

Assessment Use of Ketorolac Injection for Reduction of Incidence and Severity of Post-Operative Sore Throat

Dr. Md. Mostafa Kamal Hossain Bhuiyan¹, Dr. Mohammad Amzad Hossain²,
Dr. Abu Hena Mohammad Parvez Humayun³, Dr Mohammad Mostafizur
Rahman⁴.

¹Assistant professor, Department of Otolaryngology, Shaheed Tajuddin Ahmed Medical College, Gazipur, Bangladesh.

²Associate professor, Department of Otolaryngology, Shaheed Tajuddin Ahmed Medical college Gazipur, Bangladesh.

³Assistant professor, Department of Otolaryngology, Shaheed Tajuddin Ahmed Medical College, Gazipur, Bangladesh.

⁴Assistant professor, Department of Otolaryngology, Kushtia medical college Hospital, Kushtia, Bangladesh.

Abstract

Background: Post- operative sore throat (POST) occurs in 21–65% of patients. Ketorolac used earlier for reducing POST has limitations. **Objective:** The aim of this study was to see if injected Ketorolac reduces POST. **Methods:** The Study was conducted in the department of ENT of Shaheed Tajuddin Ahmad Medical College & Hospital, Gazipur, Bangladesh to find out the common indications of severity of post-operative sore throat. 31 cases were randomly selected for the study whose common indication of severity of post-operative sore throat. Clinical examination and evaluation were done from July 2019 to June 2020. Other necessary investigations were done if clinically indicated and to prepare the patient for anesthesia. Statistical analysis of the results was obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-22). **Results:** Majority of cases who incidence and severity of post-operative sore throat were 40-50 years (54.84%) of age. The total study population was 31 Patients aged 20 years to 50 years, 6(19.35%) were 20 years to 29 years, 8(25.81%) were 30 years to 39 years and 5(49.0%) were 40 years to 50 years. Incidence of post-operative sore throat 1(3.22%) patients were 0h and 2h, and 2(6.45%) were 4h, 6h, and 8h respectively. Severity of post-operative sore throat 0(0.0%) patients were 0h and 2h, 1(3.23) patients were 4h, 2(6.45) patients were 6h and 0(0.0%) were 8h. **Conclusion:** Ketorolac injected significantly attenuated the incidence and severity of POST, especially in the early post- operative period, with no adverse effects.

Key words: Ketorolac, injected, post- operative sore throat, tracheal intubation

Date of Submission: 30-05-2021

Date of Acceptance: 13-06-2021

I. Introduction

Post- operative sore throat (POST) occurs in 21–65% of patients receiving general anaesthesia (GA) with tracheal intubation. [1,2] Though considered as a minor complication, but it may cause significant post- operative morbidity and patient dissatisfaction.[3] Various non- pharmacological and pharmacological trials have been used for attenuating POST with no proven single modality. The pharmacological methods used to reduce POST include use of beclomethasone gel, gargling with azulene sulphonate, ketorolac and licorice.[4- 6] Ketorolac is an N- methyl- D- aspartate (NMDA) receptor antagonist and has been used as a gargle for reducing the incidence and severity of POST due to its anti- nociceptive and anti- inflammatory effects.[6,7] Ketorolac injected has a few advantages over gargle: It spares the patient from the bitter taste of ketorolac, much smaller volume is required as opposed to larger volumes required for gargle with risk of aspiration if accidentally swallowed; hence better patient cooperation is likely. So far, no study has been conducted to evaluate efficacy of injected ketorolac for prevention of POST. The main objective of this study was to evaluate the role of injected ketorolac for attenuation of POST in patients undergoing surgeries under GA with tracheal intubation.

II. Methods

The Study was conducted in the department of ENT of Shaheed Tajuddin Ahmad Medical College & Hospital, Gazipur, Bangladesh to find out the common indications of severity of post-operative sore throat. 31 cases were randomly selected for the study whose common indication of severity of post-operative sore throat.

Clinical examination and evaluation were done from July 2019 to June 2020. Other necessary investigations were done if clinically indicated and to prepare the patient for anesthesia. Statistical analysis of the results was obtained by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-22).

III. Results

Majority of cases who incidence and severity of post-operative sore throat were 40-50 years (54.84%) of age. The total study population was 31 Patients aged 20 years to 50 years, 6(19.35%) were 20 years to 29 years, 8(25.81%) were 30 years to 39 years and 5(49.0%) were 40 years to 50 years. Incidence of post-operative sore throat 1(3.22%) patients were 0h and 2h, and 2(6.45%) were 4h, 6h, and 8h respectively. The overall incidence of POST in the present study was 20% patients in group ketorolac had POST at some point of the study (Fisher's exact $P = 0.01$). Incidence of POST was significantly ketorolac at 2h and 4h post-operatively. Patients in remained haemodynamically stable with no nausea, vomiting, stridor, laryngospasm, cough, dry mouth, hoarseness, dissociative symptoms or any other adverse effect during the entire study period. Severity of post-operative sore throat 0(0.0%) patients were 0h and 2h, 1(3.23) patients were 4h, 2(6.45) patients were 6h and 0(0.0%) were 8h.

Table I: Demonstrated the distribution of study patients according to age.

Age	n=31	%
20 years to 29 years	6	19.35
30 years to 39 years	8	25.81
40 years to 50 years	17	54.84
Total	31	100.0

Incidence of post-operative sore throat

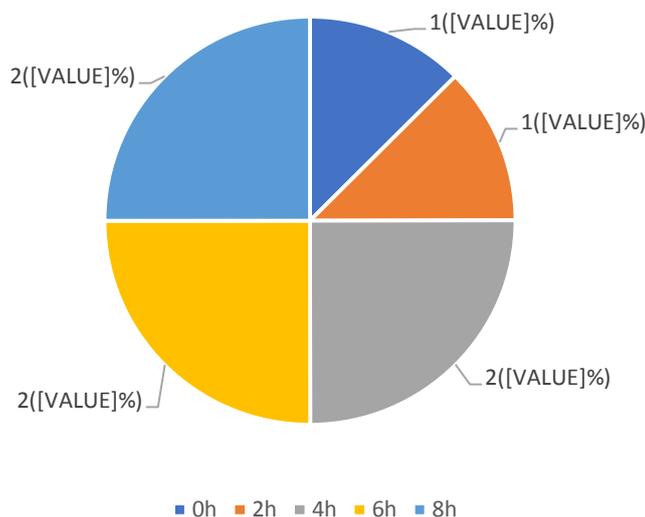


Figure I: Incidence of post-operative sore throat in patients.

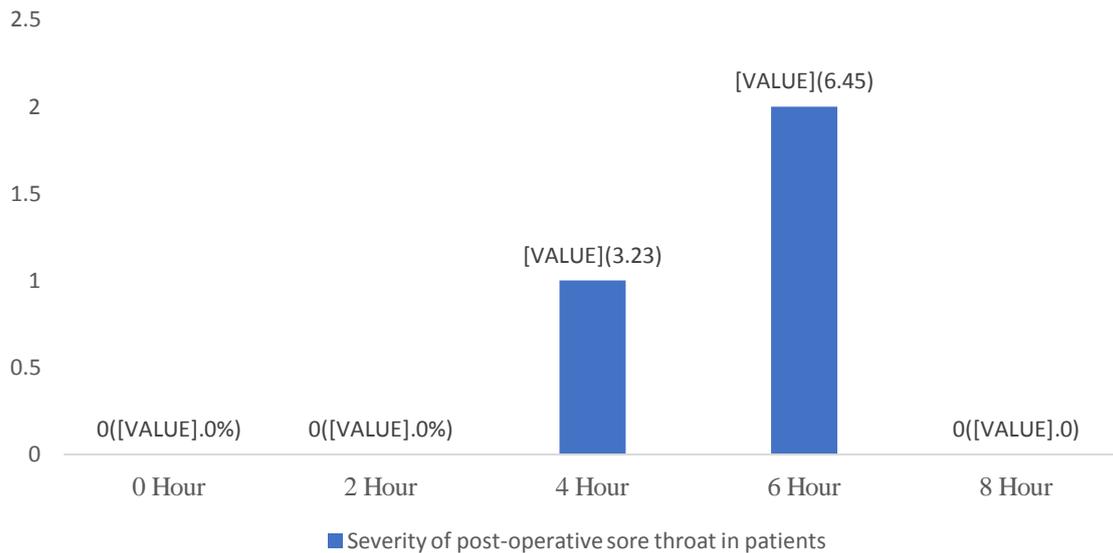


Figure II: Severity of post-operative sore throat in patients.

IV. Discussion

The present study is the first to evaluate the role of ketorolac injection on incidence and severity of POST. We observed reduction in the incidence at 2 h and 4 h, and attenuation of severity of POST at 2 h, in patients receiving ketorolac injection as compared to control group, following GA with tracheal intubation lasting for up to 1 h. The incidence of POST was 21–65% in earlier studies. [1,2] but we observed an overall incidence of 33% of POST in our patients. Out of this POST occurred only in 20% of the patients in the ketorolac group that was lower as compared to other studies. In the present study, the incidence of POST at 2 and 4 h was significantly reduced, and the attenuation of severity of POST occurred in the ketorolac group at 2 h. The mechanism of effect was possibly the topical effect of ketorolac injected that attenuated the local inflammation and also due to peripheral analgesic effect of ketorolac.[6- 9] Literature supports the topical effect of ketorolac via its NMDA- antagonistic action and anti- inflammatory effect based on animal model data.[7- 11] Ketorolac is an NMDA receptor antagonist with the primary site of action in the central nervous system, and parts of the limbic system while its use via nasal route, gargle, and rectal route suggests its peripheral effect.[6- 9] Experimental animal studies have shown a protective effect on airway inflammatory injury with ketorolac injection.[11] In an earlier study, pre- operative injection 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.[12] 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. [6,13] Attenuation of POST at 2 h and not at 24 h post- operatively after pre- operative ketorolac gargles were observed in women undergoing gynaecological surgeries. The authors measured serum ketorolac levels intra- operatively and suggested that with such low levels of serum ketorolac, the systemic absorption of ketorolac was unlikely to have role in the attenuation of POST and rather suggested a topical effect of ketorolac.[13]

Endotracheal intubation done with laryngoscope was found to attenuate POST in patients as compared to Macintosh blade with normal airway patients, at 6 and 24 h after surgery. During the use of wall- mounted oxygen driven injected the liquid is broken up into droplets by the compressed air. The aerosol produced is heterodisperse in size and is filtered within the nebulizer by baffles to remove the largest droplets. The pneumatic injection method produces larger particles (10–25 µm) which mostly deposit in the mouth and throat and for those of 5–10 µm diameter deposit in a transition from mouth to airway. Deposition of aerosol in the mouth and upper airway probably reduced incidence and severity of POST due to topical analgesia, anti- inflammatory effect and NMDA receptor antagonist effect of injected ketorolac. However, there are a few demerits of gargle ketorolac over injected due to its bitter taste, large volume required for gargle with risk of aspiration if accidentally swallowed and patient cooperation. The topical effect of ketorolac injection probably attenuated POST at 2 and 4 h post- operatively in the present study. The late onset of moderate pain in the control group reflects a more gradually developing local inflammation. 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. [4,15- 18] However, the

incidence of post-operative cough and hoarseness of voice was attenuated better with betamethasone application. [17] Lignocaine spray decreased incidence of cough at tracheal extubation in surgeries of <2 h.[19] Medicated lozenges of licorice had efficacy of decreasing POST in smokers for surgery under GA of more than 1 h.[20] Recently, siccoral and strefen have been found to be effective in relieving POST in the early hours following extubation.[21] A meta-analysis found that the topical application of BH reduced the incidence of POST in patients following GA.[22] However, dipping of whole ETT cuff with benzydamine hydrochloride (BH) prior to anaesthesia induction had no influence on the incidence and severity of POST during 24 h post-operatively.[23] IV dexamethasone significantly reduced the risk and severity of POST at 24 h in a meta-analysis.[24] Use of budesonide inhalation suspension 200 mcg 10 min prior to intubation and 6 and 24 h after extubation in thyroid surgery under GA exhibited significantly less severe sore throat and hoarseness at 1 h and 24 h following extubation.[25] Gabapentin (100 mg) when administered orally, 1 h before anaesthesia had a lower incidence of POST than the placebo group (47% vs. 78%, $P = 0.038$). We used well-defined inclusion and exclusion criteria and experienced anesthesiologists performed tracheal intubation. The tracheal intubation was performed at TOF <2 and tracheal tube cuff inflation was maintained guided by peri-cuff leak at peak airway pressure of 20 cm H₂O. There are a few limitations of our study. No formal sedation scale was used and we were also not able to measure plasma ketorolac levels during the study period. We did not keep a record of the number of episodes of bucking at the time of extubation. Bigger sample size in a similar could add strength to the findings.

Limitations of the study

This was an observational study with a small sized sample. So, the findings of this study may not reflect the exact scenario of the whole country.

V. Conclusion

The use of pre-operative ketamine injected reduced the incidence and severity of POST during early post-operative period in patients receiving GA with tracheal intubation. This technique adds to the armamentarium of the anaesthetist in management of the ‘little big problem’ of POST.

VI. Recommendation

This study can serve as a pilot to a much larger research involving multiple centers that can provide a nationwide picture, validate regression models proposed in this study for future use and emphasize points to ensure better management and adherence.

References

- [1]. Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. *Br J Anaesth* 2002;88:582- 4.
- [2]. Loeser EA, Bennett GM, Orr DL, Stanley TH. Reduction of postoperative sore throat with new endotracheal tube cuffs. *Anesthesiology* 1980;52:257- 9.
- [3]. Macario A, Weinger M, Carney S, Kim A. Which clinical anesthesia outcomes are important to avoid? The perspective of patients. *Anesth Analg* 1999;89:652- 8.
- [4]. 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. *Br J Anaesth* 2008;100:215- 8.
- [5]. Ogata J, Minami K, Horishita T, Shiraiishi 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;101:290- 3.
- [6]. Zhu MM, Zhou QH, Zhu MH, Rong HB, Xu YM, Qian YN, *et al*. Effects of injected ketorolac on allergen-induced airway hyperresponsiveness and inflammation in actively sensitized Brown-Norway rats. *J Inflamm (Lond)* 2007;4:10.
- [7]. Damle SG, Gandhi M, Laheri V. Comparison of oral ketorolac and oral midazolam as sedative agents in pediatric dentistry. *J Indian Soc Pedod Prev Dent* 2008;26:97- 101.
- [8]. Hirota K, Lambert DG. Ketorolac: New uses for an old drug? *Br J Anaesth* 2011;107:123- 6.
- [9]. Zhu MM, Qian YN, Zhu W, Xu YM, Rong HB, Ding ZN, *et al*. Protective effects of ketorolac on allergen-induced airway inflammatory injure and high airway reactivity in asthma: Experiment with rats. *Zhonghua Yi Xue Za Zhi* 2007;87:1308- 13.
- [10]. Gupta SK, Tharwani S, Singh DK, Yadav G. Injected magnesium for prevention of postoperative sore throat. *Br J Anaesth* 2012;108:168- 9.
- [11]. Marland S, Ellerton J, Andolfatto G, Strapazzon G, Thomassen O, Brandner B, *et al*. Ketorolac: Use in anesthesia. *CNS Neurosci Ther* 2013;19:381- 9.
- [12]. Ozaki M, Minami K, Sata T, Shigematsu A. Transdermal ketoprofen mitigates the severity of postoperative sore throat. *Can J Anaesth* 2001;48:1080- 3.
- [13]. Thomas S, Beevi S. Dexamethasone reduces the severity of postoperative sore throat. *Can J Anaesth* 2007;54:897- 901.
- [14]. Borazan H, Kececioğlu A, Okesli S, Otelcioglu S. Oral magnesium lozenge reduces postoperative sore throat: A randomized, prospective, placebo-controlled study. *Anesthesiology* 2012;117:512- 8.
- [15]. D'Aragon F, Beaudet N, Gagnon V, Martin R, Sansoucy Y. The effects of lidocaine spray and intracuff alkalized lidocaine on the occurrence of cough at extubation: A double-blind randomized controlled trial. *Can J Anaesth* 2013;60:370- 6.
- [16]. Gupta D, Agrawal S, Sharma JP. Effect of preoperative licorice lozenges on incidence of postextubation cough and sore throat in smokers undergoing general anesthesia and endotracheal intubation. *Middle East J Anaesthesiol* 2013;22:173- 8.
- [17]. Aydin GB, Ergil J, Polat R, Sayin M, Akelma FK. Comparison of Siccoral® spray, Stomatovis® gargle, and Strefen® lozenges on postoperative sore throat. *J Anesth* 2014;28:494- 8.

- [18]. Chen CY, Kuo CJ, Lee YW, Lam F, Tam KW. Benzydamine hydrochloride on postoperative sore throat: A meta- analysis of randomized controlled trials. *Can J Anaesth* 2014;61:220- 8.
- [19]. Nimmaanrat S, Chokkijchai K, Chanchayanon T. Efficacy of benzydamine hydrochloride dripping at endotracheal tube cuff for prevention of postoperative sore throat. *J Med Assoc Thai* 2013;96:1331- 7.
- [20]. Sun L, Guo R, Sun L. Dexamethasone for preventing postoperative sore throat: A meta- analysis of randomized controlled trials. *Ir J Med Sci* 2013. [Epub ahead of print].
- [21]. Chen YQ, Li JP, Xiao J. Prophylactic effectiveness of budesonide inhalation in reducing postoperative throat complaints. *Eur Arch Otorhinolaryngol* 2014;271:1667- 72.
- [22]. Lee JH, Lee HK, Chun NH, So Y, Lim CY. The prophylactic effects of gabapentin on postoperative sore throat after thyroid surgery. *Korean J Anesthesiol* 2013;64:138- 42.
- [23]. Najafi A, Imani F, Makarem J, Khajavi MR, Etezadi F, Habibi S, *et al.* Postoperative sore throat after laryngoscopy with macintosh or glide scope video laryngoscope blade in normal airway patients. *Anesth Pain Med* 2014;4:e15136.
- [24]. O'Callaghan C, Barry PW. The science of nebulised drug delivery. *Thorax* 1997;52 Suppl 2:S31- 44.
- [25]. Broekaert JAC. *Analytical Atomic Spectrometry with Flames and Plasmas*. 2nd ed. Weinheim, Federal Republic of Germany: WILEY- VCH Verlag Gmbh and Co.; 2005.

Dr. Md. Mostafa Kamal Hossain Bhuiya, et. al. "Assessment use of ketorolac injection for reduction of incidence and severity of post-operative sore throat." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(06), 2021, pp. 06-10.