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The Incidence of Post-Intubation Sore Throat after Ketamine or Betamethasone Gargling: A Comparative Randomized Study

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Abstract

Introduction. Post-operative sore throat (POST) is one of the common and annoying complications of endotracheal intubation following general anesthesia for major surgery. Throat pain, hoarseness of voice, cough, laryngitis and dysphagia are the common clinical signs of postoperative sore throat. Many of methods had been investigated to reduce the incidence of POST, most of these methods were pharmaceutical and some weren't pharmaceutical.

Purpose. To evaluate the efficiency of betamethasone or ketamine gargling in reducing the incidence and severity of postoperative sore throat.

Materials and methods. 91 patients were randomly assigned to two groups; ketamine group (K group) consisted of 46 patients, and betamethasone group (B group) comprised 45 patients. With K group, the patients were instructed to gargle with a ketamine solution for 30 seconds, the solution was prepared by adding 1 ml of ketamine (50 mg)

to 29 ml of 0.9% normal saline. Patients in B group were instructed to gargle with a 0.1% betamethasone solution for 30 seconds, the solution was prepared by adding 5 ml of 0.1% betamethasone solution to 25 ml of 0.9% normal saline. In both groups, postoperatively patients were evaluated at 2, 6, 12, and 24 hours by employing a blind technique to inquire about the presence of sore throat.

Results. Ketamine solution gargling shows a significant reduction in the severity of throat pain in two different times (12 hours, 24 hours) post extubation when compared with betamethasone solution.

Conclusion. Gargling with ketamine or betamethasone just before the insertion of the endotracheal tube is associated with a reduction in the severity and risk of sore throat.

Keywords: ketamine gargling, Betamethasone gargling, sore throat, endotracheal tube complications, lidocaine

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Частота возникновения постинтубационной боли в горле после полосканий растворами кетамина или бетаметазона: сравнительное рандомизированное исследование

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Резюме

Введение. Послеоперационная боль в горле – одно из распространенных и неприятных осложнений эндотрахеальной интубации после общей анестезии при серьезных хирургических вмешательствах. Характерными клиническими признаками послеоперационной боли в горле являются болевые ощущения в области гортани, охриплость голоса, кашель, ларингит и дисфагия. Исследованы различные методы снижения частоты возникновения послеоперационной боли в горле, большинство из которых являются лекарственными.

Цель. Оценить эффективность полоскания горла раствором бетаметазона или кетамина для снижения частоты возникновения и уменьшения выраженности послеоперационной боли в горле.

Материалы и методы. В исследовании принял участие 91 пациент. Пациентов случайным образом распределили по двум группам: группа кетамина (К) включала 46 пациентов, а группа бетаметазона (Б) – 45 пациентов. Пациентам группы К было предписано полоскать горло раствором кетамина в течение 30 секунд; раствор готовили путем добавления 1 мл кетамина (50 мг) в 29 мл 0,9%-ного физиологического раствора. Пациенты группы Б полоскали горло 0,1%-ным раствором бетаметазона в течение 30 секунд; раствор готовили путем добавления 5 мл 0,1%-ного раствора бетаметазона в 25 мл 0,9%-ного физиологического раствора. В обеих группах состояние пациентов после операции оценивали через 2, 6, 12 и 24 часа – слепым методом, путем опроса о наличии боли в горле.

Результаты. При полоскании горла раствором кетамина наблюдалось достоверное снижение выраженности боли в горле в двух различных временных интервалах (через 12 часов и 24 часа) после экстубации в сравнении с результатом полоскания раствором бетаметазона.

Заключение. Полоскание горла раствором кетамина или бетаметазона непосредственно перед введением эндотрахеальной трубки способствует уменьшению выраженности и риска развития боли в горле.

Ключевые слова: полоскание раствором кетамина, полоскание раствором бетаметазона, боль в горле, осложнения при использовании эндотрахеальной трубки, лидокаин

■ INTRODUCTION

The using of endotracheal intubation (ETT) during general anesthesia in major surgeries has many hazards and complications, the common and annoying one is Post-Operative Sore Throat (POST) in addition to infection, irritation and trauma for exposed tissues and airways. About 65% of patient with ETT are suffering from throat pain in the postoperative few days [1, 2]. Earlier, trauma of trachea from intubation was revealed to be more frequent in women and was related to gynecological surgeries and succinylcholine administration. The improper size and intra-cuff pressure of ETT, in addition to anesthesiologist experience, play an important role in detection the severity of POST [3, 4]. Even with simple injury or slight trauma for larynx and trachea, the POST will be exist in the postoperative period [5]. Hoarseness is one of the most common clinical signs of POST, in addition to cough, laryngitis, tracheitis and dysphagia in severe laryngeal trauma. These symptoms is related to the mucosal inflammatory that caused by using of oropharyngeal or laryngeal airways [6–8]. Many of methods had been investigated to reduce the incidence of POST, most of these methods were pharmaceutical and some weren't pharmaceutical. The pharmaceutical methods including such as lubricant the ETT with lidocaine jell, using of steroids to inflate ETTs cuff or applied as a lubrication agent. The gargling with some medications such as ketamine, benzydamine, tramadol, magnesium sulphate had been supported in many data in decreasing the incidence of POST better than the lubrication with water or even with lidocaine which had become unfavorable to use in avoiding the incidence of POST recently [9]. The new line for reducing the POST is through ask the patient to gargling with some solution of drugs before induction of anesthesia and intubation. The ideal pressure of ETT cuff is recommended to be less than 25 cm H₂O, this maneuver is much efficiency in reduce the POST incidence. The improper size of ETT or cuff pressure may increase the existing of post throat pain in the early postoperative time through increasing the risk of inflammation and ischemia for the mucosal membrane of the trachea [6, 10, 11]. From the anesthetic agent, ketamine, had been investigated in different forms in attenuation of POST because its anti-inflammatory characteristics and anti-nociceptive effect. Nebulization, mouth wash and gargling are the common ways to use the ketamine in reducing the POST. Saline solutions are considered as the most popular intravenous fluids in clinical practice especially in the perioperative period and these fluids are compatible with common drugs for dilution and administration [12–17]. Betamethasone belongs to glucocorticosteroid group which clinically has anti-inflammatory and immunosuppressive properties and have notable efficacy in the prophylaxis of postoperative nausea and vomiting [18].

■ PURPOSE OF THE STUDY

To evaluate the efficiency of betamethasone or ketamine gargling in reducing the incidence and severity of postoperative sore throat.

■ MATERIALS AND METHODS

After approving of our study by the ethical committee of Thi-Qar Health Provenance, and getting a patient written informed consent, a prospective randomized controlled study had been conducted at Al-Nasiriya Teaching Hospital from 10th of November, 2023 up to the end of March 2024. Study included 93 adult male patients aged between

22–40 years, classified to ASA I or II and scheduled for elective laparoscopic cholecystectomy under general anesthesia. The accepted intubation time is less than 90 minutes. Patients with long duration of intubation, patient with clear symptoms of sore throat, hoarseness of voice or respiratory infection, prior to induction of general anesthesia were excluded from this study. On the other hand, heavy smoker patients, patients with predicted difficult airway and intubation (Mallampati score is more than II), obese patient (BMI >35) were also excluded. In the pre-surgical waiting area, demographic information, vital signs and medical history had been taken from all participants and randomly patients were allocated into two groups: the 1st group (K group) of 46 patients asked to gargle with ketamine solution for 30 seconds, the solution was prepared previously through adding 1 ml of ketamine (50 mg) to 29 ml of 0.9% NaCl. The 2nd group (B group) of 45 patients asked to gargle with 0.1 Betamethasone solution for 30 seconds, the solution was prepared previously through adding 5 ml from 0.1% betamethasone solution to 25 ml of 0.9% NaCl. For both groups, the gargling procedure had been done before entering the patient into the operating room. The anesthesia protocol was same in both groups; a standard monitoring (electrocardiograph, blood pressure, pulse oximetry, and end-tidal carbon dioxide [ETCO₂]) was applied, intravenous access was secured with 20-gauge cannula and patients were pre-medicated with IV midazolam 0.03 mg/kg and fentanyl 2 µg/kg, intravenous fluids of 500 ml crystalloid infused during induction, also IV metoclopramide 10 mg were administered. Preoxygenation with 100% oxygen then general anesthesia was induced with propofol 1.5–2.5 mg/kg, rocuronium 0.6–1.2 mg/kg and ketamine 0.25–0.5 mg/kg. A standard ordinary cuffed ETT sized 7–7.5 was used. Immediately after intubation, the cuff of ETT was filled with the minimal volume of room air required to prevent an audible leak (6–8 ml). Anesthesia maintenance was done with sevoflurane (1.5–2%). The mechanical ventilation applied through using Volume Controlled Ventilation (VCV) with the following settings: (Vt: 5–10 ml/Kg, RR: 12, I:E ratio 1:2 PEEP: 5–6). At the end of surgery, the inhalational maintenance is switched off and the neuromuscular blockade was reversed with IV neostigmine 0.05 mg/kg and atropine 0.04 mg/kg, gentle extubation was done with gentle suctioning in the OR after a full recovery and the patient is fully awakening. Patient was transferred to the recovery room after extubation directly.

Patient assessment

A blind technique was used during the assessment of patients. Patients were assessed post operatively at 2, 6, 12, and 24 hr. through asking the patients about sore throat. Sore throat was assessed by using grades between 0–3 as the following: Score 0 used for no sore throat, score 1 for mild sore throat, score 2 for moderate sore throat, score 3 for severe sore throat at this situation the patients were complaining of change in voice or hoarseness of voice associated with throat pain).

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 23, was used to analyze the data. The categorical data were presented as frequencies and percentages. One-way ANNOVA and Chi-square test were used to analyze the association between the numerical data, a (p-value) less than 0.05 considered statistically significant.

■ RESULTS

The 91 patients were allocated to two groups randomly; 46 in Ketamine group and 45 in Betamethasone group, the demographic data including age, body weight and ASA status were compared. The mean ages of K group and B group recipients were about 36.75 ± 10.59 and 33.25 ± 10.50 respectively ($P=0.69$), duration of intubation and duration of surgery also included as shown in table 1.

According to table 2 we found the POST is existing in about 45% in both K and B groups in moderate score, there is no significant difference when comparing the effects of betamethasone or ketamine solutions in reducing the level of sore throat score during the early postoperative time. There was about 26% in B group with mild score and approximately 40% in K group with the same score.

In the second assessment of POST at 6 hrs. after end of surgery (Table 3), we found the majority of K group population had mild sore throat in 21 patients (about 46%) and 13 patients were recorded with no incidence of any signs of POST, with 10 scored at moderate level and just 2 patients (3.50%) only suffering from severe score at this time with ketamine gargling. While in the other group; B group; most patients were having mild to moderate score in 49%, and 33.3% respectively, the severe grade was recorded with 7 patients.

Table 1
Comparison of demographic and operative parameters of both groups

Parameters	Group		p-value
	Betamethasone (n=45)	Ketamine (n=46)	
Age (years)	37.65±3.45	35.17±7.81	0.153
Weight (kg)	79.24±2.63	83.66±2.97	0.418
Duration of Intubation time (min)	84.55±2.12	78.55±3.84	0.855
Duration of surgery (min)	124.18±9.58	123.92±9.85	0.922

Table 2
POST Level According to Gurgling solution (at 2 hrs.)

Throat Level According to Gurgling solution (at 2 hrs.)										
Gurgling solution	Score of Throat Level									
	0		1		2		3		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Betamethasone	5.00	11.1	12.0	26.7	20.0	44.4	8.00	17.8	45.0	100
Ketamine	1.00	2.00	18.0	40.0	21.0	45.0	6.00	13.0	46.0	100
P. value	0.244									

Table 3
POST Level According to Gurgling solution (at 6 hrs.)

Throat Level According to Gurgling solution (at 6 hrs.)										
Gurgling solution	Score Throat Level									
	0		1		2		3		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Betamethasone	1.00	2.20	22.0	48.9	15.0	33.3	7.00	15.6	45.0	100
Ketamine	13.0	29.1	21.0	45.7	10.0	21.7	2.00	3.50	46.0	100
P. value	0.003									

Table 4
POST level according to gurgling solution (at 12 hrs.)

Throat Level According to Gurgling solution (at 12 hrs.)										
Gurgling solution	Score Throat Level									
	0		1		2		3		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Betamethasone	14.0	30.4	9.00	20.0	21.0	46.7	1.00	2.20	45.0	100
Ketamine	30.0	66.6	10.0	21.2	4.00	8.70	2.00	3.50	46.0	100
P. value	<0.001									

Table 5
POST level according to gurgling solution (at 24 hrs.)

Throat Level According to Gurgling solution (at 24 hrs.)										
Gurgling solution	Score Throat Level									
	0		1		2		3		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Betamethasone	18.0	40.0	23.0	51.1	2.00	4.40	2.00	4.40	45.0	100
Ketamine	39.0	82.5	5.00	14.0	0.00	0.00	2.00	3.50	46.0	100
P. value	<0.001									

Ketamine solution significantly decreases the severity and incidence of sore throat when assessed at 12 hrs. after surgery (Table 4). 30 patients (about 67%) of K group were recorded with 0 score of POST and 10 patients scored mild level. But in the other side, there was about 67% of B group patients assessed for mild to moderate score at the same time. 30% of B group had a 0 score during this interval.

The efficacy of ketamine gargling was clearly evident at the 4th interval of assessment in 24 hrs. more than 80% of the patients (39 patients) in the K group had no evidence of sore throat, and about 14% of patients scored with mild POST. While there were just 2 patients graded with severe throat at this time. In the B group, we noticed there was more than 50% of the individuals assessed with mild sore throat and 40% had a 0 score of sore throats. In both groups there was only 2 patients suffering from severe level of POST (Table 5).

■ DISCUSSION

Sore throat is considered a repeated complaint after using the endotracheal intubation during surgery [8]. The patient's discomfort is often evident with the occurrence of the sore throat, which causes disappointment for the patient and his relatives in the quality of health care while he was in the operating room for surgery [19]. For many decades, several trials had been done by using many drugs and methods in attempts to reducing the incidence of POST [20–22]. The present study was designed to determine the efficacy of gargling with ketamine or betamethasone oral drops in attenuating postoperative sore throat following GA with tracheal intubation, lasting up to 24 hrs. Many factors had been identified in related studies which contributing to sore throat after intubation, including cuff design, intra-cuff pressure and size of ETT; in addition to age and sex of patients [4, 11, 23]. Considering our results, the ketamine gargling had a clear advantage on betamethasone in reducing the severity of sore throat during the 24-hour after surgery. The incidence of sore throat

was reported in previous study to reaches about 65% with prolonged use of ETT [6, 23]. In this study, we noted the overall incidence of POST exceed 60% in both groups; especially in the early postoperative period. The severity of POST is significantly reduced within 24 hrs. for both groups. Betamethasone and ketamine had been investigated previously in many trails, but the betamethasone was used in gel form and applied directly to ETT; while gargling and nebulization are the common methods with ketamine. Shaaban and his colleagues in their blinded clinical trial compared the application of betamethasone gel on the ETT to ketamine gargling in reducing postoperative sore throat; their result was POST is significantly reduced with in using both drugs [24]. The incidence of POST was significantly less in ketamine group in our study; and these results matched the data of study which conducted by O. Canbay et al. in 2008. In that prospective, randomized, placebo-controlled, and single blinded study, they evaluated the efficacy of ketamine gargling with placebo to reduce the incidence of POST after prolonged using of endotracheal intubation; the result was remarkable for ketamine gargling in reduce POST incidence [25]. The efficacy of ketamine gargling in attenuation the POST was confirmed by many [26, 27]. The bitter taste of ketamine gargling is considered the most common annoying problem for patients; in addition to the aspiration risk; so Ahuja et al. in a study was conducted in 2015 supposed the nebulization route in using ketamine in reducing the POST [14]. The result of this study manifested in that the severity the throat pain had been decreased significantly with the use of ketamine gargling, especially when evaluating the patients at 12 and 24 hours after the removal of the tracheal intubation; in our results also, there was an effectiveness for gargling with betamethasone in reducing the severity of the infection, but by a lesser extent than gargling with ketamine at the same time. In 2017, Rajan and his colleagues in randomized trial investigated the using of nebulization of ketamine before induction of anesthesia; the result was a significant reduction in the incidence of POST [4]. Another study conducted in 2014 explained that gargling with ketamine has an advantage over benzydamine gargling. The application of betamethasone gel to ETT is more effective from lidocaine gel; in Sumathi et al. the incidence of POST was about 40% in betamethasone group during the first 24 hrs. But 100% the incidence was in lignocaine group [28]. The incidence of sore throat was reduced significantly with using ketamine and betamethasone gel when compared with application of lidocaine gel [29]. Using of betamethasone gel on ETT efficiently reduced the occurrence of sore throat, cough and hoarseness after general anesthesia when compared to lidocaine jelly by Sarki and Mohammed in 2015 [30]. The results of our study completely matched the data of a clinical study done by Emara in 2018, the betamethasone gel compared with nebulized ketamine to reduce the incidence of sore throat after intubation [2]. Study was also had been limited some factors including discontinuing of gargling time (less than 30 seconds), the bitter taste of ketamine gargling, extended intubation time, un anticipated difficult intubation and airway protection.

■ CONCLUSION

For reducing the local associated complications of intubation; especially the incidence and severity of sore throat; the preoperative gargling with betamethasone or ketamine solution was effective. Both of these agents significantly reduce the risk and severity of POST in the early 24 hours after extubation. But the preference was clear and evident for gargling with 50 mg of ketamine solution over betamethasone gargle in the results of the current study.

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