

Betamethasone Gel and Lignocaine Jelly Applied Over Endotracheal Tube to Reduce Post-Operative Sore Throat and Hoarseness of Voice - A Comparative Study

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ABSTRACT

BACKGROUND

Although post-operative sore throat, cough and hoarseness of voice (HOV) are minor sequelae after general anaesthesia (GA), these can be troublesome to the patient. This study was done to compare the efficacy of betamethasone gel and lignocaine jelly as lubricants in reducing post-operative sore throat and hoarseness of voice in patients operated under general anaesthesia with orotracheal intubation.

METHODS

This interventional study compares the incidence of post-operative sore throat and hoarseness of voice after endotracheal intubation on applying betamethasone gel (betamethasone group) or lignocaine jelly (lignocaine group) on the tracheal tube. 120 American Society of Anaesthesiologist (ASA) class I and class II patients who had undergone elective surgeries under general anaesthesia were divided into two groups: betamethasone group and lignocaine group. All patients were enquired on post-operative sore throat and hoarseness of voice at 1, 6 and 24 hours after extubation in the post-anaesthesia care unit.

RESULTS

The incidence of no sore throat, mild, moderate and severe post-operative sore throat at 24 hours after extubation in betamethasone group was 75.0 %, 23.3 %, 1.7 % and 0 % respectively compared to lignocaine group which was 33.3 %, 53.3 %, 6.7 % and 6.7 % respectively (P value < 0.05). The incidence of sore throat was found lower in the betamethasone group than in lignocaine group at intervals 1, 6, 24 hours post extubation with P value < 0.05. The incidence of no HOV, grade 1 HOV, grade 2 HOV and grade 3 HOV in betamethasone group was 46.7 %, 48.3 %, 5.0 % and 0 % respectively compared to lignocaine group which was 25.0 %, 46.7 %, 25.0 % and 3.3 % respectively with P value < 0.05.

CONCLUSIONS

This study proves that betamethasone gel, when used for lubrication of endotracheal tube pre-operatively, has shown to be effective in decreasing post-operative sore throat and hoarseness of voice.

KEYWORDS

Betamethasone, Lignocaine, Sore Throat, Hoarseness of Voice, Endotracheal Intubation

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BACKGROUND

All patients who were intubated for long duration or short duration operations had some degree of airway injury. Common adverse effects of cuffed endotracheal tube-like local irritation, inflammation of the airway mucosa etc leads to post-extubation morbidities such as sore throat, cough and hoarseness of voice which is extremely distressing to the patient. Post-operative sore throat was rated by patients as the 8th most undesirable outcome in the post-operative period.¹ Although these symptoms resolve spontaneously without any treatment, prophylactic management for decreasing its frequency and severity is still recommended.²

A multimodal approach which consists of both non pharmacological and pharmacological interventions has been advocated and studied to attenuate post-operative sore throat. Small sized endotracheal tubes, high-volume low-pressure cuff endotracheal tubes, optimizing intra cuff pressure, lubrication of endotracheal tube or its cuff with local anaesthetics or steroids, intravenous administration of lidocaine or dexamethasone, preinduction inhalation of beclomethasone, ketamine gargle etc are some of the strategies recommended to reduce post-operative sore throat.

Local anaesthetic agents such as lignocaine gel or spray was widely studied¹ and still used extensively. Although these agents limit injury to tracheal mucosa and prevent cough, they are not effective in preventing sore throat because they do not have any anti-inflammatory effects.³ Recognising the potential role of inflammation in these post-operative airway sequelae, the use of inhaled and topical steroids was described.^{3,1,4,5} Steroids are known for their anti-inflammatory action. Betamethasone gel applied to endotracheal tube might reduce the incidence of post-operative sore throat, cough, and hoarseness of voice.^{6,7} In view of these uncertainties about the effects of commonly used lignocaine gel and lesser used steroid local application in the reduction of post-operative sore throat, the present study aims to compare and evaluate the efficacy of lignocaine 2 % gel and betamethasone 0.05 % gel in reducing the post-operative sore throat and hoarseness of voice.

Objectives

The objective of our study is to compare and evaluate the efficacy of lubrication of endotracheal tube cuff with 0.05 % betamethasone gel and 2 % lignocaine gel in reducing the incidence of post-operative sore throat and hoarseness of voice after extubation.

METHODS

This is a hospital based interventional study which was conducted from August 2020 to February 2021 at Santhiram Medical College, Nandyal after obtaining approval of our institutional ethics committee and getting written informed consent from all patients. A total of 120 adult patients of either sex, aged between 20 to 50 years, belonging to

American Society of Anaesthesiologists physical status class I and class II, undergoing elective surgeries under GA with oral endotracheal intubation, surgeries of more than one hour duration but less than 4 hours were included. Patients undergoing surgeries of oral cavity and pharynx or with anticipated difficult airway, long duration surgeries greater than 240 minutes, more than two attempts at intubation, use of nasogastric tube or throat pack, patients with upper respiratory tract infections (URTI) and patients on steroid therapy were excluded from the study.

Patients were assessed in the pre anaesthetic assessment clinic and randomized into two groups of 60 patients each by computer generated random number table.

1. Betamethasone group: received betamethasone gel 0.05 % applied on the endotracheal tube.
2. Lignocaine group: received lignocaine 2 % jelly applied on endotracheal tube.

All patients were premedicated with Tab. alprazolam 0.5 mg and Tab. pantoprazole 40 mg on the previous night of surgery and 2 hours before surgery. On the day of surgery, all patients were put under routine monitoring which includes non-invasive blood pressure (NIBP), heart rate (HR), SPO₂, electrocardiogram (ECG), EtCO₂. After attaining good IV access, patients were premedicated with IV midazolam 1 mg, IV glycopyrrolate 0.2 mg, IV ondansetron 4 mg and IV fentanyl 1 - 2 mcg/kg. After preoxygenating, induction of anaesthesia was done with propofol (1 - 2.5 mg/kg). Tracheal intubation was done by single anaesthesiologist after giving IV vecuronium (0.08 - 0.1 mg/kg). Single use PVC tracheal tubes, having low pressure - high volume cuff of size 8.0 mm and 7.0 mm were used for male and female patients respectively. The endotracheal tubes were lubricated with either betamethasone gel or lignocaine jelly as per the group allocation. The cuff of endotracheal tube was inflated with air, just enough to prevent air leakage. Anaesthesia was maintained by using nitrous oxide and oxygen in 2 : 1 ratio, isoflurane 0.2 - 1% and vecuronium 1 mg as maintenance dose.

At the end of the procedure all volatile and IV anaesthetics are cut and reversal of neuromuscular blockade was done with neostigmine (0.05 mg/kg) and glycopyrrolate (0.01 mg/kg). Trachea was extubated after deflating the cuff, only when the patient was fully awake. Assessment of post-operative sore throat was carried out at 1, 6, 24 hours after surgery and rated using visual analytical score. Hoarseness of voice was assessed using a scoring system. The data was collected by a third party and tabulated.

Scoring System for Sore Throat

- 0- No sore throat at any time from the surgery.
- 1- Minimal sore throat.
- 2- Moderate sore throat.
- 3- Severe sore throat.

Scoring System for Hoarseness of Voice

- 0- No evidence of hoarseness at any time from the surgery.
- 1- No hoarseness at the time of enquiry.

- 2- Hoarseness at the time of enquiry noted by the patient only.
- 3- Hoarseness that is very easily noted at the time of enquiry.

Statistical Analysis

The data thus collected was entered in an excel sheet and was analysed. Quantitative variables will be described by mean, standard deviation and the qualitative variables will be described by frequency distribution. Between groups, comparison of quantitative variables will be analysed by independent sample 't' test or Mann-Whitney u test according to the nature of the data. Between groups comparison of qualitative variables will be analysed by chi-square test. A P value of 0.05 will be taken as the level of significance.

RESULTS

The total patients in our study were 120 with 60 patients each in betamethasone group and lignocaine group. Patient characteristics and duration of surgery are comparable between the two groups.

	Betamethasone Group	Lignocaine Group
Age (years)	35.10 + 8.58	35.95 + 8.73
Sex (M/F)	28/32	29/31
Weight (kg)	54.74 + 11.22	55.12 + 12.57
Duration of surgery (min)	118.67 + 32.71	117.0 + 34.77

Table 1. Patient Characteristics
Data are Mean +_ Standard Deviation

Patients of both the groups were statistically comparable regarding mean age, gender, weight and duration of surgery and it was not found to be statistically significant (P > 0.05)

	Betamethasone		Lignocaine		P - Value
	N	%	N	%	
Nil	29	48.3	10	16.7	0.002
Mild	26	43.3	29	48.3	
Moderate	5	8.3	15	25.0	
Severe	0	0.0	6	10.0	
Total	60	100	60	100	

Table 2. Incidence of Sore Throat at 1 Hour Post Extubation

Patients in the betamethasone group with no sore throat is 48.3 % when compared to 16.7 % in the lignocaine gel group, mild sore throat is 43.3 % when compared to 48.3 %, moderate sore throat is 8.3 % compared to 25.0 % and severe sore throat is 0 % compared to 10.0 % respectively, at 1 hour after extubation.

	Betamethasone		Lignocaine		P-Value
	N	%	N	%	
Nil	45	75.0	18	30.0	0.001
Mild	14	23.3	31	51.7	
Moderate	1	1.7	5	8.3	
Severe	0	0.0	6	10.0	
Total	60	100	60	100	

Table 3. Incidence of Sore Throat at 6 Hours Post Extubation

The incidence of sore throat was lower in the betamethasone group than in the lignocaine group which

was statistically significant with a P value less than 0.05 (P = 0.002). Patients in the betamethasone group with no sore throat is 75.0 % when compared to 30.0 % in the lignocaine gel group, mild sore throat is 23.3 % when compared to 51.7 %, moderate sore throat is 1.7 % compared to 8.3 % and severe sore throat is 0 % compared to 10.0 % respectively, at 6 hours after extubation. The incidence of sore throat was lower in the betamethasone group than in the lignocaine group which was statistically significant with a P value less than 0.05 (P = 0.001).

	Betamethasone		Lignocaine		P- Value
	N	%	N	%	
Nil	45	75.0	20	33.3	0.002
Mild	14	23.3	32	53.3	
Moderate	1	1.7	4	6.7	
Severe	0	0.0	4	6.7	
Total	60	100	60	100	

Table 4. Incidence of Sore Throat at 24 Hours Post Extubation

Patients in the betamethasone group with no sore throat is 75.0 % when compared to 33.3 % in the lignocaine gel group, mild sore throat is 23.3 % when compared to 53.3 %, moderate sore throat is 1.7 % compared to 6.7 % and severe sore throat is 0 % compared to 6.7 % respectively, at 24 hours after extubation. The incidence of sore throat was lower in the betamethasone group than in the lignocaine group which was statistically significant with a P value less than 0.05 (P = 0.002). The incidence of sore throat was found lower in the betamethasone group than in the lignocaine group at intervals 1, 6, 24 hours post extubation, which was statistically significant with a P value less than 0.05.

	Betamethasone		Lignocaine		P - Value
	N	%	N	%	
Grade 0	28	46.7	15	25.0	0.003
Grade 1	29	48.3	28	46.7	
Grade 2	3	5.0	15	25.0	
Grade 3	0	0.0	2	3.3	
Total	60	100	60	100	

Table 5. Incidence of Hoarseness of Voice (HOV) Post Extubation

Patients in the betamethasone group with grade 0 hoarseness of voice is 46.7 % when compared to 25.0 % in the lignocaine group, grade 1 hoarseness of voice is 48.3 % when compared to 46.7 %, grade 2 hoarseness of voice is 5.0 % compared to 25.0 % and grade 3 hoarseness of voice is 0 % compared to 3.3 % respectively. The incidence of hoarseness of voice was lower in the betamethasone group than in the lignocaine group post extubation, which was statistically significant with a P value less than 0.05 (P = 0.003).

DISCUSSION

Many of the general anaesthetic procedures in the modern anaesthesia practices are carried out with endotracheal intubation. It has advantages including the provision of the reliable airway, prevention of aspiration and smooth delivery

of anaesthetic gases. But all the patients who were intubated for long term or short-term operations experience some degree of airway injury. Post-operative sore throat, hoarseness of voice and cough are often common, uncomfortable sequelae after tracheal intubation.⁶ The prevalence of these complications were reported to be around 21 % - 65 % as per the literature available⁶. The incidence of sore throat during the placement (insertion) of the laryngeal mask airway is reported to be around 34 % - 58 %.

Post-operatively, it seems that these symptoms are the result of mucosal injury with resulting inflammation caused by the process of airway instrumentation (i.e., laryngoscopy and suctioning) or the irritating effects of a foreign object (i.e. endotracheal tube, LMA or oral airway).⁸ Even though these complications are minor, they contribute significantly to the post-operative morbidity and may decrease the patient satisfaction with their anaesthetic and surgical experience.^{9,10} A number of pharmacological and non-pharmacological measures are often used for alleviating the post-operative sore throat, cough and hoarseness of voice with varying degree of success.

Many pharmacological interventions like steroids, non-steroidal anti-inflammatory drugs, local anaesthetics like lignocaine etc have been used to attenuate post-operative sore throat by various authors. But all such manoeuvres had their own advantages and disadvantages. Thus, this study was undertaken in order to establish the safety, efficacy, and outcome of application of betamethasone gel and lignocaine jelly in attenuating post-operative sore throat and hoarseness of voice. The two groups in our study were compared statistically regarding mean age, gender, weight and duration of surgery and it was not found to be statistically significant ($P > 0.05$)

Post-Operative Sore Throat at 1 Hour after Extubation

In our study, the incidence of no sore throat, mild, moderate and severe post-operative sore throat at 1 hour after extubation in the betamethasone group was 48.3 %, 43.3 %, 8.3 % and 0 % respectively compared to the lignocaine group which was 16.7 %, 48.3 %, 25.0 % and 10.0 % respectively.

Post-Operative Sore Throat at 6 Hours after Extubation

The incidence of no sore throat, mild, moderate and severe post-operative sore throat at 6 hours in the betamethasone group was 75.0 %, 23.3 %, 1.7 % and 0 % respectively compared to the lignocaine group which was 30.0 %, 51.7 %, 8.3 % and 10.0 % respectively.

Post-Operative Sore Throat at 24 Hours after Extubation

The incidence of no sore throat, mild, moderate and severe post-operative sore throat at 24 hours in the betamethasone group was 75.0 %, 23.3 %, 1.7 % and 0 % respectively

compared to the lignocaine group which was 33.3 %, 53.3 %, 6.7 % and 6.7 % respectively.

The incidence of sore throat was found lower in the betamethasone group than in the lignocaine group at intervals 1, 6, 24 hours post extubation which was statistically significant with a P value less than 0.05.

The findings of our study are in accordance with the study done by Sumathy et al.¹¹ in 2008 where the incidence of post-operative sore throat, cough and hoarseness of voice was significantly less on wide application of the betamethasone gel over tracheal tube compared with the lidocaine jelly or nothing applied over the tube.

The study by Asif Kazemi et al.¹² in 2007 observed that the application of betamethasone gel on the tracheal tube pre-operatively reduces the incidence of post-operative sore throat, cough, and hoarseness of voice after endotracheal intubation. They found that betamethasone gel was ineffective in preventing cough in the first hour after surgery, but effective in the 24th hour. They concluded that betamethasone gel had preventive effects on cough and needed a 24 hour period to manifest itself.

Post-Operative Hoarseness of Voice (HOV) after Extubation

In our study, the incidence of no hoarseness of voice, grade 1 hoarseness of voice, grade 2 hoarseness of voice and grade 3 hoarseness of voice in the betamethasone group was 46.7 %, 48.3 %, 5.0 % and 0 % respectively compared to the lignocaine group which was 25.0 %, 46.7 %, 25.0 % and 3.3 % respectively, which was statistically significant with a P value less than 0.05.

The study by Ayoub et al.⁶ in 1998 showed that 0.05 % betamethasone gel was effective in reducing the frequency of sore throat and hoarseness, but ineffective in reducing cough at 24 hours. The study by Selvaraj and Dhanpal et al.⁷ in 2002 showed that betamethasone gel significantly decreases the incidence of post-operative sore throat, hoarseness of voice and cough. In a study by Shaaban et al.¹³ the incidence of hoarseness was high in control group compared to betamethasone gel group and ketamine group.

Our study results correlate with the results of the above studies. The local anaesthetic agents such as lignocaine jelly or spray are known to be ineffective in preventing the sore throat after endotracheal intubation.^{10,14} These agents are known to limit the injury to the tracheal mucosa and prevent cough, they cannot be effective in preventing sore throat since they lack anti-inflammatory effects.¹⁰ The studies have also proven that the application of local anaesthetic jelly limits potential damage to the tracheal mucosa due to its lubricating properties which suppresses the bucking on the tracheal tube.¹⁵

The potential mechanism of pain relief in betamethasone group is presumably based on its anti-inflammatory activity. A steroid gel applied widely over an endotracheal tube effectively alleviates post-operative sore throat and hoarseness compared with the application of lignocaine jelly which does not possess any anti-inflammatory activity.¹⁶ The limitation of our study was our inability to measure intra-cuff pressure due to non-availability of the equipment.

CONCLUSIONS

The study has shown that betamethasone gel when applied over endotracheal tube pre-operatively in elective surgeries under general anaesthesia significantly decreases post-operative sore throat and hoarseness of voice when compared to lignocaine gel.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

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