

Postoperative Sore Throat (POST): Efficacy of Ketamine Gargling for Attenuation

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Abstract

It is reported that, peripherally administered NDMA receptor antagonists are involved in anti-nociception and anti-inflammatory action [16]. The present study was undertaken to evaluate the ketamine hydrochloride gargling NDMA receptor antagonist to attenuate post operative sore throat response after endotracheal intubation in elective operative procedures under general anaesthesia. In the present study, 100 patients of either sex, ASA grade I and II, 20-45 years age range posted for elective operative procedures under general anaesthesia with endotracheal intubation were studied. These patients were divided into 2 equal groups where group I (control) received 30 ml normal saline gargles 40 seconds 5 minutes prior to induction of anaesthesia and group II received 29 ml normal saline with 1 ml Ketamine hydrochloride 50 mg gargles for 40 seconds 5 minutes prior to induction of anaesthesia. Induction of anaesthesia was carried out with IN. Thiopentone 5 mg/kg and IV Suxamethonium 1 mg/kg for facilitation of intubation. With gentle laryngoscopy endotracheal intubation was done with appropriate size red rubber cuff endotracheal tube after lubrication with normal saline. All patients were monitored intraoperatively as well as postoperatively at regular intervals for haemodynamic changes. Postoperative sore throat was assessed at 0, 4, 8, and 24 hours in both groups. It was observed that, at 0 hours (immediate postoperative in recovery), the incidence of postoperative sore throat was about 60% in ketamine group as compared to 90% in control group. Out of 60%, 50% of patients had very mild sore throat and 10% moderate sore throat in ketamine group. At 4 and 8 hours, there were maximum patients with no sore throat and mild sore throat in ketamine group as compared to control group. At 24 hours, the incidence of sore throat was very minimum in ketamine group. In control group, the incidence of mild to moderate was 70-90% far more than ketamine group.

Keywords: Endotracheal anaesthesia; Postoperative sore throat (POST); NMDA receptor antagonist; Ketamine Gargles.

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Introduction

Administration of general anaesthesia is stigmatized due to incidence of either intraoperative or postoperative complications related to the technique of anaesthesia. The incidence of complications may be of minor degree which is always ignored and morbid complications

which are treated and taken care off immediately. Postoperative pharyngeal discomfort is so prevalent that it is almost expected in every patient like as an unavoidable part of routine anaesthesia. It may present as minor throat irritation to debilitating pain, inability to swallow, change in voice postoperatively. Sometimes there may be severe pharyngeal or laryngeal injury during

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laryngoscopy and endotracheal intubation. Hence postoperative follow up after general anaesthesia for detection of prevalence of complications remains essential part of duty for anaesthesiologists. Post operative sore throat (POST) is recently ranked by American Anaesthesiologists Society as the eighth most important problem of current clinical anaesthesiology [1].

In review, the incidence of sore throat after endotracheal intubation is about 14-50% [2,3], after LMA insertion 6-34% [2,4] and after face mask it is 3-8% [5,6]. Hoarseness of voice is noted upto 49% [7] after endotracheal intubation and 7-16% [8] after LMA insertion [8]. There may permanent dysphasia after endotracheal intubation in 0-3% [9,10] of patients. Various pharmacological and non-pharmacological trials have been tried for attenuating POST with variable results. Non-pharmacological methods as use of small size endotracheal tube, lubrication of tube with water soluble jelly, careful instrumentation, minimizing intra-cuff pressure and extubation after full deflation of cuff and complete recovery reported to decrease the incidence of POST [10]. Pharmacological methods as beclomethasone inhalation [11] and gargling with azulene sulfonate [12] were tried for this purpose.

The Concept, NDMA receptors are present in central nervous system and also on peripheral nerves [13,14]. It is reported that, peripherally administered NDMA receptor antagonists are involved in antinociception [15] and anti-inflammatory action [16]. The present study was undertaken to evaluate the ketamine hydrochloride gargling NDMA receptor antagonist to attenuate post operative sore throat response after endotracheal intubation in elective operative procedures under general anaesthesia.

Material and Methods

In the present study, 100 healthy patients of either sex with age range of 20-45 years belonging to ASA grade I and II undergoing elective operative procedures requiring general anaesthesia with endotracheal intubation were studied. Informed valid consent was obtained from each patient and their relatives. The patients with anticipated difficult intubation, previous history of sore throat, respiratory system disorders and sensitivity to drugs were excluded from the study. These patients were divided into 2 equal groups. Group I patient received 30 ml normal saline for gargling for a period of 40 seconds, 5 minutes prior to induction of anaesthesia.

Group II patients received 29 ml normal saline with 1 ml of 50 mg ketamine hydrochloride (total 30 ml) for gargling 40 seconds 5 minutes before induction of anaesthesia. All the monitors were attached and baseline pulse rate, blood pressure and O₂ saturation were noted. After preoxygenation, all patients were induced with Inj. Thiopentone sodium 5 mg/kg IV and inj. Suxamethonium 1 mg/g to facilitate endotracheal intubation. After gentle laryngoscopy endotracheal intubation was performed with appropriate size red rubber cuff endotracheal tube after lubrication with normal saline. All patients were maintained on Nitrous oxide with Oxygen and Halothane 0.5% on Bain's circuit controlled ventilation and muscle relaxation with Inj. Vecuronium 0.5 MG/kg loading dose and 0.01 mg/kg incremental doses. At the end of operative procedure all patients were reversed with Inj. Neostigmine 0.05 mg/kg and inj. Glycopyrolate 8 µgm/kg diluted and after complete reversal extubation after deflation of cuff was performed. Intraoperatively and immediate postoperative all patients were monitored for haemodynamic changes and any side effects at regular time intervals.

POST - Postoperative Sore Throat was assessed as

- 0 No sore throat
- 1 mild sore throat (complaining on asking)
- 2 Moderate sore throat (complaining by his own)
- 3. Severe sore throat (Throat pain, hoarseness of voice)

At the same time postoperative comfort was assessed by Visual Analogue Scale (0-10). All observations were statistically evaluated for significance by Student's T Test or Chi square test.

Results

100 patients were divided into 2 equal groups of 50 patients each.

Group I (Control) Received 30 ml of Normal saline gargles for 40 secs 5 minutes prior to induction of anaesthesia.

Group II (Ketamine) - Received 29 ml normal saline with 1 ml Ketamine 1 ml (50 mg) in solution for gargles 40 secs 5 minutes prior to induction of anaesthesia.

Age distribution was as shown in Table 1.

Maximum number of patients were in age range of 41-50 years 34% in each group and others were

comparable in both groups. There was no any significant variation in age distribution in both groups.

Sex distribution was as shown in Table 2.

The distribution of sex was identical in both groups.

Weight distribution was as shown in Table 3.

There were maximum number of patients in weight range of 60-69 kg and 50-59 kg in both groups There was no any significant variation in weight range in both groups.

Acceptance of gargles was noted in both groups as with ease or with difficulty and was shown in Table 4.

The acceptance of gargles in both was almost 95-100% only 1-2 patients in group II, there was some difficulty.

Incidence of Post operative sore was noted in group I (Control) patients as shown in Table 5.

In control group, the incidence of sore throat was noted in 80-90% of patients at all time intervals and more severe sore throat at 8 hours and 24 hours.

Incidence of postoperative sore throat was noted in group II (Ketamine) as shown in Table 6.

Immediately after gargles, no sore throat was observed in 40% of patients, mild sore throat in 50% and moderate sore throat in 10% of patients. At 4 hours, no sore throat was noted in 70% of patients, mild in 28% and moderate in 2% of patients. At 8 hours and 24 hours, no sore throat was noted in about 78 to 82% of patients, mild sore throat in 18% of patients. Thus at 4 and 8 hours more than 70% of patients had almost no sore throat and mild sore throat in 20% patients. Thus the incidence of sore throat was minimum at 0, 4 and 8 hours in ketamine group.

Table 1: Showing Age Distribution

Age in Years	Group I (NS)	Group II (K)
20-25	11 (22%)	11 (22%)
26-30	8 (16%)	10 (20%)
31-35	7 (14%)	9 (18%)
36-40	6 (12%)	5 (10%)
41-45	17 (34%)	17 (34%)

Table 2: Showing Sex Distribution

Gender	Group I	Group II
Male	20 (40%)	17 (34%)
Female	31 (62%)	33 (66%)

Table 3: Showing Weight Distribution

Weight range in KG	Group I (NS)	Group II (K)
40-49	10 (20%)	11 (22%)
50-59	15 (30%)	18 (36%)
60-69	20 (40%)	17 (34%)
70 & above	5 (10%)	4 (8%)

Table 4: Showing Acceptance of Gargles

	Group I	Group II
Acceptance with ease	50 (100%)	48 (96%)
Acceptance with Difficulty	--	2 (4%)

Table 5: Showing Postoperative Sore Throat in Group I (control)

Time	0 hours	4 hours	8 hours	24 hours
No Sore throat	5 (10%)	9 (18%)	11 (22%)	15 (30%)
Mild sore throat	30 (60%)	25 (50%)	21(42%)	15 (30%)
Moderate sore throat	10 (20%)	6 (12%)	3 (6%)	3 (6%)
Severe sore throat	5 (10%)	10 (20%)	15 (30%)	17 (34%)
Total	50 (100%)	50 (100%)	50 (100%)	50 (100%)

Table 6: Showing Postoperative Sore Throat in Group II (Ketamine)

Time	0 hours	4 hours	8 hours	24 hours
No Sore throat	20 (40%)	35 (70%)	39 (78%)	41 (82%)
Mild sore throat	25 (50%)	14 (28%)	9 (18%)	9 (18%)
Moderate sore throat	5 (10%)	1 (2%)	2 (4%)	--
Severe sore throat	--	--	--	--
Total	50 (100%)	50 (100%)	50 (100%)	50 (100%)

Table 7: Showing Comparison of POST in Both groups

Time	0 hours		4 hours		8 hours		24 hours	
	Gr I	Gr II	Gr I	Gr II	Gr I	Gr II	Gr I	Gr II
No Sore throat	5 (10%)	20 (40%)	9 (18%)	35 (70%)	11 (22%)	39 (78%)	15 (30%)	41 (82%)
Mild sore throat	30 (60%)	25 (50%)	25 (50%)	15 (40%)	21 (42%)	9 (18%)	15 (30%)	9 (18%)
Moderate sore throat	10 (20%)	5 (10%)	6 (12%)	1 (2%)	3 (6%)	2 (4%)	3 (6%)	--
Severe sore throat	5 (10%)	--	10 (20%)	--	15 (30%)	--	17 (34%)	--
Total	50	50	50	50	50	50	50	50

Table 8: Showing Visual Analogue Scale scoring

Time	0 hours		4 hours		8 hours		24 hours	
	Gr I	Gr II	Gr I	Gr II	Gr I	Gr II	Gr I	Gr II
1	1 (2%)	--	3 (6%)	--	--	--	--	--
2	3 (6%)	--	2 (4%)	--	2 (4%)	--	1 (2%)	--
3	3 (6%)	--	2 (4%)	--	2 (4%)	--	4 (8%)	--
4	11 (22%)	--	2 (4%)	--	10 (20%)	--	11 (22%)	--
5	16 (32%)	1 (2%)	6 (12%)	--	1 (2%)	--	2 (4%)	--
6	2 (4%)	4 (8%)	8 (16%)	1 (2%)	3 (6%)	1 (2%)	--	--
7	6 (12%)	3 (6%)	9 (18%)	--	5 (10%)	1 (2%)	2 (4%)	--
8	3 (6%)	14 (28%)	6 (12%)	8 (16%)	9 (18%)	2 (4%)	5 (10%)	1 (2%)
9	--	8 (16%)	3 (6%)	6 (12%)	7 (14%)	7 (14%)	12 (20%)	8 (16%)
10	5 (10%)	20 (40%)	9 (18%)	35 (70%)	11 (22%)	39 (78%)	15 (30%)	45 (90%)

Comparison of POST in both groups was as shown in Table 7.

In group I (control), no sore throat was noted in 10%, mild in 60%, moderate in 20% and severe in 10% of patients at 0 hours or immediately postoperatively after recovery. In group I, mild to moderate sore throat was noted in almost 70% of patients at all time intervals. In group II, no sore throat was noted in 90% of patients 8 and 24 hours and 70% of patients at 4 hours. There were maximum number of patients with no sore throat in group II as compared to group at any time intervals. Evaluation of POST by Visual Analogue scale was as shown in Table 8.

According to visual analogue scale sore throat as pain was experienced in control group in more number of patients at all time intervals from severe degree to mild as compared to ketamine group. In group II (Ketamine), the incidence of

pain secondary to sore throat was comparatively negligible at all time intervals as compared to control group.

Discussion

Postoperative sore throat is a significant complaint by patients undergoing elective operative procedures under general anaesthesia with endotracheal intubation. The demographic data, inclusion and exclusion were in accordance with A Rudra et al. (2010) [17] In the present study, 4 point grading score to assess postoperative sore throat immediately after surgery in recovery room (0 hours), 4 hours, 8 hours and 24 hours was carried out).

- 0 - No sore throat
- 1 - Mild sore throat (complained on asking)

2 – Moderate sore throat (complained on its own)

3 – Severe sore throat (complained of throat pain, hoarseness of voice)

This was in accordance with studies of A Rudra et al. (2010) [17], L Chan et al. (2010) [18] and O Canbay et al. (2008) [19].

A 0 hours (immediately in recover room) 60% of patients in group II (Ketamine) had no sore throat as compared to 90% of patients in group I (control) complained of sore throat. Thus there was significant decrease in incidence of sore throat immediately in recovery room in ketamine group as compared to control group. O Canbay et al. (2010) [19], Anil Agrawal et al. (2006) [20] have also observed low incidence of sore throat immediately after extubation in their studies.

According to A Rudra et al. [17], L Chan et al. [18] the patients with no sore throat were more at 0 hours and at 4 hours who received ketamine gargles as compared to control group. Our findings coincides with the studies of these authors. Overall the incidence of sore throat (no sore throat, mild, moderate or severe) at 4 hours and also upto 8-12 hours was very less in ketamine group as compared to control group. The incidence of postoperative sore throat and upper airway related symptoms is significantly evident when general anaesthesia with endotracheal is under taken. It is more common with red rubber cuff endotracheal tube than PVC tube and when there is prolonged duration of intubation. Various pharmacological and non-pharmacological methods have been carried out for attenuating incidence of postoperative sore throat with variable success. Among non-pharmacological methods, small size endotracheal tube, lubricating endotracheal tube with water soluble jelly, careful intubation, intubation after full relaxation of cords, gentle oral suctioning minimum intra-cuff pressure and extubation after complete recovery seems to decrease the incidence of sore throat [10]. As pharmacological methods include use of beclomethasone inhalation [11] and gargling with azulene sulfonate [12].

NMDA receptors are observed in central nervous system as well as on peripheral nerves [13,14]. It is reported that, peripherally administered NMDA receptor antagonists are involved with anti-nociception [15] and anti-inflammatory cascade [16]. Ketamine hydrochloride in gargle form acts like NMDA receptor antagonist on peripheral nerves to block the incidence of sore throat after endotracheal intubation. Our findings can be explained on above grounds. On visual analogue score system also we

have observed less incidence of moderate to severe throat pain in ketamine group as compared to control group at all time intervals.

In the present study, all probable parameters contributing for the postoperative sore throat as age, sex, size of endotracheal tube, anticipated difficult intubation, gentle technique for laryngoscopy and intubation, intra cuff pressure, duration of intubation etc. all were taken care off. All these parameters were in accordance with all authors A Rudra et al. [17], L Chan et al. [18]. Hence these parameters were not major contributing factors for postoperative sore throat. The incidence of sore throat at 24 hours or after may be secondary to local inflammation. Gargling with ketamine by its anti-inflammatory action reduces the incidence of POST [19]. There were minimum side effects related to oral ketamine as nausea and vomiting, sensitivity reactions etc. as we have used very minimum doses in our study.

Summary

In the present study, 100 patients of either sex, ASA grade I and II, 20-45 years age range posted for elective operative procedures under general anaesthesia with endotracheal intubation were studied. These patients were divided into 2 equal groups where group I (control) received 30 ml normal saline gargles 40 seconds 5 minutes prior to induction of anaesthesia and group II received 29 ml normal saline with 1 ml Ketamine hydrochloride 50 mg gargles for 40 seconds 5 minutes prior to induction of anaesthesia. All necessary monitors were attached and base line readings of vital parameters were noted. After preoxygenation, induction of anaesthesia was carried out with IN. Thiopentone 5 mg/kg and IV Suxamethonium 1 mg/kg for felicitation of intubation. With gentle laryngoscopy endotracheal intubation was done with appropriate size red rubber cuff endotracheal tube after lubrication with normal saline. All patients were maintained with Nitrous oxide, Oxygen with halothane). 5% controlled ventilation on Bain's circuit and muscle relaxation with IV Vecuronium 0.5 mg/kg loading and 0.01 mg/kg in increments. At the end of operative procedure reversal was done with IV Neostigmine 0.04 mg/kg and IV Glycopyrolate 8 µgm diluted and after complete recover extubation was carried out. All patients were monitored intraoperatively as well as postoperatively at regular intervals for haemodynamic changes. Postoperative sore throat was assessed at 0, 4, 8, and 24 hours in both

groups. It was observed that, at 0 hours (immediate postoperative in recovery), the incidence of postoperative sore throat was about 60% in ketamine group as compared to 90% in control group. Out of 60%, 50% of patients had very mild sore throat and 10% moderate sore throat in ketamine group. At 4 and 8 hours, there were maximum patients with no sore throat and mild sore throat in ketamine group as compared to control group. At 24 hours, the incidence of sore throat was very minimum in ketamine group. In control group, the incidence of mild to moderate was 70–90% far more than ketamine group. At 24 hours also the incidence of moderate sore throat was more in control group. On visual analogue scale, the pain score was minimum in ketamine group as compared to control group at all time intervals. In groups, the incidence drug and technique related side effects was negligible.

Conclusion

Though minor but the incidence of postoperative sore throat after administration of general anaesthesia with endotracheal intubation is one of unavoidable complication. Preoperative gargling with ketamine hydrochloride for 40 seconds 5–10 minutes prior to induction of anaesthesia attenuates incidence of postoperative sore throat. Ketamine gargles efficiently decreases the incidence of POST in majority of patients after endotracheal anaesthesia. Postoperative sore throat is considered to be eighth most important side effect in current anaesthesia practice, hence preoperative ketamine gargling can be Eighth Wonder to attenuate POST.

References

- Marcario A, Weinger M, Truong P, Lee M Which clinical anaesthesia outcomes are common and important to avoid? The perspective of a panel of both expert anaesthesiologists. *Anaesth Analg.* 1999;88:1085-91.
- McHardy FE, Chung F Postoperative sore throat: cause, prevention and treatment. *Anaesthesi.* 1999; 54:444-53.
- Nan-kai Hung, Ching-Tang Wu, Shun-Ming Chan, Chen Hwan Cherng Effect on postoperative sore throat of spraying the endotracheal tube cuff with Benzydamine Hydrochloride, 10% Lidocaine and 2% Lidocaine. *Anaesth Analg.* 2010 Oct;111:882-86.
- Edwin Seet, Smita Gupta, Rajeev Subramanyam, Frances Chung Use of manometry for laryngeal mask airway reduces postoperative pharyngo-laryngeal adverse events. *Anaesthesiology.* 2010;112:652-57.
- J Dingley, MJ Whitehead, K Wareham. A Comparative study of incidence of sore throat with laryngeal mask airway Anaesthesia. 1994;49(3): 251-54.
- Higgins PP, Chung F, Mezei G Postoperative sore throat after ambulatory surgery. *Br J Anaesth* 2002;88:582-84.
- HYamanaka Y Hayashi, Y Watanabe, H Uematu and T Mashimo Prolonged hoarseness and arytenoids cartilage dislocation after tracheal intubation, *Br J Anaesth.* 2009;103(3):452-55.
- Cros AM, Pitti R, Conil C, Giraud D, Verhulst J Severe dysphonia after use of laryngeal mask airway. *Anaesthesiology.* 1997 Feb;86(2):498-500.
- Friedrich T, Hansch U, Eichfeld U, Steinert M, Staemmler A, Schonfelder M Recurrent laryngeal nerve paralysis as intubation injury *Chirurg.* 2000;71:539-544.
- Al-Qahtani AS, Messahel FM. Quality improvement in anaesthetic practice incidence of sore throat after using small tracheal tube. *Middle East J Anaesthesiol* 2005;18:179-83.
- Elhakim M, Beclomethasone prevents postoperative sore throat. *Acta Anaesthesiol Scand* 1993;37:250-252.
- Ogata J, Minami K, Horishita T Gargling with sodium azulene sulfonate reduces the postoperative sore throat after intubation of the trachea. *Anaesth Analg.* 2005;101:290-292.
- Carlton S M, Coggeshall R E Inflammation - induced changes in peripheral glutamate receptor populations. *Brain Res.* 1999;820:63-70.
- Carlton S M, Zhou S, Coggeshall R E Evidence for interaction of glutamate and NK₁ receptors in the periphery. *Brain Res.* 1998;790:160-69.
- Davidson E M, Carlton S M Intraplantar injection of dextrorphan, ketamine or memantine attenuates formalin induced behaviors. *Brain Res* 1998;785: 136-142.
- 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.
- A Rudra, Suchanda Ray, S Chatterjee, A Ahmed, S Ghosh Gargling with ketamine attenuates the postoperative sore throat. *Ind. Jr of Anaesthesia* 2009;53:40-43.
- L Chan, ML Lee and YLLO. Postoperative sore throat and ketamine gargles *Br J Anaesth.* 2010; 105:97.
- Cambay O, Celebi N, Sahin A, Celiker V, Aypar U Ketamine gargle for attenuating postoperative sore throat. *Br Jr Anaesth.* 2008;100:490-493.