International Journal of Medical and Health Research
ISSN: 2454-9142; Impact Factor: RJIF 5.54
Received: 28-10-2018; Accepted: 30-11-2018
www.medicalsciencejournal.com
Volume 4; Issue 12; December 2018; Page No. 177-180

Assessment of nebulized ketamine for reduction of incidence and severity of post-operative sore throat

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Abstract
The primary outcome of the study was to measure the incidence of POST at 4 h post-operatively in adult patients undergoing surgery of duration of up to 1 h under GA. The secondary outcomes included the incidence and severity of post-operative sore throat at immediate recovery, and post-operatively, evaluation of side-effects including nausea, vomiting, cough and dry mouth in both the groups.
The data from the 40 patients undergoing general anaesthesia were evaluated for the post-operative sore throat. The patients recruited for the study were kept fasted for 6 h preceding surgery. On arrival at the operating room, patients were monitored by electrocardiogram, non-invasive blood pressure and pulse oximetry (SpO2). Anaesthesia protocol was made uniform for all patients. Group I received a saline nebulisation 5.0 ml and Group II received ketamine 50 mg (1.0 ml) (with 4.0 ml of the saline) nebulisation. The data is collected and presented as below.
Hence from the present study it can be concluded that the use of pre-operative ketamine nebulisation reduced the incidence and severity of POST during early post-operative period in patients receiving GA with tracheal intubation.

Keywords: ketamine, nebulization, post-operative sore throat

Introduction
Postoperative sore throat (POST) is a common adverse event after general anesthesia. Typically, the incidence of POST is highest in patients who are tracheally intubated; however, POST also occurs when a laryngeal mask airway (LMA) is used [1]. Even patients who are managed with a facemask are not immune. Most of the measures that have been recommended for reducing this complication have been directed at limiting the physical trauma that might result from airway instrumentation and manipulation. Surprisingly few investigations have evaluated pharmacologic interventions as a means of reducing POST. Furthermore, no single drug has achieved widespread acceptance in the clinical community. Two of these articles evaluate the effectiveness of topical benzydamine hydrochloride applied to the cuff of the endotracheal tube, directly to the pharyngeal mucosa, or both [2-3]. A third article evaluates the efficacy of inhaled fluticasone propionate [4]. The fourth article evaluates Strepsils ®, a nonprescription lozenge that contains 2 active ingredients, amylmetacresol and 2, 4-dichlorobenzyl alcohol.
The expression “sore throat” is obviously common to the vernacular of many different cultures, yet it provides at best a parsimonious description of the actual phenomena. Consequently, the expression “postoperative sore throat” likely represents a broad constellation of signs and symptoms. For instance, in its simplest form, sore throat is a lay description of pharyngitis, which in itself can have a variety of causes. However, sore throat may also include a variety of symptoms including laryngitis, tracheitis, hoarseness, cough, or dysphagia. Postoperatively, it seems most plausible that the 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). The site or sites of mucosal injury would obviously vary depending on the airway device. For instance, endotracheal intubation can result in injury to any portion of the pharynx as well as injury to the larynx and trachea. Placement of an LMA can reasonably be expected to cause injury to pharyngeal mucosa in the supraglottic regions only, whereas the use of a facemask with an oral airway should result in injury to only the oropharynx, assuming that no other injuries occurred because of suctioning or other airway maneuvers.
It is therefore somewhat surprising to note that the reported incidence of POST after LMA insertion is, at least in some studies, remarkably similar to that seen with endotracheal intubation [5]. Although this might lead one to infer that the mechanism and location of injury must also be similar, a number of facts seem to contradict this assumption. For instance, reducing the size of endotracheal tubes results in a significant decrease in the incidence of POST [6]. The design of tube cuffs has also been an area of intense research. The size, pressure/volume characteristics, and shape of cuff have all been implicated in tracheal mucosal injury and resultant

POST [7]. Conversely, it has been suggested that cuff inflation pressure has less of a role in POST when an LMA is used. Both airway devices are clearly capable of inducing mucosal irritation and both can cause POST in patients at rates that are not strikingly different. Yet, anatomically, the site or sites of injury cannot be the same. Pharmacological measures for attenuating POST are inhalation of beclomethasone and fluticasone, gargling with azulenesulfonate, aspirin, ketamine, benzydamine hydrochloride and licorice, local spray of benzydamine hydrochloride, and intracuff administration of alkalized lignocaine [2].

The endotracheal tube insertion can be irritating to the throat, tongue, and vocal cords. The process of having the breathing tube inserted can be irritating to the throat, and having the tube remain in place can cause further irritation in the mouth and throat. After the tube is removed, patients often find that their mouth, throat, and airway are irritated and may experience burning and other symptoms.

Postoperative sore throat has a reported incidence of up to 62% following general anaesthesia. In adults undergoing tracheal intubation, female sex, younger age, pre-existing lung disease, prolonged duration of anaesthesia and the presence of a blood-stained tracheal tube on extubation are associated with the greatest risk. Tracheal intubation without neuromuscular blockade, use of double-lumen tubes, as well as high tracheal tube cuff pressures may also increase the risk of postoperative sore throat [8].

Hence based on the above reported findings of the sore throat observations the current study was planned to assess the effect of nebulized ketamine for decreasing the post-operative sore throat in the general anaesthetic patients.

Methodology

The 40 patients undergone the surgery with the administered general anaesthesia were enrolled in the present study. The study was conducted in the Department of Anaesthesia in IMS BHU, Varanasi from Dec 2016 to May 2016. As per the classification of the American Society of Anesthesiologists I and II physical conditions were enrolled on to dthe study. The approval of the institutional ethics committee was taken before starting the study. All the patients and their parents were informed consents. The aim and the objective of the present study were conveyed to them.

The Inclusion Criteria includes the patients with age 25- 60 years and physical conditions as per American Society of Anesthesiologists I and II. The Excluded patients are Patients at particular risk of heart conditions, such as congenital disease and Pregnant/lactating females;

The patients recruited for the study were kept fasted for 6 h preceding surgery. On arrival at the operating room, patients were monitored by electrocardiogram, non-invasive blood pressure and pulse oximetry (SpO2). Anaesthesia protocol was made uniform for all patients. Group I received a saline nebulisation 5.0 ml and Group II received ketamine 50 mg (1.0 ml) (with 4.0 ml of the saline) nebulisation.

The primary outcome of the study was to measure the incidence of POST at 4 h post-operatively in adult patients undergoing surgery of duration of up to 1 h under GA. The secondary outcomes included the incidence and severity of post-operative sore throat at immediate recovery, and post-operatively, evaluation of side-effects including nausea, vomiting, cough and dry mouth in both the groups.

Results & Discussion

The data from the 40 patients undergoing general anaesthesia were evaluated for the post-operative sore throat. The patients recruited for the study were kept fasted for 6 h preceding surgery. On arrival at the operating room, patients were monitored by electrocardiogram, non-invasive blood pressure and pulse oximetry (SpO2). Anaesthesia protocol was made uniform for all patients. Group I received a saline nebulisation 5.0 ml and GroupII received ketamine 50 mg (1.0 ml) (with 4.0 ml of the saline) nebulisation. The data is collected and presented as below.

Table 1: Demographic Data

Group	Group I	Group II
Nebulisation	Saline nebulisation	Ketamine nebulisation
Total No. of Cases	20	20
Age in years	No. of Patients	No. of Patients
25 – 35 years	4	2
35 – 45 years	7	10
45 – 55 years	5	5
55 and above	4	3
Weight in Kg	55-75	55-86
Males	14	10
Females	6	10
Duration of Surgery	30-50 mins	35-55mins

Table 2: Severity of post-operative sore throat in study group

Group	Group I	Group II
Nebulisation	Saline nebulisation	Ketamine nebulisation
Total No. of Cases	20	20
Recovery time		
Immediate	4	10
2 hr	3	4
4 hr	4	4
8 hr	5	2
12 hr	3	0
24 hr	1	0

A sore throat is considered a normal and expected issue after surgery, particularly if general anesthesia was used. Post-surgical throat pain typically is nothing to worry about unless the ability to speak has been impacted or the soreness persists beyond a reasonable amount of time.

Most patients who have general anesthesia will report throat discomfort ranging from mild to severe in the hours and days following their surgery. Patients who have other types of anesthesia, such as a regional block, twilight sedation, or spinal anesthesia do not experience this type of throat discomfort due to their sedation. In cases where throat soreness does occur, a variety of options can help ease the pain.

Age also affects the occurrence of POST, either in young patients, or between 30 and 39 years, or even over 60 years. The characteristics of surgery and anesthesia can cause POST. In cephalic surgeries, POST occurs more frequently [9]. In our study the type of surgery was not a factor related to POST. The duration of anesthesia and surgery can also promote the

occurrence of PO ST. In our study, it was more frequent when the anesthesia exceeded two hours. Indeed, as soon as the duration of theanesthesia exceeds one hour [10], for more than four hours [11] POST appears unavoidable. General anesthesia is also a risk factor for the occurrence of POST but not necessarily correlated with the duration of the intubation but more with the length of the anesthesia [12].

Intubation procedure, like the number of intubation attempts, affects the occurrence of POST [13] but it is not constant [14]. When intubation is difficult, it involves more POST. In the other side, the experience of physicians performing the tracheal intubation has no influence in the occurrence of POST [15]. The size of the endotracheal tube did not necessarily have a significant influence on the occurrence of this pain.

The Post-operative sore throat is seen more controlled in the Ketamine nebulized patients. The time for the recovery if fast as compared to normal group patients.

In an earlier study, pre-operative nebulisation with 3.0 ml (225 mg) of isotonic magnesium sulphate, also a NMDA receptor antagonist showed a decrease in incidence and severity of POST at 0, 2, 4 and 24 h post-operatively [16].

The primary outcome of the study was the incidence of POST at 4 h as by this time the patents are generally awake, alert, and more cooperative to participate in the study. This is also in line with earlier studies. The authors measured serum ketamine levels intra-operatively and suggested that with such low levels of serum ketamine, the systemic absorption of ketamine was unlikely to have role in the attenuation of POST and rather suggested a topical effect of ketamine [17].

Ketamine gargle has been found to be effective in reducing the incidence and severity of POST due to its anti-inflammatory effects [18]. However, there are a few demerits of gargle ketamine over nebulization due to its bitter taste, large volume required for gargle with risk of aspiration if accidentally swallowed and patient cooperation.

Other pharmacological agents used earlier, include aspirin gargles, benzydamine hydrochloride (BH) gargles, transdermal ketoprofen, lignocaine 10% spray, IV dexamethasone, beclomethasone gel on tracheal tube and magnesium lozenges. All have been shown to reduce the incidence and severity of POST up to 24 h post-operatively [19]. Betamethasone gel applied over the endotracheal tube (ETT) and ketamine gargle were found to be comparable in attenuating POST during the first 24 post-operative hours after elective surgical procedures. However, the incidence of post-operative cough and hoarseness of voice was attenuated better with betamethasone application [20]. Lignocaine spray decreased incidence of cough at tracheal extubation in surgeries of <2 h [21]. Medicated lozenges of licorice had efficacy of decreasing POST in smokers for surgery under GA of more than 1 h [22] recently, siccoral and strefen have been found to be effective in relieving POST in the early hours following extubation [23].

Conclusion

Hence from the present study it can be concluded that the use of pre-operative ketamine nebulisation reduced the incidence and severity of POST during early post-operative period in patients receiving GA with tracheal intubation.

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