

## Comparing the effectiveness of Betamethasone Gel with Lidocaine Gel local application on endotracheal tube in preventing post-operative sore throat (POST)

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### Abstract

**Objective:** To see whether betamethasone gel or lidocaine gel is superior in reducing the incidence of post-operative sore throat after tracheal extubation.

**Methods:** This clinical study was conducted at the Nishtar Hospital and Medical College, Multan, Pakistan, from July to December 2015, and comprised patients who were set to undergo elective surgery under general anaesthesia. The patients were divided into two equal groups. In group 1, endotracheal tube was lubricated with betamethasone gel (0.05%). In group 2, endotracheal tube was lubricated with 4.0% lidocaine gel. SPSS 20 was used for data analysis. Generalised estimating equation was used to see the association between the treatment methods and severity of sore throat over time.

**Results:** Of the 120 patients, there were 60(50%) each in the two groups. The mean intubation time was 5.58±1.31 hours in group 1 and 5.43±1.21 hours in group 2. Besides, 7(11.7%) patients developed mild sore throat and 3(5.0%) moderate sore throat in group 1, whereas 13(21.7%) patients developed mild sore throat, 7(11.6%) moderate and 2(3.3%) severe sore throat after one hour of extubation ( $p=0.04$ ). After 6 hours, there were 2(3.3%) patients with moderate and 1(1.7%) with severe sore throat in group 1 compared to 8(13.3%) with moderate and 4(6.7%) with severe sore throat in group 2. After 24 hours, 5(8.3%) patients developed mild and 2(3.3%) moderate sore throat in group 1 compared to 14(23.7%) patients with mild sore throat, 5(8.5%) with moderate and 1(1.7%) with severe throat in group 2. Generalised estimating equation analysis showed a significant positive association between application of lidocaine gel on endotracheal tube and severity of sore throat ( $p<0.001$ ).

**Conclusion:** Local application of betamethasone gel was associated with reduced risk of post-operative sore throat as compared to local application of lidocaine gel on the endotracheal tube.

**Keywords:** Betamethasone gel, Lidocaine gel, Post-operative sore throat. (JPMA 67: 873; 2017)

### Introduction

The most rapid, safe and simple method of achieving all goals of airway management is endotracheal intubation and is considered to be a gold standard to achieve these goals.<sup>1</sup> But insertion of endotracheal tube (ETT) requires the use of direct laryngoscopy which can cause laryngeal trauma resulting in sore throat, pain, voice loss, tachycardia, hypertension and increase in intracranial or intraocular pressures.<sup>2,3</sup> Post-operative sore throat (POST) is one of the most commonly known complications of endotracheal intubation, with incidence ranging from 6.6 to 90%.<sup>4-7</sup> There are some other factors which can also influence the occurrence of sore throat, i.e. the size of endotracheal tube and cuff pressure, trials to insert tube, intubation duration, surgical site, and application of lidocaine, steroids (intravenous or local application) on the endotracheal tube.<sup>8-11</sup>

Intravenous administration of steroids such as

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dexamethasone has shown to provide anti-inflammatory, analgesic and anti-emetic effects. It also provides protection against the occurrence and severity of sore-throat after tracheal extubation.<sup>12,13</sup> Some studies have shown that application of betamethasone gel on the endotracheal tube before insertion significantly reduces the incidence of sore throat.<sup>1,14</sup> Lidocaine gel is also used in many centres during tracheal intubation to prevent POST.<sup>4,15</sup> The current study was planned to see the effect of application of betamethasone gel on the endotracheal tube regarding the development of sore throat post-operatively, taking application of lidocaine gel alone on the endotracheal tube as a gold standard. We also tried to find out whether betamethasone gel or lidocaine gel is superior in preventing the occurrence of POST.

### Patients and Methods

This clinical study was conducted at the anaesthesiology department of Nishtar Hospital and Medical College, Multan, Pakistan, from July to December 2015, and comprised patients aged 35-65 years who were set to undergo elective surgery under general anaesthesia. Patients taking analgesic or anti-inflammatory drugs in

pre-operative period, patients with history of any allergic disease such as asthma and gastro-oesophageal reflux syndrome were excluded. Patients were divided into two equal groups using computer-generated random number table. Patients with odd numbers were selected for group 1 and those with even numbers for group 2. In group 1 patients, endotracheal tube was lubricated using betamethasone gel 0.05%. In group 2 patients, endotracheal tube was lubricated using lidocaine gel 4.0% (a gold standard method in our hospital). Sample size for this study was calculated using the results of a previous study in which the highest incidence of post-operative sore throat was 36.7% in the betamethasone group and 66.7% in the lidocaine group.<sup>16</sup> The sample size was calculated by taking level of significance at 5.0% and power of the study 80.0%. Written consent was taken from all patients before having them on-board. Ethical approval was taken from the hospital's administration.

In the operation theatre, pulse oximetry and non-invasive blood pressure were used to monitor patients. Anaesthesia was induced using intravenous thiopental sodium and muscle relaxants (both non-depolarising and depolarising). Tracheal intubation was done by a senior anaesthetist in 1st attempt. Patients were examined for the development of sore throat after extubation by a senior anaesthetist who was unaware of the group assigned to the patient. To evaluate the severity of sore throat, a specific grading system was used (Table-1).

SPSS 20 was used for data analysis. Student's t-test was used to compare continuous variables. Generalised estimating equation (GEE) was used to see the association between the treatment methods and severity of sore throat over time.  $P \leq 0.05$  was considered significant.

## Results

Of the 120 patients, there were 60(50%) each in the two groups. In group 1, there were 54(90%) males and 6(10%) females, whereas in group 2 there were 53(88.3%) males and 7(%) females. The mean intubation time was  $5.58 \pm 1.31$  hours in group 1 and  $5.43 \pm 1.21$  hours in group 2 (Table-2).

Regarding the incidence of POST, 7(11.7%) patients developed mild sore throat and 3(5.0%) patients developed moderate sore throat in group 1, whereas in

**Table-2:** Baseline and Operative Variables.

Name of Variable	Group I (Betamethasone)	Group II (Lidocaine)	P-value
Mean age (years)	41.58±6.37	40.68±5.72	0.41
<b>Gender</b>			
Male (%)	54 (90.0)	53 (49.5)	0.77
Female (%)	6 (10.0)	7 (11.7)	
Body Mass Index (Kg/m <sup>2</sup> )	22.21±5.82	21.62±5.86	0.58
Duration of Surgery (min)	120.75±21.32	117.95±23.34	0.51
Intubation Time (hours)	5.58±1.31	5.43±1.21	0.49

**Table-3:** Incidence and Severity of Sore throat.

Variable	Group I (Betamethasone)	Group II (Lidocaine)	P-value
Sore Throat after one hour of extubation (%)			0.04
0	50 (83.3)	37 (61.7)	
1	7 (11.7)	13 (21.7)	
2	3 (5.0)	7 (11.6)	
3	0.0 (0.0)	2 (3.3)	
Sore Throat after 6 hours of extubation (%)			0.007
0	47 (78.3)	30 (50.0)	
1	10 (16.7)	18 (30.0)	
2	2 (3.3)	8 (13.3)	
3	1 (1.7)	4 (6.7)	
Sore throat after 24 hours of extubation (%)			0.028
0	53 (88.3)	39 (66.1)	
1	5 (8.3)	14 (23.7)	
2	2 (3.3)	5 (8.5)	
3	0 (0.0)	1 (1.7)	

group II, 13(21.7%) patients developed mild sore throat, 7(11.6%) moderate and 2(3.3%) developed severe sore throat after one hour of extubation. After 6 hours of extubation, the incidence and severity of sore throat increased in both groups. In Group 1, 10(16.7%) were with mild sore throat, 2(3.3%) were with moderate and 1(1.7%) had severe sore throat. In group 2 patients, the incidence of sore throat was 18(30%) mild, 8(13.3%) moderate and 4(6.7%) severe sore throat. The incidence of sore throat after 24 hours of extubation was 5(8.3%) mild and 2(3.3%) moderate sore throat in patients of group 1; in group 2, 14(23.7%) patients developed mild sore throat, 5(8.5%) moderate and 1(1.7%) developed severe sore throat (Table-3).

Generalised estimating equation was applied to determine the association of effect of different treatments on severity of sore throat over time. We found a significant association between the treatment groups and severity of sore throat over time ( $p < 0.001$ ; regression co-efficient = 0.677). This positive regression co-efficient indicates that

**Table-1:** Grading system for sore throat.

0	Absence of sore throat
1	Mild (sore throat seen less than common cold)
2	Moderate (sore throat that is seen in common cold)
3	Severe (more than that is seen in common cold)

**Table-4:** Longitudinal Association between Groups and Severity of Sore Throat.

Time Lag Model	B (95% CI)	P-value
Outcome: Change in severity of Sore throat		
Predictor: Change in Group	0.677 (0.548, 0.835)	<0.001

CI: Confidence interval.

applying lidocaine on ETT during intubation will increase the severity of sore throat by 0.67% as compared to the betamethasone application (Table-4).

## Discussion

Sore throat is a common complication after surgeries involving induction of general anaesthesia. During tracheal intubation, trauma, irritation and inflammation of the laryngeal mucosa are considered to be the responsible factors for the development of POST.<sup>17</sup> In this study, we compared the effectiveness of local application of betamethasone gel and lidocaine gel on endotracheal tube during intubation in preventing post-operative sore throat (POST).

In 1990, Stride failed to show any beneficial effect of local application of water soluble hydrocortisone on the endotracheal tube.<sup>18</sup> Stride only lubricated the tip and 5cm distal portion of endotracheal tube. But later on many other studies found that local application of steroids significantly reduces the incidence of POST. In other studies investigators use extensive application of steroids on all portions of endotracheal tube.<sup>1,14,16,19</sup> In this study, we lubricated all portion of endotracheal tube that came into contact with trachea, vocal cords and pharyngeal wall. Our study supported the results of studies that used extensive lubrication of endotracheal tube with steroid gel. These studies found that betamethasone gel was superior in preventing the incidence of sore throat after extubation as compared to lidocaine gel and normal saline. In this study, we found similar results. We found significantly lower incidence of POST in patients with betamethasone gel as compared to patients with lidocaine gel. Some studies have concluded that local application of steroids is superior to intravenous administration of steroids in preventing the incidence of POST.<sup>14</sup>

In this study, the incidence and severity of POST was significantly less in patients in whom endotracheal tube was lubricated with betamethasone gel. After 1st hour of extubation, none of the patient in this group developed severe sore throat 3(5.0%) patients developed moderate sore throat and in other group, 2(3.3%) patients developed severe sore throat and 7 (11.6%) developed moderate sore throat. The same was seen after 6 hours of

extubation; at this time 1(1.7%) patient developed severe sore throat and 2(3.3%) patients developed moderate sore throat in betamethasone group while 4(6.7%) patients developed severe sore throat and 8(13.3%) patients developed moderate degree of sore throat in lidocaine group. After 24 hours of extubation, the incidence of sore throat reduced significantly in betamethasone group but not in lidocaine group. GEE analysis showed a significant positive association between application of lidocaine gel on ETT and severity of sore throat.

The main strength of this study is that all the intubations were done in 1st attempt. The severity of sore throat was noted by a single senior anaesthetist who was unaware of the group assigned to the patients. This helped minimise bias in the study outcomes.

## Conclusion

Local application of betamethasone gel was associated with reduced risk of POST as compared to local application of lidocaine gel on the endotracheal tube.

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**Conflict of Interest:** None.

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