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Original Research Paper

Anesthesiology

USE OF PREOPERATIVE KETAMINE VS BETAMETHASONE NEBULIZATION TO ATTENUATE POST OPERATIVE SORE THROAT AFTER SURGERY UNDER GA: A COMPARATIVE STUDY

Dr Maruti Gupta MD, Asst Prof, Dept of Anaesthesiology, Command Hospital Central Command, Lucknow-226002

Dr RDS Ahluwalia* MD, Consultant, Dept of Anaesthesiology and Critical Care, Command Hospital, Lucknow-226002 (UP) *Corresponding Author

ABSTRACT

Background: Post Operative Sore Throat (POST), though trivial, is a common and agonising post operative complication usually seen following placement of a definitive airway device. Many pharmacological and non pharmacological methods have been tried to reduce the incidence of POST. Numerous studies have been conducted to judge their efficacy for its prevention and treatment. In this study two such pharmacological methods have been compared.

Methods: This observational study was carried out in a tertiary care hospital, on 150 patients undergoing various surgeries under general anaesthesia with the use of a definitive airway (Endotracheal Tube). The patients were divided into three groups (Gp B, K & C) of 50 each nebulised with Betamethasone, Ketamine & Saline respectively. Sore throat was assessed on a scale of 0-3 at different times both preoperatively and postoperatively in all the groups. The observers were blinded to the group allotment. They were compared for the onset and incidence of sore throat to determine the best modality for its prevention and treatment.

Results: The three study groups were compared statistically to ascertain the onset and incidence of POST in patients following intubation for surgery under general anaesthesia. The Student ANOVA analysis was used to compare the three groups and it was found that the incidence of POST was lowest after nebulisation with Betamethasone. Nebulisation with Ketamine gave some protection from POST but was not better than Betamethasone.

Conclusion: POST is a very common complication post tracheal intubation. The incidence of POST was found to be the least in Betamethasone Gp. It was lower in Ketamine Gp as compared to Control Gp, but was higher than Betamethasone Gp. The onset of POST was delayed the most by nebulisation with Ketamine but Betamethasone had a prolonged effect.

KEYWORDS : Post Operative Sore Throat, Betamethasone, Ketamine, Intubation

Introduction

Tracheal intubation is commonly performed during surgery for protection of airway and to provide positive pressure ventilation. Postoperatively, it may cause complications like hoarseness of voice, bronchospasm, laryngospasm, stridor, vomiting, sore throat etc. POST after tracheal intubation is a minor but very common complication1,2 and may cause discomfort to the patient which, at times can be very distressing. POST can be attributed to cuff design, cuff pressure, cuff material, duration of contact with the tracheal mucosa and volatiles used for anaesthesia.3,4 Moreover, some surgical factors such as duration of surgery, oral maxillofacial surgery, passage of Ryles tube and scopes in the oral cavity can aggravate it.

Many interventions have been tried to reduce the incidence of POST. Some of the non pharmacological methods include low pressure high volume cuffs, foam cuffs and use of smaller sized tubes.5,6 Many drugs have been used through different routes to bring comfort to patients of POST after general anaesthesia. Drugs like azulene sulphonate, liquorice, lidocaine, steroids and ketamine have been tried via oral, topical, intravenous and nebulised routes.7,8 Acting by different mechanisms, these drugs can have an additive effect as well. Steroids have a local anti inflammatory effect and Ketamine exerts some local analgesic effect.9 However, these agents can cause some systemic side effects when administered via different routes. The search for the ideal agent is still on and many studies have been carried out to compare their efficacy and side effects.10,11

The primary aim of this study was to compare the two standard methods adopted to reduce POST in patients undergoing surgery under general anaesthesia with tracheal intubation. Nebulisation with Ketamine or Betamethasone was compared with Saline nebulisation. The incidence and severity of sore throat were compared in the three groups.

Materials & Methods

This comparative study was carried out after approval by the Institutional Ethical Committee. Written informed consent was taken from all the patients after being explained about the procedure in detail, the night prior to the intervention. Patients between the age of 20-60 yrs in ASA Physical Status I & II were included in the study. Exclusion criteria for patients for the study are mentioned in Table 1. Patients were enrolled a day prior to the surgery. Only those patients who were anticipated to undergo a surgery of more than one hour duration were selected for the study. On the day of surgery patients were randomised into three groups (Gp B, K & C) with the help of computer-generated random number tables in opaque sealed envelopes prepared by an Anaesthesiologist who was not part of the study. The envelopes were opened and nebulisation solution was prepared according to group allocation. In Gp B, 1 ml (4mg) of Betamethasone mixed with 1 ml of Saline; in Gp K, 1 ml of Ketamine (50 mg) mixed with 1 ml of Saline and in Gp C, 2 ml of Saline were used for nebulisation. All the solutions were transparent and odourless. The patients were nebulised with the solution 15 minutes prior to surgery, for a duration of 10 minutes by the preoperative room nurse.

Table 1: Exclusion Criteria

• Ischemic Heart Disease
• Cerebrovascular Diseases
• Allergic Disorders
• Upper Respiratory Diseases
• GERD
• Hepatic and Renal Failure
• Hypertension
• Hyper/ Hypothyroidism
• Usage of drugs such as NSAIDS, β blockers, antihistaminics & steroids.
• More than two attempts at intubation
• Pregnancy
• Use of nasogastric tube or throat pack during surgery

After the nebulisation, patients were taken into the Operation Suite. Standard monitoring, i.e. Electrocardiography, Non invasive blood pressure, Pulse oximetry, Capnography, was carried out perioperatively. All subjects were pre-medicated with intravenous Inj Midazolam (40 µ/kg) and Inj Fentanyl (1 µg/kg). Inj Ondansetrone 4-6 mg and Inj Ranitidine 50 mg were given if

indicated for the case. Induction of anaesthesia was performed by Propofol (2 mg/kg), administered over 30 secs. After confirmation of positive mask ventilation, Inj Atracurium (0.5mg/kg) IV was given. Intubation was performed by a single expert Anaesthesiologist, after achieving an adequate depth of anaesthesia, using a Macintosh laryngoscope. An appropriate laryngoscope blade was selected for each patient according to the patient's body size. The airway was secured with an appropriate size cuffed endotracheal tube (tracheal tube size of 7.5 mm for women and 8.5 mm for men) which was optimally inflated using a cuff manometer. In both groups, anaesthesia was maintained with 40% Oxygen, 60% Nitrous oxide and volatile anaesthetics such as Sevoflurane (0.4-0.5 MAC). The neuromuscular block was reversed with Inj Neostigmine 50 µg/kg IV and Inj Glycopyrrolate 10 µg/kg IV while awaiting the return of spontaneous ventilation. On completion of surgery, trachea was extubated. During extubation, if a patient had excessive coughing, Inj lignocaine 1.5 mg/kg IV was administered as a rescue measure. Gentle suctioning of the oropharynx was carried out. All patients received humidified oxygen through a facemask after the surgery and underwent a similar hydration regimen (Ringer lactate solution was started in all patients before induction @ 2 ml/kg/h and was continued during the operation based on individual needs).

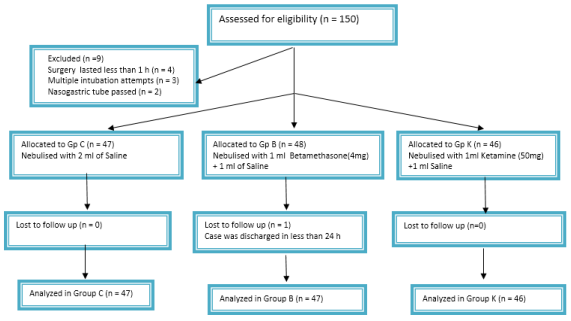


Figure 1: Consort flow diagram

Sore throat was assessed on a scale from 0-3 as mentioned in Table 2. The assessment of Sore throat was done Pre nebulisation, Pre induction, Post extubation at 4h, 8h, 12h and 24h. Other complications such as nausea, vomiting, hypertension, headache and hallucinations were recorded in the data sheet. Postoperative pain relief was achieved by Inj Paracetamol 1 gm IV 8 hourly. Data was collected and analysed.

Table 2: Post Operative Sore Throat Score

Table 2: Post Operative Sore Throat Score
0 – No sore throat
1 – Mild sore throat
2 – Moderate sore throat
3 - Severe sore throat

Results

Of the 150 patients assessed, nine got excluded and one case was lost to follow up (Figure 1). Demographic profile of the three sample groups was as shown in Table 3. The duration of surgery was noted to be slightly less in Betamethasone Gp. No other statistically significant difference was found.

Table 3: Demographic profile of the three sample groups

Group Demographic Parameter	Control Gp (n = 47)	Betamethasone Gp (n = 47)	Ketamine Gp (n = 46)
Age (yrs)	47.1 (10.7)	45.1(12.5)	45.4 (9.8)
Sex (M/F)	24 / 23	25 / 22	24 / 22
Height (cms)	168.89 (7.04)	164.57 (7.05)	164.69 (7.30)
Weight (kgs)	55.56(12.52)	58.67(13.31)	59.12 (11.78)
ASA Status I / II	39 / 8	40 / 7	39 / 7
Duration of surgery (min)	84.32	78.12	82.22

Various surgeries carried out in different groups are mentioned in Table 4

Table 4: Surgeries carried out

Sr. No.	Surgery	% of total cases in Gp C*	% of total cases in Gp B*	% of total cases in Gp K*
1	Laparoscopic Cholecystectomy	50	55	45
2	Laparoscopic Appendicectomy	6	9	5
3	Laparoscopic Ovarian Cystectomy	4	4	6
4	Total Abdominal Hysterectomy	11	7	8
5	Diagnostic laparoscopy & Proceed	5	4	3
6	Herniorraphy	9	5	9
7	Laminectomy	5	4	6
8	Genitourinary surgery	6	6	8
9	Others	4	6	10
	TOTAL	100 %	100%	100%

* percentages rounded off to nearest ones

The overall incidence of POST in post intubation cases in Control Gp was as high as 72 %, whereas in Betamethasone Gp and Ketamine Gp, it was 35% and 52% respectively. Further, it was observed that the incidence of POST in Betamethasone Gp (35%) was significantly lower at 4 -12 h post intubation than Ketamine Gp (52%) (Table 5). The duration of protection from sore throat was longer for Betamethasone Gp (POST time 2.4 h) than Ketamine Gp (POST time 3.2h) and Control Gp (POST time 9.5 h). The Ketamine Gp had side effect in the form of hallucinations in 15% of the cases. None were seen in Betamethasone Gp (Table 6). The cardivascular stability was better in Betamethasone Gp as seen in Charts 2 and 3.

Chart 1: POST Score Comparison

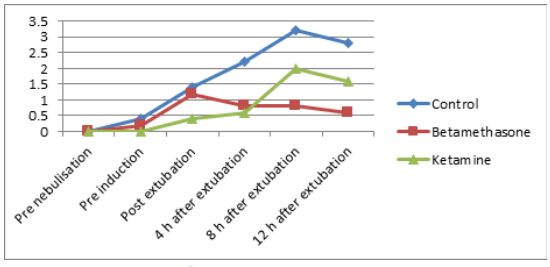


Chart 2: Mean Arterial Pressure Comparison

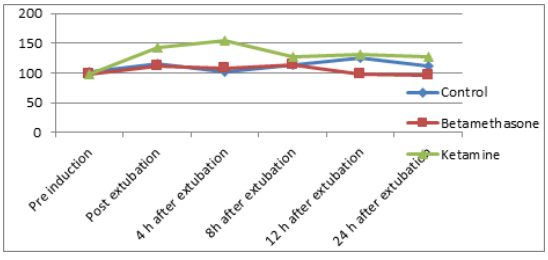
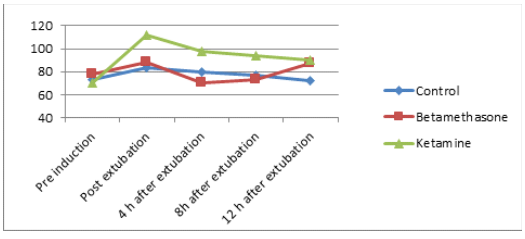


Chart 3: Heart Rate Comparison



In Chart 1 it is seen that POST scores are high in Control Gp and remain so all throughout the duration. In Betamethasone Gp the POST scores are more than Ketamine Gp initially but later on they decrease and remain significantly lower than Ketamine Gp. Overall, Betamethasone is a better medication for POST, having longer duration of action with minimal side effects but has a delayed onset

of action as compared to Ketamine. Ketamine is associated with effects on the cardiovascular system when administered to reduce POST.

Table 5: Assessment of Sore Throat in three groups

Event	Gp C	Gp B	Gp K
Onset of Sore Throat (avg time in h)	1.6	1.4	2.8
Duration of Sore Throat (in h)	9.5	2.4	3.2
Severity of Sore Throat (As per scale)	2.2	0.8	1.8

Table 6: Assessment of complications in three groups

Complications	Gp C	Gp B	Gp K
Nausea/Vomiting	7	6	7
Headache	2	3	4
Hallucinations	1	0	7
Dry mouth	4	4	3

Discussion

Sore throat is an ailment with different aetiologies and can be distressing at times. Fortunately, most sore throats are caused by a minor illness and resolve without medical treatment. Any inflammation of the oropharyngeal structures like tonsils, palate, uvula can result in sore throat. Injuries and irritants such as smoke, air pollutants, post nasal drip and GERD can also cause sore throat. Foreign body in the oropharynx is another important cause. Post intubation, the endotracheal tube in the oropharynx can act as an allergen and can be a cause of sore throat.14,15 Treating the underlying cause generally relieves the sore throat. Antibiotics, antiallergics, antihistaminics, steroids, pain killers, local anaesthetics, magnesium and soothing agents have been used.16,17 Alternative medicines such as slippery elm, liquorice root and Chinese herbs have been tried as well. The search for the ideal agent is still on and many studies have been carried out to compare various agents.

POST is a common complication of general anaesthesia. The factors resulting in a sore throat are: irritation and inflammation of the airway, trauma to pharyngolaryngeal mucosa, cuff design, contact of tracheal tube with vocal cords, pressure-induced tracheal mucosal capillary hypo perfusion and pressure over the posterior pharyngeal wall resulting in edema and mucosal lesions. Pharmacological agents used to reduce sore throat include aspirin gargles, benzydamine hydrochloride (BH) gargles, transdermal ketoprofen, lignocaine 10% spray, IV dexamethasone, beclomethasone gel on tracheal tube and magnesium lozenges.18,19,20All have been shown to reduce the incidence and severity of POST up to 24 h postoperatively. The use of Ketamine, a N-methyl-D-aspartate (NMDA) receptor antagonist is based on the local anaesthetic action of the drug rather than its general anaesthetic effect.21The mechanism of action is possibly the topical effect of ketamine nebulization which attenuates the local inflammation and also due to its peripheral analgesic effect. Betamethasone acts by its potent anti-inflammatory action on the oral mucosa. Corticosteroids reduce the synthesis of inflammatory mediators by inhibiting cyclo-oxygenase-2 during inflammation. They also produce prostaglandins and leukotrienes that inhibit the phospholipase A2 through production of calcium-dependent phospholipid-binding proteins.22

Gargling has an effect restricted to oral cavity only, however, may be associated with bitter taste of drugs and chances of aspiration due to large volume of solution.23 Nebulisation avoids such side effects. Administration of drugs, through any route, to reduce sore throat can cause systemic side effects of the drugs especially when given in large doses.

Conclusion

Post intubation sore throat is a very common phenomenon seen after general anaesthesia. Nebulisation with Ketamine or Betamethasone was found to reduce the incidence of sore throat in patients undergoing surgery post intubation under general anaesthesia. Betamethasone was found to have a delayed but prolonged effect whereas Ketamine provided an early and short duration effect. However, Ketamine was associated with more number of side effects than Betamethasone. None of the two drugs is ideal for prevention of POST but Betamethasone seems to be a better choice.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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