Section: Anaesthesiology

Original Research Article

A COMPARATIVE STUDY BETWEEN BETAMETHASONE GEL AND LIGNOCAINE JELLY APPLIED OVER THE TRACHEAL TUBE TO REDUCE POSTOPERATIVE AIRWAY COMPLICATIONS

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ABSTRACT

Background: Postoperative airway complications such as sore throat, cough, and hoarseness of voice are common following endotracheal intubation and may adversely affect patient comfort and recovery. Various topical agents have been used to reduce these complications, among which betamethasone gel and lignocaine jelly are frequently employed because of their anti-inflammatory and local anesthetic properties, respectively. The aim is to compare the efficacy of betamethasone gel and lignocaine jelly applied over the tracheal tube in reducing postoperative airway complications following endotracheal intubation.

Materials and Methods: This prospective, randomized, comparative, interventional study was conducted on 72 patients undergoing elective surgeries under general anesthesiarequiring endotracheal intubation. Patients were randomly allocated into two groups of 36 each. Group L received betamethasone gel, while Group B received lignocaine jelly applied over the endotracheal tube before intubation. Postoperative sore throat, hoarseness of voice, and cough were assessed at 1, 3, 8, and 24 hours after surgery. Statistical analysis was performed using appropriate tests, and a p-value <0.05 was considered significant.

Results: The mean age was comparable between Group B (38.47±13.10 years) and Group L (38.97±13.46 years) (p=0.874). Absence of sore throat was significantly higher in Group L at 3 hours (66.67% vs. 30.56%; p=0.006) and 8 hours (77.78% vs. 44.44%; p=0.004). Post-extubation cough was also significantly reduced in Group L at 3 hours (50.00% vs. 27.78%; p=0.044) and 8 hours (88.89% vs. 41.67%; p<0.0001). Hoarseness of voice was lower in Group L but did not reach statistical significance. By 24 hours, airway complications had largely resolved in both groups.

Conclusion: Betamethasone gel was more effective than lignocaine jelly in reducing postoperative sore throat and cough following endotracheal intubation. Both agents showed similar efficacy in preventing postoperative hoarseness of voice.

Keywords: Betamethasone gel, lignocaine jelly, endotracheal intubation, postoperative sore throat, post-extubation cough, hoarseness of voice, airway complications, general anesthesia.

INTRODUCTION

Postoperative sore throat (POST), post-extubation cough (PEC), and hoarseness of voice (HOV) are prevalent and acknowledged sequelae subsequent to general anaesthesia with endotracheal intubation, exacerbating postoperative morbidity and patient suffering. Research indicates a significant disparity in the occurrence of postoperative airway problems, with rates varying from 20% to as high as 100% for POST,[1] 40–60% for HOV and 30–50% for PEC. Furthermore, PEC may have detrimental consequences such as haemodynamic instability and elevated intracranial and intraocular pressures.[2]

Various drugs and non-pharmacological interventions have demonstrated efficacy in diminishing the occurrence of airway symptoms, but with varying degrees of success. The contradictory results indicate the probable influence of many factors related to these symptoms, such as endotracheal tube size, cuff design, and surgical duration. The primary mechanism proposed, regardless of the source, is irritation and inflammation of the airway.[3] Lidocaine is utilised for airway anaesthesia; nevertheless, its efficacy in alleviating postoperative airway discomfort has demonstrated inconsistent outcomes.[4] Steroids are recognised for their anti-inflammatory properties. Betamethasone gel is a long-acting, water-soluble glucocorticoid utilised topically for the management of inflammatory lesions of the oral mucosa. Consequently, it should offer lubrication and possess anti-inflammatory properties when utilised for the lubrication of the endotracheal tube. The present study was based on the hypothesis that thorough lubrication of the endotracheal tube with betamethasone gel would be comparable to lidocaine jelly in preventing and reducing the severity of postoperative sore throat, hoarseness of voice, and post-extubation cough. Prior research has evaluated the efficacy of betamethasone gel in comparison to standard lubricant jellies or lidocaine jellies in mitigating POST or HOV. In our investigation, we aimed to compare the medicine with an unlubricated tube, as this is our standard practice. We also attempted to evaluate no other postoperative airway symptoms, including POST, HOV, and PEC concurrently.

Lignocaine jelly: The local anaesthetic jelly, due to its lubricating characteristics, mitigates potential injury to the tracheal mucosa by inhibiting tracheal tube bucking. Lignocaine is an amide local anaesthetic that diffuses through tissue more rapidly than ester local anaesthetics. It functions by obstructing the sodium channel-specific receptor for local anaesthetics, accessing this location through two processes. Unionised base forms readily permeate the neuronal cell membrane owing to their lipophilic properties. The ionised cationic form directly accesses the sodium channel through the exterior opening. It resides in a diffusible base state at physiological pH and is metabolised in the liver by enzymatic breakdown.

Betamethasone Gel: It is a fluorinated derivative of prednisolone. It functions by suppressing the synthesis of inflammatory mediators and diminishing immune system activity. It is the most potent anti-inflammatory agent, aiding in the reduction of oedema, inflammation, and irritation in the airway. This Property may be advantageous in mitigating postoperative airway complications in intubated patients.

MATERIALS AND METHODS

Study Design: Prospective, Randomised, Comparative, Interventional study.The study was initiated after obtaining permission from the institutional ethics committee. It was done only after obtaining written informed consent of the patient. Identity of the patients were kept confidential.

Study Population: Patients underwent elective surgeries under general anaesthesia at tertiary care hospital was included in the study

study duration: A period of 12 months after approval from ethics committee

Sample Size: A total of 72 patients scheduled for elective surgical procedures under general anesthesia requiring endotracheal intubation were enrolled in the study

Inclusion criteria:

- Patients underwent elective surgeries under general anaesthesia
- Age>18 years
- ASA Grade 1 and 2 patients
- Age between 18 to 60 years
- Surgery duration 30 min to 240 min

Exclusion criteria:

- Hypersensitive reaction and allergic reaction to drug
- ASA 3 and 4
- Negative consent
- Restrictive mouth opening
- Recent history of upper respiratory tract infection Cervical spine injury
- Surgery of oral cavity, pharynx that need nasogastric tube insertion, throat packing

Patients on steroid therapy and pregnancy

Statistical Analysis: We put the data into Microsoft Excel and then used PSPP software version 27.0.Mean ± standard deviation was used to show continuous variables, and frequencies and percentages were used to show categorical variables. The unpaired t-test was utilized to examine continuous variables between independent groups, whereas the paired t-test was employed for comparisons within the same group. The Chi-square test or Fisher's exact test was used to look at categorical variables, depending on which one was better. A p-value of less than 0.05 was seen to be statistically important.

RESULTS

Table 1: Comparison of age and Gender between Group L and B.

		Group L(n=36)	Group B(n=36)	Total	P value
Age	18 to 20 years	3 (8.33%)	2 (5.56%)	5 (6.94%)	0.717*
	21 to 30 years	12 (33.33%)	11 (30.56%)	23 (31.94%)	
	31 to 40 years	2 (5.56%)	6 (16.67%)	8 (11.11%)	
	41 to 50 years	9 (25%)	8 (22.22%)	17 (23.61%)	
	51 to 60 years	10 (27.78%)	9 (25%)	19 (26.39%)	
	Mean ± SD	38.47 ± 13.1	38.97 ± 13.46	38.72 ± 13.19	0.874‡
	Median(25th-75th percentile)	41.5(27.5-51)	38.5(26.75-50.5)	40.5(26.75-51)	
	Range	18-60	19-60	18-60	
Gender	Female	22 (61.11%)	19 (52.78%)	41 (56.94%)	0.475†
	Male	14 (38.89%)	17 (47.22%)	31 (43.06%)	
	Total	36 (100%)	36 (100%)	72 (100%)	

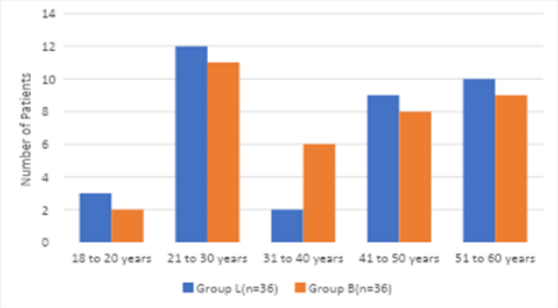

Figure 1A: Comparison of age between Group L and B.

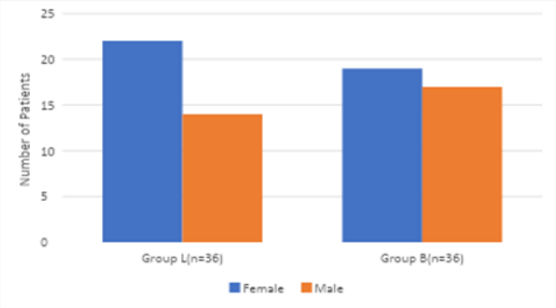

Figure 1B: Comparison of Gender between Group L and B.

Table 2: Comparison of Postoperative Sore Throat Between Group L and B (n = 72)

Time Interval	Severity of Sore Throat	Group L (n=36)	Group B(n=36)	Total (n=72)	P value
After 1 hour	No sore throat at any time since the operation	13 (36.11%)	10 (27.78%)	23 (31.94%)	0.232
	Minimal sore throat (complains of sore throat only on asking)	14 (38.89%)	12 (33.33%)	26 (36.11%)	
	Moderate sore throat (complains of sore throat on his/her own)	9 (25.00%)	10 (27.78%)	19 (26.39%)	
	Severe sore throat (change of voice or hoarseness associated with throat pain)	0 (0.00%)	4 (11.11%)	4 (5.56%)	
After 3 hours	No sore throat at any time since the operation	24 (66.67%)	11 (30.56%)	35 (48.61%)	0.006*
	Minimal sore throat (complains of sore throat only on asking)	9 (25.00%)	13 (36.11%)	22 (30.56%)	
	Moderate sore throat (complains of sore throat on his/her own)	3 (8.33%)	10 (27.78%)	13 (18.06%)	
	Severe sore throat (change of voice or hoarseness associated with throat pain)	0 (0.00%)	2 (5.56%)	2 (2.78%)	
After 8 hours	No sore throat at any time since the operation	28 (77.78%)	16 (44.44%)	44 (61.11%)	0.004*
	Minimal sore throat (complains of sore throat only on asking)	8 (22.22%)	16 (44.44%)	24 (33.33%)	
	Moderate sore throat (complains of sore throat on his/her own)	0 (0.00%)	4 (11.11%)	4 (5.56%)	
	Severe sore throat	0 (0.00%)	0 (0.00%)	0 (0.00%)	
After 24 hours	No sore throat at any time since the operation	32 (88.89%)	34 (94.44%)	66 (91.67%)	0.674
	Minimal sore throat (complains of sore throat only on asking)	4 (11.11%)	2 (5.56%)	6 (8.33%)	
	Moderate sore throat	0 (0.00%)	0 (0.00%)	0 (0.00%)	
	Severe sore throat	0 (0.00%)	0 (0.00%)	0 (0.00%)	

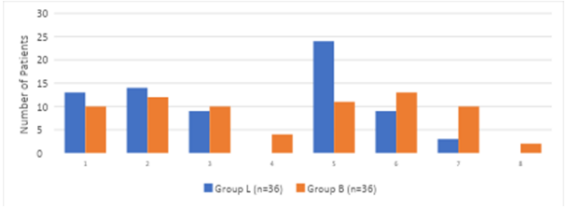

Figure 2A: Comparison of Postoperative Sore Throat Between Group L and Group A (n = 72)

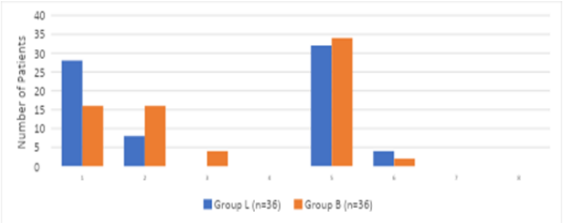

Figure 2B: Comparison of Postoperative Sore Throat Between Group L and B (n = 72)

Table 3: Comparison of hoarseness of voice between Group L and B.

Time Interval	Hoarseness of Voice	Group L (n=36)	Group B(n=36)	Total (n=72)	P value
After 1 hour	No evidence of hoarseness at any time since the operation	26 (72.22%)	18 (50.00%)	44 (61.11%)	0.091
	No evidence of hoarseness at the time of interview	4 (11.11%)	11 (30.56%)	15 (20.83%)	
	Hoarseness at the time of interview noted by patient only	6 (16.67%)	7 (19.44%)	13 (18.06%)	
After 3 hours	No evidence of hoarseness at any time since the operation	26 (72.22%)	18 (50.00%)	44 (61.11%)	0.051
	No evidence of hoarseness at the time of interview	9 (25.00%)	18 (50.00%)	27 (37.50%)	
	Hoarseness at the time of interview noted by patient only	1 (2.78%)	0 (0.00%)	1 (1.39%)	
After 8 hours	No evidence of hoarseness at any time since the operation	31 (86.11%)	27 (75.00%)	58 (80.56%)	0.234
	No evidence of hoarseness at the time of interview	5 (13.89%)	9 (25.00%)	14 (19.44%)	
	Hoarseness at the time of interview noted by patient only	0 (0.00%)	0 (0.00%)	0 (0.00%)	
After 24 hours	No evidence of hoarseness at any time since the operation	33 (91.67%)	33 (91.67%)	66 (91.67%)	1
	No evidence of hoarseness at the time of interview	3 (8.33%)	3 (8.33%)	6 (8.33%)	
	Hoarseness at the time of interview noted by patient only	0 (0.00%)	0 (0.00%)	0 (0.00%)	

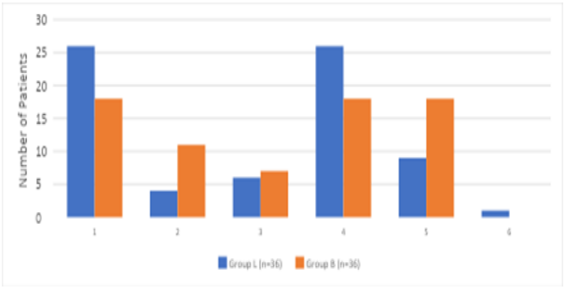

Figure 3A: Comparison of hoarseness of voice between Group L and B.

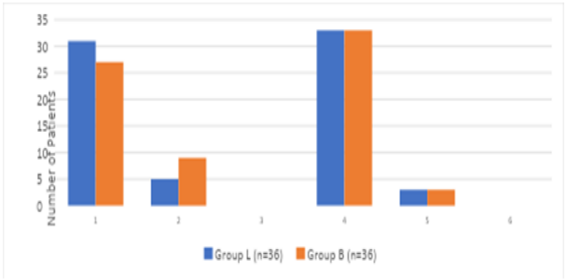

Figure 3B: Comparison of hoarseness of voice between Group L and B.

Table 4: Comparison of post-extubation cough between Group L and B.

Time Interval	Post-Extubation Cough	Group L (n=36)	Group B(n=36)	Total (n=72) n (%)	P value
After 1 hour	No cough at any time since extubation	14 (38.89)	9 (25.00)	23 (31.94)	0.185
	Minimal cough or scratchy throat	12 (33.33)	8 (22.22)	20 (27.78)	
	Moderate cough	8 (22.22)	13 (36.11)	21 (29.17)	
	Severe cough	2 (5.56)	6 (16.67)	8 (11.11)	
After 3 hours	No cough at any time since extubation	18 (50.00)	10 (27.78)	28 (38.89)	0.044*
	Minimal cough or scratchy throat	12 (33.33)	9 (25.00)	21 (29.17)	
	Moderate cough	5 (13.89)	13 (36.11)	18 (25.00)	
	Severe cough	1 (2.78)	4 (11.11)	5 (6.94)	
After 8 hours	No cough at any time since extubation	32 (88.89)	15 (41.67)	47 (65.28)	<0.0001*
	Minimal cough or scratchy throat	4 (11.11)	15 (41.67)	19 (26.39)	
	Moderate cough	0 (0.00)	5 (13.89)	5 (6.94)	
	Severe cough	0 (0.00)	1 (2.78)	1 (1.39)	
After 24 hours	No cough at any time since extubation	34 (94.44)	32 (88.89)	66 (91.67)	0.674
	Minimal cough or scratchy throat	2 (5.56)	4 (11.11)	6 (8.33)	
	Moderate cough	0 (0.00)	0 (0.00)	0 (0.00)	
	Severe cough	0 (0.00)	0 (0.00)	0 (0.00)	

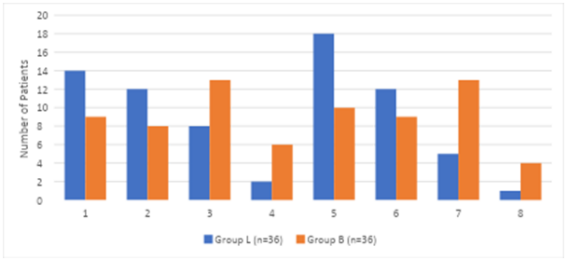

Figure 4 A: Comparison of post-extubation cough between Group L and B.

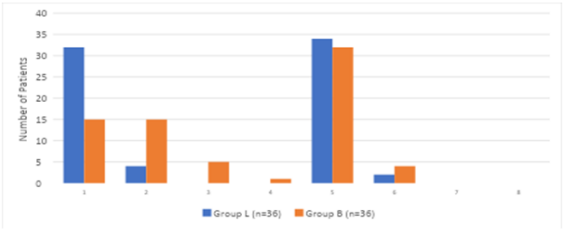

Figure 4 B: Comparison of post-extubation cough between Group L and B.

A total of 72 patients were enrolled in the study, with 36 patients each in Group B (lignocaine jelly) and Group L (betamethasone gel). The demographic characteristics were comparable between the groups. The mean age was 38.47±13.10 years in Group B and 38.97±13.46 years in Group L (p=0.874). Females constituted the majority of participants in both groups (61.11% in Group B and 52.78% in Group L ; p=0.475). The prevalence of hypertension (25% in both groups) and diabetes mellitus (13.89% in Group B vs. 11.11% in Group L) was also similar (p=1.000).

Postoperative sore throat (POST) showed no significant difference between groups at 1 hour (p=0.232). However, at 3 hours, 66.67% of patients in Group B were free from sore throat compared with 30.56% in Group L , with significantly fewer cases of moderate-to-severe sore throat in Group B (8.33% vs. 33.33%; p=0.006). At 8 hours, absence of sore throat was observed in 77.78% of Group B patients versus 44.44% of Group L patients (p=0.004). By 24 hours, symptoms had largely resolved in both groups (p=0.674).

The incidence of postoperative hoarseness of voice was lower in Group B throughout the observation period; however, differences were not statistically significant at 1 hour (p=0.091), 3 hours (p=0.051), 8 hours (p=0.234), or 24 hours (p=1.000).

Post-extubation cough was comparable at 1 hour (p=0.185). Significant reductions in cough severity were observed in Group B at 3 hours (p=0.044) and 8 hours (p<0.0001). At 8 hours, 88.89% of Group B patients reported no cough compared with 41.67% of Group L patients. By 24 hours, cough had nearly resolved in both groups (p=0.674).

DISCUSSION

In the present prospective randomized comparative study, 72 patients undergoing elective surgery under general anesthesia were equally allocated to receive either lignocaine jelly (Group B) or betamethasone gel (Group L) applied over the endotracheal tube before intubation. Baseline demographic characteristics were comparable between the two groups. The mean age was 38.47±13.10 years in Group B and 38.97±13.46 years in Group L (p=0.874), while female patients constituted 61.11% and 52.78% of the respective groups (p=0.475). Similar demographic comparability was reported by Sumathi et al., who observed no significant differences in age, sex distribution, or operative characteristics between patients receiving betamethasone gel and lignocaine jelly, ensuring that postoperative airway outcomes could be attributed to the intervention rather than baseline variations.[5]

Postoperative sore throat (POST) is a prevalent complication subsequent to endotracheal intubation. The incidence and severity of sore throat were similar one hour post-surgery (p=0.232). At the 3-hour mark, 66.67% of patients in Group B were devoid of painful throat symptoms, in contrast to 30.56% in Group L. Additionally, moderate-to-severe sore throat was observed in 8.33% of Group B patients and 33.33% of Group L patients (p=0.006). After 8 hours, the percentage of patients without painful throat rose to 77.78% in Group B, in contrast to 44.44% in Group L (p=0.004). The results demonstrate a notable decrease in postoperative sore throat among the lignocaine group in the early postoperative phase. Bagchi et al. observed same findings, indicating that topical lignocaine preparations markedly alleviated postoperative throat discomfort during the initial 6–8 hours post-surgery compared to normal lubrication, attributable to their local anaesthetic and mucosal protecting properties.[6] Likewise, McHardy and Chung reported that adequate lubrication of the endotracheal tube significantly decreases mucosal trauma and postoperative pharyngeal irritation, particularly during the immediate recovery period.[7] In contrast, Sumathi et al. demonstrated superior efficacy of betamethasone gel compared with lignocaine jelly, reporting postoperative sore throat incidences of 14% in the betamethasone group compared with 36% in the lignocaine group at 24 hours.[5] The discrepancy between their findings and the present study may be attributed to differences in patient populations, surgical duration, cuff pressure monitoring, and postoperative assessment protocols. Nevertheless, both studies highlight the importance of topical pharmacological interventions in reducing airway morbidity after intubation.

Postoperative hoarseness of voice was lower in Group B throughout the observation period, although the differences were not statistically significant. At 1 hour, 72.22% of patients in Group B had no hoarseness compared with 50.00% in Group L (p=0.091). At 3 hours, persistent absence of hoarseness was observed in 72.22% and 50.00% of patients, respectively (p=0.051). By 24 hours,

hoarseness had virtually resolved in both groups, with 91.67% of patients in each group remaining symptom-free (p=1.000). Similar findings were reported by Kazemi et al., who observed that postoperative hoarseness generally resolves spontaneously within 24 hours and that topical airway interventions have only a modest influence on its incidence.[8] Christensen et al. also found that although lubricants may reduce early vocal cord irritation, statistical significance is often difficult to demonstrate because of the relatively low overall incidence of persistent hoarseness.[9]

Post-extubation cough represents another important source of patient discomfort following tracheal intubation. In the present study, moderate-to-severe cough was observed in 27.78% of patients in Group B compared with 52.78% in Group L at 1 hour postoperatively, although the difference was not statistically significant (p=0.185). At 3 hours, the proportion of patients reporting no cough increased to 50.00% in Group B compared with 27.78% in Group L, while moderate-to-severe cough was present in only 16.67% versus 47.22% of patients, respectively (p=0.044). At 8 hours, 88.89% of Group B patients were completely free from cough compared with 41.67% of Group L patients, and no patient in Group B experienced moderate-to-severe cough (p<0.0001). These findings suggest that lignocaine jelly provides superior suppression of airway reflexes during the early postoperative period. Similar results were reported by Hung et al., who demonstrated that topical lignocaine significantly attenuates airway irritation and cough by blocking sensory nerve endings in the tracheobronchial mucosa.[10] Navarro and Baughman also observed a significant reduction in post-extubation coughing among patients receiving topical lignocaine compared with placebo-treated controls.[11]

The beneficial effect of lignocaine observed in the present study may be explained by its local anesthetic action, which suppresses sensory nerve stimulation induced by endotracheal tube contact and minimizes reflex coughing during emergence from anesthesia. Similar mechanisms have been proposed by Estebe et al., who demonstrated that topical lignocaine decreases tracheal mucosal sensitivity and improves patient comfort during the immediate postoperative period.[12]

By 24 hours, airway complications had largely resolved in both groups. No cough was reported by 94.44% of patients in Group B and 88.89% in Group L (p=0.674), while postoperative sore throat persisted only minimally in a small proportion of patients. Similar observations were reported by Higgins et al., who found that most post-intubation airway symptoms improve spontaneously within the first postoperative day regardless of prophylactic intervention, although symptom severity during the early recovery period may differ significantly between treatment groups.[13]

The findings of this study indicate that lignocaine jelly applied to the endotracheal tube significantly alleviates postoperative sore throat and post-extubation cough during the initial 8 postoperative hours in comparison to betamethasone gel, while both treatments exhibit similar effectiveness in preventing postoperative hoarseness of voice. The findings endorse the regular application of lignocaine jelly as a straightforward, cost-effective, and efficacious approach to enhance postoperative airway comfort after endotracheal intubation. Recent systematic reviews have shown analogous conclusions with topical airway treatments aimed at preventing post-intubation airway problems.[14]

CONCLUSION

This study shows that the use of betamethasone gel on the endotracheal tube effectively reduces postoperative airway problems after endotracheal intubation. Patients administered betamethasone gel had a markedly reduced incidence and severity of postoperative sore throat and post-extubation cough in the early postoperative phase compared to those treated with lignocaine jelly. The betamethasone group had a decreased incidence of voice hoarseness; nevertheless, the difference lacked statistical significance. Within 24 hours, airway problems had predominantly subsided in both groups. Betamethasone gel is a straightforward, secure, economical, and efficient technique for enhancing postoperative airway comfort and patient satisfaction.

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