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EFFECT OF KETAMINE NEBULISATION ON POSTOPERATIVE SORE THROAT

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ABSTRACT **Background :** Surgeries done under General Anaesthesia commonly involve Endotracheal intubation of the patient, which causes mucosal injury of the airways which may manifest as Post-Operative Sore Throat (POST). This study mainly aims at evaluating the effectiveness of Ketamine nebulisation to reduce the incidence of POST.

Materials and Methods: A prospective, non-randomised, placebo-control and single blinded controlled study was conducted. 50 patients were enrolled in this study, of either sex, age group between 20-60 years and American Society of Anaesthesiology (ASA) physical status I & II. Study was conducted after getting written and informed consent. Patients were divided into 2 groups:- Group K(Ketamine nebulisation receiving group) and Group S(Saline nebulisation receiving group). After the completion of surgery, patients were shifted to Post Anaesthetic Care Unit(PACU) and POST grading was done at 0,2,4,6,12 and 24 hours after extubation. POST grading was done on a 4 point scale.

Results: The incidence of POST was 25%; 13 patients developed POST. 3 patients (12%) in Group K and 10 patients (33%) in Group S had POST at some point of study. The incidence of POST in group S was significantly higher than in group K at 2nd and 4th hour post operatively.

Conclusion: Ketamine nebulisation in the pre-operative period significantly reduces the incidence and severity of Post Operative Sore Throat (POST) with no systemic side effects.

KEYWORDS : Ketamine, nebulization, post-operative sore throat

INTRODUCTION

Post-operative sore throat (POST) is a well-recognized complication that remains unresolved in patients undergoing tracheal intubation for general anaesthesia (GA). The incidence of POST is between 21-65% in General anaesthesia with endotracheal tube.[1]. Though it is considered as a minor complication, it causes significant post-operative morbidity, patient agony, patient dissatisfaction and makes them feel disappointed with the experience of recovery from general anaesthesia. Patients with POST have a longer stay in the post-anaesthesia care unit, ambulatory care unit, and were discharged later from the facility compared with those who did not complain of POST. Reducing the severity and incidence of POST should decrease the length of stay and cost of care, and improve patient satisfaction.

There are many pharmacological and non-pharmacological methods that are being used to reduce the POST. One of the pharmacological method used is Ketamine gargling and nebulisation.[2].

It is noted that N-methyl-d-aspartate (NMDA) has a role in nociception and inflammation. Ketamine is an N-methyl-D-aspartate (NMDA) receptor antagonist, has been used for decreasing POST because of its anti-nociceptive and anti-inflammatory action, both in gargle and nebulised form. Ketamine nebulisation prevents bitter taste of ketamine gargle, requires lesser volumes and not require much cooperation from patient.

The main objective of this study was to evaluate the role of nebulised ketamine for attenuation of POST in patients undergoing surgeries under GA with tracheal intubation.

MATERIALS AND METHODS

After obtaining approval by the Institute Ethics Committee of our hospital and written informed consent, 50 patients were considered for the study. The major inclusion criteria included patients of ASA physical status I-II, in the age group of 20 and 60 years, of either sex, undergoing elective surgery in supine position under GA lasting for up to 2hrs. Patients with a history of pre-operative sore throat, oral surgeries, asthma, chronic obstructive pulmonary disease, head and neck surgeries, Mallampati grade >2, known allergies to study drug, recent non-steroidal anti-inflammatory drug medication, and those who required more than one attempt at intubation were excluded from the study. It is a prospective, non-randomised, placebo-control and single blinded controlled study. The study was conducted over a period of 5 months- January 2019 to May 2019.

On arrival to the operation theatre, minimal mandatory monitors- Electrocardiography (ECG), non-invasive blood pressure, pulse oximetry and end tidal Carbon dioxide (CO2) were connected The patients would be divided into 2 groups- Group K(Ketamine nebulisation receiving group) and Group S(Saline nebulisation receiving group).

The patients in the Group K, on arrival inside the operation theatre, after monitors connected, received ketamine 50 mg (1.0 ml) with 4.0 ml of the saline nebulisation for 15 minutes[5]. Patients in both the group received nebulisation through nebulisation mask connected to wall-mounted oxygen driven source (8 L, 50 psi).

After adequate pre-oxygenation, General Anaesthesia (GA) was then induced with intravenous (IV) fentanyl 2 mcg/kg and IV propofol 2 mg/kg. Atracurium 0.5mg/kg IV was the muscle relaxant used. After 3 minutes of administration of the muscle relaxant, a gentle laryngoscopy lasting <15 seconds , was done by an experienced anaesthesiologist using a Macintosh laryngoscope blade (size 3 or 4). A sterile single-lumen cuffed polyvinyl chloride tracheal tube with an internal diameter of 7–7.5 mm for women and 8–8.5 mm for men was used to intubate the trachea. The endotracheal tube cuff was inflated until no air leakage could be heard. Peak airway pressure of 20-25 cm H_2O was maintained throughout the procedure. GA was maintained with O2:N2O 50%:50% and sevoflurane. Intermediate doses of atracurium 0.1mg/kg IV was used to maintain muscle relaxation. IV Ondansetron 4 mg was administered 30 min before the end of surgery. 1g Paracetamol was the analgesic used intra-operatively, thereafter 6th hourly in the postoperative period.

At the end of surgery, gentle suctioning of the oropharynx was done, using a soft disposable suction catheter and neuromuscular block was reversed with IV neostigmine 50 mcg/kg and glycopyrrolate 10 mcg/kg. The endotracheal tube was removed when the patient regained complete consciousness and assessment of adequate muscle power.

Sore throat assessment and hemodynamic recording were done at pre-nebulisation (baseline parameters before nebulisation of patient). After surgery, the POST was assessed at immediate recovery (0 hr) and

2, 4, 6, 8, 12 and 24 h post-operatively[4].

POST was graded on a four-point scale (0–3):
0 = no sore throat;
1 = mild sore throat (complains of sore throat only on asking);
2 = moderate sore throat (complains of sore throat on his/her own);
3 = severe sore throat (change of voice or hoarseness, associated with throat pain) [2].

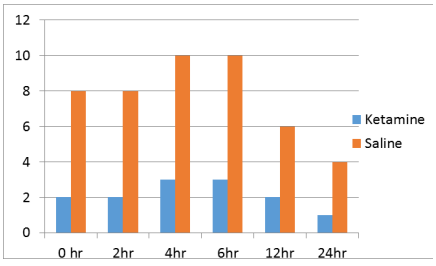
The primary objective of study was to measure the incidence of POST at 4 h post-operatively in adult patients undergoing surgery while the secondary objective was to evaluate of side-effects including nausea, vomiting, cough, dry mouth, hallucinations and respiratory depression in both the groups.

RESULTS

There was no significant difference between the 2 groups with respect to age, body weight, sex distribution, ASA grading and duration of surgery was seen. Surgeries in both group included abdominal, urological, superficial breast surgery (fibroadenomas), ear and orthopaedic surgeries.

CHARACTERISTICS	GROUP K (KETAMINE)	GROUP S (SALINE)
AGE	38.9	35.6
SEX (MALE/FEMALE)	12/13	12/13
WEIGHT	69.67	67.88
DURATION OF SURGERY	88.22	90.18

In this study, the incidence of POST was 25%; 13 patients developed POST. 3 patients(12%) in Group K and 10 patients(33%) in Group S had POST at some point of study.[p value 0.02- p value <0.05 considered as significant]. The incidence of POST in group S was significantly higher than in group K, at 2nd and 4th hour post operatively.



At 2nd hour post-extubation, 2 patients in Group K and 8 patients in Group S developed POST, (p value 0.033) which is statistically significant.

Similarly, at 4th hour post-extubation, 3 patients in Group K versus 10 patients in Group S developed POST, which was also statistically significant(p value 0.024) Similar incidence of POST was noted in 6th hour after extubation.

The severity of POST was also assessed in both the groups. The incidence of POST Grade 2 was observed to be higher in Group S as compared to Group K, which was statistically significant.

TIME (HOURS)	POST GRADE	GROUP K	GROUP S
0	0	23	17
	1	1	4
	2	1	4
2	0	23	17
	1	2	5
	2	0	3
4	0	22	15
	1	3	6
	2	0	4
6	0	22	15
	1	3	6
	2	0	4
12	0	23	19
	1	2	5
	2	0	1
24	0	24	19
	1	1	6
	2	0	0

No adverse effects were noted in patients of both the group.

DISCUSSION

POST is probably caused by injury to the pharyngeal mucosa during laryngoscopy, resulting in an aseptic inflammatory process or irritation to the tracheal mucosa produced by endotracheal tube cuff or it can also be due to injury to tissues during intubation and extubation.

In previous studies, the incidence of POST was 21%–65%. In this study we observed 25% incidence. The incidence in Ketamine group was 12% against 33% in saline group Among nonpharmacological methods, small sized endotracheal tubes (ETTs), smooth laryngoscopy and intubation, cuff design minimizing cuff pressure, lubricating the tubes with water soluble jelly, gentle oropharyngeal suctioning and extubation when the cuff is fully deflated have been reported to reduce incidence of POST.

Other pharmacological agents used earlier, include aspirin gargles, benzydamine hydrochloride (BH) gargles, transdermal ketoprofen, lignocaine 10% spray, IV dexamethasone, beclomethasone gel on tracheal tube and magnesium lozenges, MgS04 nebulisation.[3].

Ketamine is a NMDA receptor antagonist, its main site of action in the CNS, and parts of the limbic system, while its use via nasal route, gargle, and rectal route suggests its peripheral effect. Experimental animal studies have shown a protective effect on airway inflammatory injury with ketamine nebulisation. In an earlier study, pre-operative nebulisation with 3.0 ml (225 mg) of isotonic magnesium sulphate, also a NMDA receptor antagonist showed a decrease in incidence and severity of POST at 0, 2, 4 and 24 h post-operatively.

The mechanism of action was probably due to the topical effect of ketamine nebulisation which attenuated the local inflammation and also due to its peripheral analgesic action. Literature supports the topical effect of ketamine via its NMDA-antagonistic action and anti-inflammatory effect .

Chan *et al*., in his study using ketamine gargle for reducing POST, measured serum ketamine levels. With such low levels of serum ketamine, the systemic absorption of ketamine was unlikely to have role in the attenuation of POST and rather suggested a topical effect of ketamine.[6].

The disadvantages of ketamine gargle include bitter taste, larger volumes required, risk of aspiration if accidentally swallowed and patient cooperation.

In this study, wall mounted oxygen driven nebulisation is given. While doing so the liquid is broken up into droplets by the compressed air.

Largest droplets are filtered within the nebulizer, but larger particles (10–25 μm) mostly deposit in mouth and throat and those of 5–10 μm diameter get deposited in a 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.

CONCLUSION

For a smooth anaesthesia experience, this little big problem of Post operative sore throat should not be overlooked. Nebulisation is well tolerated and accepted by patients. Ketamine among its many other beneficial effects, its reduction in incidence and severity of post operative sore throat when given via nebulisation, could be carried out whenever feasible.

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