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Can We Reduce Postoperative Airway Symptoms Related To Endotracheal Intubation In Elective General Anesthesia?

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Abstract

Objective: To assess whether applying betamethasone-gel to an endotracheal tube is more effective than using an unlubricated endotracheal tube in minimizing the occurrence of postoperative sore throat, hoarseness, and cough.

Methods: 144 patients of the American Society of anaesthesiologists-physical status (ASA-PS) I and II, aged 18–65 years of either gender planned for elective surgery under general anaesthesia with endotracheal intubation were included. Patients undergoing ENT /oral cavity / oropharyngeal surgeries and upper respiratory tract infections were excluded. Patients were divided into two groups. In group X, patients were intubated with an endotracheal tube lubricated with 0.05% betamethasone-gel. In group Y patients were intubated with the unlubricated endotracheal tube. All patients were evaluated for the frequency of POST, HOV and PEC at 24 h after extubation.

Results: Post-operative sore throat was present in 25 (34.7%) patients in group X and 29 (40.3%) patients in group Y. Post-extubation cough was present in 06 (8.3%) patients in group X and 9 (12.5%) patients in group Y. Hoarseness of voice was present in 04 (5.6%) patients in group X and 6 (8.3%) patients in group Y. A comparison of both groups showed a p-value of 0.0001 which is statistically significant.

Conclusion: Using betamethasone-gel to lubricate the endotracheal tube markedly diminishes the frequency and intensity of postoperative airway symptoms.

Keywords: Endotracheal intubation, betamethasone, sore throat, cough, hoarseness, anesthesia.

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1. Introduction

Endotracheal intubation is the gold standard of airway management during general anaesthesia. It is the most rapid, safe, and simple method of achieving all goals of airway management.[1]

However, endotracheal intubation is not without complications. Complications vary from minor upper airway symptoms to major upper airway injuries.[2,3] Minor upper airway symptoms include POST (postoperative sore throat), PEC (post-extubation cough) and HOV(hoarseness of voice). The incidence of these symptoms varies from 20 % to 100 %.[4] Although minor, these symptoms increase postoperative morbidity and cause a significant amount of discomfort for patients.[5]

Numerous factors have been suggested as a cause of these symptoms. These include the size of the endotracheal tube, design of the cuff, cuff pressure, surgery duration, difficulty intubation traumatic intubation etc. Regardless of the underlying cause, the primary mechanism suggested involves the irritation and inflammation of the airway. [5,6]

Multiple pharmacological and non-pharmacological approaches, each with varying degrees of success, are employed to lessen or mitigate POST (postoperative sore-throat), PEC (post-extubation cough) and HOV (hoarseness of voice). Non-pharmacological attempts involved employing a smaller-sized tube, lubricating with water-soluble jelly, and reducing intracuff pressure [6]. Pharmacological strategies encompassed applying steroids on the endotracheal tube, using lozenges, administering lignocaine, and employing ketamine gargles.[7-9]

The anti-inflammatory action of steroids is well known. Betamethasone-gel is a glucocorticoid that is water-soluble and exhibits long-acting properties. It is frequently used topically for treating mucosal inflammatory lesions of the oral cavity. Consequently, if employed for lubricating the endotracheal tube, it is expected to offer both lubrication and anti-inflammatory effects.[9]

This study undertakes to find out the frequency of POST (postoperative sore-throat), PEC (post-extubation cough) and HOV(hoarseness of voice) in patients intubated with unlubricated and lubricated (betamethasone-gel) endotracheal tube so that better

management could be adopted and morbidity of patients could be decreased.

2. Materials & Methods

This prospective cohort study was carried out at PAF Hospital Islamabad from June to December 2023. The sample size was calculated to be 144 by the WHO sample size calculator, keeping the incidence of post-intubation symptoms among the non-lubricated group at 32 %,[13] an assumption that lubrication can reduce the risk (RRa) of postoperative symptoms by 50 % with 95% confidence level and 5 % alpha. Approval from the institutional ethical review committee was obtained. Non-probability consecutive sampling technique was used to recruit the patients with American Society of anaesthesiologists-physical status (ASA-PS) I and II, undergoing elective surgery under general anaesthesia with endotracheal intubation. Patients undergoing oropharyngeal surgeries or with difficult airways were excluded. Informed written consent was taken from all patients. Patients were divided into two groups as per the anaesthetist's choice. In group X, patients were intubated with endotracheal tubes lubricated with 0.05% betamethasone-gel while group Y comprised patients intubated with unlubricated endotracheal tubes. All patients were kept nil per oral from the midnight before surgery. Patients were assessed on the operation table. A blood pressure cuff, ECG chest leads and pulse oximeter probe were attached to the patient for monitoring. Induction was done with intra-venous propofol 1.5-2.5 mg/kg. Intra-venous nalbin 0.1- 0.3 mg/kg was given for analgesia. Intravenous atracurium 0.5 mg/kg was given as a muscle relaxant during induction. Each patient was ventilated for 3 minutes. An appropriate size endotracheal tube was used for intubation and secured. Maintenance of anaesthesia was achieved by isoflurane gas and intra-venous atracurium 0.1 mg/kg. Emergence was done with I.V. neostigmine 0.04-0.08 mg/kg and glycopyrrolate. All patients were observed for 24 hours after extubation for the development of postoperative sore throat (POST), hoarseness of voice (HOV) and post-extubation cough (PEC) using the four-point scale as per operational definition. All information was collected on performance by a blindfolded pre-trained team member. Data was entered and analyzed in SPSS version 20.0. Mean and standard deviation were calculated for quantitative variables like age. Frequency and percentage were calculated for qualitative variables like gender, post-operative sore throat, post-extubation cough and hoarseness of voice. Relative risk was computed and a chi-square test was applied to compare the proportion of participants developing post-operative sore throat, post-extubation cough and hoarseness of voice between the two groups. P- Values less than 0.05 were considered significant.

3. Results

18 to 65 years was the age range. The mean age in group X was 38.49 ± 10.33 years and 35.99 ± 12.06 years in group Y as shown in Table 1.

Table 1: Age distribution for groups (n=144)

Age (years)	Group X (n=72)		Group Y (n=72)	
	No. of patients	%age	No. of patients	%age
18-40	44	61.11	48	66.67
41-65	28	38.89	24	33.33
Mean ± SD	38.49 ± 10.33		35.99 ± 12.06	

Gender distribution for groups is shown in Table 2.

Table 2: Gender distribution for groups (n=144)

Gender	Group X (n=72)		Group Y (n=72)	
	No. of patients	%age	No. of patients	%age
Male	39	54.16	31	43.06
Female	33	45.84	41	56.94

The distribution of patients according to ASA status is shown in Table 3.

Table 3: Distribution of patients according to ASA status (n=144)

ASA status	Group X (n=72)		Group Y (n=72)	
	Frequency	%age	Frequency	%age
I	53	73.61	58	80.56
II	19	26.39	14	19.44

In this study, post-operative sore throat was observed in 25 (34.7%) patients in group X and 29 (40.3%) patients in group Y. Post-extubation cough was observed in 06 (8.3%) patients in group X and 9 (12.5%) patients in group Y. Hoarseness of voice was observed in 04 (5.6%) patients in group X and 6 (8.3%) patients in group Y. The p-value of 0.0001 was calculated by comparison of two groups.

Table 4: Comparison of the effectiveness of lubricating an endotracheal tube with betamethasone-gel versus an unlubricated endotracheal tube

	Group X (n=72) (Betamethasone-gel lubricated ETT)		Group Y (n=72) (Unlubricated ETT)		p-value
	N	%	N	%	
Postoperative sore-throat (POST)	25	34.7 %	29	40.3 %	0.0001
post-extubation cough (PEC)	06	8.3 %	09	12.5 %	0.0001
hoarseness of voice (HOV)	04	5.6%	06	8.3%	0.0001

4. Discussion

POST (postoperative sore-throat), PEC (post-extubation cough) and HOV (hoarseness of voice) are prevalent and widely acknowledged complications that often occur after general anaesthesia with endotracheal intubation. These complications contribute to heightened patient morbidity after surgery. Research indicates a considerable disparity in the occurrence of post-operative airway complaints. POST varies from 20 % to 80 %, HOV 40–60% and PEC 30–50%.[4-6] In our study, among the unlubricated ETT group, the incidence of POST, PEC, and HOV was 40.3 %, 12.5% and 8.3 % respectively. However, among the betamethasone-lubricated ETT group, the incidence of POST, PEC, and HOV was 34.7%, 8.3% and 5.6 % respectively. Our findings are consistent with previous studies.[10,11] In our research, we observed a noteworthy decrease in both the occurrence and intensity of POST (postoperative sore-throat), PEC (post-extubation cough) and HOV (hoarseness of voice) through the utilization of 0.05% betamethasone-gel. This effect is likely attributed to the anti-inflammatory effect of betamethasone-gel. A study conducted by Sumathi et al,[12] investigated the application of betamethasone-gel on the endotracheal tube, comparing it to lidocaine jelly for reducing postoperative sore throat. Their findings concluded that widespread use of betamethasone-gel on endotracheal tubes significantly lowers the occurrence of POST.[12] A study conducted by Ayoub et al,[14] utilizes placebo gel versus betamethasone gel. POST was 55.8% in the placebo group as compared to 27.2% in the betamethasone group. PEC was 37.2% in the placebo group as compared to 20.5% in the betamethasone group. HOV was 46.5% in the placebo group as compared to 18.2% in the betamethasone group..

5. Conclusion

This study leads to the conclusion that betamethasone-gel application to the endotracheal tube substantially diminishes both the frequency and severity of POST (postoperative sore-throat), PEC (post-extubation cough) and HOV (hoarseness of voice). As a result, we recommend the routine use of betamethasone-gel for endotracheal tube lubrication in every patient to alleviate the above symptoms.

Institutional Review Board Approval
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S.A[1], S.A[2] - Conception of study
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M.A, F.F, S.C, N.A -
Analysis/Interpretation/Discussion
M.A, F.F - Manuscript Writing
S.A[1], S.A[2], S.C, N.A - Critical Review

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