



Original Research Article

Incidence of Sore Throat in Postoperative Patients after Use of Betamethasone Gel Compared with Lidocaine Gel during Endotracheal Intubation

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INTRODUCTION

Obtaining and preserving a patent airway is a basic task of clinicians, who are engaged in providing emergency care and anesthesia.[1] Endotracheal intubation is one of the most widely applied methods of airway control, during which a tube is inserted into the trachea via the oral cavity or nose to provide sufficient ventilation and oxygenation.[2] The

Abstract: Background: After endotracheal intubation during general anesthesia, postoperative sore throat (POST) is a frequent side event that can negatively affect patient comfort and satisfaction. Several topical medications, including lidocaine gel and betamethasone gel, have been used to reduce airway discomfort during intubation. However, it's unclear how effective these drugs are in comparison.

Objective: To assess the frequency of sore throats following endotracheal intubation with lidocaine gel against betamethasone gel.

Methodology: The trial was a randomized controlled trial that was carried out at Jinnah Postgraduate Medical Centre, Karachi. Sixty patients who were undergoing elective surgery using general anesthesia were sampled. Group A used 0.05% betamethasone gel as the lubricant of the endotracheal tube, whereas Group B involved 2% lidocaine gel. The data were analyzed with SPSS version 26. The chi-square test and independent t-test were conducted to compare categorical data, and the p value of ≤ 0.05 was regarded as statistically significant. **Results:** Sore throat occurred at 6 hours after surgery in 26.7% of patients in the betamethasone group and 43.3% in the lidocaine group. At 24 hours, the incidence stood at 33.3 and 36.7%, respectively. The majority of cases were mild in nature. **Conclusion:** Following endotracheal intubation, betamethasone gel and lidocaine gel were successful in reducing postoperative sore throat, with comparable outcomes for each group. Betamethasone gel was associated with a slight reduction in symptom incidence, and there is a possible clinical benefit.

Keywords: Betamethasone; Lidocaine; Endotracheal Intubation; Postoperative Sore Throat.

process is commonly done among critically ill patients with impaired respiratory effort, airway protection, hypoxemia, or high carbon dioxide blood concentrations. Also, endotracheal intubation is performed systematically in patients with surgeries that need general anesthesia and in patients who are incompetent with non-invasive ventilation in intensive care units.[3]

Even though endotracheal intubation is a life-saving procedure, it does not come without complications.[4] The patients can develop several negative outcomes, such as accidental tube placement, improper placement in the esophagus or bronchus, and oral injuries to the lips, tongue, and teeth or mucosal lining.[5] Following the extubation surgery, a considerable proportion of patients may experience sore throats and hoarseness of voice, which are among the most often reported postoperative problems. Previous studies have shown that between one-third and half of intubated patients experience postoperative painful throat, while up to half may experience voice hoarseness. The prevalence of postoperative sore throat is said to be approximately 12% in cases of administration of lidocaine gel and about 28% in cases of dexamethasone application.[6]

There are several preventive measures that have been explored in order to reduce airway-related morbidity caused by endotracheal intubation. These methods are the application of smaller diameter endotracheal tubes and high-volume, low-pressure cuffs; they are supposed to minimize mechanical irritation of the airway mucosa.[7] Moreover, endotracheal tube topical pharmacological application has been used to reduce endotracheal friction and inflammation. Lubricant gels encourage an easier process of tube insertion and can assist in minimizing mucosal trauma in case of intubation.[8] Corticosteroids (betamethasone) are also under examination because they have been shown to reduce airway irritation and postoperative sore throat after intubation because of their potent anti-inflammatory effects.[9]

The most frequent and yet not always properly considered complication of endotracheal intubation is postoperative sore throat. Despite being thought of as a relatively minor side effect, patients may endure significant discomfort, increased anxiety following surgery, and a worse overall experience with anesthesia services. In other instances, chronic irritation of the throat can also predispose one to infections of the upper respiratory tract. Reducing postoperative sore throat as one of the sequelae has become more important as the emphasis on implementing improved recovery after surgery (ERAS) standards and early patient release has increased. Simple preventive measures have been proposed as topical application of pharmacological agents such as betamethasone gel and lidocaine gel to the endotracheal tube. Nevertheless, studies have found conflicting results; hence, there has been uncertainty about the best agent that offers superior protection against postoperative sore throat. Thus, the current research was intended to compare the incidence of the postoperative sore throat in patients undergoing endotracheal intubation with

betamethasone gel and lidocaine gel.

Materials and Methods

The study was a randomized controlled trial (clinical registration number: **NCT07256834**) and was carried out in the Department of Anesthesia at Jinnah Postgraduate Medical Centre. The research was conducted in six-months, 15th March 2025 to 15th September 2025. Ethical permission was taken to carry out the research by the Institutional Review Board of Jinnah Postgraduate Medical Centre with the approval number NO.F.2-81/2025-GENI/429/JPMC. The World Health Organization sample size calculator was used to establish the sample size. Previous research has shown that the rate of postoperative sore throat at 24 hours is 8% for betamethasone gel and 38% for lidocaine gel.[10] The necessary sample size of 30 patients in each group was obtained using a power of 80% and a significance level of 5%.

The patients were chosen by a non-probability convenience sampling method. Participants in the study, who were between the ages of 18 and 60 and had a physical status I or II according to the American Society of Anesthesiologists (ASA), were scheduled to have an elective surgical procedure performed under general anesthesia for less than four hours. The study excluded patients whose endotracheal intubation required more than two attempts to accomplish, patients who had undergone surgery in the mouth or pharynx, patients whose Mallampati score was III or IV, patients with infections of the upper respiratory tract, patients already on steroid therapy, and patients who needed to insert a nasogastric tube preoperatively.

The patients were recruited by meeting the eligibility criteria and undergoing elective general anesthesia surgery at Jinnah Postgraduate Medical Centre. All participants were informed and gave their written consent before enrollment. The baseline demographic data, which comprised name, date of presentation, age, weight, height, body mass index (BMI), and gender, was entered on an existing proforma.

The participants were randomly assigned to two groups (Group A and Group B) using the random sampling software. Just before the induction of anesthesia, '2.5 ml of 0.05%' betamethasone dipropionate gel was administered to the endotracheal tube in Group A, covering the distal end of the tube to a distance of 15 cm. Group B: Similarly, '2.5 ml of 2%' lidocaine gel was used to lubricate the same. General anesthesia was induced by intravenous propofol (2.5 mg/kg), nalbuphine (0.1 mg/kg), and atracurium (0.5 mg/kg). After three minutes of bag-mask ventilation, tracheal intubation using a 7 or 7.5 mm endotracheal tube was

performed, depending on the trachea's inner diameter.

A combination of isoflurane and 60% oxygen in compressed air was observed to maintain anesthesia. Regardless of the outcome of surgery, isoflurane was stopped, and residual neuromuscular blockage was reversed by administration of a 0.05 mg/kg dose of neostigmine. The patient was fully conscious and had sufficient spontaneous respiration, so the extubation was carried out. Upon extubation, patients were moved to the post-anesthesia care unit, where they were monitored by the anesthetists using the standard ASA monitoring. The occurrence and intensity of postoperative sore throat were measured based on the postoperative sore throat scoring system that is established at 6 hours and 24 hours after surgical procedures in the presence of a consultant anesthetist who has a minimum experience of five years. This study minimized the possible confounding factors and bias by ensuring the use of appropriate inclusion and exclusion criteria. The presence of a sore throat was determined in the patients at 6 hours and 24 hours of the time when they were assessed. The degree of painful throat was rated using the Post-Operative Sore Throat (POST) score.[11] The degree and severity of post-extubation throat irritation were assessed using a standardized grading system. A score of 0 indicated that there was never a sore throat after the procedure.

A score of one indicated a minor sore throat, where the patient only reported discomfort in the throat when asked directly.

A score of 2 was a moderate sore throat, where the patient was asked about the symptom, and he reported it without prompting. A severe sore throat was given a score of 3, which was defined as the presence of pain in the throat, with the help of hoarseness of voice.

IBM SPSS Statistics was used to arrange and evaluate all of the collected data. Continuous variables were tested for normality using the Shapiro-Wilk test. Age, length of surgery, weight, height, and body mass index were among the continuous variables that were displayed in mean $\pm$ standard deviation. For categorical factors including gender, ASA status, residential status, hypertension, and diabetes mellitus, frequencies and percentages were provided. Fisher's exact test and the Chi-square test were used to compare the incidence of postoperative sore throat in the two groups at a significance level of 5%. An independent t-test was employed while dealing with continuous variables. In order to determine whether any of these factors influenced the incidence of postoperative sore throat, it was additionally stratified by age, gender, length of operation, ASA status, residential status, hypertension, and diabetes mellitus. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The 60 patients in the trial were split equally between the betamethasone group (Group A) and the lidocaine group (Group B), each consisting of 30 participants. The betamethasone arm's average age was 44.3 ± 11.3 years, whereas the lidocaine arm's was 41.5 ± 12.3 years. There was no statistically significant difference between the two groups ($p = 0.359$). In both groups, women made up the majority of participants (83.3% in the betamethasone group and 63.3% in the lidocaine group). With respect to ASA status, 46.7% and 50.0% patients in the betamethasone and lidocaine groups were ASA I and ASA II, respectively. Regarding comorbidities, 43.3% of patients in each group did not have any underlying disease. The betamethasone group had 30.0% patients with hypertension, and the lidocaine group had 40.0% with hypertension. Diabetes mellitus occurred in 3.3% of patients in each group, and combined hypertension and diabetes in 23.3% and 13.3% of patients in each group (Table 1).

Table 1: Baseline Characteristics of Study Participants (n = 60)

Variable	Betamethasone Group (A) n=30	Lidocaine Group (B) n=30	p-value
Age (years) Mean $\pm$ SD	44.3 $\pm$ 11.3	41.5 $\pm$ 12.3	0.359**
Gender n(%)			
Male	5 (16.7%)	11 (36.7%)	0.0001*
Female	25 (83.3%)	19 (63.3%)	
ASA Status n(%)			
I	14 (46.7%)	15 (50.0%)	0.0001*
II	16 (53.3%)	15 (50.0%)	
Comorbidities n(%)			
None	13 (43.3%)	13 (43.3%)	0.0001*
Hypertension	9 (30.0%)	12 (40.0%)	
Diabetes Mellitus	1 (3.3%)	1 (3.3%)	
HTN + DM	7 (23.3%)	4 (13.3%)	

**The Chi-square test and Fisher's exact test were applied, and $p \leq 0.05$ was considered significant.*

***Independent t-test applied.*

After extubation, the frequency of sore throats was measured at six and twenty-four hours. Six hours following surgery, 26.7% and 43.3% of patients in the beta methasone and lidocaine groups reported having a sore throat, while the remaining 73.3% and 56.7% of patients in the group/groups did not report this symptom. At 24 hours after surgery, 33.3% of patients who received betamethasone and 36.7% of those who received lidocaine reported having a sore throat, compared to 66.7% and 63.3% of patients who did not have this symptom.(Table 2)

Table 2: Incidence of Postoperative Sore Throat in Both Groups (n = 60)

Postoperative Sore Throat	Betamethasone (n=30)	Lidocaine (n=30)
At 6 Hours		
Present	8 (26.7%)	13 (43.3%)
Absent	22 (73.3%)	17 (56.7%)
At 24 Hours		
Present	10 (33.3%)	11 (36.7%)
Absent	20 (66.7%)	19 (63.3%)

Six hours after surgery, the degree of postoperative sore throat was assessed using the POST grading method. The majority of patients in the betamethasone group (73.3%) reported no sore throat, whereas 26.7% reported mild sore throat. A moderate sore throat did not occur in any of the individuals in this group. In contrast, 40.0% of patients in the lidocaine group reported having mild sore throats, 3.3% reported moderate sore throats, and 56.7% reported having no sore throats at all. At six hours, there was no statistically significant difference in the two groups' postoperative sore throat severity ($p = 0.295$)(Table 3).

Table 3: Severity of Postoperative Sore Throat at 6 Hours in Betamethasone and Lidocaine Groups (n = 60)

POST Score (6 Hours)	Betamethasone Group (A) n=30	Lidocaine Group (B) n=30	P-value
0 (No sore throat)	22 (73.3%)	17 (56.7%)	0.295
1 (Mild sore throat)	8 (26.7%)	12 (40.0%)	
2 (Moderate sore throat)	0 (0%)	1 (3.3%)	

At 24 hours following the procedure, the degree of sore throat was comparable in both groups. Of those taking betamethasone, 66.7% said they had no sore throat, 30.0% said they had a mild, painful throat, and 3.3% said they had a moderate sore throat. Of the patients in the lidocaine group, 6.7% experienced a serious sore throat, 30.0% had a mild sore throat, and 63.3% denied having one. Additionally, there was no statistically significant difference in the two groups' 24-hour postoperative sore throat intensity ($p = 0.836$) (Table 4).

Table 4: Severity of Postoperative Sore Throat at 24 Hours in Betamethasone and Lidocaine Groups (n = 60)

POST Score (24 Hours)	Betamethasone Group (A) n=30	Lidocaine Group (B) n=30	p-value
0 (No sore throat)	20 (66.7%)	19 (63.3%)	0.836
1 (Mild sore throat)	9 (30.0%)	9 (30.0%)	
2 (Moderate sore throat)	1 (3.3%)	2 (6.7%)	

DISCUSSION

One of the most prevalent minor complications in the postoperative period following endotracheal intubation is postoperative sore throat (POST): it is primarily caused by mucosal inflammation and mechanical irritation during airway manipulation. In the current randomized controlled trial, POST was also reduced in the betamethasone group as compared to the lidocaine group at 6 hours and 24 hours after the operation, but this was not statistically significant. Severity measurement also revealed that the vast majority of the patients in both groups had no sore throat or a mild one, whereas

moderate sore throat was reported in a few cases.

Our study's findings are comparable to those of Alam et al. (2022), who evaluated the advantages of endotracheal tube covering with lidocaine and betamethasone gel for surgical patients under general anesthesia. According to their report, the incidence of a sore throat at 24 hours was not significantly different between the two groups, which is consistent with the results of the current investigation, even though betamethasone gel reduced the severity of the postoperative airway symptoms.[10]

Similarly, the incidence of postoperative sore throat at 6 and 24 hours was reduced in the betamethasone

treatment group (12% and 25.2%) than in the lignocaine treatment group (30.3% and 38.56%) in a randomized controlled trial conducted by Imayaval and Sanjana (2021). The authors came to the conclusion that topical corticosteroids minimize postintubation airway inflammation and irritation. These results confirm the tendency that is present in the current study, in which betamethasone also demonstrated a decreased occurrence of sore throat in contrast with lidocaine, yet the distinction was not found to be statistically significant.[12]

The comparison between betamethasone gel and lidocaine gel in patients who had undergone elective surgery was reported in another Pakistani study by Asad et al. (2022), which indicated that severe postoperative sore throat was found in 7.4% of patients who received betamethasone gel versus 18.5% of patients receiving lidocaine gel. Their findings showed that the severity of sore throat significantly decreased with the use of betamethasone, which proved the anti-inflammatory nature of topical corticosteroids.[13]

Similar observations have also been noted in international studies. Thapa et al. 2017 and Majid et al. 2025 performed studies to compare betamethasone gel, lidocaine jelly, and unlubricated endotracheal tubes. They found that the betamethasone group had a considerably lower incidence of sore throats during the first 24 hours following surgery compared to the lidocaine group. In addition, patients treated with betamethasone gel also experienced less intense symptoms. These findings underscore the positive effect of corticosteroids as an anti-inflammatory agent to decrease mucosal irritation (following intubation).[14, 15]

Individuals who received betamethasone gel experienced a significantly lower rate of postoperative sore throat in the first 24 hours following surgery than those who received intravenous dexamethasone, according to another clinical trial that examined the two treatments. This effect was ascribed in the study to the local anti-inflammatory effects of corticosteroids, which inhibit inflammatory intermediates that cause mucosal inflammation and irritation.[16]

Conversely, there are some studies that have also found the same results as the current study, where there was not much of a difference between interventions. Indicatively, Regmi et al. 2025 found that the treatment groups and the control groups were not significantly different in the incidence of sore throat at 24 hours. The authors proposed that the tube size, operation period, and mode of intubation may play a more significant role in the occurrence of postoperative sore throat than the

topical agents.[17]

Other observational and comparative studies have indicated that the use of betamethasone gel reduces the total rate of postoperative airway complications, including coughing, hoarseness, and sore throat, as opposed to lidocaine jelly or no lubrication. These investigations focus on highlighting the fact that corticosteroids are used to reduce mucosal inflammation and irritation induced by endotracheal tube contact with the pharyngolaryngeal mucosa.[18-20]

The current study's findings suggest that topical medications may be useful in reducing postoperative sore throat following endotracheal intubation. The betamethasone group exhibited comparatively fewer postoperative symptoms at 6 and 24 hours, despite the fact that both betamethasone gel and lidocaine gel were found to be helpful in reducing the incidence and severity of postoperative sore throat. This suggests that topical corticosteroids' anti-inflammatory properties may help reduce irritation of the airway mucosa caused by endotracheal tube insertion. Betamethasone gel used as an endotracheal tube lubricant could thus be viewed as a low-cost, easy-to-use, and effective intervention to enhance the comfort and satisfaction levels of patients in the clinical anesthesia practice.

Limitations:

Although this study has useful insights, it has some limitations. The sample size was small and focused on one tertiary care center, and this could be a limitation to the overall generalizability of the results to the general population. Furthermore, convenience sampling was non-probability, something that can be subject to selection bias. The sore throat assessment was included in the postoperative period based on patient-reported symptoms on a scoring system, and it can be affected by subjective variation and individual pain perception. Moreover, the influence of other factors that might affect postoperative sore throat, including cuff pressure, precise intubation duration, and changes in intubation technique were not the focus of the current study.

Conclusion:

A common and excruciating side effect of endotracheal intubation in patients under general anesthesia is the development of postoperative sore throat. The current study's findings indicated that the incidence and severity of postoperative sore throat at 6 and 24 hours following surgery were comparable when betamethasone gel and lidocaine gel were used to lubricate the endotracheal tube. Although patients receiving betamethasone had a comparatively lower incidence of sore throats than patients receiving lidocaine gel, the difference was not statistically significant. The cases that were reported were mostly

mild and ended within the initial postoperative day. The evidence indicates both agents are effective and safe in the reduction of postoperative throat discomfort, but betamethasone gel might have a minor clinical benefit through its anti-inflammatory effect. Proper lubrication methods during endotracheal intubation can thus help in enhancing postoperative pain and satisfaction.

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