

## Efficacy of Ketamine Soaked Pharyngeal Pack for Prevention of Sore Throat Following Oro-Nasal Surgeries in Paediatrics

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### Abstract

**Background and Aim:** Post operative sore throat has reported incidence of upto 62% following general anaesthesia. The incidence in paediatric anaesthesia is variable, and the etiology is unclear. Many methods have been used to mitigate postoperative sore throat in paediatrics. The aim of the current study was to evaluate the efficacy of Ketamine soaked pharyngeal pack in preventing post operative sore throat with probable advantage of prolonged contact with mucosa, thereby producing sustained drug release at the site of action.

**Methods:** This is a prospective randomized control study in 70 ASA1 or ASA2 patients undergoing oro-nasal surgeries. Group K (n=35) received Ketamine soaked pharyngeal pack (1mg/Kg) and group N (n=35) received normal saline soaked pharyngeal pack intra operatively. We compared post-operative sore throat, dysphagia, observational pain scores and hemodynamic variables in both the groups

**Results:** Post-operative sore throat, dysphagia and observational pain score were comparatively less in group K compared to group N (p<0.05). Hemodynamic profile were comparable in both groups with no side effects.

**Conclusion:** Ketamine soaked pharyngeal pack at the dose of 1mg/kg, reduced the incidence of post-operative sore throat and dysphagia with minimal side-effects compared to normal saline soaked pharyngeal pack in paediatrics. It also reduced the requirement of post operative analgesia.

**Keywords:** Ketamine; Pharyngeal pack; Postoperative sore throat; Dysphagia and Observational pain score.

### Introduction

Adenotonsillectomy and palate surgeries are among the most commonest oro-nasal surgeries done in paediatric patients.<sup>1</sup> Added to the post-surgical pain is the post-operative sore throat which occurs in 21-65% of patients receiving general anaesthesia.<sup>2</sup> Post-intubation soreness is rated as 8<sup>th</sup> most common adverse effect in the post-operative period.<sup>3</sup> Pharyngeal packs which are commonly used in oro-nasal surgeries also contribute to increase in the incidence of post-operative sore throat.

Pharmacological and non-pharmacological intervention have been used to attenuate post-operative sore throat. Careful airway instrumentation, smaller sized ET tube, lubricating ET tube with jelly, gentle suctioning, reducing intra cuff pressure are some among non-pharmacological methods.

Pharmacological measures include nebulized ketamine<sup>2,3,12</sup>, dexamethasone<sup>9</sup>, MgSO<sub>4</sub><sup>21</sup>, beclomethasone inhalation and gargling with azulene sulfonate, aspirin, benzylamine hydrochloride and licorice. Intracuff administration of alkalized lignocaine has also been used.

### How to cite this article:

Sandhya K, Shilpa Nijalingappa Bingi / Efficacy of Ketamine Soaked Pharyngeal Pack for Prevention of Sore Throat Following Oro-Nasal Surgeries in Paediatrics/Indian J Anesth Analg. 2021; 8(3): 385-390.

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The inotropic glutamate receptors N-methyl-D-aspartate (NMDA), alpha amino-3 hydroxyl-5 methyl-4 isoxazol -eprapionic acid, and the kainite receptors are found in the CNS as well as the peripheral nerves. Activation of these receptors results in nociceptive behaviours and contribute to inflammatory pain. Peripherally administered NMDA receptors antagonists are involved in anti-nociception.<sup>4</sup>

Ketamine<sup>4,5,11,13</sup> -a NMDA receptor antagonist is involved in anti-nociception and anti-inflammatory cascade by reducing nuclear factor beta(B)activity and tumour necrosis factor alpha production.<sup>4,5</sup>

No studies exists in the literature, where drug soaked pharyngeal pack have been used for the prevention of POST in the paediatric age group. Drug soaked pharyngeal pack has the probable advantage of prolonged contact with mucosa, there by producing sustained drug release at the site of action.

## Materials and Methods

After approval from the institutional ethical committee and a written informed consent, a prospective randomised control study was conducted in 70 patients, belonging to American Society of Anaesthesiologists Classes I or II, aged between 6-15 years posted for elective oro-nasal surgery. Exclusion criteria included patients refusal, allergy to study drugs, pre-op upper respiratory tract infection and psychiatric illness, anticipated difficult airway, attempts at intubation > 3 and history of head injury.

Patients were allocated into 2 groups using a computer generated randomization list to receive either pharyngeal pack soaked in Ketamine 1 mg/kg diluted in 15 ml normal saline (Group K) or Throat pack soaked in 15 ml normal saline (Group N). The length of throat pack was standardized to 40-60 cm (based on a pilot study)and was prepared by OT technician.

All patients were evaluated preoperatively on the previous day of surgery. On the day of surgery, an intravenous line was secured. On arrival in the operating room, monitors like automated non-invasive blood pressure (NIBP), pulse oximetry, an electrocardiogram was attached to the patient in operation theatre and base line parameters like heart rate (HR), systolic blood pressure(SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP) were noted. Pre-medication done with Inj Glycopyrrolate 0.01 mg/kg iv, Inj Midazolam 0.1mg/kg iv and Inj Fentanyl 2 mcg/

kg iv. Induction was performed with Propofol 2 mg/kg iv and Inj Vecuronium 0.1mg/kg iv. Mask ventilation with oxygen performed for 3 min along with isoflurane. Laryngoscopy and intubation was done by an experienced anaesthesiologist using appropriate sized cuffed endotracheal tube and was fixed after confirming bilateral equal air entry by auscultation and end tidal capnography.

Throat pack soaked in Ketamine (1mg/kg) in 15 ml normal saline (Group k) or plain Normal saline (15 ml) (Group N) was used to pack the space around the tube under vision using Magill's forceps. Cuff pressure was measured and was maintained between 15-25 cm H2O. Anaesthesia was maintained with oxygen 50% and air 50% and isoflurane 1-2% and Inj Vecuronium 0.02 mg/kg iv for maintenance of muscle paralysis. Isoflurane was turned off at the last suture. All patients received Inj Paracetamol 2mg/kg intravenously for analgesia. Rescue analgesia Inj Fentanyl 0.5 mcg/kg was used. At the end of the surgery, reversal done with Inj Glycopyrrolate 0.01 mg/kg iv and Neostigmine 0.05 mg/kg iv. Throat pack was removed and extubation performed after gentle oropharyngeal suctioning under vision using Yankaver tip. Attempts at intubation, size of ET tube, cuff pressure of tube and hemodynamic parameters were monitored and recorded .

Patient was followed up at 0 hr, 2<sup>nd</sup> hr, 6<sup>th</sup> hr, 12<sup>th</sup> hr and 24<sup>th</sup> hr in the postoperative period. The patient, Anaesthesiologist intubating and following up the patient were blinded to the procedure. Post-operative pain was assessed using observational pain score (OPS). If the score was >4, rescue analgesia in the form of injection fentanyl 0.5µg/kg was administered. The time at which the First rescue analgesia was given was noted and the total consumption of rescue analgesia in first 24 hours was recorded.

Severity of sore throat was graded and recorded as none, mild, moderate and severe (fig 13). Post-operative dysphagia were noted as present/absent, while post-operative pain was assessed using observational pain score (fig 14).

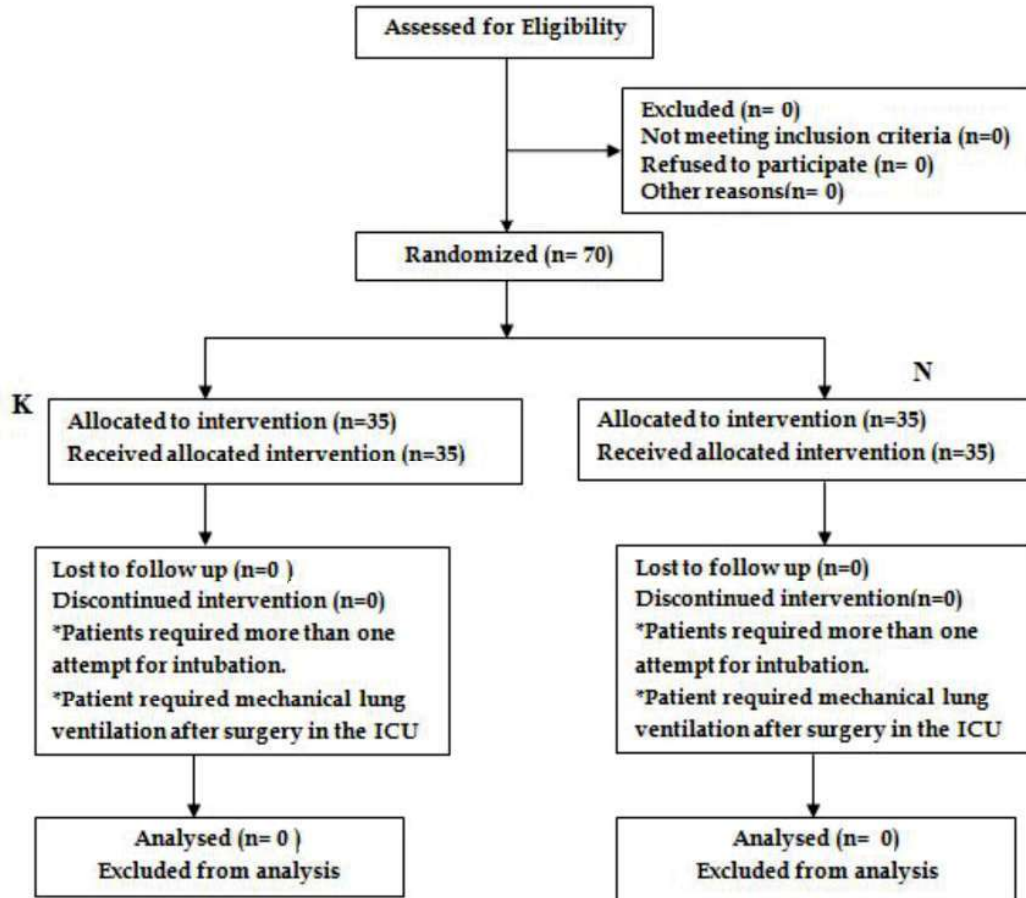
Increased oral secretions and post-operative disorientation were the side effects noted .

## Statistical Analysis

Statistical analysis was done using the computer statistical software system, SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). Numerical data were analysed using Student's ttest. Categorical data were analysed by Chisquare test or fisher's exact

test as appropriate. Results were expressed as mean  $\pm$  standard deviation, number or percentage (%).

Results were considered statistically significant if  $P < 0.05$ .



**Study Design**

**Table 1:** Grading Severity of Post Operative Sore Throat 9.

Grade	Severity
1	Mild-No sore throat at any time since the operation
2	Minimal-patient answered in the affirmative when asked about sore throat
3	Moderate-patient complained of sore throat on his/her own
4	Severe-patient is in obvious distress.

**Dysphagia**

0	Absent
1	Present

**Table 2:** Pain Scoring Table <sup>11,12</sup>

Observational pain scores (OPS)

<b>Crying</b>	
None	0
Consolable	1
Inconsolable	2
<b>Movement</b>	
None	0
Restless	1
Thrashing	2
<b>Agitation</b>	
Asleep or calm	0
Mild	1
Hysterical	2
<b>Swallowing secretions</b>	
Normal	0
Uncomfortable	1
Unable	2
<b>Complaints of pain</b>	
Asleep or none	0
Cannot localize	1
Localize	2

**Results**

The mean age in Group K was  $9.49 \pm 2.38$  and in GROUP N was  $9.97 \pm 2.66$ .

The mean gender (M:F) in Group K was 18:17 and in Group N was 23:12.

The mean body weight in Group K was  $32.40 \pm 5.22$  and in Group N was  $30.17 \pm 6.46$ .

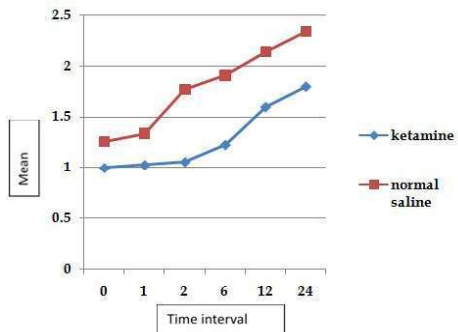
The mean BMI in Group K was  $17.91 \pm 1.89$  and in Group N was  $15.82 \pm 2.59$ .

The mean duration of surgery in Group K was  $125.68 \pm 31.89$  and in Group N  $127.42 \pm 31.39$ .

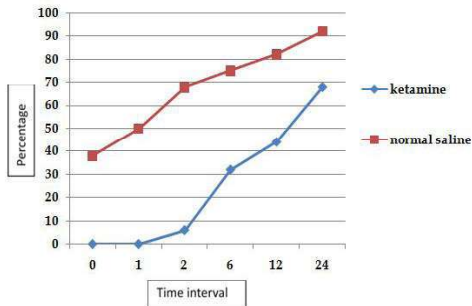
The demographic data of the patients and duration of surgery were comparable in both the groups. The attempts at intubation, ET tube size and Cuff pressure distribution were comparable in both the groups.

The total dose of consumption of rescue analgesia was lower in Group K than in Group N ( $23.86 \pm 23.89$  V/s  $60 \pm 21.07$ ,  $p < 0.05$ ). In Group K, 45% of patients required first dose of analgesia at 720 min while 40% in Group N required at 360 min, ( $p < 0.05$ )(Fig 4).

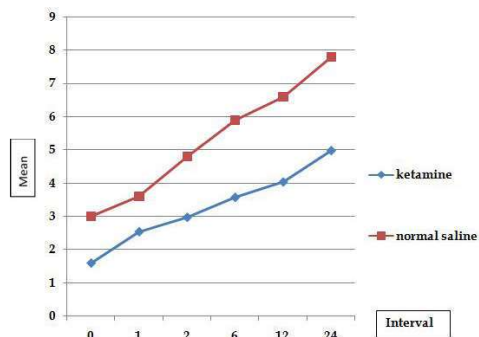
Group K experienced lower post operative sore throat (Fig 1) and observational pain scores (Fig 3) than Group N ( $p < 0.05$ ). The percentage of post operative dysphagia (Fig 2) was lower in Group K than Group N.



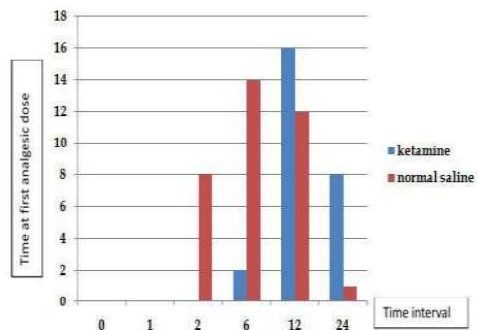
**Fig. 1:** Mean post op sore throat score was low in ketamine group compared to saline group.



**Fig. 2:** Percentage of post op dysphagia was low in ketamine group compared to saline group.



**Fig. 3:** Mean post op observational pain score was low in ketamine group compared to saline group.



**Fig. 4:** 45% of patients in ketamine group required analgesia at 720 min while 40% in ns required at 360 min.

there were no significant changes in haemodynamic parameters in both the groups and no significant side effects were noted.

**Discussion**

Our study shows that Ketamine soaked pharyngeal pack was efficacious in preventing post operative sore throat in paediatrics with no side effects.

Postoperative sore throat is common complaint in the post operative period.<sup>7,13,14</sup> Tracheal intubation is a foremost cause of trauma to the airway mucosa, resulting in postoperative sore throat (Post) with reported incidence of 21–65%.<sup>15</sup> It can lead to dissatisfaction and discomfort after surgery and can delay a patient’s return to normal routine activities. Many factors can contribute to postoperative sore throat and the incidence has been found to vary with the method of airway management, female gender<sup>16</sup>oro-nasal surgeries, inappropriate sized endotracheal tube<sup>17</sup> and cuff pressures.<sup>18</sup>

The placement of a protective pharyngeal pack (throat pack) following tracheal intubation is common during ear, nose and throat (ENT) and oral surgery. It is commonly believed that pharyngeal packing not only helps in absorbing most of the blood from the surgical field and provides physical barrier to the leakage of blood into the aero digestive

passages. The trauma of placing a pharyngeal pack is associated with postoperative sore throat, injury to the pharyngeal plexus and swelling of the tongue.<sup>18,19</sup>

Myles et al reported that women were almost 1.5 times more likely to develop sore throat in post operative period. In our study, distribution among gender were comparable in both the groups.<sup>16</sup>

Ahmed et al in his study concluded that the method used for airway management has the strongest influence on the incidence of sore throat. Out of 312 patients interviewed, 81(26%) patients suffered with sore throat postoperatively. Of them 28% of patients with endotracheal intubation (ETT) and 3.5% of patients with laryngeal mask airway had a sore throat.<sup>20</sup> The method of airway management in our study was using endotracheal tube for intubations, which were comparable in both the groups.

Jaensson et al in his study stated that use of smaller sized ET tube alleviated sore throat.<sup>17</sup> In our study, ET tube size distribution among both the groups were comparable.

Karbasforushan A et al divided 140 patients into two groups, where one group was managed with pharyngeal pack and the other without pharyngeal pack. They concluded that pharyngeal pack increases severity of sore throat when leaving recovery room and discharging hospital.<sup>21</sup> Our study used pharyngeal pack as mode of drug delivery to the site of action.

Erhan ÖL et al preferred ketamine in post tonsillectomy for analgesia in sub anaesthetic doses as it has both central and peripheral action unlike local anaesthetics, and it lacks side effects of opioids being nausea, vomiting, respiratory depression, constipation and sedation.<sup>22</sup> In our study, we used ketamine at the dose of 1mg/kg. Systemic absorption of ketamine were not measured, yet the haemodynamics in ketamine group were comparable in Group K and Group N, suggesting potent topical ketamine effect.

Canbay et al, did study using topical 20mg ketamine and 20mg morphine over tonsillar fossae in children aged between 3 -15yr old post operatively in tonsillectomy patients and found topical administration have longer effective analgesia time.<sup>23</sup>

Mostafa et al in his study, compared 3 groups 6-16 yr old, 36 in each group. They were nebulized preoperatively with magnesium sulphate 40mg/kg (Group M), ketamine 1mg/kg (Group K) and dexamethasone 0.16mg (Group D). It was found that

nebulization Ketamine in the dose of 1mg/kg was effective in paediatric in preventing postoperative sore throat.<sup>6</sup>

The limitation of the current study was that excessive soft tissue handling during surgery and experience of the surgeon which would have contributed to postoperative soreness were not assessed in the study.

**Conflict of Interest:** Nil

## Conclusion

Pharyngeal pack soaked with Inj Ketamine of 1mg/kg was efficacious in preventing postoperative sore throat following oro-nasal surgeries in paediatrics. It also reduced the requirement of postoperative analgesia with minimal hemodynamic instability.

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