

Original Research Article

Comparison of the Efficacy between Triamcinolone Gel 0, 1% and Lidocaine Gel 2% Applied Over Tracheal Tube to Reduce Postoperative Sore Throat, Cough, and Hoarseness after General Anesthesia

Rose Mafiana¹, Endang Melati Maas¹, Theodorus², Wendy Wijaya³

¹Department of Anesthesia and Critical Care, ²Medical Research Unit, ³Fellow of Department of Anesthesia and Critical Care, Medicine Faculty of Sriwijaya University, Palembang Indonesia

Corresponding Author: Wendy Wijaya

ABSTRACT

Background: Endotracheal intubation was done to maintain airway patency in patients undergoing general anesthesia. Endotracheal Tube intubation (ETT) might cause complications in the form of complaints symptoms of sore throat, cough and hoarseness of voice. These complaints were caused by irritation and inflammation of the airway as a result of trauma to the airway mucosa.

Objective: This study was to determine the efficacy between triamcinolone gel 0,1 % and lidocaine gel 2% applied over tracheal tube to reduce postoperative sore throat, cough, and hoarseness after general anesthesia.

Methods: Randomized controlled trial, double blind test has been conducted in patients who undergo surgery with general anesthesia endotracheal intubation technique in operating theater Dr. Mohammad Hoes in General Hospital Palembang Indonesia in October 2016 - December 2016. There were 56 subjects who full filled to the criteria inclusion and were divided into two groups: triamcinolone gel 0, 1% group and lidocain gel 2% group. Statistical analyses were performed by using SPSS software version 17.

Results: General characteristics of the subjects included age, gender, ASA and duration of operation between the two groups showed no significantly difference ($p > 0.05$). Triamcinolone 0.1% gel was effective than lidocaine gel 2% in preventing and reducing the incidence of POST in the first 24 hours post-extubation

Conclusion: there was no significant difference between triamcinolone gel 0,1% and lidocain gel 2% to reduce sore throat, cough and hoarseness due to endotracheal intubation in 24th hours and after 24th hours after extubation.

Key words: triamcinolone gel 0, 1%, lidocain gel 2%, post operative sorethroat, cough, hoarseness, randomized controlled trial

INTRODUCTION

Endotracheal intubation was generally done to maintain the airway in patients under general anesthesia. Endo Tracheal Tube intubation (ETT) can cause postoperative complications in the form of complaints of sore throat, cough, and hoarseness abbreviated as Post Operative Sore Throat (POST).

Those complaints were probably caused by irritation and inflammation of the airway as a result of mucosal trauma in the airway. The incidence of occurrence varies, ranging from 14.4% - 50%. [1]

The incidence and severity was associated with many factors such as age, sex, size of ETT, surgical location, external laryngeal manipulation, stilet use when

laryngoscopy and intubation, nitrogen oxide use during anesthesia, pressure in the cuff during operation, suction act, duration of intubation, and postoperative analgesia protocol. [2,3,4,5,6,7] Non pharmacological and pharmacological efforts have been used to reduce POST with varying success rates.

Non-pharmacologic attempts that have been tested include the use of smaller ETT, ETT lubrication with water-soluble gel, intubation after full relaxation, minimizing pressure in the cuff, carefully fitting ETT, cautious sucking of mucus, extubation when cuff ETT completely deflated. Pharmacologic attempts that have been tested consist of mouth rinse using aspirin, mouth rinse using ketamine preoperative, non steroidal anti-inflammatory drugs, inhalation beclomethasone, intravenous lidocaine and ETT lubrication with steroid and topical anesthesia. [8,9,10,11]

Several lubrication agents for ETT have been investigated for their ability to reduce POST incidence rates with varying success rates. ETT lubrication is useful for decreasing damage to the mucosa by facilitating the entry of ETT into the trachea and reducing the risk of aspiration. Topical steroids as lubrication agents are a good option to reduce the incidence of POST because local irritation and inflammation of the tracheal mucosa are most likely the main cause of POST.

Study by Shaaban and Kamal (2012) stated that the application of betamethasone gel on ETT was effective in reducing POST. [8,9] Park et al showed that the use of 0.1% triamcinolone gel applied to ETT could reduce the incidence and severity of POST compared with the use of chlorhexidine gluconate gel. These findings have the potential to prevent POST, one of the most frequent side effects of ETT intubation. [12]

Triamcinolone gel 0.1% less potent gel but more active as topical glucocorticoids. Triamcinolone gel 0.1% had only one fifth of betamethasone glucocorticoid activity and a 0.1% triamcinolone gel dose used in a study

equivalent to 0.4 mg of prednisone which was a lower dose than that of used in other studies (Ayoub et al) using betamethasone equivalent to 3 mg of prednisone and Sumathi et al using betamethasone equivalent to 4 mg of prednisone. The study showed a 19.4% POST incidence rate that was lower than other studies using betamethasone, 43% in Ayoub et al and 40% in Sumathi et al. [10,12,13]

Triamcinolone gel 0.1% has an advantage over other steroids because of its weak potential but has acetonide components that facilitate penetration into tissue and are advantageous when used topically. [14,15] In addition weak potential, adverse effects of steroids such as infection, candidiasis, mouth and dry throat can be reduced. Triamcinolone gel 0.1% uses methylparaben preservatives and propyl parabens that are antibacterial and antifungal, and are commonly used for preservatives of foods, beverages and drugs. [16]

Lidocaine gel 2% is a sterile, gel-shaped product containing local anesthetic agents and is topically administered. Lidocaine gel 2% also contains hypromellose, and the resulting mixture will maximize contact with the mucosa and provide lubrication for instrumentation. [17,18]

METHODS

Randomized controlled trial was conducted in patients who undergo surgery with general anesthesia endotracheal intubation technique in operating theater of Dr. Mohammad Hoes in General Hospital Palembang, Indonesia in October 2016 - December 2016. The protocol has been approved by ethic committee of medicine faculty of Sriwijaya University and Dr. Mohammad Hoesin General Hospital Palembang, Indonesia.

There were 56 subjects appropriate to the inclusion criteria and were divided into two groups: triamcinolone gel 0, 1% group and lidocaine gel 2% group. Statistical

analyses were performed using SPSS software version 17.

Independent variables: sore throat, cough and hoarseness. Binding variable: lubricating agent triamcinolone gel 0, 1% and lidocaine gel 2%. The universal variable: age, gender, duration of surgery and American Society of Anesthesiologists (ASA) physical status classification.

All patients who meet the inclusion criteria given informed consent. Patients who agreed to participate in the study were further randomized either to in group I (triamcinolone gel 0.1%) or group II (lidocaine gel 2% agent). In the operating room the patient mounted a monitor of blood pressure, pulse, ECG and oxygen saturation. Next were installed an intravenous line in the forearm.

The volume of 0.5 ml of each agent was aspirated using 3 mL syringe and applied along the ETT with sterile gloves. The ETT is lubricated from the distal end along the length of 15 cm, and the cuff was fully developed to ensure the surface was evenly distributed. The anesthesia resident who performs the laryngoscopy did not know which lubricant was used.

Patients were premedicated with midazolam 0, 02 -0,05 mg/kg BW IV and induced with propofol 2 mg / kg BW IV, fentanyl 2 ug / kg BW IV. Intubation was facilitated using atracurium 0.5 mg / kg BW IV. Ventilation assistance was done with the help of a face mask.

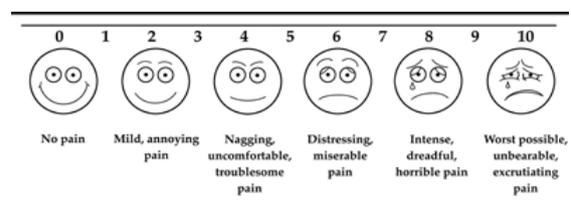
After muscle paralysis worked perfectly, the intubation action was performed by middle to senior anesthesia resident, using polyvinylchloride ETT, high-volume 7 mm (for women) and 7.5 mm (for men) had previously been given lubrication. The depth of the ETT was checked by listening to the right lung breathing sound similar to the left lung using a stethoscope. Cuff ETT was filled air chamber with pressure <30 cmH₂O (<22 mmHg) and ETT was fixed with plaster.

During operation the ventilation control was performed and towards the end of the operation the patient was breathing

spontaneously. Maintenance of anesthesia was performed using air: O₂ = 50%: 50%, sevoflurane 2 vol% (according to the depth of anesthesia), if necessary, additional fentanyl to 5ug / kg BB and / or atracurium may be provided. The intracuff pressure was monitored every 1 hour and maintained <30 cmH₂O (<22 mmHg).

Thirty minutes before surgery was completed, the patients were given ketorolac 30 mg IV for postoperative analgesics. Sucking of mucous in the trachea and oropharynx was done slowly and carefully, using a 12 F suction catheter without laryngoscopy when the patient was still under the influence of anesthesia. After cleansing, ETT cuffs was deflated and extubated.

The airway was maintained and the patients were taken to the recovery room and administered oxygen 3lpm through nasal cannula. Visual Analogue Score (VAS) was using to assess throat pain and performed 5 times. Firstly in the recovery room after the patients were awake by asking for POST and Aldrette score degrees, after 0 hours, 1 hour, 6 hours, 12 hours and 24 hours after extubation.



Score of sore throat: value 0 no sore throat (VAS 0), value 1 mild throat was found sore throat, discomfort, itching in the throat but not painful when swallowing (VAS 1-3), value 2 a moderate sore throat was a sore throat and pain during swallowing (VAS 4-6) and value 3 severe sore throat was found sore throat with difficulty or could not swallow (VAS 7 - 10).

Score of cough: value 0 no coughs, value 1 mild cough with a rare frequency, value 2 a moderate cough such as a respiratory tract infection and value 3 severe cough with

frequent frequency like a respiratory tract infection.

Score of hoarseness: value 0 no hoarseness, value 1 light hoarse sound was only felt by the patient, but not heard by the examiner, value 2 a hoarse voice was being audible to the examiner and value 3 heavy rasping sound was afonia.

If the VAS value of the recovery room is > 4, then the patient was given an additional dose of fentanyl analgesic 50 micrograms intravenously. Continuous variables were analyzed by T test while dichotomous variable with Chi Square test. For the efficacy analysis using Mc Nemar test; $p < 0,05$ were considered to be statistically significant

RESULT

The characteristics of the study subjects were shown in Table 1 is based on age, mean age, weight, sex, duration of operation and ASA of triamcinolone gel group and lidocaine gel group. With all of p value > 0,05 meaning there were no significantly difference between the two groups significantly so it were worth to compared.

Table1. Characteristic of sample

Variablele	Triamcinolone gel 0,1% group		Lidocaine gel 2% group		P
	N	%	N	%	
Age (years),mean±DS	41,14±13,37		40,46±14,58		0,857*
BodyWeight (kg),Mean±DS	60,21±12,26		59,29±11,79		0,774*
Height(cm),mean±DS	158,57±8,32		157,50±8,65		0,638*
Duration of Operation (mnt),rate±DS	122,50±50,62		127,32±38,19		0,928**
Sex, n(%)					1,000***
Male	13	46,4	13	46,4	
Female	15	53,6	15	53,6	
ASA, n(%)					1,000***
1	19	67,9	18	64,3	
2	9	32,1	10	35,7	

* Independent T Test, $p=0,05$

** Uji Mann-Whitney, $p=0,05$

*** Uji Chi Square, $p=0,05$; $p=0,05$

From table 2 score of sorethroat, it could be concluded that there was no significant difference in incidence of sore throat at the 0th, 6^h, 12th and 24th hours between the two groups except at 1st hour of 0.046 ($p < 0.05$)

Table2. Score of Sorethroat

Score of Sore throat	Triamcinolone gel 0,1% group		Lidocaine gel 2% group		p*
	N	%	N	%	
0 th hour post extubation	23	82,1	15	53,6	0,067
No Pain	4	14,3	9	32,1	
Mild Pain	1	3,6	4	14,3	
Moderate Pain	0	0	0	0	
Severe Pain	0	0	0	0	
1 th hour post extubation	24	85,7	16	57,1	0,046
No Pain	4	14,3	10	35,7	
Mild Pain	0	0	2	7,1	
Moderate Pain	0	0	0	0	
Severe Pain	0	0	0	0	
6 th hours post extubation	26	92,9	22	78,6	0,270
No Pain	2	7,1	5	17,9	
Mild Pain	0	0	1	3,6	
Moderate Pain	0	0	0	0	
Severe Pain	0	0	0	0	
12 th hours post extubation	26	92,9	26	92,9	1,000
No Pain	2	7,1	2	7,1	
Mild Pain	0	0	0	0	
Moderate Pain	0	0	0	0	
Severe Pain	0	0	0	0	
24 th hours post extubation	28	100	27	96,4	0,313
No Pain	0	0	1	3,6	
Mild Pain	0	0	0	0	
Moderate Pain	0	0	0	0	
Severe Pain	0	0	0	0	

*Chi Square Tes, Pearson chi square ; $p=0,05$

Table3. Score of cough

Score of cough Batuk	Triamcinolone gel 0,1% group		Lidocaine gel 2% group		p*
	N	%	N	%	
0 th hour post extubation	25	89,3	20	71,4	0,076
No Cough	2	7,1	8	28,6	
Mild Cough	1	3,6	0	0	
Moderate Cough	0	0	0	0	
Severe Cough	0	0	0	0	
1 th hour post extubation	25	89,3	23	82,1	0,455
No Cough	3	10,7	5	17,9	
Mild Cough	0	0	0	0	
Moderate Cough	0	0	0	0	
Severe Cough	0	0	0	0	
6 th hour post extubation	28	100	26	92,9	0,150
No Cough	0	0	2	7,1	
Mild Cough	0	0	0	0	
Moderate Cough	0	0	0	0	
Severe Cough	0	0	0	0	
12 th hour post extubation	28	100	27	96,4	0,313
No Cough	0	0	1	3,6	
Mild Cough	0	0	0	0	
Moderate Cough	0	0	0	0	
Severe Cough	0	0	0	0	
24 th hour post extubation	28	100	27	96,4	0,313
No Cough Mild Cough	0	0	1	3,6	
Cough	0	0	0	0	
Moderate Cough	0	0	0	0	
Severe Cough	0	0	0	0	

*Pearson Chi Square Test,; $p=0,05$

From table 3 incidence of cough due to endotracheal intubation, the statistical analysis of cough probability values in the 0th, 1st, 6th, 12th and 24th hours were 0.076; 0.455; 0.150; 0.313 and 0.313 ($p > 0.05$) in arrow can be concluded there was no significant difference of cough incident at the 0th, 1st, 6th, 12th and 24th hours between the two groups.

From table 4 the incidence of hoarseness because of endotracheal intubation was obtained statistical analysis of the probability values of hoarseness at the 0th, 1st, 6th, 12th and 24th hours respectively 0.147; 0.462; 0.485; 0,388 and 1,000 ($p > 0,05$) so it could be concluded there was no significant difference of hoarseness incident at the 0th, 1st, 6th, 12th and 24th hours between the two groups.

Table4. Score of Hoarseness

Score of Hoarseness	Triamcinolone gel 0,1% group		Lidocaine gel 2% group		p*
	N	%	N	%	
	0 th hour post extubation				
No Hoarseness	22	78,6	17	60,7	0,147
Mild Hoarseness	3	10,7	9	32,1	
Moderate Hoarseness	3	10,7	2	7,1	
Severe Hoarseness	0	0	0	0	
1 th hour post extubation					
No Hoarseness	22	78,6	18	64,3	0,462
Mild Hoarseness	5	17,9	9	32,1	
Moderate Hoarseness	1	3,6	1	3,6	
Severe Hoarseness	0	0	0	0	
6 th hour post extubation					
No Hoarseness	24	85,7	22	78,6	0,485
Mild Hoarseness	4	14,3	6	21,4	
Moderate Hoarseness	0	0	0	0	
Severe Hoarseness	0	0	0	0	
12 th hour post extubation					
No Hoarseness	24	85,7	26	92,9	0,388
Mild Hoarseness	4	14,3	2	7,1	
Moderate Hoarseness	0	0	0	0	
Severe Hoarseness	0	0	0	0	
24 th hour post extubation					
No Hoarseness	28	100	28	100	1,000
Mild Hoarseness	0	0	0	0	
Moderate Hoarseness	0	0	0	0	
Severe Hoarseness	0	0	0	0	

*Pearson Chi Square Test,; $p = 0,05$

From table 5, his incidence of sore throat, cough and hoarseness was assessed prior to surgery and after intervention within 24 hours then a statistical test was performed to see differences before and after treatment. From the statistical test, there was no difference in the incidence of sore throat ($p = 0.062$), there was no difference in incidence of cough ($p = 0.250$) and there was a difference in the incidence of hoarseness ($p = 0.031$), where 6 experienced a hoarse voice incident at hour 0 disappeared at the 24th hour.

From table 6, the incidence of sore throat, cough and hoarseness was assessed before surgery and within 24 hours after administration of the drug and then tested statistically to see differences before and after treatment. From the statistical test results appealed that there was a difference in the incidence of sore throat before and after treatment ($p = 0,000$), of which 12 incidents of sore throat at the 0th hour disappeared at the 24th hour. In addition, there was a difference in the incidence of cough before and after treatment ($p = 0.016$), where 7 cough incidents at the 0th hour disappeared at 24 hours and there was a difference in the incidence of hoarseness before and after treatment ($p = 0.001$)

Where 11 incidents of hoarse voice at the 0th hour disappeared at the 24th hour.

Table5. Efficacy of Triamcinolone Gel 0,1%

Variable	In 24 th hours of Triamcinolone Gel 0,1%		Total	P value*
	Yes	No		
Before operation				
Sore throat				
Yes	0	5	5	0,062
No	0	23	23	
Cough				
Yes	0	3	3	0,250
No	0	25	25	
Hoarseness				
Yes	0	6	6	0,031
No	0	22	22	
Total			28	

*Mc Nemar Test, p =0,05

Table6. Efficacy of Lidocaine Gel 0,1%

Variable	In 24 th hours of Lidocaine Gel 2 %		Total	P value*
	Yes	No		
Before operation				
Sore throat				
Yes	1	12	13	0,000
No	0	15	15	
Cough				
Yes	1	7	8	0,016
No	0	20	20	
Hoarseness				
Yes	0	11	11	0,001
No	0	17	17	
Total			28	

*Mc Nemar Test, p =0,05

From table 7, the incidence of sore throat, cough and hoarseness of both groups was examined at 24 hours then a statistical test was performed for incident comparison between the two groups by using the Mc Nemar test. From the statistical test, there were no differences in incidence of sore throat, cough and hoarseness between the triamcinolone gel 0.1% and 2% lidocaine gel (p = 1,000).

Table7. Effectiveness of Triamcinolone Gel 0,1% and Lidocaine gel 2%

Variable	After 24 th hours of Lidocaine Gel 2%		Total	P value*
	Yes	No		
After 24 th hours of Triamcinolone Gel 0,1%				
Sorethroat				
Yes	0	0	0	1,000
No	1	27	28	
Cough				
Yes	0	0	0	1,000
No	1	27	28	
Hoarseness				
Yes	0	0	0	1,000
No	0	28	28	
Total			28	

*Mc Nemar Test, p =0,05

DICUSSION

Sorethroat pain, cough and hoarseness or Post Operative Sore Throat (POST) is common complaints experienced by patients after surgery under general anesthesia with endotracheal intubation. Although minor complications can cause patient dissatisfaction and morbidity. This is due to the irritation and inflammation of the respiratory tract of the airway trauma. [19]

Sarki et al (2015) said incidence of sore throat, cough and hoarseness of 80%, 43.3% 46.7% without prophylaxis. [20] According to Mchardy et al incidence POST of 14.4% - 50% whereas according to Ayoub et al of 21% -65%. [2,10] Of 200 patients, studied according to Edomwongi et al incidence of sore throat 49%, cough 36% and hoarseness 5%. [21]

Sore throat, cough and hoarseness due to intubation are three things that are related because of the location of trauma, and lesions in the posterior pharyngeal edema, anterior larynx, vocal cords and trachea. [22,23,24,25]

Cough reflex is facilitated by primary afferent vagal nerve as bronchopulmonary rapidly adapting receptor (RARc) and bronchopulmonary C fibers which is triggered by mechanical stimulation and deformity of the airway epithelium such as mucus and smooth muscle contraction. This reflex is in the larynx, trachea and carina. RARc very sensitive to the mediator histamine, bradykinin, prostaglandins, 5-hydroxytryptamin, capsaicin, tachykinin are stimulated when there is trauma resulting in airway smooth muscle contraction, vasodilatation and edema. Inflammatory reactions can be treated with corticosteroid drugs such as triamcinolone. [26]

Muscles that play a role in such a cough reflex muscles in the posterior cricoarytenoid laryngeal abductor and adductor muscles like thyroarytenoid and arytenoid. [27] Local anesthetics such as lidocaine can block the cough as antitusive

by inhibiting sensory neural activity but its use is controversial because it is irritable. [26]

From table 2, 3 and 4, the comparison of sorethroat, cough and hoarseness at 0,1,6,12, and 24 hours post extubation between the two groups in percentage, the POST incidence of the triamcinolone gel group of 0.1% was finding always lower than the lidocaine group gel 2%. This is due to reduced inflammation and edema because local steroid applications reduce the production of cytokines and other inflammatory mediators, such as prostaglandins and leukotriens, by inhibiting the phospholipase A2 and cyclooxygenase 2 during inflammation resulting in effective inhibition of inflammatory or ulcerative lesions in the mucosa. While lidocaine gel has no antiinflammatory effect. [14]

The epithelial vocal cords are a squamous stratified thin layer composed of flat and round cells that are more superficial and constantly renew themselves. The epithelium lies above the basement membrane and lamina propria. Lamina propria superficial part is Reinke space consisting of little collagen, few cells, and some fibroblasts and little capillaries making it easier for edema and hematoma This space that allows movements such as waves from the mucous and determine the sound quality. [25]

The vocal cords have very little lymphatic tissue meaning that if the edema takes a long time to recover and if it happens repeatedly polyps may occur. When laceration reaches the inside of the lamina propria may result in impaired voice modulation. [26] These could explain why triamcinolone no statistically significant difference to reduce hoarseness due to table 5.

A good ETT position is that the cuff is distal from the cartilago cricoid in the cartilago tyroid. The easiest area of the lesion is 6-10mm below the vocal cords so the ETT cuff is recommended to be 15mm below the vocal cords. [28]

Lidocaine has an analgesic effect also has a vasodilate effect. Vasodilation will overcome the depressed mucosal ischemia in ETT. This vasodilation mechanism is due to breaking the delivery in the sodium channel. The effects of lidocaine vasodilation are also mediated by the release of nitric oxide from the vascular endothelium. [29] On the basis of topical lidocaine should be able to prevent ischemia throat mucosa to figure POST can be reduced. [30,31,32,33] Maruyama et al (2004) said that local anesthesia could actually harm, had bilateral involvement as a cause of recurrent laryngeal nerve palsy. [3] According to Kazemi et al (2007) although lidocain limits the tracheal mucosal injury and prevent coughing, but it cannot be effective in preventing sore throats because it does not have anti-inflammation. [8]

According Doukumo et al (2011) overall incidence of sore throat, cough and hoarseness following after lubrication of ETT with lidocaine gel 2% amounting to 34.9%, 27.9% and 25.6%. [34] In this study, a higher percentage obtained by 46, 4%, 14.2% and 39.2%.

From table 7 shows that both groups of drugs have no effect difference in reducing and preventing POST incidents after 24 hours post-stubation. These finding supported by the research of Mchardy et al (1999). It said that extensive damage to the larynx and tracheal epithelium occurs as a result of tracheal intubation, especially in the 1 hour period following surgery and according to Vangipuram et al (2015) the peak of complaints occurs within the first 2-6 hours after extubation. And about 50% of the complaining patients recover spontaneously within 24 hours after extubation. [2,35,36]

According to Selvaraj et al (2002) who compared the steroid gel with 2% lidocaine gel found 33.3% incidence of sore throat in the steroid gel group compared to 73.3% in the lidocaine gel 2% group. [37] According to Siddig et al (2015) lubrication with betamethasone gel pre-operatively, is qualitatively superior to normal saline for

decreasing postoperative sore throat and cough. [38] Betamethasone gel applied over the tracheal tube effectively mitigates postoperative sore throat compared with IV dexamethasone application. [39]

According to Sarki et al (2015) the highest incidence of POST recorded at 6 hours after extubation, incidence of sore throat was 36.7%: 66.7%, cough was 13.3%: 26.7% and hoarseness was 23.3%: 30%, for Betamethasone compared with lidocaine gel. [20] According to Ferdian et al (2014) the number of sore throats in the triamcinolone acetonide group was always lower than in the lidocaine group, either at 1 hour (10.3% : 31%), 6 hours (17.2% : 37.9%), and 24 hours post-extubation (6.9% : 41.4%). [30]

According to Sumathi et al (2008), the incidence of POST in the corticosteroid-group was lower than in the lidocaine group. In the first 24 hours after surgery, the incidence of postoperative strep throat was 40: 100%, cough is 6: 40% and the hoarseness of sound is 4.1: 32.9%, this difference is significant both at 1,6 and 24 post-extubation hours. [13] In Adi Wibowo study the incidences of sore throat after endotracheal intubation in triamcinolone gel compare to water soluble gel (K-Y Gel) group are lower, but not statistically significant. [40]

In the Sumathi study using betamethasone gel was equivalent to 4 mg of prednisone, while this study used triamcinolone which is equivalent to 0.4 mg of prednisone but the results obtained the same that corticosteroids are more effective. [13] The anti-inflammatory effect of 4 mg triamcinolone is equivalent to that 20 mg of cortisol. [41]

These findings supported by previous studies that the incidence of POST with corticosteroid agents (triamcinolone) was lower than the local analgesic agent (lidocaine) to prevent and reduce POST.

CONCLUSION

There was no statistically significant difference between triamcinolone gel 0.1%

and 2% lidocaine gel to reduce throat pain, cough and hoarseness due to endotracheal intubation within the first 24 hours and after 24 h postoperative ($p = 1.000$, $p > 0.05$).

Triamcinolone 0.1% gel was effective than lidocaine gel 2% in preventing and reducing the incidence of POST in the first 24 hours postextubation.

REFERENCES

1. Rao TR, Subrahmanyam C, Parmar A, Patil S. Effect of nebulized lignocaine for the treatment of post-operative sore throat. *International Journal of Scientific Study*. 2015;3(6):10-13.
2. McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. *Anaesthesia*. 1999; 54:444-53.
3. Maruyama K, Sakai H, Miyazawa H, Toda N, Linuma Y, Mochizuki N, et al. Sore throat and hoarseness after total intravenous anesthesia. *British Journal Anaesthesia*. 2004;92(4):541-3.
4. Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. *British Journal of Anaesthesia*. 2002;88:582-4.
5. Hu B, Bao R, Wang X, Liu S, Tao T, Xie Q, et al. The Size of Endotracheal Tube and Sore Throat after Surgery: A Systematic Review and Meta-Analysis. *Plos One*. 2013;8(10):1-7.
6. Gold EB, Wells C, Rasor MO. The Association of Inflammation with premenstrual Symptoms. *Journal of Women's Health*. 2016;25(9): 865-74.
7. Gilliland L, Perrie H, Scribante J. Endotracheal tube cuff pressures in adult patients undergoing general anaesthesia in two Johannesburg academic hospitals. *Southern African Journal of Anaesthesia and Analgesia*. 2015;21(3):81-84.
8. Kazemi A, Amini A. The effect of betamethasone gel in reducing sore throat, cough, and hoarseness after laryngo-tracheal intubation. *Middle East Journal of Anesthesiology*. 2007; 19(1):197-204.
9. Shaaban AR, Kamal SM. Comparison between betamethasone gels applied over endotracheal tube and ketamine gargle for attenuating postoperative sore throat, cough and hoarseness of voice. *Middle East Journal of Anesthesiology*. 2012; 21(4):513-20.

10. Ayoub CM, Ghobashy A, Koch ME, McGrimley L, Pascale V, Qadir S, et al. Widespread application of topical steroid to decrease sore throat, hoarseness, and cough after tracheal intubation. *Anaesthesia & Analgesia*. 1998; 87:714-6.
11. Fuller PB. The relationship between preintubation lidocaine and postanesthesia sore throat. *Journal of the American Association of Nurse Anesthetists*. 1992; 60(4):374-8.
12. Park SY, Kim SH, Kim SH, Lee SJ, Chae WS, Jin HC, et al. Application of triamcinolone acetone paste to the endotracheal tube reduces postoperative sore throat: a randomized controlled trial. *Canadian Journal Anaesthesia*. 2011; 58:436-42.
13. Sumathi PA, Shenoy T, Ambareesha M, Krishna HM, Controlled Comparison between betamethasone gel and lidocaine jelly applied over tracheal tube to reduce postoperative sore throat, cough and hoarseness of voice. *British Journal Anaesthesia*. 2008; 100(2):215-18.
14. Katz M, Gans EH. Topical corticosteroids, structure-activity and the glucocorticoid receptor: discovery and development – a process of planned serendipity. *Journal of Pharmaceutical Sciences*. 2008;97(8):2936-47.
15. Park SY, Kim MJ, Kim MG, Lee SJ, Kim SH, Ok SY, et al. Triamcinolone Acetone Paste Applied over the Laryngeal Mask Airway to Reduce the Severity of Postoperative Sore Throat. *Soonchunhyang Medical Science*. 2011;17(1):7-10.
16. Matysova L, Hajkova R, Sicha J, Solich P. Determination of methyl paraben, propylparaben, triamcinolone acetone and its degradation product in topical cream by RP-HPLC. *Anal Bioanal Chem*. 2003; 376(4):440-3.
17. Archer M, Newbold J, Steinvort C, Larson B, Oderda G. Topical analgesic and anesthetic agents drug class review. Salt Lake City, Utah: University of Utah College of Pharmacy; 2013.1-17.
18. Artime C, Candido K, Golembiewski J, Meyer T. Use of Topical Anesthetics To Support Intubation. *Anesthesiology News*. 2015;1:51-6.
19. Butterworth JF, Mackey DC, Wasnick JD. Morgan & Mikhail's Clinical Anesthesiology. 5th ed. New York: McGraw-Hill Education; 2013.320-321.
20. Sarki AM, Mohammed AD. A comparison of betamethasone gel and lidocaine jelly as prophylaxis against intubation associated throat complications. *Nigerian Journal of Basic and Clinical Sciences*. 2015;12:105-10.
21. Edomwonyi NP, Ekwere IT, Omo E, Rupasinghe A. Postoperative Throat Complications after Tracheal Intubation. *Annals of African Medicine*. 2006;5(1):28-32.
22. Divatia JV, Bhowmick K. Complications of endotracheal intubation and other airway management procedures. *Indian Journal Anaesthesia*. 2005; 49(4):308-318.
23. Christensen M, Larsen HW, Lundby L, Jakobsen KB. Postoperative throat complaints after tracheal intubation. *British Journal of Anaesthesia*. 1994; 73:786-87.
24. Scuderi PE. Postoperative sore throat: More answer than questions. *Anesthesia & Analgesia*. 2010; 111(4):831-32.
25. Martins RHG, Braz JRC, Dias NH, Castilho EC, Braz LG, Navarro HC. Hoarseness after tracheal intubation. *Revista Brasileira de Anestesiologia*. 2006; 56(2):189-99.
26. Chung KF, Widdicombe JG, Boushey HA. Cough: Causes, Mechanisms and Therapy. Massachusetts, USA: Blackwell Publishing Ltd; 2003. 18-20,161,239.
27. Singh A, Sethi N, Sood J. Postoperative bilateral abductor vocal cord palsy. *Indian Journal Anaesthesia*. 2006;50(2):133-135.
28. Vyshnavi S, Kotekar N. Aphonia following tracheal intubation: An unanticipated post-operative complication. *Indian Journal Anaesthesia*. 2013;57(3):306-8.
29. Abbasi S, Mahjobipoor H, Kashefi P, Massumi G, Aghadavoudi O, Farajzadegan Z, et al. The effect of lidocaine on reducing the tracheal mucosal damage following tracheal intubation. *Journal of Research in Medical Sciences*. 2013;18:733-8.
30. Ferdian E, Soenarjo, Budiono U. Perbandingan Penggunaan Triamcinolone Acetone Dan Lidocaine Pada Pipa Endotrakea Terhadap Angka Kejadian Nyeri Tenggorok Pasca Intubasi Pada Anestesi Umum. *Jurnal Anestesiologi Indonesia*. 2014;6(3):182-92.
31. Tanaka Y, Nakayama T, Nishimori M, Tsujimura Y, Kawaguchi M, Sato Y.

- Lidocaine for preventing postoperative sorethroat. Cochrane Database of Systematic Reviews 2015, Issue 7. Art. No.: CD004081. DOI: 10.1002/14651858.CD004081.pub3.
32. Teoh SC, Lee CY. Comparison between lignocaine 2% gel and water-based lubricant in reducing post intubation sore throat. Brunei International Medical Journal. 2014;10(2):85-91.
 33. Soltani HA, Aghadavoudi O. The Effect of Different Lidocaine Application Methods on Postoperative Cough and Sore throat. Journal of Clinical Anesthesia. 2002;14(1):15-8.
 34. Doukumo DM, Faponle AF, Bolaji BO, Adenekan AT, Olateju SOA. Effect of lidocaine and K-Y jellies on sore throat, cough, and hoarseness following endotracheal anaesthesia. Journal of the West African College of Surgeons. 2011;1(3):44-62.
 35. Chari VR, Paul A. Comparative study to analyze the incidence of sore throat, cough, and hoarseness of voice after general anesthesia with the use of topical benzydaminehydrochloride and 2% lignocaine gel with placebo. Med J DY Patil Univ 2016;9:61-5.
 36. Muhamad M, Fuadi I, Nawawi AM. Perbandingan Penggunaan Topikal Spray Benzidamin HCl 0,15% dan Gel Lidokain 2% pada Pipa Endotrakeal terhadap Kejadian Nyeri Tenggorok Pascaintubasi Endotrakeal. Jurnal Anestesi Perioperatif. 2015;3(2):123-30.
 37. Selvaraj T, Dhanpal R. Evaluation of the application of topical steroids on the endotracheal tube in decreasing postoperative sore throat. Journal of Anaesthesiology clinical pharmacology. 2002;18(2):167-170.
 38. Handady SO, Elsir Y, Sanhoury M, Mimoun H, Alawad AA. The Effect of Betamethasone Gel in Reducing Post Operative Sore Throat and Cough After Endotracheal Intubation in Khartoum Teaching Hospital in Sudan. Open Science Journal of Clinical Medicine. 2015;3(4):140-4.
 39. Tabari M, Soltani G, Zirak N, Alipour M, Khaeni K. Comparison of Effectiveness of Betamethasone gel Applied to the Tracheal Tube and IV Dexamethasone on Postoperative Sore Throat: A Randomized Controlled Trial. Iranian Journal of Otorhinolaryngology. 2013;25(4):215-20.
 40. Wibowo A, Soenarjo, Hendriarto HS. Perbandingan Penggunaan Triamcinolone Acetonide Dan Gel Larut Air Pada Pipa Endotrakea Terhadap Angka Kejadian Nyeri Tenggorok. Jurnal Anestesiologi Indonesia. 2014;6(3):170-81.
 41. Stoelting RK, Hillier SC. Handbook of Pharmacology & Physiology in Anesthetic Practice. 4th ed. Philadelphia, USA: Lippincott Williams & Wilkins;2006.

How to cite this article: Mafiana R, Maas EM, Theodorus et al. Comparison of the efficacy between triamcinolone gel 0, 1% and lidocaine gel 2% applied over tracheal tube to reduce postoperative sore throat, cough, and hoarseness after general anesthesia. Int J Health Sci Res. 2017; 7(12):6-15.
