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# Comparison of topical application of ketamine aspirin and lignocaine on effects of intubation

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## Abstract:

**Background:** Postoperative sore throat, cough, and hoarseness of voice can contribute to post operative morbidity and patient dissatisfaction. Besides pain and nausea these are the most frequent subjective complaints .**Objective:** To determine and compare the effects of Ketamine gargle, Aspirin gargle and 10% Lignocaine spray on reducing the incidence and severity of post operative sore throat, cough and hoarseness.**Materials and methods:** Patients were randomly allocated in to three groups of 50 patients each. In group K (40mg Ketamine diluted in 29 ml of normal saline), group A (350mg of soluble Aspirin diluted in 30 ml of distilled water) and in group L (3 puff of 10% Lignocaine was sprayed before intubation). **Results:** The incidence of sore throat at 2nd hour was 20%(K), 24%(A) and 22%(L); cough was 20%(K), 12%(A) and 20%(L). All the patients were free of hoarseness in first 2 hours. At 4th hour the incidence of sore throat was 24%(K), 24%(A) and 26%(L); cough was 16%(K), 18%(A) and 20%(L) and in group K and A only 4% patients had hoarseness of grade 2 severity whereas in L group 6% patients had hoarseness of grade 3 severity. At 24th hour the incidence and severity was decreased to 8%(K), 10%(A) and 10%(L) for sore throat; 4%(K), 6%(A) and 4%(L) for cough and all the patients were free of hoarseness at 24th hour.**Conclusions:** All the three drugs were equally effective in reducing the incidence and severity of post operative sore throat, cough and hoarseness without causing drug related side effects.

**Key words:** Aspirin, Ketamine, Lignocaine, Sore throat, cough, Hoarseness

## Introduction

Postoperative sore throat (POST), cough, and hoarseness of voice though minor sequelae after general tracheal anaesthesia can contributes to post operative morbidity and patient dissatisfaction. Postoperative sore throat and hoarseness rank, besides pain and nausea, amongst the most frequent subjective complaints [1].

The incidence of patients complaining of sore throat after intubation for general anesthesia has been reported to be as high as 90%, and as low as 5.7% [2]. Similarly, postextubation coughing (PEC)

during emergence from GA and later in the PACU(post anaesthesia care unit), is an important problem, with an incidence of 15% to 94% that can result in potentially dangerous complications such as hypertension, cardiac dysrhythmias, myocardial ischemia, surgical bleeding, bronchospasm, raised intra ocular and intra cranial pressure[3].

Hoarseness is a common complication after tracheal intubation and may be very limiting for a patient after anaesthesia [4, 5]. Previous reports suggest that the incidence of postoperative hoarseness varies widely from 16% to 55% [6]. This variation may be due to timing of assessment of hoarseness after anaesthesia [7].

It was postulated that these effects are because of irritation and inflammation of airway [8]. Numerous non pharmacological and pharmacological measures have been used for attenuating POST, cough and hoarseness with variable success. Among the non pharmacological methods like smaller sized ET(endotracheal) tubes, lubricating the ET tubes, careful airway instrumentation, intubation after full relaxation, gentle oropharyngeal suctioning, minimizing intra cuff pressure and extubation when the tracheal tube cuff is fully deflated were used . Pharmacological measures include Beclomethasone inhalation, gargling with Azulene sulphonate, Ketamine, Aspirin and benzydamine hydrochloride, local spray with lidocaine and intracuff administration of alkalized lignocaine have been reported to decrease the incidence of Postoperative airway symptoms [9-11].

There is increasing amount of experimental data showing that NMDA receptors are found not only in the CNS but also in the peripheral nerves. Ketamine being an NMDA receptor antagonist, its topical administrtion involved in antinociception and anti inflammatory cascade. Thus helps in prevention of POST [10].Aspirin gargles are reportedly effective in relieving pain of oral lesions [12]. Only few studies have evaluated its efficacy in attenuating POST.

Although there has been many studies conducted showing the effectiveness of Lignocaine in reducing the incidence and severity of postoperative cough and hoarseness, but there are no studies showing the efficacy of Ketamine and Aspirin with respect to postoperative cough and hoarseness. Hence we intended to do a comparative study regarding the efficacy of all the three drugs.

## Materials and Methods:

The present study is a prospective, randomized, double-blind study carried out at Bangalore Medical College and Research Institute, Bengaluru. One hundred and fifty ASA grade I and II patients undergoing elective surgery under general anaesthesia were included in the study. Patients were divided into 3 groups of 50 patients each (group K, group A and group L). In group K 40mg of Ketamine diluted in 29 ml of normal saline was given to gargle for 30 sec, in group A 350mg of soluble Aspirin diluted in 30 ml of distilled water was given to gargle for 30 sec, all these were done 5 minutes before induction and in group L 10% of Lignocaine was sprayed on laryngopharyngeal structures before intubation. In all the three groups the drug dosage was fixed based on the previous studies.

Incidence, duration and severity of post operative sore throat, cough, hoarseness observed at 2, 4,and 24 hours.

Institutional ethical committee approval was obtained. Written informed consent obtained preoperatively. Patients with ASA grade I and II physical status, aged between 18 to 60 years, airway assessment by Mallampati grade I and II and patients undergoing elective surgeries were included in the study. Exclusion criteria includes the patients having nasogastric tubes passed before, during or within the first 24 hours of operation, requiring nasotracheal intubation, requiring more than one attempt for orotracheal intubation, patients having oropharyngeal procedures or bronchoscopy, remained intubated after discharge from recovery room, head and neck surgeries, anticipated rapid sequence induction or airway difficulty, patients considered to be at risk for difficult intubation or signs of respiratory disease and known drug allergy.

Preanaesthetic check up was done one day prior to the surgery. Patients advised overnight fasting & premedicated with Tab.Ranitidine 150mg and Tab.Emeset 4mg on the previous day of surgery and on the day of surgery. After shifting patient to the operating room, IV access was obtained and crystalloids connected. Patients were monitored for ECG, NIBP, SpO2, Etco2.

In Group-K and Group-A all patients were made to gargle Ketamine and Aspirin respectively for 30 seconds, 5minutes before induction. In Group-L 10% lignocaine(3 puffs) was sprayed on laryngopharyngeal structures before intubation.

Premedicated with intravenous inj.Glycopyrollate 0.02 mg/kg, inj.Midazolam 0.05 mg/kg and inj.Fentanyl 2µg/kg. Induction with intravenous

inj.Thiopentone 5mg/kg and Inj.Vecuronium bromide 0.1mg/kg. Trachea was intubated with a soft seal cuffed sterile poly vinyl chloride endotracheal tube. In males 8mm or 8.5mm internal diameter endotracheal tube was used and in females 7mm or 7.5mm internal diameter endotracheal tube was used. Endotracheal tube cuffs was filled with the minimal volume of room air required to prevent an audible leak .Anaesthesia was maintained using 70% Nitrous oxide in Oxygen, isoflurane/sevoflurane and maintenance dose of Vecuronium bromide 0.05mg/kg with intermittent positive pressure ventilation. Adequate depth was maintained to prevent bucking during perioperative period. Extubation done in inspiratory phase with gentle oro-pharyngeal suctioning after the tracheal tube cuff is fully deflated.

Scoring system based on Department of Anesthesiology, Yale University School of Medicine, New Haven, for sore throat, cough, and, hoarseness occurring with in 24 hours since operation was used [13].

For sore throat 0-no sore throat, 1-minimal sore throat, 2-moderate sore throat, 3-severe sore throat. For cough 0-no cough or scratchy throat, 1-minimal cough or scratchy throat, 2-moderate cough, 3-severe cough. For hoarseness 0-no evidence of hoarseness, 1-no evidence at the time of interview, but previously it was present, 2-hoarseness at the time of interview, noted by patient only, 3-hoarseness easily noted at the time of interview.

**Statistical analysis:** The Statistical software namely SAS 9.2, SPSS 15.0, Stata 10.1, MedCalc 9.0.1 ,Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc**.**

## Results:

The number of patients without sore throat outnumbered those with sore throat in all the three groups. At the end of 24 hours we found only few patients having minimal sore throat [L (10%), K (8%) and in A (10%)], but found no patients having moderate or severe sore throat and this was statistically insignificant (Table 1).

**Table 1: Comparison of incidence of Sore throat in three groups of patients**

| Soar throat | Group L (n=50) | Group K (n=50) | Group A (n=50) | P value |
|---|---|---|---|---|
| **2nd hour** | | | | |
| • Score 0 | 39(78.0%) | 40(80.0%) | 38(76.0%) | 0.961 |
| • Score 1 | 10(20.0%) | 8(16.0%) | 10(20.0%) | |
| • Score 2 | 1(2.0%) | 2(4.0%) | 2(4.0%) | |
| • Score 3 | 0 | 0 | 0 | |
| **4th hour** | | | | |
| • Score 0 | 37(74.0%) | 38(76.0%) | 38(76.0%) | 1.000 |
| • Score 1 | 8(16.0%) | 7(14.0%) | 7(14.0%) | |
| • Score 2 | 5(10.0%) | 5(10.0%) | 5(10.0%) | |
| • Score 3 | 0 | 0 | 0 | |
| **24th hour** | | | | |
| • Score 0 | 45(90.0%) | 46(92.0%) | 45(90.0%) | 1.000 |
| • Score 1 | 5(10.0%) | 4(8.0%) | 5(10.0%) | |
| • Score 2 | 0 | 0 | 0 | |
| • Score 3 | 0 | 0 | 0 | |

**Table 2: Comparison of incidence of cough in three groups of patients.**

| Cough | Group L (n=50) | Group K (n=50) | Group A (n=50) | P value |
|---|---|---|---|---|
| **2nd hour** | | | | |
| • Score 0 | 39(78.0%) | 40(80.0%) | 44(88.0%) | 0.215 |
| • Score 1 | 10(20.0%) | 7(14.0%) | 5(10.0%) | |
| • Score 2 | 1(2.0%) | 3(6.0%) | 1(2.0%) | |
| • Score 3 | 0 | 0 | 0 | |
| **4th hour** | | | | |
| • Score 0 | 40(80.0%) | 42(84.0%) | 41(82.0%) | 0.980 |
| • Score 1 | 6(12.0%) | 5(10.0%) | 6(12.0%) | |
| • Score 2 | 4(8.0%) | 3(6.0%) | 3(6.0%) | |
| • Score 3 | 0 | 0 | 0 | |
| **24th hour** | | | | |
| • Score 0 | 48(96.0%) | 48(96.0%) | 47(94.0%) | 1.000 |
| • Score 1 | 2(4.0%) | 2(4.0%) | 3(6.0%) | |
| • Score 2 | 0 | 0 | 0 | |
| • Score 3 | 0 | 0 | 0 | |

Incidence of patients without cough exceeded those with cough in all the three groups. At the end of 24 hours we found only few patients having minimal cough [ L (4%), K(4%) and in A(6%)], but there were no patients having moderate or severe cough and this was statistically insignificant (Table 2).

**Table 3: Comparison of incidence of hoarseness in three groups of patients.**

| Hoarseness | Group L (n=50) | Group K (n=50) | Group A (n=50) | P value |
|---|---|---|---|---|
| **2nd hour** | | | | |
| • Score 0 | 50(100.0%) | 50(100.0%) | 50(100.0%) | 1.000 |
| • Score 1 | 0 | 0 | 0 | |
| • Score 2 | 0 | 0 | 0 | |

| | | | | |
|---|---|---|---|---|
| • Score 3 | 0 | 0 | 0 | |
| **4th hour** | | | | |
| • Score 0 | 47(94.0%) | 48(96.0%) | 48(96.0%) | 0.089 |
| • Score 1 | 0 | 0 | 0 | |
| • Score 2 | 0 | 2(4.0%) | 2(4.0%) | |
| • Score 3 | 3(6%) | 0 | 0 | |
| **24th hour** | | | | |
| • Score 0 | 50(100.0%) | 50(100.0%) | 50(100.0%) | 1.000 |
| • Score 1 | 0 | 0 | 0 | |
| • Score 2 | 0 | 0 | 0 | |
| • Score 3 | 0 | 0 | 0 | |

Table 3 shows the distribution of patients according to reported incidence of hoarseness. At the end of 2 hours there were no patients who had hoarseness. At the end of 4 hours there were 3 patients who had grade 3 hoarseness in Lignocaine group and 2 patients had grade 2 hoarseness in ketamine and Aspirin group. This was statistically significant.

## Discussion:

Sore throat, cough and hoarseness following endotracheal intubation remains a problem for many patients after surgery. Although a minor complication, it contributes to postoperative morbidity and patient dissatisfaction [14]. This study was designed to compare the local effects of lignocaine, ketamine and aspirin in preventing postoperative sore throat, cough and hoarseness.

Brimacombe J et al [15] explained that pressure exerted by the tracheal tube cuff on the mucosa may exceed capillary perfusion pressures and is a major cause of morbidity in intubated patients. Jensen PJ et al [16] found that frequency and severity of postoperative sore throat after short-term intubation was significantly greater after the use of low-pressure, high-volume cuffs, than after the use of a mask or of high-pressure, low-volume cuffs.

The incidence of sore throat in the lignocaine group is low when compared with the study done by Soltani HA et al [3], where they evaluated the efficacy of various ways of Lidocaine application in reducing postoperative sore throat and cough. This difference could be attributed to subjective feeling and size of the study group. The incidence of sore throat in ketamine group is compared with the study conducted by Rudra A,et al [17] where they compared the effectiveness of Ketamine gargle with placebo in preventing POST after endotracheal intubation. POST was graded at 4, 8 and 24 hours after operation on a four-point scale (0-3). They observed that incidence of POST at 4, 8 and 24 hours was 40%, 35% and 25% respectively. This result may be due to difference in the sample size. POST incidence in the Aspirin group was similar to the findings by Agarwal A et al [14].

Soltani HA et al [3] explained that postoperative cough is due to irritation of respiratory mucosa by ETT. It seems reasonable, therefore, to consider targeted application of local anesthesia to the mucosa in contact with the ETT as a method of increasing ETT tolerance. They evaluated the

number of coughs per patients and found that the frequency of cough in the recovery room was 64.4% in Lignocaine group.

Sumathi PA, et al [8] compared the local effects of Betametasone gel and Lidocaine jelly in prevention of postoperative cough and found that in the first 24hr after surgery incidence of postoperative cough was 6% in Betametasone gel and 40% in Lidocaine jelly. In our study the overall incidence of postoperative cough in the first 24hr after surgery was 46%.

Although there has been many studies conducted showing the effectiveness of Lignocaine in reducing the incidence and severity of postoperative cough and hoarseness, but there is no study showing the efficacy of Ketamine and Aspirin with respect to postoperative cough and hoarseness. Thus we have compared the effect of topical application of Ketamine, and Aspirin in prevention of postoperative cough and hoarseness. We found that in Ketamine group [14%,10% 4%] patients had minimal or scratchy cough and moderate cough [6%,6% 0%] at $2^{nd}$ ,$4^{th}$ and $24^{th}$ hourly respectively. However none of the patient developed severe grade of cough during the 24 hour period.

Whereas in Aspirin group incidence of minimal or scratchy cough was [10%, 12% 6%], moderate cough [2%, 6% 0%] at $2^{nd}$, 4th and $24^{th}$ hourly respectively and none of the patients had severe grade of cough.

None of our patients complained of hoarseness at $2^{nd}$ hour in all the 3 groups. But at $4^{th}$ hour in Lignocaine group we noticed hoarseness in 3(6%) patients at the time of interview whereas in Ketamine and Aspirin group 2(4%) patients in each group reported symptoms of change in voice by themselves.

Factors like damage to arytenoids cartilage, laceration or granuloma of the mucosa of upper respiratory tract and cord paralysis may result in hoarseness and some studies have tried to identify the causative factors.

Ayoub CM et al [13] studied the effect of topical steroids (Betamethasone 0.05%) in decreasing the sore throat, hoarseness and cough after tracheal intubation and found that application of Betamethasone 0.05% to the portion of ETT comes in contact with the posterior pharyngeal wall, vocal cords and trachea. This reduces local edema and inflammation which helps to reduce incidence of postoperative hoarseness.

In conclusion, our study demonstrates that gargling with Ketamine, Aspirin and topical application of 10% Lignocaine spray over laryngopharyngeal structures prior to intubation are equally effective in reducing the incidence and severity of postoperative sore throat, cough and hoarseness for the first 24 hours following extubation without causing any drug related side effects.

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