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Research Article

Post Operative Sore Throat : Incidence after nebulization with Ketamine, Lidocaine and Budesonide

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Abstract:

Post operative sore throat and hoarseness are common complications after endotracheal intubation. We conducted an experimental, randomized, double- blind study to compare the effectiveness of preoperative nebulisation with ketamine, budesonide and lignocaine in reducing the incidence and severity of post operative sore throat.

MATERIAL & METHODS

120 patients (aged 20-60 years) scheduled for elective surgery under general anaesthesia were enrolled. Preoperatively , patients were nebulized with ketamine (Group 1) , Budesonide (Group 2) , Lignocaine (Group 3) and distilled water (Group 4). Number of attempts required for intubation, duration of laryngoscopy and anaesthesia were recorded. Patients were evaluated post operatively at various time intervals for sore throat, hoarseness and cough, pain and signs of mucositis in laryngopharynx.

RESULTS

The incidence of sore throat at different time intervals was found to be least in ketamine group at 1 hr, by lignocaine at 24 hrs and budesonide at 48 hrs.. Lignocaine reduced cough at 1 and 24 hrs. Incidence of hoarseness was comparable in all the groups.

CONCLUSION

Nebulisation with lignocaine was efficacious in reducing cough , and ketamine reduced sore throat in early post operative period , whereas long term outcome was better with budesonide.

Key words: Endotracheal intubation, post operative sore throat, nebulization, ketamine, lignocaine, budesonide.
Level of Evidence : 1b

Introduction

A postoperative pharyngeal discomfort or post operative sore throat (POST) is like an unavoidable outcome of general anaesthesia following endotracheal intubation. Complaints range from a minor throat irritation to debilitating pain, inability to swallow and temporary voice changes. In a small number of cases, pharyngo-laryngeal injury may take months to recover and may even be permanent (1). Routine tracheal intubation for surgical procedures can result in pathological changes, trauma and nerve damage which may account for POST (2).

In most cases, it resolves spontaneously without specific treatment. In moderate to severe cases, it may be beneficial to treat pain and dysphagia by various methods. Various non-pharmacological and pharmacological trials have been used for attenuating POST with no proven single modality. The non pharmacological methods include smaller sized endotracheal tubes, lubricating the endotracheal tube with water soluble jelly, careful airway instrumentation, intubation after full relaxation, gentle esophageal suctioning, minimizing intracuff pressure and extubation when the tracheal cuff is fully deflated (3). The pharmacological methods include gargling and nebulization with various agents like ketamine, lignocaine, budesonide, beclomethasone and azulene sulphonate.

Nebulization is primarily oriented for safety and ease of administration to the patient in addition of the benefit of the drug reaching lower airways. During the use of nebulization, the liquid is broken up into droplets by the compressed air. The pneumatic nebulization method produces large particles (10-25 µm), which mostly deposit in mouth and throat and smaller particles(5-10 µm) diameter, deposit in a transition from mouth to airway (4).

Studies have been done in the past using ketamine, corticosteroids and local anaesthetics nebulization to attenuate POST, but none has compared them together. Hence, in this study, we aimed to compare the efficacy of preoperative nebulization with ketamine, lignocaine and budesonide for attenuating risk of POST at different time intervals.

Methods

After approval by the institutional Ethical Committee and written informed consent, 120 patients of American Society of Anaesthesiologists (ASA) physical status I–II, in the age group of 20 and 60 years, of either sex, undergoing surgery under GA requiring endotracheal intubation were included in our study and were nebulized with one of the study drugs 10 minutes before shifting to operation theatre. Group 1 received ketamine 50 mg (1ml) + Normal Saline (1ml), Group 2 received Budesonide 250 mcg (1ml) + Normal Saline (1ml), Group 3 received lignocaine 4% (40 mg) (1ml) + Normal Saline (1ml) and Group 4 received Distilled water (1ml) + Normal Saline (1ml). Patients enrolled for study were randomized according to computer generated numbers into four equal groups. Patients with a history of POST, oral surgeries, asthma, chronic obstructive pulmonary disease, pre existing cough or sore throat, oral and nasal surgeries, Mallampati grade >II, known allergies to study drug, nasogastric tube insertion, pregnant females, emergency surgeries requiring rapid sequence induction and surgeries in lateral and prone position were excluded from our study

The baseline values of heart rate (HR), systolic, diastolic and mean arterial pressure (SBP, DBP, MAP), oxygen saturation (SpO2), respiratory rate (RR), electrocardiograph (ECG), end tidal carbon dioxide concentration ($EtCO_2$) were recorded. Patients were induced by injection (Inj.) fentanyl 2mcg/kg iv, inj. Propofol 2mg/kg and neuromuscular blockade was achieved with inj. Vecuronium bromide 0.1 mg/kg. Laryngoscopy was performed by a skilled anaesthesiologist and the time of laryngoscopy and number of attempts were noted. Patients requiring more than two attempts were excluded from the study. Cuff pressures were measured at timely intervals of 20 minutes using a handelled Portex cuff manometer so as to keep intracuff pressure between 18-20 cm of H_2O. At the end of surgery, neuromuscular block was antagonized with a combination of inj. Neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. Gentle oral suctioning was done with a 12 F suction catheter under direct vision to avoid trauma to the tissues and to confirm that the clearance of secretions was complete. Ramsay sedation score was noted at the time of extubation and 1 hr postoperatively to assess the level of sedation (5). The patients were assessed for sore throat, cough and hoarseness at 1, 24 and 48 hrs postoperatively using assessment scale given by Harding CJ & McVey FK (6). Pain assessment was done using the visual analogue scale (VAS) (7). The patients were familiarised with the concept of visual analogue scale (VAS) for pain assessment with 0 = no pain and 10 = worst possible pain in pre anaesthetic checkup. Pain was classified as no pain (VAS=0), mild (1-3), moderate (4-6) and severe (7-10). The condition of laryngopharynx was assessed by an ENT surgeon on indirect laryngoscopy at interval of 1, 6 and 24 hrs using the signs of mucositis in laryngopharynx (8).

Statistics

On the basis of previous studies, evaluation of sample size with a power of (α=0.5, β=0.5) for comparison of quantitative and continuous data, a minimum of 30 patients in each group with a total minimum of 120 patients either male or female were included. Data was analyzed by standard statistical tests by software SPSS version 22. Results are presented as mean ± standard deviation (SD) for parametric data and as percentage for non-parametric data. Analysis of variance (ANOVA) was used to analyze the continuous data while Chi-square test was used for non-parametric data. Kruskal-Wallis H test was used to compare the subgroups taking median into consideration. Mann-Whitney test was used to compare the independent groups taking mean of sum of ranks into consideration.

A p value of <0.05 was taken as significant, <0.001 as highly significant.

Results

All the patients completed the study, and the results were analysed. Demographic profile in terms of age, weight, ASA physical status and intubation characteristics were comparable in all the groups

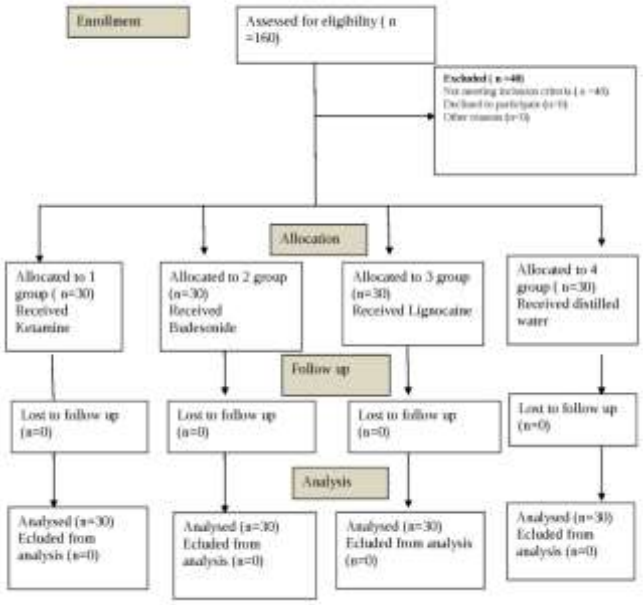


Fig. 1 Consolidated trials flow diagram

TABLE I : DEMOGRAPHIC PROFILE OF PATIENTS IN DIFFERENT GROUPS

Criteria	Group 1	Group 2	Group 3	Group 4	p value
Male:Female	25:5	26:4	22:8	23:7	0.555
ASA I/II	28/2	26/4	27/3	22/8	0.127
Age(yrs) (Mean±SD)	34.3 ± 9.71	38.93± 11.12	36.56 ± 11.90	37.2 ± 12.76	0.47
Weight (kg) (Mean±SD)	57.93 ± 10.22	55.63±10.85	58.9 ± 10.41	59.96 ± 9.74	0.41

*Data represented as mean ± SD

TABLE II : INTUBATION CHARACTERISTICS

Criteria	Group 1	Group 2	Group 3	Group 4	p value
Number(n)	30	30	30	30	--
No. of Attempts ½	29/1	29/1	30/0	30/0	0.565
DOL (sec) (Mean±SD)	9.2 ± 4.61	11.26 ± 10.70	9.5 ± 5.09	9.46 ± 4.60	0.62
DOI (min) (Mean±SD)	122.57 ± 37.80	114.97± 53.39	114.97±53.39	107.43 ± 36.51	0.65
DOS (min) (Mean±SD)	116.07 ± 37.28	106.57± 54.59	99.13 ± 29.74	100.47 ± 36.01	0.35

DOL – duration of laryngoscopy
DOI - duration of intubation
DOS – duration of surgery

In our study, the incidence of sore throat at 1 hr was 48.33%. At 24 hrs, this decreased to 27.5% and at 48 hrs, it reduced to 21.66%. Severe sore throat was not seen in any of the patients. There was a significant association between sore throat complaints with passage of time. The incidence and severity of sore throat at 1hr was higher in the patients who received lignocaine. Also, we found that it was lesser after budesonide nebulization as compared to other groups except in ketamine group which showed a better outcome at 1 hr, though not statistically significant. Lignocaine was found to be better than ketamine at 24 hrs, difference being statistically significant. Budesonide was most effective at 48 hrs. On evaluation with VAS, there was a significant statistical difference between groups 1, 2 and 3 with the control group. With passage of time, the overall incidence of VAS also decreased in all the groups. The frequency at various time points was lower in the 3 groups as compared to the normal saline group.

Fig. 2 Sore throat at various time intervals

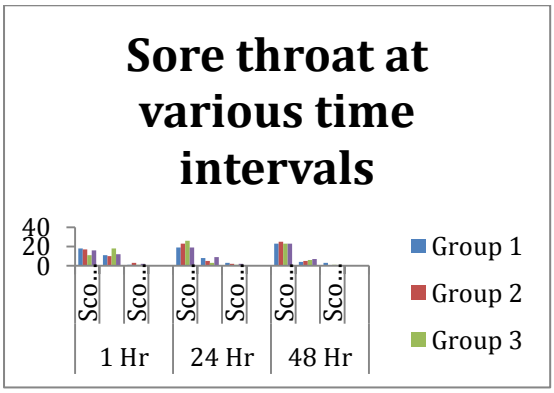
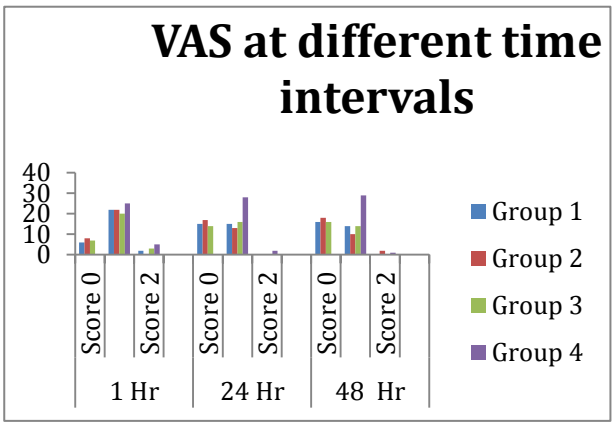


Fig. 3 VAS at various time intervals



The incidence of cough was 22.5%, 18.33% and 10% at 1, 24 and 48 hrs respectively. The incidence of hoarseness was 35%, 19.16% and 20% at 1, 24 and 48 hrs respectively. It was seen that there was a significant decrease in the incidence and severity of cough and hoarseness with increase in time. Lowest incidence of cough was found in the lignocaine group at 1 and 24 hrs postoperatively. The incidence of mucosal changes (erythema, pain or ulceration) was 35.83% at 1hr, which decreased to 13.33% at 6 hrs and further to 7.5% at 24 hrs. The condition of mucosa improved with passage of time.

Fig. 4 Cough at various time intervals

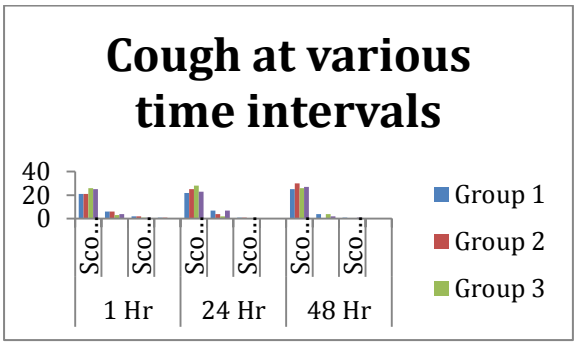
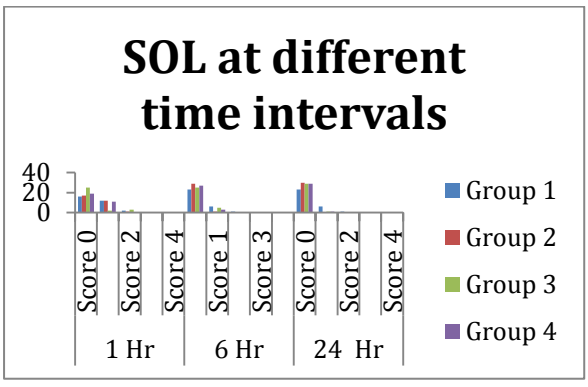


Fig. 5 SOL at various time intervals



There was no obvious difference in any of the study drugs regarding the sedation score.

Pearson's coefficient for finding a correlation was calculated between VAS and sore throat with signs of mucositis in laryngopharynx. A positive correlation was found between VAS and signs of mucositis at 1hr (0.232), but we did not find a positive correlation between them at 24 hrs (-0.07). However, a positive correlation was found between sore throat and signs of mucositis at both 1 (0.317) and 24 hrs (0.11)

Discussion

In our study, the incidence and severity of sore throat decreased with passage of time. Fewer studies have compared the incidence of sore throat within 1 to 2 hrs after short term endotracheal intubation. As compared to previous studies (9, 10), the incidence is lower in our study probably because they had not standardized their suction technique and did not measure their cuff pressures. We also found that the incidence and severity of sore throat was less in ketamine group at 1 hr as compared to other groups. The mechanism of effect was possibly topical that attenuated the local inflammation and also due to its peripheral effect. Ketamine is a NMDA receptor antagonist with primary site of action in CNS and parts of the limbic system (11). In contrast to this, we found that at 24 hrs, the incidence and severity of sore throat was reduced in lignocaine group as compared to control group. Although precise mechanism is not clearly known, suppression of the excitatory sensory C fibers in airways, which reduces the amount of neuropeptide release (12). The incidence was lower in budesonide group at 48 hrs as compared to other groups. It is thought that topical corticosteroids decrease irritation, inflammation, and edema in the upper airways as well as the incidence and severity of sore throat and cough (13).

Sore throat incidence and severity was highest in the control group as compared to other drugs used in our study as assessed by VAS scores. We found a higher incidence of sore throat using VAS scores as compared to that assessed using Harding and McVey criteria. It could be due to the fact that Harding and McVey criteria is a kind of assessment by direct questioning, whereas VAS score assessment is a subjective experience for the patient, and it may be difficult to quantify the symptoms.

The incidence of cough also decreased with passage of time. Lowest incidence of cough was found in lignocaine group at 1 hr and 24 hrs as compared to other groups. Lignocaine, an antiarrhythmic agent, is a sodium channel blocker that acts as a membrane stabilizer; it prevents ectopic and spontaneous electric activity. It has a suppressive effect on spontaneous ectopic discharges of injured nerves without blocking normal nerve conduction. A single administration of it can lead to complete elimination of a persistent cough, most probably through a change in the nerve-action potential setting (14). Incidence of hoarseness was comparable in all the groups at all time intervals. It also decreased with passage of time. On assessment of condition of laryngopharynx, it was seen that most of the patients had a score of 0, while none had a score of 3 and 4. We did not find any obvious or statistical difference in the 3 drugs on the basis of RSS. This could be due to the fact that doses used in our study were very less than those required for sedative or other CNS effects.

Limitations of our study

There was no record of coughing or bucking on extubation. Another drawback in our study was lack of measurement of plasma drug levels. We cannot rule out the contribution of the systemic effect of the drugs in our results. Comparing with the previous studies, our doses were relatively low and we did not observe any CNS or other side effects. The safety and dosage of the drugs used for inhalation need further investigation, even though we did not find any adverse effects after their use as doses which were used in the study were quiet less when compared to that causing adverse effects.

A measurement of postoperative hemodynamic status could have been another variable to be worked upon. This could have shown about the systemic effects of nebulization with our study drugs postoperatively.

Conclusion

Nebulization with Lignocaine was efficacious in reducing cough, Ketamine reduced sore throat in early postoperative period whereas long term outcome was better with budesonide.

Dosage and timing of nebulization prior to intubation in addition to monitoring of postoperative plasma levels to rule out the systemic side effects needs further evaluation. However, this is an easy and cost effective method of reducing postoperative distress due to airway problems. Methods chosen for recording postoperative complaints has an important effect on the final results.

References

1. Zuccherelli L. Post operative upper airway problems – Review article. SAAJA. 2003(9):12-6.
2. McHardy FE, Chung F. Post operative sore throat : cause, prevention and treatment. Anaesthesia 1999; 54: 444-53.
3. Al-Qahtani AS, Messahel FM. Quality improvement in anesthetic practice--incidence of sore throat after using small tracheal tube. Middle East J Anesthesiol. 2005 ;18(1):179-83.
4. Callaghan OC, Barry PW. The science of nebulised drug delivery Thorax 1997;52(2):S31–S44.
5. Ramsay MA, Savege TM, Simpson BR, Goodwin R. Controlled Sedation with alphaxalone-alphadolone. Br Med J. 1974;2(5920):656-9.
6. Harding CJ, McVey FK. Interview method affects incidence of postoperative sore throat. Anaesthesia 1987;42:1104-7.
7. Aicher B, Peil H, Peil B, Diener HC. Pain measurement: Visual Analogue Scale (VAS) and Verbal Rating Scale (VRS) in clinical trials with OTC analgesics in headache. Cephalalgia. 2012 ;32(3):185-97.
8. Chen YQ, Wang JD, Xiao J.Prophylactic Effectiveness of Budesonide Inhalation in Reducing Postoperative Throat Complaints. J Anesth Clin Res 2012;3(7):3-7.
9. Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. British J Anaesth. 2002;88(4):582-4.
10. Biro P, Seifert B, Pasch T. Complaints of sore throat after tracheal intubation: a prospective evaluation. Eur J Anaesthesiol. 2005;22(4): 307-11

11. Zhu MM, Zhou QH, Zhu MH, Mei Hua Zhu3, Rong HB, XU YM, Qian YNet al. Effects of nebulized ketamine on allergen-induced airway hyperresponsiveness and inflammation in actively sensitized Brown-Norway rats. J. Inflamm (Lond) 2007; 4:10.
12. Honarmand A, Safavi M. Beclomethasone inhaler versus intravenous lidocaine in the prevention of postoperative airway and throat complaints: a randomized controlled trial. Ann Saudi Med. 2008; 28(1):11-6.
13. Chen YQ, Li JP, Xiao J. Prophylactic effectiveness of budesonide inhalation in reducing postoperative throat complaints. Eur Arch Otorhinolaryngol. 2014;271(6):1667-72.
14. Peleq R, Binyamin L. Practice tips. Treating persistent cough. Try a nebulized mixture of lidocaine and bupivacaine. Can Fam Physician. 2002; 48: 275.