

Betamethasone Gel versus Intravenous Dexamethasone as Prophylaxis against Postoperative Sore Throat

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Abstract

Background: Postoperative sore throat (POST) though a minor sequel after general anaesthesia with endotracheal intubation, it can be distressing to the patient. **Objective:** The effectiveness of lubricating endotracheal tube with 0.05% betamethasone gel or intravenous dexamethasone in reducing the postoperative sore throat was compared. **Materials and method:** This was a prospective study carried out among ninety ASA I and II informed consenting patients aged 20-50 years undergoing elective surgery under general anaesthesia with endotracheal intubation. The patients were randomly divided into three groups with thirty subjects in each group. Betamethasone gel (0.05%) was applied over endotracheal tube over 15 cm mark from the tip in group I, intravenous dexamethasone was given in group II and group III was taken as control. In post-anaesthesia care unit, an anesthesiologist interviewed all patients on postoperative sore throat at 1 hour, 6 hours and 24 hours after operation. **Results:** At 24 hours following extubation, there was statistically significant lower incidence of post-operative sore throat (POST) in betamethasone group compared to other two groups (betamethasone group 3.33%, dexamethasone group 20% and control group 26.66%, $p < 0.05$). When the groups were compared in pairs at 24 hours, there was statistically significant difference in the incidence of POST between betamethasone group and dexamethasone group and also betamethasone group and control group with lower incidence of POST in betamethasone group, $p < 0.05$. It was also observed that there was no significant difference of POST between dexamethasone and control group at 1 hour, 6 hours or 24 hours, $p > 0.05$. **Conclusion:** It can be concluded that the use of 0.05% betamethasone gel to lubricate widely the endotracheal tube prior to intubation effectively reduces postoperative sore throat, compared to intravenous dexamethasone administration.

Keywords: Betamethasone; dexamethasone; tracheal intubation; sore throat.

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Introduction

Tracheal intubation is often required during general anaesthesia to secure the airway and facilitate ventilation. The process of laryngoscopy

and placement of tracheal tube is associated with postoperative complications such as sore throat, cough and hoarseness of voice is common,

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uncomfortable and distressing sequelae.¹⁻⁴ The incidence of these throat complications vary between 15% and 94%.⁵

The postoperative throat complications may cause surgical bleeding, increased intracranial and intraocular pressure, bronchospasm, hypertension, cardiac dysrhythmia and myocardial ischemia.^{6,7}

It is postulated that these effects are because of inflammation and irritation of airway³. Although local anaesthetic jelly along with its lubricating property limits the potential damage to the tracheal mucosa by suppressing bucking on the tracheal tube, its role on postoperative sore-throat is inconclusive because it has no intrinsic anti-inflammatory property.^{8,9}

Several medications and non-pharmacological methods have shown to reduce the incidence of airway symptoms with variable success rate. These inconsistent results suggest the likelihood of multiple factors associated with these symptoms like trauma to pharyngeal mucosa,¹⁰ endotracheal tube size, cuff design, cuff pressure induced tracheal mucosal capillary hypoperfusion,¹¹ contact of tracheal tube with vocal cord and pressure over the posterior pharyngeal wall resulting in inflammation, edema and mucosal lesion.¹²

As steroids are known for their anti-inflammatory action, in this study it was tried to compare the efficacies of betamethasone gel applied over tracheal tube against intravenous dexamethasone in the prevention of postoperative sore-throat (POST) following general anaesthesia with tracheal intubation.

Materials and method

This was a randomized controlled study conducted in National Institute of ENT Dhaka, Bangladesh, during September to November 2017. Ninety voluntarily consenting patients with American Society of Anesthesiologists (ASA) physical

status class I and class II of either sex aged 20 – 50 years who were scheduled to undergo elective surgical procedures that required general anaesthesia with orotracheal intubation were recruited into the study.

An anticipated difficult intubation, more than two attempts of intubation, patient's refusal, surgery of oral cavity or pharynx, use of throat pack, use of nasogastric tube, patient of upper respiratory tract infection, patient on steroid and surgery longer than 180 minutes were excluded. Pre anaesthetic investigations and evaluation was done in all patients. The patients were randomly allocated into three groups of 30 patients each.

Group I: Endotracheal tube (ETT) lubricated with 2.5 ml of 0.05% betamethasone gel 15 cm from the tip.

Group II: Intravenous 5 mg dexamethasone after induction of anaesthesia.

Group III: Control group without betamethasone or dexamethasone.

After arrival in operation theatre routine monitoring was used for all patients including noninvasive blood pressure, pulse oximetry, capnography and electrocardiography. Then intravenous cannula was secured and lactated Ringer's solution was started 1.5 mL per kg body weight per hour. Then patients were pre-medicated with intravenous fentanyl 2 mg per kg body weight. Every patient was pre-oxygenated for 3-5 minutes before induction of anaesthesia by intravenous titrated dose of propofol, then 0.1 mg per kg body weight vecuronium was used for muscle relaxation and assisted ventilation for 3 minutes was maintained. Then orotracheal intubation was done using high volume low pressure single use endotracheal tube (ETT) size 7.5 mm and 7.0 mm in male and female patients respectively. ETT position was confirmed and

secured. General anaesthesia was maintained by oxygen, nitrous oxide, halothane, vecuronium and fentanyl as standard procedure. After completion of operation muscle relaxation was antagonized by neostigmine and atropine with usual dose. Before extubation pharyngeal suction was done. All patients received oxygen through face mask after operation in post-operative ward.

Assessment of post-operative sore throat was carried out at 1 hour, 6 hours and 24 hours after surgery by an anesthesiologist using the questionnaire.

Questionnaire of postoperative sore throat

0= No sore throat at any time since operation.

1= Minimal sore throat (complains of sore throat only on asking)

2= Moderate sore throat (complains of sore throat on his/her own)

3= severe sore throat (change of voice or hoarseness, associated with throat pain)

Data was collected and recorded as per questionnaire and analyzed statistically. Quantitative variables were summarized as mean±standard deviation. One-way analysis of variance (ANOVA) was used to compare means for patients' characteristics across treatment groups. Chi-square test was done for incidence and severity of postoperative sore throat. $p < 0.05$ was considered statistically significant.

Results

A total of 90 patients, 30 in each group, were included in this study. The study groups were comparable with respect to age, sex, weight and baseline clinical characteristics as shown in Table I ($p > 0.05$). The duration of tracheal intubation defined as the period from the time the tracheal

tube was placed in the trachea to the time patient was extubated, in the three groups were 68.22 ± 14.30 minutes, 70.17 ± 12.24 minutes and 72.04 ± 14.45 minutes for betamethasone gel group, intravenous dexamethasone group and control group respectively ($p > 0.05$). The mean duration of laryngoscopy, the base line pulse rate and mean arterial pressure were also not significantly different among three groups ($p > 0.05$).

Table I: Patients' demographic and clinical characteristics (N=90)

Variables	Group I (n=30)	Group II (n=30)	Group III (n=30)	p-value
Age (years)	36.30±7.18	37.82±6.21	34.98±8.14	p>0.05
Sex M/F	19/11	17/13	16/14	
Weight (Kg)	57.16±7.72	55.97±8.12	58.05±6.13	p>0.05
ASA I/II	24/6	25/5	23/7	
Duration of laryngoscopy (Sec)	16±2	18±1	17±2	p>0.05
Duration of intubation (min)	68.22±14.30	70.17±12.25	72.04±14.45	p>0.05
Base line pulse rate (bpm)	79.3±5.7	82.4±6.8	81.7±8.2	p>0.05
Base line MAP (mm Hg)	98.3±7.4	96.5±8.2	95.9±9.1	p>0.05
Type of surgery				
Tympanoplasty	24	23	26	
Mastoid exploration	4	5	1	
Hemi thyroidectomy	2	2	3	

The incidence and severity of post operative sore throat (POST) was summarized in Table II. When the incidence and severity of POST were considered at different time interval, no significant difference was seen at 1 hour post extubation, $p > 0.05$. However, at 24 hours following extubation there was statistically significant lower incidence of POST in betamethasone group compared to other two groups (betamethasone group 3.33%, dexamethasone group 20% and control group 26.66%, $p < 0.05$). When the groups were compared in pairs at 24 hours, there was statistically significant difference in the incidence of POST between betamethasone group and dexamethasone group and also betamethasone group and control group with lower incidence of POST in betamethasone group, $p < 0.05$. It was also observed that, there was no significant difference of POST between dexamethasone and control group at 1 hour, 6 hours or 24 hours, $p > 0.05$.

Table II: Summary of the incidence and severity of sore throat at 1 hour, 6 hours and 24 hours post-operatively

Time of observation	Severity of POST	Group I (n=30)	Group II (n=30)	Group III (n=30)	p value among three groups	p value between group I and II	p value between I and III	p value between group II and III
1 hour	0	26 (86.6%)	21 (70%)	20 (66.6%)	p>0.05	p>0.05	p>0.05	p>0.05
	1	3 (10%)	6 (20%)	6 (20%)				
	2	1 (3.3%)	2 (6.66%)	3 (10%)				
	3	0 (0%)	1 (3.33%)	1 (3.33%)				
6 hours	0	27 (90%)	22 (73.3%)	19 (63.3%)	p>0.05	p>0.05	p<0.05	p>0.05
	1	2 (6.66%)	5 (16.66%)	7 (23.33%)				
	2	1 (3.33%)	3 (10%)	3 (10%)				
	3	0 (0%)	0 (0%)	1 (3.33%)				
24 hours	0	29 (96.66%)	24 (80%)	22 (73.3%)	p<0.05	p<0.05	p<0.05	p>0.05
	1	1 (3.3%)	4 (13.33%)	6 (20%)				
	2	0 (0%)	2 (6.66%)	2 (6.66%)				
	3	0 (0%)	0 (0%)	0 (0%)				

Discussion

The present study has found a lower incidence of postoperative sore throat (POST) over 24 hours postoperative period using 0.05% betamethasone gel compared to most other literature. Corticosteroids reduce the synthesis of inflammatory mediators by inhibiting cyclo-oxygenase-2 during inflammation.¹³ They also inhibit phospholipase A2 which is responsible for synthesis of arachidonic acid from cell membrane phospholipid so prostaglandin and leukotriene production is inhibited, also calcium dependent phospholipid binding protein called annexin is involved.¹⁴ The role of betamethasone and intravenous dexamethasone in reducing sore throat and cough has been previously proved by different studies.¹⁵⁻¹⁷ Epstein demonstrated that prophylactic corticosteroids decrease the risk of airway obstruction and probably the need for re-intubation.¹⁸ The incidence of postoperative sore throat, cough and hoarseness of voice varies from 6.6% to as high as 90%.¹⁹ These variations might be due to various confounding factors like difference in tube size, cuff pressure, use of nitrous oxide, etc. Selvaraj et al.¹⁴ Summathi,²⁰ Ayoub et al.³ and Kazeme et al.¹² in their studies have found a significant reduction of the incidence

and severity of POST, cough and hoarseness of voice with the use of 0.05% betamethasone gel. Masoometh et al.²¹ reported less postoperative sore throat with betamethasone gel in comparison with intravenous dexamethasone which is comparable to our study. Park et al.¹⁷ found a decrease of sore throat at 1 hour post extubation by 22% and 42% with prophylactic intravenous dexamethasone in doses 0.1 mg/kg and 0.2 mg/kg respectively. Thomas et al.¹⁶ reported a 36.3% decrease in overall incidence of sore throat at 24 hours post extubation with intravenous dexamethasone 8 mg preoperatively. Others reported a decrease in incidence of sore throat at 2 hours post extubation to the extent of 56.7% when using 0.1 mg/kg dexamethasone preoperatively.²² A reduction of postoperative sore throat at 6 hours have also been observed with 10 mg intravenous dexamethasone preoperatively.²³

It can be concluded that the use of 0.05% betamethasone gel to lubricate widely the endotracheal tube prior to intubation effectively reduces postoperative sore throat, compared to intravenous dexamethasone administration.

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