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Effectiveness of Lignocaine Spray At Laryngeal Inlet Versus Intravenous Lignocaine in Reducing Cough At Extubation

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ABSTRACT

Objective: To ascertain effectiveness of topical lignocaine when compared with IV lignocaine during extubation in terms of reduction in cough.

Study Design: Quasi Experimental Study.

Duration and Place of Study: Anesthesiology department, Combined Military Hospital, Rawalpindi, Pakistan, from Jul 2021 to Dec 2021.

Methodology: A total of 160 patients were separated into two Groups of similar size. During the introduction of the laryngoscope in Group A, 2 puffs of 10% lignocaine were sprayed on vocal cords prior to insertion of the Endo Tracheal Tube. Approximately 10 mg of lignocaine was present in each puff. During induction, patients in Group B did not receive any lignocaine, but during extubation, 1.5-2 mg/kg IV lignocaine was administered.

Results: Mean age of all patients was 37.25±13.44 years whereas mean BMI was 28.80±3.86. Gender distribution showed that 116 (72.5%) were males while 44 (27.5%) were females. There were a total of 51(31.9%) patients who developed cough while being extubated out of which 29 (26.3%) patients belonged to topical lignocaine Group and 22(27.5%) patients in IV lignocaine Group (*p*-value=0.309). Post-operative sore throat (*p*-value=0.746), dysphagia (*p*-value=0.990) and dysphonia (*p*-value=0.620) were also insignificant in two Groups.

Conclusion: When compared to a global intravenous injection of 2% lignocaine, a combination of 10% lignocaine spray on the laryngeal inlet demonstrates equivalent effectiveness in minimising coughing during extubation. In two Groups, the side effects were likewise comparable.

Keywords: Cough, Endo tracheal tube, Lignocaine, Post operative sore throat

How to Cite This Article: *Sarfaraz A, Tariq W, Buland K, Iqbal MR, Hashmi SRA , Munir MA. Effectiveness of Lignocaine Spray At Laryngeal Inlet Versus Intravenous Lignocaine in Reducing Cough At Extubation. Pak Armed Forces Med J 2025; 75(Suppl-5): S730-S734. DOI https://doi.org/10.51253/pafmj.v75iSUPPL-5.8813*

INTRODUCTION

Coughing during endotracheal tube extubation is a typical issue that leads to poor surgical results.[1] Hemodynamic alterations, bronchospasms, and elevated intraocular, abdominal, and intracranial pressure are all possible side effects of coughing. Hypoperfusion of heart, hypoxia, rebleeding at the surgical incision, surgical wound dehiscence, and brain damage can all result from these alterations.[2] Coughing occurs in 38 to 96 percent of patients during extubation and emergence.[3] Coughing during the extubation and emergence phase is influenced by a variety of circumstances, including smoking, oropharyngeal secretions, and discomfort from volatile anaesthetics. The cuff of endotracheal tube (ETT) may physically irritate the tracheal mucosa. This may also be a key contributing element.[4]

Intravenous (IV) medications (local anaesthetics, opioids, dexmedetomidine), jelly medications on the endotracheal tube cuff (lignocaine, corticosteroids, water-soluble lubrication, vegetable gum), local anaesthetics intracuff (local anaesthetics, alkalinized or not), nebulized anaesthetics or laryngheal topicalization with anaesthetic agents are some of the methods to mitigate cough while extubating patients from general anesthesia. [5,6,7]

Because of its simplicity and absence of major side effects, lignocaine has recently become popular for lowering cough during extubation.[8] The two basic ways for lignocaine administration are systemic intravenous injection and local direct application on the laryngeal inlets, such as spraying lignocaine on the supraglottic and subglottic regions or inserting lignocaine jelly or sprayed lignocaine on the tip of the ETT.[9] However, there is a scarcity of evidence comparing the effectiveness of local lignocaine with systemic lignocaine in lowering cough during extubation. Soltani *et al.* tested five different lignocaine delivery routes with a controlled technique of normal saline application. They found that inflating the ETT

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Received: 01 Jun 2022; revision received: 06 Aug 2022; accepted: 07 Sep 2022

cuff with lignocaine and injecting lignocaine intravenously were more successful than the other techniques at reducing cough during extubation.[10]

Post-operative sore throat, nausea, and agitation have all been recorded as adverse effects of topical lignocaine when used in intracuff.[11] To reduce lignocaine leakage from intracuff lignocaine administration, we used a modified technique in which we sprayed lignocaine on the ETT cuff and also sprayed lignocaine on the laryngeal inlet. As a result, we undertook this study to evaluate the effects of topical lignocaine to IV lignocaine during extubation. The rationale of our study was that topical lignocaine sprayed at the intake may have fewer negative effects and be safe to use.

METHODOLOGY

This was a Quasi Experimental Study conducted at department of Anesthesiology, Combined Military hospital, Rawalpindi from July 2021 to Dec 2021. The study started after approval by the institution's research ethics committee 226/12/21. Sample size was calculated using WHO sample size calculator, level of significance was 5%, power of test was 80%, percentage of cough with topical lignocaine 20% and percentage of cough with Intravenous lignocaine was 40%.[12] The total sample size for two Groups was 160 patients. Samples were taken by non-probability consecutive sampling.

Inclusion Criteria: The study comprised both male and female patients between the ages of 20 and 60 who were undergoing any surgery requiring general anaesthesia and endotracheal tube placement and had an ASA I or II.

Exclusion Criteria: Patients with a BMI > 35 kg/m2, susceptible to aspiration during extubation, smokers having more than 10 pack years history, known cases of asthma, long standing cough or recent lung infection, Malampatti III and IV, already intubated cases, prior surgery of oro-facial region, neck, or thoracic region, when operation is expected to last more than 2 hours or less than 30 minutes, or a history of lignocaine allergy were excluded from the study.

Confidentiality problems, such as data coding, destruction, sharing, and archiving, were preserved by informing about ethical difficulties.

The usual approach was used to anaesthetize all of the patients, and the procedure was carried out by a single competent anaesthetist. The patients were instructed to consume no food or drink for 6 hours before to surgery. The patients' blood pressure, ECG, pulse oximetry, and end-tidal carbon dioxide were all monitored in the operating room. Before receiving 1-2 g/kg fentanyl, 1.5-2.5 mg/kg propofol, and 0.15-0.2 mg/kg cisatracurium, the patients were given 100% oxygen for 3-5 minutes.[13]

The patients were consecutively separated into two Groups.

During the introduction of the laryngoscope in Group A, two puffs of 10% lignocaine were sprayed on each true vocal chord prior to insertion of the ETT. Approximately 10 mg of lignocaine was present in each puff. During induction, patients in Group B did not receive any lignocaine, but during extubation, 1.5-2 mg/kg IV lignocaine was administered. A minimum of two intubation attempts were made and if diffiult the subject was excluded from study. During the process, all patients were closely followed, and deep extubation was conducted only if they met the following criteria: normal vital signs, spontaneous breathing, a tidal volume of more than 5 ml/kg, voluntary eye-opening, command compliance, and no secretions in the airway.

An investigator who was blinded to the study assessed the intensity of the cough during extubation. The severity of the cough18 was assessed in the following way: 0 = no cough; 1 = minor cough (cough without evident abdominal contraction); 2 = moderate cough (strong and abrupt abdominal contraction lasting less than 5 seconds); 3 = severe cough (cough with noticeable abdominal contraction lasting more than 5 seconds) (strong and sudden contraction of the abdomen sustained more than 5 sec).[14] At 24 hours after extubation, secondary outcomes such as postoperative sore throat, dysphonia, and dysphagia were assessed. We used a numeric rating scale to assess sore throat (0 = no, 10 = severe).10 If the numeric rating was greater than 3, the sore throat was regarded a major adverse event.

The statistical package for the social sciences (SPSS) version 22:00 was used to analyse the data. Mean and SD were computed for quantitative factors such as age and the mean intensity of cough and sore throat. Percentages were determined for qualitative characteristics like gender. The difference in mean between the two Groups was determined using an independent sample t-test. Significant was defined as a *p*-value of less than 0.05.

RESULTS

A total of 160 cases fulfilling the inclusion/exclusion criteria were enrolled to compare the effects of topical lignocaine sprayed on vocal cords when compared with IV lignocaine during extubation.

The age demographic data showed that patients within the age Group of 20-40 years were more common; 86(53.8%). Mean age of all patients was 37.25±13.44 years whereas mean BMI was 28.80±3.86. Mean age in Group A and B was 35.97±12.55 years and 38.67±14.22 years respectively and BMI was 28.74±3.60 and 28.86±4.12. There was no significant statistical difference in the data. (Table-I)

Table-I: Age And Bmi Distribution (n=160)

Variable	GROUP A n = 80	GROUP B n = 80	*p*-value
Mean and SD for BMI	28.74±3.60	28.86±4.12	0.855
Mean and SD for Age	35.97±12.55	38.67±14.22	0.205

Gender distribution showed that 116(72.5%) were males while 44(27.5%) were females. (Table-II). There was no statistical difference between the two Groups.*p*>0.05.

Table-II:Gender Wise Distribution (n=160)

Gender	Group a	Group b	*p*-value
Male	54(67.5%)	62(77.5%)	0.215
Female	26(32.5%)	18(22.5%)	

There were 51(31.9%) patients who developed cough while being extubated. A total of 29(26.3%) patients in topical lignocaine Group and 22(27.5%) patients in IV lignocaine Group developed cough (*p*-value=0.309). The comparison between the Groups is shown in Table-III. Further comparison in terms of severity of cough is shown in Table-IV.

Table-III: Pdph Incidence In Groups (n=160)

Cough present	Group a	Group b	*P*-value
Yes	29(36.3%)	22(27.5%)	0.309
No	51(63.8%)	58(72.5%)	

Table-IV Comparison of Severity of Cough Between The Groups(n=160)

Severity of cough	Group a N=80	Group b N=80	*p*-value
No cough	51(63.8%)	58(72.5%)	0.071
Mild cough	17(21.3%)	6(7.5%)	
Moderate cough	8(10%)	13(16.3%)	
Severe cough	4(5%)	3(3.8%)	

Further distribution of post operative sore throat (POST), dysphonia and dysphagia is shown in table V. There was no statistically signficant post operative sore throat (*p*-value=0.746) and dysphagia (*p*-value=0.990) in two Groups. Moreover, dysphonia was also comparable in both the Groups (*p*-value=0.620)

Table-V: Distribution of Post Operative Sore Throat, Dysphagia and Dysphonia Between the Two Groups (n=160)

Variable	Value	Group a N = 80	Group b N = 80	*p*-value
Post-Op Sore Throat	None	74(92.5%)	76(95%)	0.746
	Severe (>3 score)	6(7.5%)	4(5%)	
Dysphagia	None	79(98.8%)	78(97.5%)	0.990
	Present	1(1.3%)	2(2.5%)	
Dysphonia	None	77(96.3%)	79(98.8%)	0.620
	Present	3\z(3.7%)	1(1.3%)	

DISCUSSION

Endotracheal intubation is required for general anaesthesia, especially for head and neck surgery, to ensure a patent airway and offer ideal circumstances for operation and positive pressure breathing. Intubation complications, such as elevated IOP owing to coughing, can be mitigated in a variety of ways by using lignocaine.,[15,16] The current investigation found that a topical spray of 10% lignocaine on the actual vocal cords reduced cough as effectively as a 1.5 mg/kg intravenous injection of 2 percent lignocaine. There was no statistically significant difference in severity grade between the two Groups when it came to cough severity. Thongrong C *et al* found that topical lignocaine was as effective as IV lignocaine when sprayed on vocal cords and in ETT. He did notice, however, that as compared to the IV Group, topical lignocaine treatment was linked with a statistically significant reduction in grade 3 cough.[17] He determined that the combination of this modified topical method with systemic intravenous treatment was effective in reducing cough. Saltoni et al. showed that intravenous lignocaine injection reduced cough during extubation with excellent effectiveness.[10] However, systemic problems (such as bradycardia, local anaesthetic systemic toxicity, and hypotension from fast absorption) are more likely to develop with systemic injection than with topical treatment. According to him, topical tracheal lignocaine, while effective to a lesser extent, necessitates the use of a particular delivering device, prolonged laryngoscopy,

or repeated laryngoscopy, and it is impossible to determine the exact quantity of lignocaine supplied. As a result, using a modified topical lignocaine strategy to minimise cough during extubation might be a viable option. There were no systemic side effects in either the topical or IV Groups in our investigation.

After spraying lignocaine at the actual vocal cord, we noticed no significant difference POST between the topical and IV Groups in terms of side effects. The incidence of topical lignocaine was 7.5 percent, compared to 5% in the IV Group. In the spraycuff Group, D Arango *et al.* observed a modest POST of 7.1 percent.[18] The majority of patients experienced minor POST (Score>3) and spontaneous recovery after 24 hours, suggesting a modest impact on therapeutic practise, similar to the prior research. Other adverse effects of using 10% lignocaine, such as hoarseness and dysphagia, did not differ substantially across the Groups (p>0.05). Although there was a higher risk of dysphonia in the topical lignocaine Group, this was negligible (3.7 percent Vs 1.3 percent p-value 0.642).

The absence of a record of coughing frequency is a drawback of our study. Another restriction is the varying timing of lignocaine administrations, which may have an impact on our findings. Although we make every effort to rule out surgery with an expected operational time of more than 120 minutes. To supplement the findings of our investigation, the author suggests conducting a multicentric experiment.

CONCLUSION

When compared to a global intravenous injection of 2% lignocaine, a combination of 10% lignocaine spray on the laryngeal inlet demonstrates equivalent effectiveness in minimising coughing during extubation. The procedures utilised had little effect on the intensity of the cough. Furthermore, both Groups had similar levels of post-operative sore throat, dysphagia, and dysphonia.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AS & WT: Data acquisition, data analysis, critical review, approval of the final version to be published.

KB & MRI: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SRAH & MAM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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