

# The Effect of Preoperative Ketamine Gargles on Postoperative Sore throat after Oral Endotracheal Intubation

MUHAMMAD ASHRAF ZIA, FAKIHA SHEIKH, SAJJAD RAZA KAZMI, S. MAHMOOD SHAH, RAZIA ASHRAF

## ABSTRACT

**Aim:** To compare the effectiveness of Ketamine Gargles for prevention of POST(post op sore throat) after Oral Endotracheal Intubation

**Study Design:** Randomize Controlled Trial

**Setting:** ENT Operation Theater – Jinnah Hospital Lahore

**Duration of Dates:** 6 months

**Results:** The overall incidence of POST in control group (Group C) of our study was 56%. The overall incidence of POST was positively less in Ketamine Gargle group (Group K) with 34% when compared to 56% in the control group (Group C). Ketamine Gargle contributed to an additional benefit of 22% reduction in the incidence of POST in study population. 24hrs after extubation, the incidence of mild POST was lesser in Group K. No correlation of gender, age, endotracheal tube size with POST, with respect to Ketamine Gargle was seen in present study.

**Conclusion:** Ketamine gargle (50mg Ketamine = 1mL of 29 mL normal saline) for 30 seconds, 5 minutes before induction of anesthesia is a useful adjunct to decrease POST after Oral Endotracheal Intubation.

**Keywords:** Post-operative sore throat; Prone; Endotracheal intubation; Ketamine gargle

---

## INTRODUCTION

Postoperative sore throat is a common complication after general anesthesia that can cause patients a great deal of discomfort. Various pharmacological and non-pharmacological methods have been used for attenuating postoperative sore throat. Non-pharmacological methods reported in the literature include small size ETT, lubricating the ETT with water soluble jelly, careful airway instrumentation, intubation after full relaxation, gentle oropharyngeal suctioning and extubation when the tracheal tube cuff is fully deflated<sup>1</sup>. Although the symptoms resolve spontaneously and without any medical treatment, prophylactic management for decreasing its frequency and severity is still recommended to improve the quality of post anesthesia care<sup>2</sup>. The reported incidences of post operative sore throat varies from 21 to 65% .A study done by A. Rudra et al showed significantly more (60%) patients suffered post-operative sore throat in control group at 24 hours when compared with patients belonging to ketamine group (25%) with p value <0.05<sup>3</sup>.

Pharmacological measures to decrease post operative sore throat include beclomethasone inhalation, gargling with azulene sulphonate, aspirin, benzydamine hydrochloride, local spray with

lidocaine and intracuff administration of alkalized lignocaine, aspirin or benzydamine hydrochloride<sup>4</sup>. POST was rated by patients as the eighth most undesirable outcome in post operative period. Ketamine inhibits the N-methyl-D-aspartate receptor mediated central sensitization, potentially reducing postoperative pain<sup>5</sup>.

Another study done by L. Chan et al showed there is no significant reduction in post operative sore throat at 24 hours in both groups p value=0.498<sup>6</sup>.

Rationale of my study is there is controversy in the results of previous investigators, so I want to compare the effectiveness of ketamine gargles with distilled water in reducing post-operative sore throat after oral endotracheal intubation. The result of my study will guide us in better management of patients.

## MATERIALS AND METHODS

This randomized Control Trial was conducted in ENT Operation Theater of Jinnah hospital Lahore for a period of 6 months. 100 cases, 50 cases in each group, calculated with 95% confidence level and 80% power of study with an expected percentage of postoperative sore throat in ketamine group 25% and 60% in control group. Sampling technique used was non probability, purposive sampling. Ketamine gargles reduces postoperative sore throat after oral endotracheal intubation. Both male and female patients between 20-50 years of age undergoing septoplasty, falling in American Society of

---

Associate Professor Anaesthesiology & ICU AIMC/Jinnah Hospital Lahore

Correspondence to Dr. Muhammad Ashraf Zia, Cell: 0302-8447906, Email: drashzia@gmail.com

Anesthesiology (ASA) class 1 were included in the study.

**Exclusion criteria:**

1. Patients with upper respiratory tract infection (cough, fever)
2. Patients requiring more than one attempt for passage of endotracheal tube.
3. Known sensitivity to study drug.
4. Patients with history of preoperative sore throat.
5. Duration of surgery more than 2 hours

One hundred patients were randomized into two groups of 50 each by computer-generated random number table. Group A including normal saline gargle ( placebo ) and topical 2% Lignocaine jelly on the tracheal tube while Group K including ketamine gargle and topical 2% lignocaine jelly on tracheal tube

Appropriate investigations were done according to the condition of the patients. All the patients included in the study were pre-medicated with tablet Xanax (0.5mg) and table Ondansetron (8mg) on the day of surgery with 6 hours of the fasting period. On arrival at the preoperative ward, and 18/20 gauge intravenous cannula was inserted and an infusion of normal saline was started. The patients allocated to group C and K were asked to gargle with normal saline (30mL) and a preparation of preservative free ketamine (50mg/mL) one mL in 29mL of normal saline respectively for 30 seconds, five minutes before induction of anesthesia by a senior anesthetist who was blind to the study. The patients could not be blinded because of the different taste of two preparations

The patient was then shifted to the operation theater and monitors were attached. Anesthesia was induced with nalbuphin 0.1mg /kg and Propofol 2 mg /kg. Tracheal intubation was facilitated by Atracurium 0.5 mg/kg, and trachea was intubated with soft seal cuffed steryl polyvinyl chloride endotracheal tube with the standard cuff internal diameter 7 for women and 7.5 for men. 2% lignocaine jelly was applied on the external surface of tracheal tube. Tracheal intubation was performed after ensuring maximum neuromuscular blocking effect. Immediately after intubation, the tracheal tube cuff was inflated to an intracuff pressure of 15-20 cm of water.

Anesthesia was maintained with oxygen 33% in nitrous, supplemented with Isoflurane, throat was packed with a throat pack. Towards the end of the surgery one gram injection Paracetamol was given. Oropharyngeal suctioning was performed under direct vision after removal of throat pack. After administration of appropriate doses of neostigmine and Glycopyrrolpe, deflation of the cuff was done when patient was fully awake. Patient was then shifted to recovery room. On arrival at the recovery

room, assessment of patient for POST at 4, 8 & 24 hours after surgery was graded on a 4 points scale 0-3.

Data was, analyzed in SPSS version 17.0. Quantitative variables like age, were presented using Mean and standard deviation. Qualitative data like gender and post operative sorethroat was presented using frequency and percentages. Data was analyzed by chi square for statistical significance P ≤ .05 will be taken as statistical significant. Data was stratified for the grade 1, 2 and 3 to address the effect modifiers.

**RESULTS**

Out of hundred cases, 50 cases were included in Group C and 50 cases were included in Group k. The minimum age in group C and K were 20 and 21 respectively. The maximum age in group C and K were 50 and 49 respectively. Mean and SD for Group C was 29.74±8.40 and for Group K was 31.54±8.15 Years. Computed P value was 0.279. Group C had 35 males (70%) and 15 females (30%). Group B had 33 males (66%) and 17 females (44%).Samples were gender matched with p= 0.830.

In group C, 24(48%) and 26(52%) patients were intubated with 7.0 and 7.5 millimeter endotracheal cuffed tubes respectively. In group K, 29(58%) and 21(42%) patients were intubated with 7.0 and 7.5 millimeter cuffed endotracheal tubes respectively. Mean endotracheal tube size was similar in two groups, 7.26±0.25 and 7.21±0.24 millimeters and computed P value of 0.310. Overall sore throat was less in group K with 17(34%) patients when compared to group C with 28(56%) patients complaining of it with P = 0.043

Age in years	Group C	Group K
21-30	30(60%)	27(54%)
31-40	15(30%)	13(26%)
41-50	5(10%)	10(20%)
Mean±SD	29.74±8.40	31.54±8.15

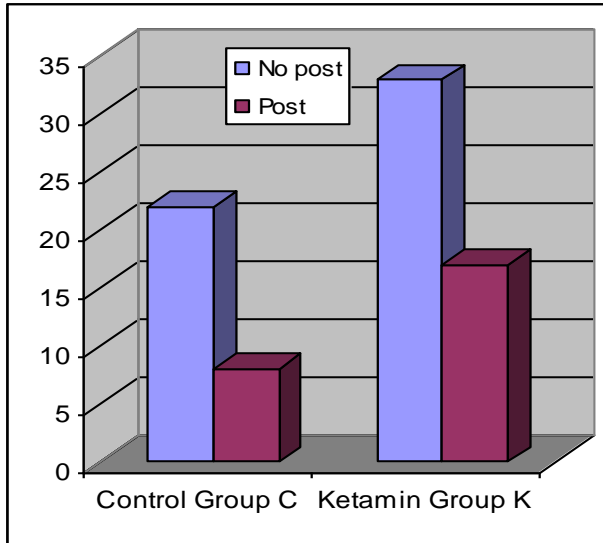
Gender	Group C	Group K
Male	35(70%)	33(66%)
Female	15(30%)	17(44%)

Table: Distribution according to ETT size

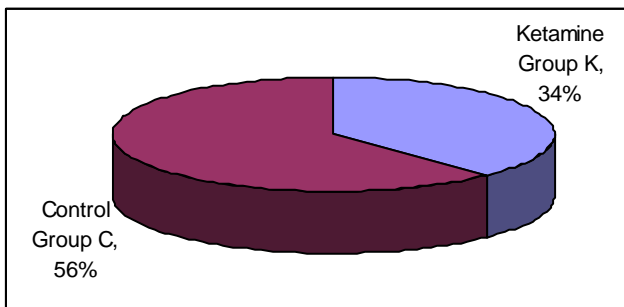
ETT size	Group C	Group K
7.0	24(48%)	29(58%)
7.5	26(52%)	21(42%)
Mean ±SD	7.26±0.25	7.21±0.24

Overall sore throat	Group C	Group K
Yes	28(56%)	17(34%)
No	22(44%)	33(66%)

Graph 1: Incidence of postoperative sore throat in study population



Graph 2: Percentage of POST in both study groups



## DISCUSSION

Many of the general anesthetic procedures in the modern anesthetic practice are carried out with endotracheal intubation. Post op sore throat is a well-recognized minor complication after general anesthesia<sup>2</sup> rated by patients as the 8<sup>th</sup> most undesirable outcome in the post-operative period<sup>4</sup>. Prophylactic management for decreasing its frequency and severity is still recommended to improve the quality of post anesthesia care though the symptoms resolve spontaneously without any treatment<sup>5</sup>. POST is a parsimonious description representing a broad constellation of signs and symptoms of laryngitis, tracheitis, hoarseness, cough or dysphagia<sup>4</sup> with incidence varying from 14.4% to 100% after endotracheal intubation<sup>2,3</sup>.

Research indicates that POST can be attenuated using a multi model approach consisting of pharmacological and non-pharmacological interventions. Identification of the factors associated with an increased risk of POST will allow anesthesia providers to avoid combination of controllable factors,

decrease the incidence of POST and improve patients' anesthetic outcome. Many pharmacological interventions like steroids and non-steroidal anti-inflammatory drugs, lignocaine, have been used to attenuate POST by various authors. But all such maneuvers had their own limitations. Ketamine is in the middle of the affinity range of the uncompetitive NMDA antagonists which has been found by various authors to attenuate POST<sup>4,6,7,8,9</sup>. An increasing amount of experimental data shows that NMDA receptors are found not only in central nervous system but also in the peripheral nerves. Peripherally administered NMDA receptor antagonists are involved with antinociception and anti-inflammatory cascade<sup>4,10,11</sup> by reducing NFK beta activity and TNF alpha production<sup>12</sup>, expression of inducible nitric oxide synthase<sup>13</sup> serum C-reactive protein IL-6 and IL-10<sup>16</sup>. Pharmacological studies reveal that low dose ketamine especially in the subpsychotomimetic range has anti-hyperalgesic, anti-allodynic and possibly opioid "tolerance protective" effect. Due to an additive affect with opioids which is attributed to presynaptic opioid inhibition reducing afferent transmission by diminished transmitters release, and post synaptic NMDA blockage which reduces windup and central sensitization. The present study was undertaken to determine the incidence of POST in patients undergoing oral endotracheal intubation and to compare the effectiveness of ketamine gargle for prevention of POST after oral endotracheal intubation.

## CONCLUSIONS

1. The overall incidence of post-operative sore throat in control group, Group-C of our study population was 56%
2. The overall incidence of POST was positively less in ketamine gargle group, Group-K with 34% when compared to 56% in the control group.
3. Ketamine gargle contributed to an additional benefit of 22% in reduction of POST in the study population
4. No correlation of age, gender, ETT size was evident.
5. Hence it is concluded that ketamine gargle (1mL=50mg in 29mL normal saline) for 30 seconds, 5 minutes before induction of anesthesia is a useful adjunct to decrease post-operative sore throat after endotracheal intubation for patients' undergone septoplasty.

## REFERENCES

1. Park.S.Y, Kim.S.H, Lee.S.J, Chae.W.S, Jin.H.C, Lee.J.S,et al. Application of triamcinolone acetone paste to the endotracheal tube reduces postoperative

- sore throat: a randomized controlled trial. *Canadian Journal of Anesthesia* .2011; 58(5) 436-442.
2. Nan-Kai Hung, Ching-Tang Wu, Shun-Ming Chan, Chueng-He Lu, Yuan-Shiou Huang, Chun-Chang Yeh et al. Effect on postoperative sore throat of spraying the endotracheal tube cuff with benzydamine hydrochloride, 10% lidocaine, and 2% lidocaine *Anesth Analg* 2010;111:882–6.
  3. Park SY, Kim SH, Noh JI. The effect of intravenous low dose ketamine for reducing postoperative sore throat. *Korean Journal of Anesthesiology*. 2010; 59:22-6.
  4. Agarwal A, Nath SS, Goswami D, et al. An Evaluation of the Efficacy of Aspirin and Benzydamine Hydrochloride Gargle for Attenuating Postoperative Sore Throat: A Prospective, Randomized, Single-Blind Study. *Anesthesia and Analgesia*. 2006; 103:1001-3.
  5. 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.
  6. Chan. L, Lee. M. L, Lo. Y.L. Postoperative sore throat and ketamine gargle. *BJA*. 2011;Oct: 97.
  7. McHardy FE, Chung F. Postoperative sore throat: cause, prevention and treatment. *Anaesthesia* 1999; 54:444–53.
  8. Philip E Scuderi. Post-operative sore throat: more questions than answers. *Anesthesia – Analgesia*.2010 Oct.; 111(4 )831- 33
  9. Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. *B J A*. 2002; 88(4):582–4.
  10. Nasrin Faridi- Tazeh Kand, Bita Eslami, Khadijeh Mohammadian. Inhaled Fluticasone propionate reduces post-operative sore throat, cough and hoarseness. *Anaesth and analg*: 2010; 111:895-8.
  11. Christensen AM, Willemoes-Larsen H, Lundby L, Jakobsen KB. Postop throat complaints after tracheal intubation. *Br J Anaesth*. 1994 Dec; 73(6):786-7.
  12. Keller C, Sparr HJ, Brimacombe JR. Laryngeal mask lubrication – a comparative study of saline versus 2% lignocaine gel with cuff pressure control. *Anaesthesia* 1997; 52:586-602.
  13. Loerser EA, Bennett GM, Orr DL, Stanley TH. Reduction of postoperative sorethroat with new endotracheal tube cuffs. *Anesthesiology*. 1980 Mar;52(3):257-9.
  14. Alexopoulos C, Lindholm CE. Airway complaints and laryngeal pathology after intubation with an anatomically shaped endotracheal tube. *Acta Anaesthesiologica Scandinavica* 1983; 27: 339-44.
  15. Hilding AC: Laryngotracheal damage during intratracheal anaesthesia. *Ann Otol* 1971; 80:565-8 1.
  16. Koay.C.K, Lim.E.K, Chan. W.Y, Chin. M.K .Sore throat following short term endotracheal intubation. *SING MED J*. 1988; 29:296-299.
  17. Priebe J-H, Henke W, Hedley-Whyte J. Effects of tracheal intubation on laryngeal acoustic waveforms. *Anesth Analg*. 1988; 67:219-27.
  18. Lesser T, Williams G. Laryngographic investigation of postoperative hoarseness. *Clin Otolaryngo.l* 1988; 13:37-42.
  19. Ayoub. C.M, Ghobashy. A, Koch. M.E, McGrimley. L, Pascale. V.,Qadi. S.R. et al. Widespread application of topical steroids to decrease sore throat, hoarseness, and cough after tracheal intubation. *Anesth Analg*. 1998; 87:714 – 6.
  20. Davidson EM, Carlton SM. Intraplantar injection of dextrorphan, ketamine or memantine attenuates formalin-induced behaviors. *Brain Res* 1998; 785: 136 –42.
  21. Zhu MM, Zhou QH, Zhu MH, et al. Effects of nebulized ketamine on allergen-induced airway hyper-responsiveness and inflammation in actively sensitized Brown-Norway rats. *J Inflamm (Lond)* 2007; 4: 10.
  22. Leal Filho MB, Morandin RC, de Almeida AR, et al. Importance of anesthesia for the genesis of neurogenic pulmonary edema in spinal cord injury. *Neurosci Lett* 2005; 373: 165–70.
  23. Neder Meyer T, Lazaro Da Silva A. Ketamine reduces mortality of severely burnt rats, when compared to midazolam plus fentanyl. *Burns* 2004; 30: 425–30.
  24. Sun J, Li F, Chen J, Xu J. Effect of ketamine on NF-kappa B activity and TNF-alpha production in endotoxin-treated rats. *Ann Clin LabSci* 2004; 34: 181–6.
  25. Helmer KS, Cui Y, Dewan A, Mercer DW. Ketamine/xylazine attenuates LPS-induced iNOS expression in various rat tissues. *J Surg Res*.2003; 112: 70–8.
  26. Zhu MM, Qian YN, Zhu W. Protective effects of ketamine on allergen-induced airway inflammatory injury and high airway reactivity in asthma: experiment with rats. *Zhonghua Yi Xue Za Zhi*. 2007; 87: 1308–13.
  27. Park SY, Kim SH, Noh JI. The effect of intravenous low dose ketamine for reducing postoperative sore throat. *Korean Journal of Anesthesiology*. 2010; 59:22-6.
  28. Shrestha SK, Bhattarai B, Singh J. Ketamine gargling and postoperative sore throat. *J Nepal Med Assoc*. 2010; 50(180):282-5.