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A Comparative Evaluation of the Effect of Preoperative Ketamine and Tramadol Nebulisation on Post Operative Sore Throat after Endotracheal Intubation

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Abstract

Background: Postoperative sore throat (POST) is a common complaint during postoperative period after tracheal intubation. We evaluated and compared the effects of preoperative ketamine or tramadol nebulization on POST in patients undergoing general anaesthesia with tracheal intubation.

Methods: Sixty patients, aged 18-60 years of ASA status 1 & 2 scheduled for elective surgery lasting upto 2 hours under general anaesthesia with endotracheal intubation were randomly divided into two groups; Group K: patients received Ketamine 50 mg (1 ml) with normal saline (4 ml) nebulisation, Group T: patients received Tramadol 50 mg (1 ml) with normal saline (4 ml) nebulization 30 min before induction. Incidence of postoperative sore throat and its intensity, nausea vomiting, sedation and any side effects of drugs were recorded.

Result: No significant difference was observed in the incidence of postoperative sore throat between the ketamine group and tramadol group patients. Severity of POST was higher in group T as compared to group K but it was statistically insignificant. Nausea, vomiting and sedation incidence was comparable in both groups.

Conclusion: Preoperative nebulisation with ketamine is clinically more effective than tramadol nebulization in prevention of postoperative sore throat.

Keywords: Ketamine; Tramadol; Postoperative Sore Throat.

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Introduction

Postoperative sore throat (POST) is a frequently encountered complaint during postoperative period after tracheal intubation. Though it is being considered as a minor complication, but is a important cause of dissatisfaction and morbidity among patients. Post has been rated by patients as the 8th most undesirable outcome in postoperative period.[1] The incidence of Post is 21–65% in patients receiving general anaesthesia (GA) with tracheal intubation.[2] Factors contributing to the development of Post includes trauma to pharyngolaryngeal mucosa during laryngoscopy or oral suctioning.[3-5] In addition, the cuff design and pressure may affect tracheal mucosal capillary perfusion and the contact of tracheal tube with vocal cords and posterior pharyngeal wall resulting in oedema or mucosal lesion.

Various nonpharmacological and pharmacological methods have been tried to attenuate the POST with no proven single modality.[6-8] The pharmacological methods used to reduce POST include use of triamcinolone acetonide paste, beclomethasone gel, betamethasone gel, lignocaine gel application over the endotracheal tube, benzydamine hydrochloride or lidocaine spray, gargling with aspirin and benzydamine hydrochloride, azulene sulphonate, ketamine, licorice, magnesium sulphate, tramadol, inhalation of beclomethasone, fluticasone propionate etc.[9-17]

It has been proved that N-methyl-D-aspartate (NMDA) have a role in nociception and inflammation18. It is reported that NMDA receptor antagonists when administered peripherally, have analgesic and anti-inflammatory effects in experimental study. Ketamine is a N-methyl-D-aspartate (NMDA) receptor antagonist. It has been used as a preoperative gargle for reducing the incidence and severity of Post due to its anti-nociceptive and anti-inflammatory effects.

Tramadol hydrochloride is a synthetic analogue of codeine and a μ opioid receptors agonist. It inhibits reuptake of monoamines (noradrenaline and serotonin), and is a NMDA receptor antagonist and has local anaesthetic effect.[19] It has also been used as preoperative gargles to reduce the incidence of POST. Most of the previous studies undertaken to prevent POST, used the drugs in gargle form. However nebulisation can be considered better than gargle as it is an easy way to administer the drug, smaller volume of drug is required, better patient cooperation is likely and no risk of aspiration. After analyzing various relevant literatures, we did not find any study that compared the preoperative ketamine and tramadol nebulisation to attenuate the Post developed after oral endotracheal intubation. Thus we have undertaken this study to compare the efficacy of ketamine and tramadol nebulisation given 30 minutes before administration of anaesthesia, to attenuate the Post in patients scheduled for elective surgery under general anaesthesia with endotracheal intubation.

Methods

After approval of the Iinstitutional Ethical Committee, a prospective, randomized, double blind study was carried out on 60 patients, aged 18-60 years of ASA status 1 & 2 scheduled for elective surgery lasting upto 2 hours under general anaesthesia with endotracheal intubation.

In this study patients were randomly allocated by sealed envelope method in to the following two groups of 30 patients each.

- Group K: patients received Ketamine 50 mg (1ml) with normal saline (4ml) nebulisation.
- Group T: patients received Tramadol 50 mg (1ml) with normal saline (4ml) nebulisation.

Exclusion criteria were patient refusal, allergic to study drugs, patients having URI, COPD, undergoing oral, nasal, head and neck surgery, pregnancy, hepatic and renal failure and patients requiring more than one attempt at intubation.

All patients were thoroughly examined with complete medical history, physical examination including vital signs and airway assessment. All routine investigations were done. Patients were kept fasted for 6-8 hours preoperatively. In the pre-operative area all patients were cannulated and premedicated with metoclopramide 10 mg, 1 hour before anaesthesia. On arrival in operating room, standard monitoring including noninvasive arterial blood pressure, electrocardiography and pulse oximetry were applied and assessed continuously.

Baseline heart rate, non-invasive blood pressure was recorded. Patients were nebulised via compressor nebuliser for 15 minutes according to group allocated. Fifteen minutes after completion of nebulisation patients were premedicated with inj. glycopyrrolate 0.004 mg/kg, midazolam 0.04 mg/kg and inj. fentanyl 2 mcg/kg intravenously.

After preoxygenation, induction was done with propofol 2 mg/kg. Endotracheal intubation was facilitated with inj. vecuronium 0.1 mg/kg and the intubated with a sterile cuffed polyvinyl endotracheal tube with an internal diameter of 7-7.5 mm for female and 8-8.5 mm for male. Tracheal tube cuff was inflated with a volume

of room air until no air leakage was audible. All intubations were performed by an experienced anaesthesiologist with laryngoscopy lasting for less than 15 sec. Mechanical ventilation was adjusted to maintain end tidal CO_2 between 35-40 mmHg. Maintenance of anaesthesia was done by using 33% O_2 in N_2O and sevoflurane and vecuronium. At the end of surgery muscle relaxation was reversed with neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. Patients were extubated when fully conscious and attained adequate muscle power and normal respiration with adequate tidal excursion. Patients were shifted to postanaesthesia care unit for observation.

The number of patients developed postoperative sore throat in postoperative period was recorded. The intensity of postoperative sore throat was recorded at 2, 4, 6, 12 and 24 hours post operatively, from the time of extubation. Sore throat was measured on 4 points scale 0-3[44] where 0=no sore throat, 1=mild sore throat (complain of sore throat on asking), 2=moderate sore throat (complain of sore throat on his/her own) and 3=severe sore throat (change in voice or hoarseness associated with throat pain).

Nausea and vomiting was assessed on a 3-point ordinal scale; (0 = none, 1 = nausea, and 2 = vomiting) and 4 mg IV ondansetron was used to treat vomiting.[45] Sedation was evaluated on a scale of 0–4; (- 0 = fully awake, 1 = slight drowsiness, 2 = sleepy but easily aroused, 3 = fully asleep but arousable and 4 = fully asleep, not arousable).[45] Any other complications occurred, were recorded. Statistical analysis was done by using Student 't' test and Chi square test and $p<0.05$ was considered as significant.

Results

Table 1: Pulse Rate (Beats Per Min).

Time	Group K		Group T		P Value
	Mean	SD	Mean	SD	
Base line (Pre-op)	79.43	7.84	81.3	13.16	0.5064
After intubation at 1 min	78.8	7.32	78.13	9.02	0.7532
At 5 min	77.56	7.95	77.2	9.25	0.8898
At 15 min	77.6	5.78	77.96	6.88	0.8271
At 30 min	78.4	5.61	77.03	5.18	0.3298
At 45 min	76.7	6.42	76.56	5.27	0.9268
At 60 min	76.7	6.3	75.5	5.43	0.4326
At 120 min / After extubation	76.1	4.9	74.93	4.19	0.3244

Both groups were comparable with regard to demographic data. Patients in both groups were remained haemodynamically stable (Table 1,2).

Table 2: Mean Arterial Pressure in mmHg.

Time	Group K		Group T		P Value
	Mean	SD	Mean	SD	
Base line (Pre-op)	92.26	10.06	90.23	7.63	0.3822
After intubation at 1 min	92.73	7.79	91.1	5.44	0.3513
At 5 min	90.1	6.64	88.5	4.74	0.2872
At 15 min	87.76	6.88	85.43	4.32	0.1216
At 30 min	86.06	6.7	84.43	2.75	0.2217
At 45 min	83.46	5.74	81.93	3.68	0.2235
At 60 min	83.7	6.42	81.1	3.11	0.0506
At 120 min/ After extubation	80.73	6.25	79.86	3.31	0.5055

Table 3: Distribution of patients according to Post Operative Sore Throat.

Time	Group K		Group T		P Value
	No. of Patients	Percentage	No. of Patients	Percentage	
2 hr	4	13.33	7	23.33	0.3365
4 hr	4	13.33	7	23.33	0.3365
6 hr	2	6.66	5	16.66	0.2347
12 hr	1	3.33	3	10	0.3087
24 hr	1	3.33	2	6.66	0.5614

Though the incidence of Post was higher in group T as compared to group K, however both groups were comparable with regard to distribution of patients according to Post at different time intervals during postoperative period (Table 3). None of the patient in any group had severe Post during study period. Number of patients who developed mild or moderate Post was clinically higher in group T but statistically this difference was insignificant among both groups (Table 4).

Nausea was more in group T in comparison to group K at 2 Hrs. However both groups were comparable with regard to incidence and severity of nausea and vomiting (Table 5). One patient each in both groups developed grade I sedation at 2 hour (Table 6). None of the patient in any group had any adverse effect like anaphylaxis, headache, bronch ospasm/laryngospasm, coughing, hoarseness of voice, dysphonia, dysphagia, tongue/lip/dental trauma etc. during study period.

Table 4: The Incidence and Severity of Post.

Time	2 hr		4 hr		6 hr		12 hr		24 hr	
Group	K	T	K	T	K	T	K	T	K	T
No. Grade	30	30	30	30	30	30	30	30	30	30
No Post (Grade 0)	26	23	26	23	28	25	29	27	29	27
Mild (Grade 1)	3	5	3	5	2	5	1	3	1	3
Moderate (Grade 2)	1	2	1	2	0	0	0	0	0	0
Severe (Grade 3)	0	0	0	0	0	0	0	0	0	0
Total Post	4	7	4	7	2	5	1	3	1	0
P-Value	0.3365		0.3365		0.2347		0.3087		0.5614	

Table 5: Incidence and Severity of Nausea & Vomiting.

	2 hr		4 hr		6 hr		12 hr		24 hr	
Group	K	T	K	T	K	T	K	T	K	T
No.	30	30	30	30	30	30	30	30	30	30
None (Grade 0)	24	22	28	28	30	30	30	30	30	30
Nausea (Grade 1)	6	8	2	2	0	0	0	0	0	0
Vomiting (Grade 2)	0	0	0	0	0	0	0	0	0	0
Total	6	8	2	2	0	0	0	0	0	0
P-Value	0.5495		0.9999							

Table 6: Patient Distribution According to Sedation.

Time	Group K		Group T		P Value
	No. of Patients	Percentage	No. of Patients	Percentage	
2 hr	1	3.33	1	3.33	0.99
4 hr	0	0	0	0	0
6 hr	0	0	0	0	0
12 hr	0	0	0	0	0
24 hr	0	0	0	0	0

Discussion

Postoperative sore throat is the 8th most undesirable outcome in postoperative period with the incidence of 21–65% in patients receiving general anaesthesia (GA) with tracheal intubation.[2] Although symptoms resolve spontaneously and without any medical treatment, prophylactic management for reducing its incidence and severity is still recommended to improve the quality of postanaesthesia care.

Ketamine or tramadol has been used preoperatively to reduce the incidence of Post with promising results. On literature search, till date there is no study comparing the efficacy of ketamine and tramadol nebulization on Post. In this present study patients were nebulized with ketamine or tramadol via compressor nebuliser 15 minutes before general anaesthesia.

We found that incidence of sore throat was more in tramadol group as compared to ketamine group, but statistically there was no significant difference in the incidence of sore throat in both group. The sore throat incidence decreased with time in both groups.

Severity of Post was higher in patients who received tramadol nebulization as compared to patients receiving ketamine nebulization. In ketamine group 1 patient (3.33%) out of 30 complained of grade 2 sore throat, at 2 and 4 hours after extubation. In tramadol group, 2 (6.66%) out of 30 patients were complained of grade 2 sore throat at 2 and 4 hours after extubation. None of the patients in any group had grade 3 (severe) Post at any time during study period.

Our study correlated with the study of Sandeep Kudva et al[20] in which they found that the incidence of postoperative sore throat in ketamine group was 19%, 14.3%, 9.5%, 0% and in tramadol group it was 28.6%, 28.6%, 19%, 9.5% at just after, 2, 4 and

24 hour respectively after extubation. Our results also coincides with study of Samaa Raswan et al21, who concluded that the incidence of sore throat after tramadol gargle at 2, 6, 12 and 24 hours after extubation was 4%, 8%, 8% and 8% respectively. They observed only mild Post and no side effect like nausea, vomiting or sedation in any group. In their study the incidence of Post was less which might be due to shorter duration of surgery (up to 1 hour) and use of higher dose of tramadol i.e. 2 mg/kg.

In correlation with our study, Derlin Thomas et al[22] concluded that the incidence of sore throat after ketamine nebulisation just after extubation, at 2, 4, 6, 12 and 24 hours after extubation was 14.58%, 12.5%, 12.5%, 12.5%, 10.41% and 8.33% respectively. Similarly Shalini Jain et al[23] concluded that the incidence of sore throat after ketamine nebulisation at just after extubation, 2, 4, 8, 12 and 24 hours after extubation was 4%,6%, 12%, 16%, 12% and 4% respectively. Sunita Jain et al24, who studied the effect of ketamine nebulisation on Post and concluded that the incidence of sore throat after ketamine nebulisation at 4, 8, 12 and 24 hours after extubation was 12%, 26%, 28% and 14% respectively. In contrast to our study, Muhammad Ashraf Zia et al[25] found that the incidence of postoperative sore throat in ketamine group at 4, 8 and 24 hour after extubation was overall 34%. In their study the incidence of Post was higher which might be due to fixed ET-tube size (7-7.5 mm) for both sex.

In our study both groups were comparable with regards to incidence of nausea and vomiting. In accordance with our study, Derlin Thomas et al[22] observed no side effects like nausea and vomiting in their study. Similarly Samaa Raswan et al[21] also observed only mild Post and no side effect like nausea, vomiting or sedation in any group.

In the present study only one patient (3.33%) each out of 30 in both groups complained of sedation of grade 1 (slight drowsiness) after 2 hour of extubation. Our results are in accordance with study of Samaa Raswan et al[21] who also did not observe any side effects, like sedation in any group while studying effect of tramadol gargle on Post.

Pulse rate, MAP and SpO2% were measured in both group at different time intervals and we did not find any significant difference among the groups.

None of the patient in any group had any adverse effect like anaphylaxis, headache, bronchospasm/ laryngospasm, coughing, hoarseness of voice, dysphonia, dysphagia, tongue/ lip/ dental trauma etc. during study period.

Conclusion

Though the incidence and severity of postoperative sore throat was clinically higher in patients who received preoperative tramadol nebulization as compared to ketamine nebulization, however statistically both groups were comparable with regards to Post, nausea, vomiting and sedation. We suggest that this method should be used routinely in management of anaesthesia to prevent the postoperative sore throat.

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