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Original research article

Effect of ketamine nebulization on post-operative sore throat after general anaesthesia

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Abstract

General anaesthesia with endotracheal intubation results in postoperative sore throat. We studied the effectiveness of nebulization with ketamine which is a NMDA receptor antagonist, on the incidence and severity of sore throat in patients undergoing surgery under general anaesthesia. Institutional ethical committee approval obtained. 100 consenting patients scheduled for middle ear surgeries were randomly allocated to two groups of 50 each to receive 50mg of Ketamine or saline nebulization 15 minutes before the induction. Sore throat was less in 0, 2, 4, and 6hrs (p<0.02). Ketamine nebulization before intubation reduces incidence and severity of sore throat.

Keywords: Ketamine, nebulization, post-operative sore throat, endo tracheal intubation, general anaesthesia

Introduction

Post-operative sore throat after general anaesthesia with endo-tracheal intubation occurs in 21% to 65% of patients [1].

It has been reported to be one of the most undesirable outcomes in the post-operative period influencing patient satisfaction and the patient's activities after discharge from the hospital [2]. Complaints range from minor throat irritation to debilitating pain, inability to swallow and temporary hoarseness of voice. Routine tracheal intubation for surgical procedures can result in pathological changes, trauma and nerve damage which may cause post-operative sore throat [3].

Several non-pharmacological methods like small sized endotracheal tubes, lubricating the endotracheal intubation tube with water soluble jelly, intubation after full relaxation, minimizing intra-cuff pressure and extubation when cuff is fully deflated. The pharmacological measures include gargling and nebulization with drugs like budesonide, beclomethasone, ketamine, lignocaine etc have been studied [3].

Ketamine a phencyclidine derivative, has been used as a nebulization in the attenuation of post-operative sore throat by its action on NMDA receptors [4].

The present study evaluates the possibility of ketamine being used as nebulization before tracheal intubation in middle ear surgeries to prevent undesirable side-effects like sore throat, cough and hoarseness and ensuring patient satisfaction and unhampered patient activity in the post-operative period.

This study was undertaken to evaluate the effectiveness of nebulized ketamine in alleviating post operative sore throat.

Methodology

Source of data

Data was collected from all consenting patients who were scheduled for elective middle ear surgeries under general anesthesia with endo-tracheal intubation in department of Anesthesiology, Pain and Critical Care.

Sample size: A minimum of 50 patients were required in each group to detect a decreased incidence of post-operative sore-throat from 65% to 50%, with confidence interval of 95%, power 90% and precision of 5%, based on the study conducted by Vanitha Ahuja *et al*. we required a sample size of 46 per group, on adding 10% patients for possible loss to follow-up, the sample size was 50 patients in each group with below mentioned inclusion and exclusion criteria.

Study Design: Prospective Randomized double-blind study.

Inclusion criteria

1. Patient who are willing to give informed written consent.

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2. American Society of Anesthesiologists (ASA) class I-II.
3. Age 18 -60 years of either gender.
4. Elective middle ear surgical procedures with oro- tracheal intubation.
5. Duration of surgery <4hrs.

Exclusion criteria

1. Patients with history of preoperative sore throat.
2. Patients requiring more than one attempt at intubation.
3. Mallampati grade >2.
4. History of allergy to study drug.
5. Patients with recent NSAID's intake.
6. History of asthma, chronic obstructive pulmonary disease,
7. Recent upper respiratory tract infection (within 15 days)

The present study was conducted after receiving approval from Ethical committee of our institution. Following detailed pre-anaesthetic checkup, informed written consent was obtained from all patients fulfilling the required inclusion and exclusion criteria. On the day of surgery, after arrival to the operation theatre, the patients were shifted to anesthesia preparation room.
Patients were randomized into following two groups by a computer-generated random number table:

1. **Test group:** Group K (ketamine) 50mg ketamine with 4ml NS
2. **Control group:** Group S (normal saline) 5ml

The medications were prepared by anesthesiology resident (observer 1) who was not be involved later in the study. All medications were inhaled by nebulization, 15 minutes before induction of anaesthesia by a staff nurse who was not involved later in the study.

Results

Table 1: Distribution of type of surgery between study groups

Type of Surgery	Ketamine		Normal saline		p value
	N	%	N	%	
Left tympanoplasty	20	40	25	50	0.315
Right tympanoplasty	30	60	25	50	
Total	50	100	50	100	

Patients undergoing left ear tympanoplasty in test and control groups were 20 (40%) and 25 (50%) respectively; patients undergoing right ear tympanoplasty in test and control groups were 30(60%) and 25 (50%) respectively, there is no difference between the groups.

Table 2: Distribution of ASA physical status between study groups

ASA	Ketamine		Normal saline		p value
	N	%	N	%	
Grade I	43	86	45	90	0.538
Grade II	7	14	5	10	
Total	50	100	50	100	

Percentage of participants of ASA grade 1 in test group and control group were 86 and 90 respectively, percentage of participants of ASA grade 2 in test and control group were 14 and 10 respectively and there was no difference between both groups.

Table 3: Duration of anaesthesia between study groups

Parameters	Ketamine		Normal saline		p value
	Mean	SD	Mean	SD	
Duration of Anaesthesia (min)	91.2	11.0	87.8	11.0	0.129

Mean duration of anaesthesia (min) for subjects in test group and control group were 91.2 and 87.8 respectively. There was no clinical or statistically significant difference between both the groups.

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Table 4: Distribution of sore throat between study groups

Hrs	Sore throat	Ketamine		Normal saline		p value
		N	%	N	%	
0	Absent	36	72	15	30	<0.001*
	Present	14	28	35	70	
2	Absent	41	82	25	50	0.010*
	Present	9	18	25	50	
4	Absent	45	90	36	72	0.022*
	Present	5	10	14	28	
6	Absent	49	98	37	74	0.001*
	Present	1	2	13	26	
24	Absent	50	100	49	98	0.475
	Present	0	0	1	2	

Note: p value* significant at 5% level of significance (p<0.05)

Post extubation, 14 patients in the test group had sore throat as compared to 35 patients in the control group (p<0.001). At the end of 2 hours post- operatively, only 9 patients had sore throat as compared to 25 patients in control group (p=0.001). After 4 hours post operatively only 5 patients had sore throat as compared to the 14 patients in the control group (p=0.022). At the end of 6 hours only 1 patient had sore throat as compared to 13 patients in control group (p=0.001). At the end of 24 hours no patient had sore throat as compared to 1 patient in control group(p=0.475).

Discussion

We conducted a prospective randomised study to find out the effectiveness of ketamine given preoperatively as nebulisation in a fixed dose of 50 mg in patients scheduled for middle ear surgeries under general anaesthesia with respect to post- operative sore throat, cough and hoarseness of voice. Patients were assessed in the post-anaesthesia care unit at 0,2,4,6 and at 24hr by an observer who was blinded to the study group assigned for the occurrence of post-operative sore throat, cough and hoarseness of voice on a four-point scale. We observed that ketamine nebulisation reduces the severity of post operative sore-throat, cough and hoarseness of voice upto 24 hrs without any systemic effects.

Post-operative sore throat, cough and hoarseness of voice after intubation under general anaesthesia is a troublesome complication, and is recognised as one of the undesirable outcomes in the post-operative period [1].

These airway related complications are associated with tracheal intubation or extubation after general anaesthesia due to mucosal injury or inflammation caused by airway instrumentation or the foreign body like endotracheal tube itself [5].

The other contributing factors for POST include sex, age, use of succinyl choline, larger ET tubes, cuff designs, and high intra-cuff pressures [6].

We did not observe any correlation between the age, gender, height, duration of surgery and ASA status. We had chosen patients in ASA physical status 1 or 2 for the study and to standardise the type of surgery, we chose middle ear surgeries like tympanoplasty.

Brimacombe *et al*, explained that the pressure exerted by the tracheal tube cuff on the mucosa may exceed capillary perfusion pressure and this is a major cause for morbidity in intubated patients [7].

Jensen *et al*, found that frequency and severity of POST after short term intubation was significantly greater after the use of high- pressure, low volume cuffs than after the use of a mask or of low-pressure high-volume cuffs [8]. We used in all patient's high volume and low pressure cuffed appropriate sized endotracheal tubes and maintained the intra-cuff pressure by intermittently checking the cuff pressure and keeping it below 25 mmHg.

Prevention strategies for POST and other airway complications have recently shifted from non-pharmacological (e.g., ETT size, cuff pressure or volume control) to pharmacological strategies [3].

Several pharmacological approaches to minimize the incidence and severity of POST have been tried with variable results. We avoided the routine use of Lignocaine jelly for lubrication in both the groups to reduce any confounding factors.

Ketamine is an NMDA receptor antagonist with the primary site of action in the central nervous system and parts of limbic system while its use via nasal route, gargle, and rectal route suggests its peripheral action [1]. Our inclusion and exclusion criteria were well-defined and tracheal intubation was performed by experienced anaesthesiologists. We used the ketamine nebulization in a standard dose of 50 mg which was similar to what Derlin Thomas *et al* [5] used in their study.

Conclusion

We concluded that pre-operative ketamine nebulization reduces the incidence and severity of POST in the post-operative period in patients who underwent elective middle ear surgery under general anaesthesia with endotracheal intubation.

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