78	32 ± 10.89	0.367
Gender			
Males %	16 (45.7%)	17 (45.7%)	0.81
Females %	19 (54.2%)	18 (51.4%)	0.79
Mean weight ± SD (kg)	59.69 ± 6.70	60.87 ± 8.51	0.62
Mean height ± SD (cm)	160.23 ± 3.45	160.63 ± 4.45	0.56
Mean BMI ± SD kgm^{-2}	24.51 ± 1.04	23.61 ± 1.04	0.64

Group A= Patients received IV lidocaine, Group B = Patients received topical lidocaine
SD= Standard Deviation

Table 2: Comparison of response variables during the laryngoscopy

Variables	Group A		Group B		F-value	P-value
	Mean	SD	Mean	SD		
SBP (mmHg)	120.03	9.72	140	10.87	3.56	0.021
DBP (mmHg)	75.81	10.46	85.42	11.01	2.87	0.012
MAP (mmHg)	75.34	9.61	98.34	9.13	4.65	0.035
HR (bpm)	76.78	7.71	99.87	10.14	1.84	0.051
Oxygen saturation %	96.38	1.31	89.98	2.32	2.95	0.021

SD= Standard Deviation, SBP= Systolic Blood Pressure, DBP= Diastolic Blood Pressure, MAP= Mean Arterial Pressure, HR= Heart Rate

DISCUSSION

Lidocaine has a history of proven efficacy and safety used as a local anesthetic for laryngoscopy techniques. Various formulations of lidocaine are available; among them, topical was also reported with effective attenuating pressor response to laryngoscopy as well as intubation with the reduction in risk of hypotension. On the other hand, it inducted the throat irritation and develops a bitter aftertaste, which could be because of the used additive in its formulation.[11 -12] In the case of oropharyngeal anesthesia another formulation of lidocaine was applied by using the stick. This technique was evaluated in patients who go through awake laryngoscopy procedures in comparative, randomized, and many other studies.[13-14]

Topical lidocaine has applied in the form of jelly or spray, was brought the worse outcome. The additive in its jelly form used in several trials had caused the hypersensitivity reactions or induce allergy. Similarly, lidocaine spray was not efficacious to overcome the stress produced during the laryngoscopy while it damaged the tracheal mucosa during intubation.[15-16] Although, studies had suggested that reduction in lidocaine action leads to the rise of action potential that ultimately reduces the conduction velocity in atrial muscles, its IV administration causes the blunting enhancement in heart rate and blood pressure.[17]

The researcher suggested that prophylactic intravenous does have no record of harmful side effects and has proven optimal within 3 minutes of intubation.[18] Moreover another attempt demonstrated that prophylactic use of intravenous lidocaine attenuates the stress response produced due to an increase in intraocular pressure.[19] In the current study, the prophylactic topical application of lidocaine had no proper effect to reduce the blunt stress response produced during the laryngoscopy. As per the results of this study, article pressure was high in group B in comparison to group A. Similarly, an increase in systolic blood pressure, as well as diastolic blood pressure, was recorded in group B which can induce the stress in articles. Prophylactic intravenous lidocaine had proven effective in group A with an efficacious response to control the stress that develops during laryngoscopy. Although, more research has been needed to get more clear results with more pieces of evidence for the prophylactic use of lidocaine.

CONCLUSION

The study concluded that the intervenous administration of lidocaine is more effective to handle the blunt stress response produced during the laryngoscopy. While there is no harmful effect measured with topical use of prophylactic topical application of lidocaine. IV route for Lidocaine is easy and safe as compared to the topical formulation.

REFERENCES

1. Lewis, S. R., Butler, A. R., Parker, J., Cook, T. M., & Smith, A. F. (2016). Video laryngoscopy versus direct laryngoscopy for adult patients requiring tracheal intubation. Cochrane Database of Systematic Reviews, (11).
2. Arfinnaaz, M. H. (2022). A randomized clinical trial comparing haemodynamic stress response to laryngoscopy and intubation using McCOY, macintosh and Miller blades" in patients undergoing elective surgery (Doctoral dissertation, Shri Dharmasthala Manjunatheshwara University, Dharwad).
3. Hoshijima, H., Maruyama, K., Mihara, T., Boku, A. S., Shiga, T., & Nagasaka, H. (2020). Use of the GlideScope does not lower the hemodynamic response to tracheal intubation more than the Macintosh laryngoscope: a systematic review and meta-analysis. Medicine, 99(48).
4. Haddad, S. M. S. A., Otaifa, R. S. A. A., & Shuber, R. H. A. (2022). The Role of General Anaesthesia in Supraglottic Airway Device by

Using Hemodynamic Response. Eurasian Medical Research Periodical, 5, 71-78.
5. Altun, D., Ali, A., Çamcı, E., Özonur, A., & Seyhan, T. Ö. (2018). Hemodynamic response to four different laryngoscopes. Turkish Journal of Anaesthesiology and Reanimation, 46(6), 434.
6. Mhaibes, A. A. (2022). The Evaluation of Endotracheal Intubation Effect on Blood Flow Stability Parameters in Baghdad and Gazzi AL-Harriri Hospitals. Journal of Techniques, 4(1), 56-61.
7. Lakhe, G., Pradhan, S., & Dhakal, S. (2021). Hemodynamic response to laryngoscopy and intubation using McCoy laryngoscope: a descriptive cross-sectional study. JNMA: Journal of the Nepal Medical Association, 59(238), 554.
8. Samuel, H., Melekamayhu, A., Woldeyohannes, M., Tesfaye, S., & Shitemaw, T. (2019). A comparative study between intravenous fentanyl and intravenous lidocaine on attenuation of hemodynamic pressor responses to laryngoscopic intubation: a prospective cohort study, Ethiopia. Open Journal of Anesthesiology, 9(09), 167.
9. Weinberg, L., Peake, B., Tan, C., & Nikfarjam, M. (2015). Pharmacokinetics and pharmacodynamics of lignocaine: A review. World Journal of Anesthesiology, 4(2), 17-29.
10. Choudhary, S., Sahu, M., Thakur, N., Uike, S., Jain, A., & Jain, S. (2019). A COMPARATIVE STUDY OF HEMODYNAMIC RESPONSES TO LARYNGOSCOPY AND INTUBATION USING MCCOY AND MACINTOSH LARYNGOSCOPE BLADES WITH AND WITHOUT FENTANYL.
11. Khodadoostan, M., Sadeghian, S., Safaei, A., Shavakhi, A. R., & Shavakhi, A. (2018). Viscous lidocaine solution versus lidocaine spray for pharyngeal local anesthesia in upper gastroesophageal endoscopy. Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences, 23.
12. Liao, A. H. W., Yeoh, S. R., Lin, Y. C., Lam, F., Chen, T. L., & Chen, C. Y. (2019). Lidocaine lubricants for intubation-related complications: a systematic review and meta-analysis. Canadian Journal of Anesthesia/Journal Canadien d'anesthésie, 66(10), 1221-1239.
13. Mekhemar, N. A., El-Agwany, A. S., Radi, W. K., & El-Hady, S. M. (2016). Comparative study between benzydamine hydrochloride gel, lidocaine 5% gel, and lidocaine 10% spray on endotracheal tube cuff as regards postoperative sore throat. Revista Brasileira de Anestesiologia, 66, 242-248.
14. Liao, A. H. W., Yeoh, M. S. R., Lin, M. Y. C., Lam, C. F., Chen, M. T. L., & Chen, P. C. Y. (2019). Lidocaine lubricants for intubation-related complications: a systematic review and meta-analysis Les lubrifiants abase de lidocaıne pour la prévention des complications liées al'intubation: une revue systématique et méta-analyse.
15. Xu, Y. J., Wang, S. L., Ren, Y., Zhu, Y., & Tan, Z. M. (2012). A smaller endotracheal tube combined with intravenous lidocaine decreases post-operative sore throat–a randomized controlled trial. Acta Anaesthesiologica Scandinavica, 56(10), 1314-1320.
16. Lam, F., Lin, Y. C., Tsai, H. C., Chen, T. L., Tam, K. W., & Chen, C. Y. (2015). Effect of intracuff lidocaine on a postoperative sore throat and the emergence phenomenon: a systematic review and meta-analysis of randomized controlled trials. PLoS One, 10(8), e0136184.
17. Yukioka H, Yoshimoto N, Nishimura K, Fujimori M. Intravenous lidocaine as a suppressant of coughing during tracheal intubation. Anesth Analg. 1985; 64(12):1189-92.
18. Aleem, M. A., Awati, M. N., & Adarsh, S. (2012). Attenuation of cardiovascular responses to direct laryngoscopy and intubation-A comparative study between iv bolus fentanyl, lignocaine, and placebo (NS). Journal of clinical and diagnostic research: JCDR, 6(10), 1749.
19. Wang YM, Chung KC, Lu HF, Huang YW, Lin KC, Yang LC, Lin CR. Lidocaine: the optimal timing of intravenous administration in attenuation of increase of intraocular pressure during tracheal intubation. Acta Anaesthesiol Sin. 2003 Jun;41(2):71-5.