e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2023; 13(3); 316-322

Original Research Article

Clinical Outcome of Preoperative Ketamine Gargle on Sore Throat Postoperatively in a Tertiary Care Hospital: An Observational Study

Vipin M C[1], Deepa Franklin[2], Suma R[3]

[1]Assistant Professor, Department of Anaesthesiology, Government Medical College, Calicut, Kerala

[2]Associate Professor, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala

[3]Associate Professor, Department of Anaesthesiology, Government Medical College, Thiruvananthapuram, Kerala

Received: 11-01-2023 / Revised: 17-02-2023 / Accepted:20-03-2023

Corresponding author: Dr. Suma R

Conflict of interest: Nil

Abstract

Background: Postoperative sore throat (POST) following extubation after general anaesthesia is one of the most distressing side effects of endotracheal intubation during the immediate postoperative period. Ketamine, a NMDA antagonist, has anti-nociceptive and anti-inflammatory properties. Through its action on the peripherally located NMDA receptors, it reduces inflammation and pain.

Objective: To assess the efficacy of ketamine gargle in the prevention of post-operative sore throat in patients undergoing endotracheal intubation for general anaesthesia.

Methodology: 106 patients undergoing general anaesthesia with endotracheal intubation were included in our study and were randomly assigned into Groups A and B, with 53 patients each. Group A received 50 mg (1 ml) of ketamine diluted with 29 ml of normal saline in the form of a gargle, and Group B received 30 ml of normal saline 5 minutes before induction. Patients had to gargle for a period of 30 seconds.

Results: Showed that gargling with ketamine before surgery cut down on the number of cases and severity of POST (post-operative sore throat). When compared, the difference in the incidence of sore throat at 0, 4, 8, 12, and 24 hours post-extubation was found to be statistically significant ($p<0.001$).

Conclusion: Ketamine gargle significantly reduces the incidence and severity of postoperative sore throat.

Keywords: Endo-tracheal intubation, Ketamine, Ketamine gargle Postoperative sore throat.

Introduction

The management of the airway is central to the practice of anaesthesia and encompasses the whole range of airway manipulations required during the course of anaesthesia. Endotracheal intubation forms an integral part of airway management. Cuffed endotracheal tubes prevent aspiration and are therefore commonly used. However local the irritation, inflammation of the airway is a common sequelae to cuffed endotracheal intubation, which leads to post-extubation morbidities

like sore throat, cough, and hoarseness of voice, which are extremely distressing to the patient.

A number of different measures, both pharmacological and non-pharmacological, have been studied to reduce the incidence and severity of post extubation sore throat. Some of the strategies used to reduce postoperative sore throat include smaller tubes [1], high volume low pressure cuffed endotracheal tubes [2], careful airway instrumentation, adequate intracuff pressure, fully deflating the cuff before extubation, lubricating with lignocaine jelly [3], betamethasone gel [3], IV dexamethasone [4], and beclomethasone inhalation [5]. However, each intervention is associated with side effects that may not be desirable. Hence, there is a need for an intervention that would prevent rather than treat post-operative sore throat and is effective, patient-friendly, and reliable.

N-methyl-D-aspartate (NMDA) receptors are present not only in the central nervous system but also in the peripheral nervous system [6]. These receptors contribute to inflammatory pain. Ketamine is a NMDA antagonist with anti-nociceptive and anti-inflammatory properties, which may be the possible mechanism in the prevention of post-operative sore throat (POST) [6]. Hence, we undertook a study on the effect of ketamine gargle and compared it with normal saline gargle in the prevention of post-operative sore throat.

Objectives

To assess the efficacy of ketamine gargle in the prevention of postoperative sore throat in patients undergoing endotracheal intubation for general anaesthesia.

Methodology

Study design: It was prospective observational study.

Study Setting: Patients undergoing general anaesthesia with endotracheal intubation at the Govt. Medical College, Thiruvananthapuram.

Study Duration: One Year

Sampling Technique: A random sampling technique was used for the study. Patients were randomly divided into two groups using a computer generated table. Group A and B, with 53 patients each. Group A received 50 mg (1 ml) of ketamine diluted with 29 ml of normal saline in the form of a gargle, and Group B received 30 ml of normal saline 5 minutes before induction. Patients had to gargle for a period of 30 seconds.

Sample size:

A total sample size of 106 cases, 53 in Group A and the other 53 in Group B

Sample size calculation

The sample size was calculated by considering the incidence of POST as 30 % (p1) with ketamine gargle and with that of normal saline as 60% (p0).
With type I error rate $\alpha = 0.05$ and type II error rate $\beta = 0.02$
With a power of 80% and using the formula:
$n=2 (Z\alpha+Z\beta)^2 pq \div (p0-p1)^2$
$n=2(1.96+0.84)^2(60)(50) \div (60-30)^2$
$n=52.66$
n = number of samples,
$Z\alpha= 1.96$, $Z\beta= 0.84$, P0 = 60%, P1 = 30%
Thus the sample size was calculated as 106, 53 in each group.

Selection Criteria:

Inclusion Criteria:

- ASA physical status I and II
- Age between 18 and 60 years old.
- Airway assessment by Mallampati grades I and II
- Patients undergoing elective surgeries under general anaesthesia.

Exclusion Criteria:

- Patients not willing to give consent
- Patients requiring more than one attempt for endotracheal intubation.
- Patients with an upper respiratory tract infection
- Patients with a preoperative sore throat

Study Procedure

After obtaining the approval of the Ethical Committee and written informed consent, a total of 106 patients undergoing elective surgeries of a maximum duration of 3 hours under general anaesthesia were included in the study. Patients were randomly divided into two groups using a computer generated table.

- Group A received preservative-free ketamine, 1 ml (50 mg) in 29 ml of normal saline (NS).
- Group B received 30 mL of normal saline.

Patients were asked to gargle for 30 seconds five minutes prior to induction. Throughout the anaesthesia, standard non-invasive monitoring was performed. Following preoxygenation, patients were premedicated with injections of glycopyrrolate (0.005 mg/kg IV), midazolam (0.05 mg/kg IV), and fentanyl (2 mcg/kg IV). Induction of anaesthesia was done with 5 mg/kg of injection thiopentone sodium IV, sufficient to obtund the eye-lash reflex, followed by Inj. vecuronium 0.1 mg/kg IV. Tracheal intubation was performed with an appropriate sized endotracheal tube by an experienced anaesthesiologist with >3 years of experience. The endotracheal tubes were lubricated with 2% lignocaine jelly at room temperature. Immediately after intubation, the cuffs of the endotracheal tubes were filled with the volume of room air required to prevent a palpable air leak. Anaesthesia was maintained with isoflurane, fentanyl, and vecuronium and supplemented with oxygen at 33% in nitrous oxide. Intra cuff pressure was maintained throughout the procedure between 18 and 22 cm H2O using a handheld pressure gauge. Residual neuromuscular relaxation with vecuronium was antagonized with injections of Neostigmine IV (0.05 mg/kg body weight) and Inj. Glycopyrrolate IV (0.01 mg/kg body weight) on completion of surgery. Oropharyngeal suction before extubation was done under direct vision to avoid trauma to the tissues, confirming that secretion clearance was complete. The patients were interviewed regarding postoperative complaints. If they did not complain about a sore throat, then a leading direct question was asked regarding the same at 0, 4, 8, 12, and 24 hours after the procedure.

The post was graded on a four-point scale (0-3):

- Grade 0: No sore throat
- Grade 1: Mild sore throat (complains of sore throat only on asking)
- Grade 2: Moderate sore throat (complains of sore throat on his/her own)
- Grade 3: Severe sore throat (change of voice or hoarseness, associated with throat pain).

Other side-effects, if any, were also noted.

Statistical Analysis

To compare patient characteristics, the duration of anaesthesia and a surgery student's t-test were used. To compare gender distribution between the two groups, the Chi-square test was used. To analyze the association between sore throats and two groups, the Chi-square test was used. $P<0.05$ was considered statistically significant.

Result

The present study was conducted to study the efficacy of ketamine gargle in the prevention of postoperative sore throat following endotracheal intubation in patients receiving general anaesthesia. 110 patients were enrolled for the study, keeping in mind the inclusion and exclusion criteria. Four patients, however, could not gargle for 30 seconds and hence had to be excluded from the study. The study included 106 ASA grade I-II patients between the ages of 18 and 60, of both sexes.53 patients in Group A (ketamine gargle) and 53 patients in Group B (normal saline gargle)

Demographic Data

The average age of patients in Group A was 33 years, and the average age of patients in Group B was 37 years. When compared statistically, the difference was not found to be significant (p = 0.087). The 2 groups were comparable with respect to age. Of the total 53 patients in Group A, 30 (57%) were female and 23 (43%) were male. Of the 53 total patients in Group B, 27 (51%) were female and 26 (49%) were male. When the two groups were compared, the difference was not found to be statistically significant (p=0.342). The mean duration of the procedure was 131.603 minutes in Group A, and the mean duration of the procedure was 130.377 minutes in Group B. When compared, the difference between the two groups was not found to be statistically significant (p = 0.8). (Table 1)

Table 1: Demographic Data

PARAMETER	Group A Ketamine (Mean ± S.D.)	Group B Normal saline (Mean ± S.D.)	P Value
Age (in years)	32.9±11.7	36.8±11.9	0.087
Duration of procedure (in minutes)	131.603±30.52	130.377±30.522	0.8
Sex (M/F)	23/30	26/27	0.342

Demographic data were comparable in both the groups

Incidence of sore throat was lower in Group A than in Group B at intervals 0 hr, 2 hrs, 4 hrs, 8 hrs, 12 hrs, 24 hrs. Statistically significant at all instances with p value of <0.05.

Incidence of sore throat		Group A	Group B	P value
At 0 hour	**Grade 0**	2	0	P value< 0.001
	Grade 1	34	6	
	Grade 2	15	30	
	Grade 3	2	17	
At 4 hour	**Grade 0**	18	3	p value< .001
	Grade 1	30	21	
	Grade 2	5	29	
	Grade 3	0	0	
At 8 hour	**Grade 0**	39	8	p value< 0.001
	Grade 1	14	36	
	Grade 2	0	9	
	Grade 3	0	0	
At 12 hour	**Grade 0**	51	28	p value< 0.001
	Grade 1	2	25	
	Grade 2	0	0	
	Grade 3	0	0	
At 24 hour	**Grade 0**	53	45	p value< 0.001
	Grade 1	0	8	
	Grade 2	0	0	
	Grade 3	0	0	
Total		**53**	**53**	**106**

Discussion

Endotracheal intubation is used for many general anaesthetic procedures in modern anaesthetic practice. Postoperative sore throat (POST) is a well-recognized side effect, albeit a minor one, after endotracheal intubation [11]. But the discomfort produced by a sore throat makes it one of the most undesirable side effects in

the postoperative period. 9 POST (post-operative sore throat) represents a broad constellation of signs and symptoms of laryngitis, tracheitis, hoarseness, cough, or dysphagia, with an incidence varying from 26% to 75% 10 days after endotracheal intubation. Postoperative sore throat was rated by patients as the 8th adverse effect in the postoperative period. [7] Several contributing factors for sore throat after surgery have been reported, including patient sex [11], age [11], use of succinylcholine [11], large tracheal tube [1], cuff design [9], and intra-cuff pressure .[9] Identification of the factors associated with an increased risk of POST will allow anaesthesia providers to avoid combinations of controllable factors, decrease the incidence of POST, and improve post anaesthetic outcomes. A multimodal approach can be used for attenuation of POST. These consist of non-pharmacological and pharmacological interventions. Smaller sized endotracheal tubes [1], lubricating the endotracheal tube with water soluble jelly [3], careful airway instrumentation, intubation after full relaxation, gentle oropharyngeal suctioning, minimizing intra-cuff pressure [11], and extubation when the tracheal tube cuff is fully deflated are some of the non-pharmacological measures to reduce the incidence of POST.

Pharmacological interventions include beclomethasone inhalation [5], IV steroids 4, IV preservative-free lignocaine [13], gargling with azulene sulfonate [13], etc. However, all such maneuvers have their own limitations and have not been successful in dealing with this distressing side effect. Hence, in our study, we compared pre-emptive ketamine gargle with normal saline gargle as a means to prevent post-operative sore throat.

The incidence of POST has been found to be higher in females as compared to males (17.7% vs. 9.%). [9]. In our study, the number of male patients was 23 in the ketamine group and 26 in the saline group. The number of female patients was 30 in the ketamine group and 27 in the saline group. When compared, the difference was not found to be statistically significant ($p = 0.342$). The incidence of sore throat increases with the duration of the procedure. Hence, in our study, the duration of the procedure was defined. The duration was standardized in both groups. Any patient whose surgery lasted for more than 3 hours was excluded from our study. The duration of the procedure in the ketamine group was 131.603+30.52 minutes, while in the normal saline group it was 130.377+30.52 minutes. When compared, the difference was not found to be statistically significant ($p = 0.8$). An increased incidence of sore throat has been reported in patients when succinylcholine is used to facilitate endotracheal intubation (14% in the group that received succinylcholine as compared to 17% in the group that did not). [11]. As a result, we did not use succinylcholine for endotracheal intubation in our study. All intubations were facilitated using Vecuronium. The use of cuffed tubes, Stout D. M. et al. (1987) [1], showed a higher incidence of sore throat with a larger size tube compared with a smaller size; hence, in our study, we used a 7.5 mm tube for female patients and an 8.5mm tube for male patients in both groups. The incidence of postoperative sore throat has been found to be higher when tubes with high pressure, low volume cuffs are used in comparison with tubes with high volume, low pressure cuffs. Hence, in our study, we used Portex tubes that have a high volume, low pressure cuff in all patients [11].

Previous studies have reported that POST is associated with an increase in cuff pressure. Excessive inflation of the endotracheal tube cuff produces high pressure on the tracheal wall, thereby affecting the perfusion of the tracheal mucosa and resulting in its ischaemic necrosis. When pressure in the endotracheal tube cuff exceeds 22 mmHg, blood flow in the tracheal mucosa begins

decreasing and reduces markedly when the pressure reaches 30 mmHg; hence, in our study, we maintained the intra-cuff pressure between 18 and 22 mmHg in both the groups. Trauma during insertion of the endotracheal tube is associated with a higher incidence of postoperative sore throat [11]; hence, in our study, all the intubations were done by an anaesthesiologist with a minimum experience of 3 years to avoid unnecessary trauma.

Blind suctioning causes trauma to the pharyngolaryngeal structures, which increases the chances of a post-operative sore throat. Suctioning was strictly done under vision in our study. High anaesthetic air flow rates cause drying of the mucosa, which in turn leads to an increased incidence of post-operative sore throat. In our study, we used O2:N2O in a ratio of 1:1 with a fresh gas flow of 4 liters. [14] The incidence of postoperative sore throat varied with the type of questioning employed. Various investigators have used various techniques to elicit a sore throat in the postoperative period. Harding C. J. et al. [8] conducted a study in 1987 that showed a higher incidence of sore throats with direct questioning. Hence, in our study, we have used a scale on which the patient is asked about his complaints in the postoperative period. If the patient does not complain of sore throat, a direct question pertaining to sore throat, cough, or hoarseness was asked. Coughing or bucking on the endotracheal tube has been found to be associated with a greater incidence of POST. However, none of our patients coughed or bucked while on the tube. All patients had a smooth recovery and were extubated following complete deflation of the cuff. Placement of the throat pack around the endotracheal tube increases the incidence of POST [12]. However, in our study, a throat pack was not inserted in any of the patients.

Our study found that gargling with 50mg of ketamine diluted with 29 ml of NS five minutes before induction successfully reduced the incidence and severity of post-operative sore throat. Immediately after extubation, 17/53 patients in the normal saline group complained of severe POST, compared to only 2/53 patients in the ketamine group. At four hours post-extubation, 29/53 patients in the normal saline group complained of moderate sore throat, while only 5/23 in the ketamine group experienced sore throat. When compared statistically, the difference in incidence of POST at 0 and 4 hours post-extubation was found to be statistically significant($p<0.001$).

At 12 hours post-extubation, only 2/53 patients in the ketamine group complained of mild sore throats, while none had moderate or severe symptoms. However, in the saline group, although no patients had moderate or severe symptoms, 25/53 patients still experienced a mild sore throat. 8/53 patients had a mild sore throat even 24 hours after extubation in the saline group, while none of the patients in the ketamine group complained of any sore throat. When compared statistically, the difference in incidence of POST at 12 and 24 hours post -extubation was found to be statistically significant($p<0.001$). This shows that ketamine gargled just prior to induction of general anaesthesia significantly reduces the incidence and severity of POST. However, 34/53 patients in the ketamine group complained of a mild sore throat at 0 hours, i.e., immediate post -extubation; this could be attributed to post-operative sedation or difficulty in comprehending questions.

Conclusion

Preoperative Ketamine gargle significantly reduces the incidence and severity of postoperative sore throat in patients undergoing endotracheal intubation during general anaesthesia thereby contributing to a smoother recovery and greater patient satisfaction.

Reference

1. Stout DM, Bishop MJ, Dwersteg JF, Cullen BF. Correlation of endotracheal tube size with sore throat and hoarseness following general anaesthesia. Anaesthesiology. 1987 Sep; 67(3):419-21.
2. Jenson PJ, Hommelgaard P, Sondergaard S. Sore throat after operation. Influence of tracheal intubation, intracuff pressure and type of cuff. British Journal of Anaesthesia 1982; 54: 453-7
3. 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 of Anaesthesia.2008;100:215-18.
4. Thomas S, Beevi S. Dexamethasone reduces the severity of postoperative sore throat. Can J Anaesth. 2007 Nov;54(11):897-901.
5. Honarmand A, Safavi M. Beclomethasone inhaler versus intravenous lidocaine in the prevention of postoperative airway and throat complaints: A randomized, controlled trial. Ann Saudi Med. 2008; 28:11-6.
6. Chan. L, Lee. M.L, Lo. Y. L. Postoperative sore throat and ketamine gargle. British Journal of Anaesthesia. 2011; Oct: 97.
7. Rajkumar G et al prophylactic administration of ketamine gargle for reducing postoperative sore throat following endotracheal intubation. J Med Soc. 2012;26:175-9.
8. Harding C J, Mc Vey F K. Interview method affects incidence of post operative sore throat. Anaesthesia. 1987;42:1104-7
9. Canbay. O, Celebi. N, Sahin. A, Celiker. V, Ozgen. S and Aypar. U. Ketamine gargle for attenuating postoperative sore throat. British Journal of Anaesthesia. 2008;100 (4):490–3.
10. Rudra A, SuchandaRay, Chatterjee S, Ahmed A, Ghosh S. Gargling with ketamine attenuates the postoperative sore throat. Indian Journal of Anaesthesia. 2009; 53(1):40-43.
11. McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. Anaesthesia. 1999;54:444–53.
12. Jaiswal. V and G C Bedford. G. C. Review of the use of throat packs in nasal surgery. The Journal of Laryngology & Otology. 2009; 123: 701-704.
13. Ogata J, Minami K, Horishita T, Shiraishi M, Okamoto T, Terada T, et al. Gargling with sodium azulene sulfonate reduces the postoperative sore throat after intubation of the trachea. Anesth Analg. 2005 Jul; 101(1):290-3.
14. Peirovifar A, Eydi M, Mirinejhad MM, Mahmoodpoor A, Mohammadi A, Golzari SE. Comparison of postoperative complication between Laryngeal Mask Airway and endotracheal tube during low-flow anaesthesia with controlled ventilation. Pak J Med Sci. 2013 Apr;29(2):601-5.