

## Comparison of efficacy of Nebulized ketamine versus lignocaine for postoperative sorethroat

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### Abstract

**Introduction:** Post operative sore throat (POST) is a common post operative complaint following general anaesthesia with endotracheal intubation. Its incidence ranges from 30-75%. It may cause significant post operative morbidity and patient dissatisfaction.

**Aim:** The aim of the study is to evaluate the efficacy of ketamine and lignocaine nebulization.

**Materials and Methods:** This study is a Prospective randomised control study. After obtained Institutional Ethical Committee approval and written informed consent, 90 adult patients were randomized into three groups each consists of 30 participants. Group K received ketamine 50mg with 4ml of normal saline, Group B received lignocaine 2% 2ml with 2ml of normal saline nebulization 15 mins before induction and Group C did not receive any nebulization and is a control group. Postoperative sorethroat was monitored based on four point scale at immediate, 2, 4, 8, 12 and 24 hrs.

**Results:** The Severity of postoperative sorethroat was less in lignocaine and ketamine group compared to control group. On follow up for 24 hours, ketamine group provides better relief in sorethroat compared to lignocaine group. Hemodynamic parameters were comparable in all three groups.

**Conclusion:** Ketamine nebulization and lignocaine nebulization provides less discomfort to the patient and the severity of sore throat was less over 24 hrs in the post operative period. To conclude ketamine nebulization provides better relief of post operative sore throat when compared to lignocaine nebulization and no nebulization.

### Introduction

Sore throat is a common postoperative complaint occurs in adults in the post operative period following general anaesthesia with endotracheal intubation.

Irritation and inflammation of the airway are considered to be the causes of post operative sore throat.

There are pharmacological and non pharmacological methods to decrease the incidence and severity of post operative sore throat.

The following factors influences the incidence of post operative sore throat, which includes Experience of anaesthetist, adequate relaxation of the patient, careful insertion technique, soft suction catheters, smaller tracheal tubes, minimal cuff-tracheal contact area, monitoring and adjustment of intracuff pressure and avoidance of local anaesthetic /steroid lubricants. Various methods to alleviate postoperative sorethroat has been reported in the literature. There are variable causes that can aggravate sorethroat such as patient related factors, type of anesthesia and type of surgery. Steroids are commonly used intraoperatively to reduce airway edema and inflammation. Ketamine gargling has been used for sorethroat but due to risk of aspiration,

palatability limits its usage. Lignocaine jelly applied over tracheal tube cuff may reduce sore throat but because of inaccuracy of instilled drug and short duration of action some additional management has to followed for postoperative sorethroat. Nebulization of lignocaine and ketamine prior to general anaesthesia confers good tube tolerability to patient as entire air passages is anaesthetized and attenuates sorethroat after extubation

Dexamethasone has been used to reduce the incidence of post operative sore throat. There is a reduction in incidence of sore throat following tracheal intubation after gargle with lignocaine or ketamine before induction of anaesthesia.

### Materials and Methods

The study was approved by Institutional Ethical Committee and Patients were randomly allocated to Group K, Group B and Group C each group consists of 30 participants by computer generated random numbers. The anesthesiologist taking up the case is blinded to type of nebulization given to the patients.

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**Inclusion Criteria**

ASA physical status I, II, age group between 20 -60 years of either sex, duration of surgery less than 2hrs taken under general anaesthesia.

**Exclusion Criteria**

Head and neck surgeries, surgery in prone position, difficult airway and intubation attempts more than one.

Parameters monitored include postoperative sorethroat immediately after extubation, 2hrs, 4hrs, 8hrs, 12hrs and 24hrs. General anesthesia was given 10 minutes after nebulization. Standard monitors like blood pressure, ECG and SPO2 were monitored. Premedication inj glycopyrolate 0.2 mg, inj midazolam 1 mg iv given just before induction. GA induced with inj propofol 2mg/kg i.v, inj. fentanyl 2microgram /kg i.v and muscle relaxant inj. succinylcholine 2mg/kg i.v and intubation proceeded with 7-7.5 mm size endotracheal tube for women,8-8.5 mmsize for men. Position of endotracheal tube confirmed by auscultation and capnography. Endotracheal tube cuff is high volume, low pressure cuff and was inflated with air until no air leak heard with stethoscope. Cuff pressure monitor was connected and pressure in cuff is maintained between 20-22 cm H2O .Inj vecuronium 0.1mg/kg i.v loading dose given. Maintenance of anesthesia done with 50%nitrous oxide and isoflurane 1-1.5% and end tidal CO2 maintained between 30-35mmHg. Intravenous dexamethasone is given at the start of procedure. Tracheal tube cuff pressure monitored every 20 minutes and pressure is maintained between 20-22cm H2O. At the end of surgery, suctioning done and reversal inj. neostigmine 50mic/kg i.v and inj. glycopyrolate 10mic/kg was given. Patient is extubated after the patient is fully conscious and good muscle strength T4/T1ratio >0.9. Post operative pain is managed with IV paracetamol infusion 6<sup>th</sup> hourly. Postoperative sore throat, any cough, hoarseness of voice were assessed based on scores immediately after extubation, 2hrs, 6hrs, 12hrs, 24hrs postoperatively.

**Post Score –severity**

Grade 1: no sore throat

Grade 2: minimal says sore throat when asked

Grade 3: moderate complaint of sorethroat without question

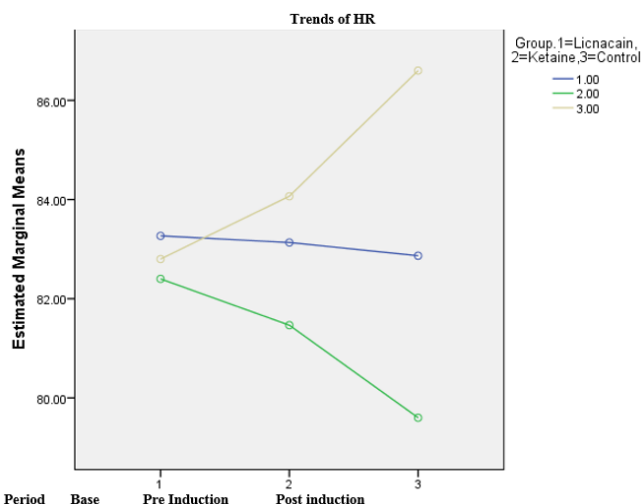
Grade 4: severe change in voice

Primary outcome of the study was to find the incidence of postoperative sorethroat at 2hrs postoperatively in patients undergoing surgery of duration less than 2 hr. The secondary outcome of the study were to measure the

incidence and severity of postoperative sorethroat at immediate recovery and 4hrs, 8hrs, 12hrs, 24hrs, and to compare the blood pressure after nebulization, at intubation and heart rate after nebulization, at intubation with baseline within these three groups.

**Statistical Analysis and Interpretation**

The study subjects namely lignocaine, Ketamine and control groups were described and compared between them in respect of their demographic profiles for homogeneity. The continous variables were compared by ANOVA and categorical variables by  $\chi^2$  (Chi-square) test. The physiological variables such as SBP, DBP and HR of the three groups were compared by ANOVA and confirmed the groups by repeated measures of ANOVA. The sore throats by Friedman test and between groups by Krusca Wallis (KW) test. The P-values less than or equal to 0.05 ( $P \leq 0.05$ ) were fixed as the level of statistical significance.



**Fig. 1:** Trends of HR of three groups at base through post induction

**Results**

**Description of the Study Subjects**

The demographical variables such as age and gender were compared between the three groups. The differences in age between the three groups were not statistically significant ( $P > 0.05$ ).

**Table 1:** Comparison mean BP at Base, pre induction and post induction between the three groups

Period	Lignocaine		Ketamine		Control		“F”	df	Sig
	Mean	SD	Mean	SD	Mean	SD			
Base	122.3	8.9	122.7	8.9	122.3	8.8	0.028	2,89	P=0.973
Pre Induction	121.6	8.2	119.0	14.0	123.0	9.1	1.090	2,89	P=0.341
Post induction	119.3	7.4	110.1	12.6	133.0	13.1	48.364	2,89	P<0.001

**Table 2:** Comparison of sore throat within the group from immediate throughout 24 hours

Groups (n=30)	Mean ranks at						Friedman $\chi^2$	df	Sig
	Immediate	2 hrs	4 hrs	8 hrs	12 hrs	24 hrs			
Lignocaine	3.37	3.97	3.67	3.37	3.27	3.37	16.061	5	P=0.007
Ketamine	3.69	3.58	3.58	3.38	3.38	3.38	11.522	5	P=0.042
Control	4.38	4.53	3.15	3.07	2.98	2.88	49.220	5	P<0.001

Table 2 compares the sore throat within the groups from immediate through 24 hours. The level of sore throat in Lignocaine group was highly significant (P<0.01). The level of sore throat in Ketamine group was just significant (P<0.05). The level of sore throat in control group was very highly significant (P<0.001).

**Table 3:** Comparison of sore throat between groups at immediate

Sore throat Level	Lignocaine		Ketamine		Control		Results (K W)
	No	%	No	%	No	%	
Nil	28	93.3	27	90.0	3	10.0	$\chi^2 =60.418$ df=2 P<0.001
Mild	2	6.7	3	10.0	12	40.0	
Moderate	0	0.0	0	0.0	10	33.3	
Severe	0	0.0	0	0.0	5	16.7	
Total	30	100.0	30	100.0	30	100.0	
Mean ranks	32.00		33.25		71.25		

**Table 4:** Comparison of sore throat between groups at 2hours

Sore throat Level	Lignocaine		Ketamine		Control		Results (K W)
	No	%	No	%	No	%	
Nil	22	73.3	28	93.3	0	0.0	$\chi^2 =62.413$ df=2 P<0.001
Mild	8	26.7	2	6.7	17	56.7	
Moderate	0	0.0	0	0.0	9	30.0	
Severe	0	0.0	0	0.0	4	13.3	
Total	30	100.0	30	100.0	30	100.0	
Mean ranks	35.77		28.07		72.67		

The above table-5 compares the sore throat at 2 hours. The mean ranks between the three groups were statistically significantly differed (P<0.001).

**Table 5:** Comparison of sore throat between groups at 8 hours

Sore throat Level	Lignocaine		Ketamine		Control		Results (K W)
	No	%	No	%	No	%	
Nil	28	93.3	30	100.0	6	20.0	$\chi^2 =56.668$ df=2 P<0.001
Mild	2	6.7	0	0.0	20	66.7	
Moderate	0	0.0	0	0.0	3	10.3	
Severe	0	0.0	0	0.0	1	3.3	
Total	30	100.0	30	100.0	30	100.0	
Mean ranks	35.37		32.5		68.63		

The above table 5 compares the sore throat at 8 hours. The mean ranks between the three groups were statistically significantly differed (P<0.001).

**Table 6:** Comparison of sore throat between groups at 24 hours

Sore throat Level	Lignocaine		Ketamine		Control		Results (K W)
	No	%	No	%	No	%	
Nil	28	93.3	30	100.0	6	20.0	$\chi^2 =56.702$ df=2 P<0.001
Mild	2	6.7	0	0.0	21	70.0	
Moderate	0	0.0	0	0.0	3	10.0	
Total	30	100.0	30	100.0	30	100.0	
Mean ranks	35.40		32.5		68.6		

The above table-6 compares the sore throat at 24 hours. The mean ranks between the three groups were statistically significantly differed (P<0.001).

## Discussion

POST is more common problem encountered in post operative period. Irrespective of tube size and cuff pressure monitoring patient complaints of sore throat post operatively. Previous studies were done to alleviate POST by nebulization with steroid, gargling with various drugs, coating ETT cuff with lignocaine jelly etc. In our study, Ketamine nebulization 15 mins prior to general anaesthesia with endotracheal intubation offers good post operative sore throat relief and better comfortability for the patients. 50mg Ketamine is least amount to enter into the circulation to have effect. Ketamine by acting directly in NMDA receptor relieve pain as it has peripheral anti nociceptive effect. Ketamine nebulization when compared to gargling provides less discomfort to the patient. Amingad B, Jayaram S. et al compared the ketamine nebulization with ketamine gargling in reducing post-operative Sore throat.<sup>3</sup> Kalil DM, Silvestro et al published a study on various pharmacologic methods that was used preoperatively helps in prevention of sore throat.<sup>4</sup> Ahuja V, et al proposed a study on ketamine nebulization reduces the incidence and severity of POST.<sup>5</sup> Zhu MM, Zhou QH, et al. studied in rats that have hyperresponsive airway with allergens and effects with ketamine nebulization.<sup>6</sup> D'Aragon F, Beaudet N, et al. studied the effects of intracuff lignocaine with lignocaine spray on post operative sore throat.<sup>7</sup> O'Callaghan C, Barry PW studied the mechanism of drug delivery with nebulization and its action on airway. Ketamine nebulization produces effects that lasts more than a hour after surgery when compared to Lignocaine nebulization.<sup>8</sup> Khatavkar SS, Bakhshi RG et al compared nasal midazolam with ketamine for children prior to surgery.<sup>9</sup> Aditya AK, Das Assessment of nebulized ketamine for reductions of incidence and severity of post-operative sore throat.<sup>10</sup> Reddy M Dose-dependent effectiveness of ketamine in POST.<sup>11</sup> Intraoperative hemodynamics was comparable with all the three groups in the study. POST can be effectively managed if prior proper steps are taken.

## Conclusion

In our study both ketamine and lignocaine effectively reduced the POST, provided ketamine had extended duration of action when compared to lignocaine.

**Source of Support:** None.

**Conflict of Interest:** None.

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