

Comparison Between The Effects of Betamethasone Gel And Lidocaine Jelly To Reduce Post-Operative Tracheal Tube Related Airway Symptoms

Syed Sajjad Alam, Nighat Abbas, Ali Asghar, Muhammad Rafique, Khadijah Abid*

Liaquat National Hospital & Medical College Karachi Pakistan, *Shaheed Zulfiqar Ali Bhutto Institute of Science and Technology, Karachi Pakistan

ABSTRACT

Objective: To determine the role of betamethasone gel and lidocaine jelly on reducing the post-operative airway complications related to tracheal tube.

Study Design: Comparative prospective study.

Place and Duration of Study: Department of Anesthesia, Liaquat National Hospital, from Jul 2019 to Jan 2020.

Methodology: A total of 150 patients were randomly assigned into three different groups; group-B (0.05% betamethasone gel), group-L (tube lubricated with 2% lidocaine jelly) and group-C (intubated with un-lubricated tubes). Patients were assigned by using lottery method, which was carried out by a research assistant who was not involved in the study. There were 50 patients in each group.

Results: Post-operative sore throat and post-extubation cough at 24-hours were statistically insignificant ($p>0.05$) between groups while hoarseness of voice at 24-hours postoperatively was significant ($p<0.05$) in all the groups. The overall difference for severity of postoperative sore throat, hoarseness of voice and post-extubation cough at 24 hours in the groups B, L, and C were statistically significant (<0.05).

Conclusion: The application of betamethasone gel on endotracheal tube before intubation reduces the post-extubation cough, severity of post-operative sore throat, hoarseness of voice and post-extubation cough in comparison with the application of lidocaine jelly and un-lubricated ETT.

Keywords: Betamethasone, Endotracheal tube, General anesthesia, Intubation, Post-operative airway complications.

How to Cite This Article: Alam SS, Abbas N, Asghar A, Rafique M, Abid K. Comparison Between the Effects of Betamethasone Gel and Lidocaine Jelly to Reduce Post-Operative Tracheal Tube Related Airway Symptoms. *Pak Armed Forces Med J* 2022; 72(1): 185-189. Doi: <https://doi.org/10.51253/pafmj.v72i1.6575>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

There are several common complications of general anesthesia with endotracheal intubation including post-operative sore throat (POST), post-extubation cough (PEC), and hoarseness of voice (HOV) that result in distress and morbidity. Previous literature reported variation in the frequency of postoperative airway symptoms ranging from 20% to as high as 100% for POST,¹⁻⁴ 40-60% for HOV,^{5,6} and 30-50% for PEC.^{4,5}

Furthermore, the anesthetist always tries to prevent these airway symptoms during and after endotracheal extubation especially post-extubation cough (PEC) because there are certain adverse effects of (PEC) that include an increase in intraocular pressure, increase in intracranial pressure and hemodynamic instability.⁷ To prevent these adverse effects anesthetists prefer to use several medications and non-pharma-

logical methods to reduce the frequency of these complications but the reason behind these inconsistent results suggested multiple factors like endotracheal tube size, cuff design and duration of surgery, etc.^{7,8} The usage of lidocaine airway anesthesia shows variation in results in postoperative symptoms.^{9,10}

Betamethasone is an anti-inflammatory, long-acting, water-soluble glucocorticoid usually used topically for the treatment of inflammatory lesions of oral mucosa. Due to this, if used for lubrication of endotracheal tube it can provide both lubrication and anti-inflammatory effect. Therefore, we hypothesized that widespread application of betamethasone gel over the endotracheal tube is as effective as the application of lidocaine jelly for reduction of the frequency and severity of POST, HOV, and PEC.

Previously only the effect of betamethasone gel with plain lubricant jellies or lidocaine jellies in reducing POST or HOV was compared in several studies but in our study, we wanted to compare the drug with an un-lubricated tube since that was our routine practice.

Correspondence: Dr Syed Sajjad Alam, Department of Anesthesiology, National Stadium Road, Karachi Pakistan
Received: 15 Apr 2021; revision received: 23 May 2021; accepted: 26 May 2021

METHODOLOGY

After the approval from the Institutional Ethical Review Board (Ref: no 0457-2018-LNH-ERC) the prospective comparative study was conducted at Liaquat National Hospital and Medical College, Karachi, from January to July 2019. Sample size was estimated by using WHO sample size calculator. The percentage of POST with betamethasone gel was taken as 12.5% and lidocaine jelly 37.5% from a previous study conducted in Nepal.¹¹ The calculated sample size was 150 (50 patients in each group). Informed consent was taken from all the patients.

Inclusion Criteria: Patients of either gender with ASA physical status I and II, aged between 18-65 years, were included in the study.

Exclusion Criteria: Patients with ASA physical status III and IV, surgeries of the oral cavity and pharynx, surgeries lasting longer than 4 hours, anticipated difficult airway, more than two attempts at intubation, use of throat pack, use of nasogastric tube peri-operatively and patients with upper respiratory tract infection or on steroids were excluded from the study.

Patients were recruited by non-probability consecutive sampling technique who were scheduled to undergo elective surgery under general anesthesia with endotracheal intubation. Patients were randomly divided into three equal groups. Group-B patients were those who were intubated with endotracheal tube lubricated with 0.05% betamethasone gel. Group-L patients were those who were intubated with endotracheal tube lubricated with 2% Lidocaine jelly. Group-C patients were those who were intubated with un-lubricated tubes using lottery method by a research assistant with no clinical involvement in the study. Single blinding technique was used in this study. Only patients were blinded for randomization but the investigator and the analyst were not blinded. The different colors of the lidocaine jelly and betamethasone gel were used for blinding purpose.

Pre-operatively before the induction of anesthesia, endotracheal tube was either lubricated from the distal end of the cuff to 15cm mark on the endotracheal tube.¹² Endotracheal tube was lubricated with either 2.5ml of 0.05% Betamethasone dipropionate gel (prone gel) for group-B or 2.5ml of 2% lidocaine jelly (xylocaine) for group-L by using 3ml of syringe for the volume of lubricant.¹³ For group-C, the endotracheal tube remained un-lubricated. During the procedure, intravenous access was obtained, crystalloids solution was attached, ASA standard monitoring was done and

induction of general anesthesia with IV propofol 2-2.5 mg/kg, nalbuphine 0.1 mg/kg, and atracurium 0.5 mg/kg was carried out.¹⁴ After 3 minutes of the bag and mask ventilation, the trachea was intubated with an endotracheal tube of size 7 and 7.5 mm as per internal diameter of trachea. The endotracheal tube was confirmed by capnography and fixed by auscultating bilateral equal air entry. The tracheal tube cuff was inflated by using a leak test. Maintenance of general anesthesia was done by using isoflurane and 60% oxygen mixed with compressed air. Intravenous paracetamol 1gm was administered if there was variation in systolic blood pressure and heart rate of >20% basal value.¹⁵ When the surgery was completed, isoflurane was discontinued and residual neuromuscular blockade was antagonized with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. Oral suctioning was done only once, after the patient was fully awake, the endotracheal tube cuff was deflated and the trachea was extubated.¹⁶ After operations, all the patients were transferred by an anesthetist and trainee anesthesia to a post-anesthesia care unit where all of them were again monitored as per ASA standards. The monitoring supplementary oxygen was given by facemask until full recovery. The assessment was done by non-blinded investigators by using four point scales to record frequency and severity of POST, HOV and PEC at intervals of 1, 6 and 24 hour after extubation (Table-I).¹¹⁻¹⁴

Table-I: Scoring scale for post-operative sore throat (POST), hoarseness of voice (HOV) and post extubation cough (PEC).

Score	
Post-Operative Sore Throat (POST)	
0	No sore throat at any time since the operation
1	Minimal (complain of sore throat only on asking)
2	Moderate (complain of sore throat in his/her own)
3	Severe (hoarseness, associated with throat pain)
Post Extubation Cough (PEC)	
0	No cough at any level
1	Minimal cough or scratchy throat
2	Moderate cough
3	Severe cough
Hoarseness of Voice (HOV)	
0	No hoarseness at any level
1	No hoarseness during data collection noted by patient only
2	Hoarseness during data collection
3	Easily noted hoarseness

Statistical Package for Social Sciences (SPSS) version 20 was used for the data analysis. Quantitative variables were reported as mean and standard deviation whereas qualitative variable like gender, comorbid, post-operative sore throat, hoarseness of voice and post-extubation cough were summarized as frequency

and percentages. Comparison between the groups was carried out by using chi square test for post-operative sore throat, hoarseness of voice and post-extubation cough. The *p*-value of ≤ 0.05 was considered statistically significant.

RESULTS

The mean age of the patients in groups B, L and C was reported as 34.18 ± 10.25 , 29.80 ± 10.81 and 31.90 ± 11.56 years respectively. The proportion of males and females were approximately equal in all the three groups (Table-II). No statistically significant difference was observed between the groups with respect to age ($p=0.203$), duration of surgery ($p=0.792$) and gender ($p=0.685$) (Table-II).

The overall frequency of POST at 24-hours post-operatively in group-B, L and C were 12 (24%), 18 (34%), 20 (40%) respectively (p -value=0.349). Whereas overall frequency of HOV at 24 hour post-operatively in-B, L and C groups were 5 (10%), 19 (38%) and 26 (52%) respectively. This result was statistically

significant (p -value=0.04). Majority of the patients had the duration of surgery as 2-3 hours in group-C (57.5%).

Table-II: Baseline characteristics.

Parameters	Group-B	Group-L	Group-C	<i>p</i> -value
Age in years	34.18 ± 10.25	29.80 ± 10.81	31.90 ± 11.56	0.203
Duration of Surgery				
1 to 2 hours	20 (50%)	21 (52.2%)	17 (42.5%)	0.792
2 to 3 hours	20 (50%)	19 (47.5%)	23 (57.5%)	
Gender				
Male	20 (50%)	19 (47.5%)	22 (55%)	0.648
Female	20 (50%)	21 (52.2%)	18 (45%)	

The frequency of POST at 1-hour post-operatively was statistically insignificant in the groups ($p=0.104$). The frequency of POST at 6-hours post-operatively in group-B, L and C were reported as 5 (10%), 20 (40%) and 25 (50%) respectively, hence the difference was statistically significant ($p=0.001$). The frequency of POST at 24-hours post-operatively was also statistically significant ($p=0.001$) (Table-III).

Table-III: Comparisons of severity among groups on different intervals.

	Duration	Severity	Group-B (n=50)	Group-L (n=50)	Group-C (n=50)	<i>p</i> -value	
Post-Operative Sore Throat (POST)	1 hour	no sore throat at any time since operation	33 (66%)	28 (56%)	25 (50%)	0.093	
		minimal sore throat	5 (10%)	9 (18%)	6 (12%)		
		moderate sore throat	1 (2%)	1 (2%)	7 (14%)		
		severe sore throat	1 (2%)	2 (2%)	2 (2%)		
	6 hours	no sore throat at any time since operation	35 (70%)	3 (6%)	2 (2%)	0.428	
		minimal sore throat	32 (64%)	7 (14%)	1 (2%)		
		moderate sore throat	30 (60%)	9 (18%)	1 (2%)		
	24 hours	no sore throat at any time since operation	36 (72%)	21 (42%)	21 (42%)	0.001	
		minimal sore throat	2 (4%)	15 (30%)	6 (12%)		
		moderate sore throat	2 (4%)	4 (8%)	7 (14%)		
		severe sore throat	-	-	6 (12%)		
	Post Extubation Cough (PEC)	1 hour	no cough at any time since the operation	35 (70%)	33 (66%)	22 (44%)	0.002
minimal cough or scratchy throat			5 (10%)	2 (4%)	10 (20%)		
moderate cough			-	5 (10%)	8 (16%)		
6 hours		no cough at any time since the operation	38 (76%)	30 (64%)	25 (50%)	0.001	
		minimal cough or scratchy throat	2 (4%)	1 (2%)	5 (10%)		
		moderate cough	-	9 (18%)	6 (12%)		
24 hours		no cough at any time since the operation	38 (76%)	30 (64%)	26 (52%)	0.017	
		minimal cough or scratchy throat	2 (4%)	2 (4%)	4 (8%)		
		moderate cough	-	8 (16%)	8 (16%)		
		severe cough	-	-	2 (4%)		
Hoarseness of Voice (HOV)		1 hour	no evidence of hoarseness at any time since the operation	39 (78%)	36 (72%)	23 (46%)	0.001
			hoarseness at the time of interview noted by the patient only	1 (2%)	3 (6%)	13 (26%)	
	hoarseness that is easily noted at the time of interview		-	1 (2%)	4 (8%)		
	6 hours	no evidence of hoarseness at any time since the operation	39 (78%)	30 (60%)	26 (52%)	0.009	
		hoarseness at the time of interview noted by the patient only	1 (2%)	6 (12%)	9 (18%)		
		hoarseness that is easily noted at the time of interview	-	4 (8%)	5 (10%)		
	24 hours	no evidence of hoarseness at any time since the operation	37 (74%)	35(70%)	27 (54%)	0.027	
		hoarseness at the time of interview noted by the patient only	2 (4%)	5 (10%)	10 (20%)		
		hoarseness that is easily noted at the time of interview	1 (2%)	-	3 (6%)		

The frequency of HOV at 1-hour post-operatively in group-B, L and C were reported 3 (6%), 10 (20%) and 37 (74%) respectively and the difference was statistically significant ($p=0.001$). The frequency of HOV at 6-hours post-operatively in group-B, L and C were reported as 3 (6%), 24 (48%) and 24 (48%) respectively and the difference was statistically significant ($p=0.01$) (Table-III).

DISCUSSION

In our study we found that wide spread application of Betamethasone gel over the endotracheal tube before intubation greatly reduces the frequency of post-extubation cough, the severity of post-operative sore throat, hoarseness of voice and post-extubation cough in comparison of application of Lidocaine jelly and ETT remain un-lubricated.

The study conducted by Agarwal *et al*, indicated that there are three most common adverse effects, i.e. POST, HOV and PEC, usually observed in patients who undergone general anesthesia by endotracheal intubation, which contribute to the complications and discomfort.¹⁴ However, we found the frequency after 24 hours was much lower in POST & PEC and the frequency of HOV after 24hrs was higher. Moreover, laryngeal mucosa related complications like irritation, trauma and inflammation mostly are also caused by POST.^{15,16} In addition, PEC also causes adverse effects including hemodynamic instability, raised intracranial pressure and intraocular pressure.¹⁷ Honarmand *et al*, revealed that steroids used in the treatment of bronchial asthma like aerosol have been previously proved significant in the prevention of these complications.¹⁸ However, considering the relatively high cost of inhaled steroids and the beneficial role of betamethasone gel (cheap and readily available steroid) as observed in this study, it is preferred to prevent post intubation complication at low resource settings.

A study conducted, stride failed to achieve any beneficial effect of local application of hydrocortisone on endotracheal tube. It was probably because stride involves only lubrication of tip of endotracheal tube.¹⁹ Investigators of other studies used extensive lubrication of tube with steroids.²⁰⁻²² Previous studies suggested the role of betamethasone gel over lidocaine and normal saline in significant reduction of frequency and severity of commonly occurring complications. But in contrast to those studies in spite of extensive lubrication in our study we found that over all frequency was more or less similar with betamethasone gel and lidocaine jelly but the role of betamethasone gel is superior

over lidocaine with regards to the severity of POST, HOV and PEC.

When POST were compared at different time intervals in our study, we found significant difference of frequency at 6 and 24 hours whereas study conducted in India showed significant results at 24 hours only. The comparison of severity of POST among three groups in our study revealed significant difference at 24 hours which correlated with the study conducted in India.²³ Other studies have also found significant role of steroids in reduction of frequency and severity of POST, HOV and PEC.^{24,25}

The current study found that only the frequency of HOV was reduced in patients with betamethasone gel in comparison with lidocaine jelly and un-lubricated ETT groups. However, severity of POST, HOV and PEC was reduced with the use of betamethasone gel as compare to other groups.

ACKNOWLEDGEMENT

Authors were thankful to Khursheed Anwar; Head Nurse and Mr. Jami-ur-Rehman; Staff nurse for their valuable contribution in the study.

CONCLUSION

The application of betamethasone gel on endotracheal tube before intubation reduces the post-extubation cough, severity of post-operative sore throat, hoarseness of voice and post-extubation cough in comparison with the application of lidocaine jelly and un-lubricated ETT.

Conflict of Interest: None.

Authors' Contribution

SSA: Basic concept, conclusion & manuscript writing, NA: Supervise & review article, AA: Contribution & helped in collection of study, MR: Helped in collection of study, KA: Data analysis.

REFERENCES

- Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. *Br J Anaesth* 2002; 88(4): 582-584.
- El-Boghdady K, Bailey CR, Wiles MD. Postoperative sore throat: a systematic review. *Anaesth* 2016; 71(6): 706-717.
- Dostálová K, Doubravská L, Fritscherová S, Pospíšilová D, Adamus M. Postoperative sore throat. *BJS Open* 2014; 312(2): 145-154.
- Selvaraj T, Dhanpal R. Evaluation of the application of topical steroids on the endotracheal tube in decreasing post-operative sore throat. *J Anaesthesiol Clin Pharmacol* 2002; 18(2): 167-170.
- Sumathi PA, Shenoy T, Ambareesha M, Krishna HM. Controlled comparison between Betamethasone gel and Lidocaine jelly applied over tracheal tube to reduce postoperative sore throat, cough, and hoarseness of voice. *Br J Anaesth* 2008; 100(2): 215-218.
- Yamanaka H, Hayashi Y, Watanabe Y, Uematu H, Mashimo T. Prolonged hoarseness and arytenoid cartilage dislocation after tracheal intubation. *Br J Anaesth* 2009; 103(3): 452-455.

Role of Betamethasone Gel and Lidocaine Jelly

7. Agarwal A, Gupta D, Yadav G, Goyal P, Singh PK, Singh U. An evaluation of the efficacy of licorice gargle for attenuating postoperative sore throat: a prospective, randomized, single-blind study. *Anesth Analg* 2009; 109(1): 77-81.
 8. Ayoub CM, Ghobashy A, Koch ME, McGrimley L, Pascale V, Qadir S, et al. Widespread application of topical steroids to decrease sore throat, hoarseness, and cough after tracheal intubation. *Anesth Analg* 1998; 87(3): 714-716.
 9. Fuller PB. The relationship between preintubation Lidocaine and postanesthesia sore throat. *AANA J* 1992; 60(4): 374-378.
 10. Takekawa K, Yoshimi S, Kinoshita Y. Effects of intravenous Lidocaine prior to intubation on postoperative airway symptoms. *J Anesth* 2006; 20(1): 44-47.
 11. Klemola UM, Saarnivaara L, Yrjola H. Post-operative sore throat: effect of lignocaine jelly and spray with endotracheal intubation. *Eur J Anaesthesiol* 1988; 5(6): 391-399.
 12. Kori K, Muratani T, Tatsumi S, Minami T. Influence of endotracheal tube cuff lubrication on postoperative sore throat and hoarseness. *Masui* 2009; 58(3): 342-345.
 13. Soltani HA, Aghadavoudi O. The effect of different Lidocaine application methods on postoperative cough and sore throat. *J Clin Anesthiol* 2002; 14(1): 15-18.
 14. Agarwal A, Gupta D, Yadav G, Goyal P, Singh PK, Singh U. An evaluation of the efficacy of licorice gargles for attenuating postoperative sore throat: a prospective, randomized, single-blind study. *Anesth Analg* 2009; 109(1): 77-81.
 15. Ahmed A, Abbasi S, Ghafoor HB, Ishaq M. Postoperative sore throat after elective surgical procedures. *J Ayub Med Col, Abbottabad* 2007; 19(2): 12-14.
 16. Sumathi PA, Shenoy T, Ambareesha M, Krishna HM. Controlled comparison between betamethasone gel and lidocaine jelly applied over tracheal tube to reduce postoperative sore throat, cough, and hoarseness of voice. *Br J Anaesth* 2008; 100(2): 215-218.
 17. Ebneshahidi A, Mohseni M. Strepsils (R) tablets reduce sore throat and hoarseness after tracheal intubation. *Anesth Analg* 2010; 111(4): 892-894.
 18. Honarmand A, Safavi M. Beclomethasone inhaler versus intravenous Lidocaine in the prevention of postoperative airway and throat complaints: a randomized, controlled trial. *Ann Saudi Med* 2008; 28(1): 11-16.
 19. Stride PC. Postoperative sore throat: topical hydrocortisone. *Anesth* 1990; 45(11): 968-971.
 20. Handady YE, Sanhoury M, Mimoun H, Ali MA. The effect of beatamethasone gel in reducing post-operative sore throat and cough after endotracheal intubation in khartoum teaching hospital in Sudan. *Open Sci J Clin Med* 2015; 3(4): 140-144.
 21. Tabari M, Soltani G, Zirak N, Alipour M, Khazaeni K. Comparison of effectiveness of betamethasone gel applied to the tracheal tube and iv dexamethasone on postoperative sore throat: a randomized controlled trial. *Iran J Otorhinolaryngol* 2013; 25(73): 215-220.
 22. Sarki ADM. A comparison of Betamethasone gel and Lidocaine jelly as prophylaxis against intubation-associated throat complications. *Niger J Basic Clin Sci* 2015; 12(2): 105-110.
 23. Thapa P, Shrestha RR, Shrestha S, Bajracharya GR. Betamethasone gel compared with lidocaine jelly to reduce tracheal tube related postoperative airway symptoms: a randomized controlled trial. *BMC Res Notes* 2017; 10(1): 361.
 24. Tabari M, Soltani G, Zirak N, Alipour M, Khazaeni K. Comparison of effectiveness of betamethasone gel applied to the tracheal tube and iv dexamethasone on postoperative sore throat: a randomized controlled trial. *Iran J Otorhinolaryngol* 2013; 25(73): 215-220.
 25. Kazemi A, Amini A. The effect of betamethasone gel in reducing sore throat, cough, and hoarseness after laryngo-tracheal intubation. *Middle East J Anesthesiol* 2007; 19(1): 197-204.
-