Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

Original research article

Incidence of cough and hoarseness of voice after general anaesthesia

[1]Dr. Shalini C, [2]Dr. Lingaraju N, [3]Dr. Charulatha Rudrappa, [4]Dr. Tejanand K

[1]Senior Resident, Department of Anesthesia, ESIC, Bangalore, Karnataka, India

[2]Assistant Professor, Department of ENT, CIMS, Chamarajanagar, Karnataka, India

[3]Assistant Professor, Department of Anesthesia, Navodaya Medical College, Raichur, Karnataka, India

[4]Assistant Professor, Department of Anesthresia, CIMS, Chamarajanagar, Karnataka, India

Corresponding Author:
Dr. Tejanand K

Abstract

The Nebulizer produces droplets of size 5-8microns, only 37-60% of the drug will be deposited in the oropharynx. Hence, significant side effects are not observed. It is a water-soluble molecule structurally related to Phencyclidine. It contains an asymmetric carbon atom hence has two optical isomers: the S (+) isomer and R (-) isomer. Benzethonium chloride is added as a preservative. 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. Post extubation, 16 patients had cough in test group as compared to 18 patients in control group (p=0.068). At the end of 2 hours only 1 patient had cough as compared to 14 patients in control group(p<0.001). At 4 hours post extubation, no patient had cough in test group as compared to 9 patients in the control group (p=0.002). At the end of 6 hours, no patient had cough as compared to 2 patients in control group (p=0.153). At the end of 24hrs no patient in the test and control group had the cough.

Keywords: Cough, Hoarseness of Voice, General Anaesthesia

Introduction

Ketamine is in clinical use since 1970, it 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, nebulization, gargle, and rectal route suggests its peripheral effect. Several literatures support the topical effect of ketamine via its NMDA- antagonistic action and anti-inflammatory effect [1].

The Nebulizer produces droplets of size 5-8microns, only 37-60% of the drug will be deposited in the oropharynx. Hence, significant side effects are not observed.

It is a water-soluble molecule structurally related to Phencyclidine. It contains an asymmetric carbon atom hence has two optical isomers: the S (+) isomer and R (-) isomer. Benzethonium chloride is added as a preservative [2].

The incidence of POST with the use of face mask and oral plastic airway is 15 to 22%. A study was conducted for comparing the incidence of sore throat with and without use of Guedel airway. Factors associated with increased incidence of sore throat were the blood stain to the laryngoscope blade and the suction catheter during any time of the surgery [3].

Laryngeal trauma is the important factor for the incidence of POST and use of soft suction catheters may be beneficial. Intubation with endotracheal tube and laryngoscopy cause pathological changes like epithelial loss, glottis oedema, glottis hematoma, submucosal tears, contact ulcer granuloma which provide the organic basis for the post-operative throat complaints [4].

Studies shown in the post-mortem specimens of larynx and trachea and stained with methylene blue to see the extent of epithelial damage which happened due to laryngoscopy and the tracheal tube insertion. Trauma was found to be mostly at the cricoid plate and over the vocal processes of arytenoids and the trauma was more in patients who were intubated for long time. Trauma on the tracheal rings was also seen and due to insertion or removal of tracheal tube. Microscopically epithelial loss was seen with submucosal damage [5].

In a study in which post-operative laryngoscopy was done to see the changes and was found that most of the patients had intra laryngeal, vocal cord and glottis congestion, a crushed epiglottis and a small number of submucosal tears. With intubation, trauma can occur in the larynx and hypopharynx. Most injuries were glottis hematomas and these were due to inadequate relaxation of patients during intubation.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

In the same study, two patients had vocal cord paralysis and was found to be due to high intra cuff pressures which caused neuropraxia of recurrent laryngeal nerve and it caused hoarseness in the patients [6].

Decreased elasticity of the trachea and the surrounding tissue in the older people increase the damage to the mucosa of the larynx and the trachea during laryngoscopy and intubation which increased the incidence of POST.

Methodology

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.
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 <4 hrs.

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 cough between study groups

Hrs	Cough	Ketamine		Normal saline		p value
		N	%	N	%	
0	Absent	34	68	32	64	0.068
	Present	16	32	18	36	
2	Absent	49	98	36	72	<0.001*
	Present	1	2	14	28	
4	Absent	50	100	41	82	0.002*
	Present	0	0	9	18	
6	Absent	50	100	48	96	0.153
	Present	0	0	2	4	
24	Absent	50	100	50	100	1
	Present	0	0	0	0	
Total		50	100	50	100	

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

Post extubation, 16 patients had cough in test group as compared to 18 patients in control group (p=0.068). At the end of 2 hours only 1 patient had cough as compared to 14 patients in control group (p<0.001). At 4 hours post extubation, no patient had cough in test group as compared to 9 patients in the

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

control group (p=0.002). At the end of 6 hours, no patient had cough as compared to 2 patients in control group (p=0.153). At the end of 24hrs no patient in the test and control group had the cough.

Table 2: Distribution of hoarseness between study groups

Hrs	Hoarseness	Ketamine		Normal saline		p value
		N	%	N	%	
0	Absent	45	90	35	70	0.033*
	Present	5	10	15	30	
2	Absent	48	96	39	78	0.007*
	Present	2	4	11	22	
4	Absent	48	96	48	96	-
	Present	2	4	2	4	
6	Absent	50	100	49	98	0.315
	Present	0	0	1	2	
24	Absent	50	100	49	98	0.315
	Present	0	0	1	2	
Total		50	100	50	100	

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

Post extubation, 5 patients in the test group had hoarseness of voice as compared to 15 patients in the control group (p=0.033). At the end of 2 hours, only 2 patients had the hoarseness of voice as compared to 11 patients in control group (p=0.007). After 4 hours post extubation, 2 patients in both the groups had hoarseness of voice. At the end of 6 hours, none of the patients in test group had hoarseness of voice as compared to 1 patient in control group (p=0.315). At the end of 24 hours, none of the patients in test group had hoarseness of voice as compared to one patient in control group (p=0.315).

Table 3: Distribution of side-effects between Study groups

Side effects	Ketamine		Normal saline		p value
	N	%	N	%	
Nausea	6	12	7	14	0.766
Vomiting	1	2	2	4	0.068
Numbness	3	6	0	0	0.079

In the post- operative period, 10 patients had side effects in test group as compared to 9 patients in the control group which was clinically not significant.

Discussion

We chose nebulization as the route of administration of ketamine because of smaller volume of drug required, no risk of aspiration if accidentally swallowed, better patient cooperation and cost effectiveness and it ensures that the drug is equally distributed all over the pharynx and respiratory tract. For this, we used a wall- mounted oxygen driven nebulization method. In this method, liquid is broken up into droplets by the compressed air. Largest droplets are filtered within the nebulizer, but larger particles (10-25 micrometre) mostly deposit in mouth and throat and those of 5-10micrometer diameter get deposited in the passage from mouth to airway. This settling of aerosol in mouth and upper airway might probably be the reason for the decreased incidence and severity of POST in ketamine group due to its topical analgesic, anti-inflammatory, and NMDA- receptor antagonistic effect [7].

Chan *et al*, in their study used ketamine gargle for reducing the POST and they measured the intraoperative serum ketamine levels. They demonstrated low serum levels of ketamine and suggested a topical action of ketamine resulting in the attenuation of the POST rather than the systemic effects [8]. Ketamine administration is associated with unwanted outcomes such as psychomimetic effects and increase in blood pressure levels. In our study we didn't measure the serum ketamine levels. However, compared with the previous reports with topical ketamine at higher doses, the dose chosen by us was relatively low and we did not observe any CNS side effects.

Reddy *et al* [9] studied the dose dependent effectiveness of ketamine nebulisation with 0.5 mg/kg, 1mg/kg and1.5 mg/kg on POST. They found that nebulised ketamine at a dose of 0.5 mg/kg is comparatively less effective than 1mg/kg and 1.5mg/kg. But they also noted that at higher doses there was increased and thicker secretions. Hence in our study we used the fixed dose of 50mg of ketamine nebulisation and no patients in our study showed increased or thickening of secretions. In our study, 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).

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 11, 2023

Vanitha Ahuja *et al*, [10] studied the effect of ketamine nebulization on the POST. In all their studies, the overall incidence of POST is 33%, 25% and 25% respectively. They all demonstrated that the incidence and severity of sore throat is significantly less with ketamine at all time periods post operatively. In our study the overall incidence of sore throat was 29%; 44% among saline group and 15% among the ketamine group which was much lower when compared to the above study.

Post extubation vigorous coughing during emergence from general anaesthesia is an important factor for sore throat, and also it might increase intracranial, intra- thoracic or intra- abdominal pressure resulting in bronchospasm, wound dehiscence, and bleeding. None of the patients in our study had vigorous coughing during emergence from anaesthesia.

We also observed the effectiveness of ketamine on post-operative cough and hoarseness of voice after extubation and there was significant decrease in the incidence of cough and hoarseness of voice upto 6 hrs after extubation. Patients in our study in ketamine group reported better satisfaction score with no significant systemic side effects in post-operative period as compared to control group. No patients in our study complained of sore throat at the end of 24 hrs.

Conclusion

Ketamine nebulization in a dose of 50 mg, 15 minutes before the endotracheal intubation reduces the cough and hoarsness of voice in the post-operative period up to 24 hrs in patients who underwent elective middle ear surgery under general anaesthesia.

There were no systemic side effects with ketamine nebulization and patient satisfaction was good.

References

1. Rieger A, Brunne B, Striebel HW. Intracuff pressures do not predict laryngopharyngeal discomfort after use of the laryngeal mask airway. Anesthesiology. 1997;87(1):63-67.
2. 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(6):592-97.
3. Browne B, Adams CN. Post-operative sore throat related to the use of a Guedel airway. Anaesthesia. 1988;43(7):590-91.
4. Hilding AC. Laryngotracheal damage during intratracheal anaesthesia. Demonstration by staining the unfixed specimen with methylene blue. Ann Otol Rhinol Laryngol. 1971;80(4):565-81.
5. Donnelly WH. Histopathology of endotracheal intubation. An autopsy study of 99 cases. Arch Pathol. 1969;88(5):511-20.
6. Donnelly WA, Grossman AA, Grem FM. Local sequelae of endotracheal anesthesia as observed by examination of one hundred patients. Anesthesiology. 1948;9:490-97.
7. Peppard SB, Dickens JH. Laryngeal injury following short term intubation. Ann Otol Rhinol Laryngol. 1983;92(4):327-30.
8. Chan L, Lee ML, Lo YL. Postoperative sore throat and ketamine gargle. Br J Anaesth. 2010;105:97
9. Reddy M, Fiaz S. Dose-dependent effectiveness of ketamine nebulisation in preventing post operative sore throat due to tracheal intubation. Sri Lankan Journal of Anaesthesiology. 2018;26(1):22-27.
10. Ahuja V, Mitra S, Sama R. Nebulized ketamine decreases incidence and severity of post-operative sore throat. Indian J Anaesth. 2015;59:37-42.