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Original Research

To evaluate the effect of nebulised magnesium sulphate on the incidence of post operative sore throat

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ABSTRACT

Aim: The purpose of this investigation is to evaluate whether or not nebulized magnesium sulphate reduces the incidence of postoperative sore throat in patients who have had surgery.

Methods: Patients were either male or female, between the ages of 20 and 65, and either ASA 1 or ASA 2 statuses. They were undergoing elective surgery that lasted approximately 2 hours or longer while they were under general anaesthesia and required tracheal intubation. There were a total of 200 patients who participated in the study. Patients in the trial group were given a nebulization treatment consisting of 3 millilitres of isotonic nebulized magnesium sulphate containing 225 mg while they were waiting in the holding area. It was observed that the patient had a painful throat when at rest and during swallowing immediately after extubation, as well as at 2, 4, 10, and 24 hours following the operation. In the postoperative ward, patients were checked for any adverse drug reactions as part of the monitoring process.

Results: There was no discernible variation in POST between the two groups with regard to demographic factors such as age, gender, or ASA status. There was no statistically significant difference between the two groups' POST measurements taken at rest at 0h and 2h. There was a really important. Using the chi square test, we can see that there is a significant difference in the POST at rest between group A and group B at 4 hours (p=0.06), 10 hours (p=0.001), and 24 hours (p=0.001). According to the results of the chi square test, there was a statistically significant difference in POST on swallowing at 2 hours (p=0.008), 4 hours (0.001), 10 hours (0.001), and 24 hours (0.001).

Conclusion: Patients who have had general anaesthesia with a tracheal tube for routine surgical procedures for up to 24 hours often experience POST. The use of magnesium sulphate in the form of nebulization as a pre-medication agent was found to be safe, simple, and effective in preventing the occurrence of postoperative sore throat. This leads us to the conclusion that the use of magnesium sulphate in this manner significantly reduces the incidence of POST when compared to the use of normal saline.

Keywords: Post-operative sore throat, normal saline, magnesium sulphate, nebulisation.

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Introduction

Although a sore throat (ST), which is a typical complaint of the postoperative period following tracheal intubation is being treated as a minor consequence, it is in reality a legitimate cause of dissatisfaction and morbidity among patients. [1] In patients undergoing general anaesthesia (GA) with tracheal intubation, the frequency of pulmonary edoema ranges from 21–65 percent. [2,3] Attenuating ST has been studied using a wide variety of pharmacological and non-pharmacological treatments, but no one modality has been shown to be effective. A number of different pharmacological treatments, such as beclomethasone gel, gargling with azulene sulphonate, ketamine, licorice, magnesium sulphate, etc., may be used to lessen the severity of ST.

Previous research has shown that the incidence of post-operative sore throat ranges anywhere from 20 to 65%, making it one of the most prevalent aftereffects of endotracheal intubation. The acronym "POST" stands for "post-operative sore throat." According to the research, the probable causes of POST include mucosal erosion, inflammation, and dehydration, all of which contribute to irritation of the trachea and, ultimately, POST. Even though it is regarded to be a relatively minor complication in the post-operative period, the fact that it causes the patient to be unhappy and lengthens the amount of time they have to spend in the hospital is the primary concern. [4] There have been research studies on a variety of pharmaceutical and nonpharmacological approaches with the purpose of alleviating POST; nevertheless, the success rate of these trials has been variable. [5] Reducing the size of endotracheal tubes, lowering the cuff pressure to less than 20 mm Hg, and minimising the number of attempts made for laryngoscopy are some of the various non-pharmacological and pharmacological measures that were tried. Similarly, the various pharmacological measures that were tried include the use of ketamine gargle, ketamine nebulisation, lignocaine spray, beclomethasone gel, and magnesium s [6] The ketamine gargle or lozenges have demonstrated the highest effectiveness rate of all of these methods; nevertheless, the most significant drawback is that ketamine has a bitter taste; as a result, the danger of aspiration is substantial, which may lead to severe consequences. Because of this, the administration of drugs through the nebuliser route in the form of aerosol has gained popularity among anaesthetists, and patient approval of this method has also been positive. [7,8] NMDA receptors, also known as N-methyl D-aspartate receptors, are the primary receptors that are accountable for nociception as well as inflammation, and these receptors can be found in both the central nervous system as well as the peripheral nervous system. Both magnesium and ketamine have properties that are antagonistic against NMDA receptors, and as a result, they are able to perform the functions of an analgesic and anti-inflammatory medication. [9,10] Studies in the past have been done with the analgesic medication ketamine in the form of gargles and aerosols. A small number of studies have been done with magnesium in the form of gargles, lozenges, and nebulization, and they have shown a variety of outcomes. [11-13] The current study was carried out to evaluate the efficacy of using magnesium sulphate nebuliser in reducing the incidence of post-operative sore throat because very few studies had been conducted using magnesium in the form of nebulisation and not much work has been carried out in this part of the state.

Materials and methods

This was a prospective, observational study conducted in the Department of anaesthesiology.

Inclusion criteria

Patients were either male or female, between the ages of 20 and 65, and either ASA 1 or ASA 2 statuses. They were undergoing elective surgery that lasted approximately 2 hours or longer while they were under general anaesthesia and required tracheal intubation. There were a total of 200 patients who participated in the study.

Exclusion criteria

Patients with neuromuscular illness, medication allergies or sensitivities, patients having neck surgery, and patients undergoing laparoscopic surgery were not eligible for this study.

In accordance with the procedure followed by the department as a whole, all of the patients were instructed to abstain from food and liquids the night before and the morning of their surgeries, and they were given oral doses of alprazolam (0.5 mg) and ranitidine (150 mg) as premedication. Patients in the trial group were given a nebulization treatment consisting of 3 millilitres of isotonic nebulized magnesium sulphate containing 225 milligrammes for a period of 15 minutes in the holding area before the induction of anaesthesia. An anesthesiologist who was not involved in the care of the patient was the one to deliver the solution that was used for nebulization. Blinding was performed on both the individual administering the anaesthesia and the individuals assessing the post-operative sore throat. Five minutes after the nebulization was finished, the patient was moved to the operating room so that they could continue with the procedure. In the operating room, fentanyl 2 mcg/kg and propofol 2 mg/kg were administered to the patient in order to induce anaesthesia. The patient was then connected to the usual ASA monitoring system. Atracurium 0.6 mg/kg was administered to make tracheal intubation easier, and a soft seal cuffed sterile polyvinyl chloride tracheal tube with a 7 mm inner diameter was inserted into the trachea of female patients and an 8 mm inner diameter was inserted into the trachea of male patients. The cuff of the tracheal tube was made larger by adding air. The cuff pressure was tested immediately after intubation using a portable tracheal cuff pressure monitor. After that, it was monitored every 30 minutes up until the completion of the procedure, and it was maintained at 20 cm of H2O throughout. Ventilation was under control, and there was no need to implant a nasogastric tube. The level of anaesthesia was kept constant with the use of 66% nitrous oxide in oxygen, a MAC value of isoflurane, and periodic doses of atracurium and fentanyl as needed. Twenty minutes before the patient was extubated, the last dosage of atracurium was administered. Before the trachea was removed and the patients were sent to the post anaesthesia care unit, the muscular relaxation was undone at the conclusion of the operation with a combination of neostigmine 0.05

mg/kg and glycopyrrolate 0.01 mg/kg. This was done before the trachea was removed. It was observed that the patient had a painful throat when at rest and during swallowing immediately after extubation, as well as at 2, 4, 10, and 24 hours following the operation. In the postoperative ward, patients were checked for any adverse drug reactions as part of the monitoring process. The results that were obtained were then compared with those of an equal number of patients who fulfilled the inclusion criteria, on whom normal saline was used as a standard of nebulization for 15 minutes, and in whom the data on post-operative sore throat had already been collected and was available for use.

Statistically analysis

In the case of categorical data, the frequency and percentage of distribution were computed, while the Chi square test and the fisher exact test were used for the purpose of group comparison. The Fisher's exact test was performed, and a P value of less than 0.05 was determined to be statistically significant. The mean, the standard deviation, and the range were determined for the quantitative data (continuous data). The student's t test was used for the purpose of comparing the quantitative data gathered by each group.

Results

There was no discernible variation in POST between the two groups with regard to demographic factors such as age, gender, or ASA status. There was no statistically significant difference between the two groups' POST measurements taken at rest at 0h and 2h. There was a really important. Using the chi square test, we can see that there is a significant difference in the POST at rest between group A and group B at 4 hours (p=0.06), 10 hours (p=0.001), and 24 hours (p=0.001). According to the results of the chi square test, there was a statistically significant difference in POST on swallowing at 2 hours (p=0.008), 4 hours (0.001), 10 hours (0.001), and 24 hours (0.001).

Discussion

In the current study, an attempt was made to compare the effectiveness of pre-operative nebulization with normal saline and magnesium sulphate in reducing the incidence of postoperative sore throat (POST) following general anaesthesia with an endotracheal tube in patients undergoing elective surgeries that lasted for less than four hours and had an ASA grade of 1 or 2. The participants in this study ranged in age from 20 to 65 years old.

Post-operative sore throat could have more than one cause. These causes include mechanical injury during laryngoscopy and intubation, continuous pressure by the inflated tracheal tube cuff on tracheal mucosa causing damage and dehydration of the mucosa, as well as de-epithelialisation and local inflammatory damage of the mucosa. These factors could all contribute to the development of post-operative sore throat.

Table 1: Demographic profile of the patients

Parameter	**Normal saline**	**Magnesium sulfate**	**P value**
Age (years)	40.25±6.39	41.85±6.98	0.47
Gender			
Male	75	62	0.5
Female	25	38	
Weight (kg) (mean ± CI)	58.03±2.85	59.88±2.96	0.06

Table 2. Post operative sore throat at rest at different time intervals

Time (h)	Nebulised drug= 100	POST (%)	Pearson chi-square value (p-value)
0	NS MgSO4	32 27	0.63
2	NS MgSO4	35 23	0.08
4	NS MgSO4	32 13	0.06
10	NS MgSO4	24 11	0.001
24	NS MgSO4	19 6	0.001

Table 3. Post operative sore throat on swallowing at different time intervals

Time (h)	Nebulised drug= 100	POST (%)	Pearson chi-square value (p-value)
0	NS MgSO4	30 27	0.71
2	NS MgSO4	37 24	0.008
4	NS MgSO4	32 20	0.001
10	NS MgSO4	25 12	0.0001
24	NS MgSO4	19 6	0.001

h=hours, NS=normal saline, MgSO4=magnesium sulphate, POST=Post-operative sore throat

There is a paucity of published research on the topic of the attenuation of POST caused by the use of nebulized magnesium sulphate.[14]

Attenuating POST has been attempted using a wide variety of approaches, both non-pharmacological and pharmaceutical, with varying degrees of effectiveness. Smaller tracheal tubes, careful airway instrumentation, minimising the number of laryngoscopy attempts, intubation after the full relaxation of the larynx, gentle oropharyngeal suctioning, filling the cuff with an anaesthetic gas mixture, minimising intracuff pressures 20 mm Hg, and extubation when the tracheal tube is fully deflated are among the nonpharmacological methods that have been reported to decrease

It is well known that N-methyl-D-aspartate (NMDA) plays a role in nociception and inflammation.[15,16] NMDA receptors are found in peripheral nerves and the central nervous system.[17,18] Magnesium is also an antagonist of the NMDA receptor ion channel.19 We decided to study the efficacy of magnesium sulphate nebulization to reduce the incidence of post-operative sore throat caused by endotracheal tube placement

The results that we found in the control group were comparable to those of earlier studies. We refrained from employing lignocaine jelly so as to reduce the number of potential confounding variables, the likes of which may have led to inconsistencies and muddled interpretations of the findings of our research. When lignocaine jelly containing 2% lignocaine was applied as a lubricant on the tracheal tube, researchers Kori et al.[20] and Maruyama et al.[21] discovered an increase in the incidence and severity of POST.

Borazan et al.[22] conducted a study to determine whether or not taking magnesium lozenges 30 minutes before surgery was useful in lowering the incidence and intensity of postoperative pain and discomfort (POST) in the immediate postoperative period. These findings are consistent with the findings of our research.

Gupta et al.[23] also evaluated the effectiveness of preoperative nebulization of magnesium sulphate. They discovered that the incidence and severity of POST were decreased both when the patient was at rest and while they were swallowing at all time points (P 0.05). In spite of the fact that our research was unable to provide evidence of an effective reduction in the occurrence of sore throat immediately after extubation while the patient was resting and swallowing, a clear benefit of a significant reduction in the occurrence of sore throat on swallowing was observed beginning two hours after extubation.

There was no associated risk of local or systemic toxicity because the dose used was approximately one-tenth of the systemically used dose for the treatment of pre-eclampsia and eclampsia, and the mucosal drug absorption would not anywhere match the systemic levels of parenteral administration of the same drug. These findings are comparable to the conclusions reached by Blitz et al.[24], who used nebulized magnesium sulphate for the treatment of acute asthma The fact that we did not examine the amounts of magnesium in the serum meant that it was difficult to determine whether or not magnesium had a role in the systemic effects seen. This was a limitation of our research.

In the research that we conducted, we found that nebulization with magnesium sulphate significantly decreased the incidence of post-operative sore throat at rest after four hours, in comparison to the group that underwent nebulization with normal saline. When compared to the usual saline nebulization group, the magnesium sulphate group had a considerably lower incidence of post-operative sore throat on swallowing after two hours. This difference was statistically significant.

Conclusion

Patients who have had general anaesthesia with a tracheal tube for routine surgical procedures for up to 24 hours often experience POST. The use of magnesium sulphate in the form of nebulization as a pre-medication agent was found to be safe, simple, and effective in preventing the occurrence of postoperative sore throat. This leads us to the

conclusion that the use of magnesium sulphate in this manner significantly reduces the incidence of POST when compared to the use of normal saline.

References

1. Macario A, Weinger M, Carney S, Kim A. Which clinical anesthesia outcomes are important to avoid? The perspective of patients. Anesth Analg. 1999;89:652-8.
2. Higgins PP, Chung F, Mezei G. Postoperative sore throat after ambulatory surgery. Br J Anaesth. 2002;88:582-4.
3. Loeser EA, Bennett GM, Orr DL, Stanley TH. Reduction of postoperative sore throat with new endotracheal tube cuffs. Anesthesiology. 1980;52:257-9.
4. Al-Qahtani AS, Messahel FM. Quality improvement in anesthetic practice - Incidence of sore throat after using small tracheal tube. Middle East J Anaesthesiol 2005;18:179-83.
5. Suzuki N, Kooguchi K, Mizobe T, Hirose M, Takano Y, Tanaka Y, et al. Postoperative hoarseness and sore throat after tracheal intubation: Effect of a low intracuff pressure of endotracheal tube and the usefulness of cuff pressure indicator. Masui 1999;48:1091-5.
6. Canbay O, Celebi N, Sahin A, Celiker V, Ozgen S, Aypar U, et al. Ketamine gargle for attenuating postoperative sore throat. Br J Anaesth 2008;100:490-3.
7. Davidson EM, Carlton SM. Intraplantar injection of dextrorphan,ketamine or memantine attenuates formalin-induced behaviors. Brain Res 1998;785:136-42.
8. Hess DR. Nebulizers: Principles and performance. Respir Care. 2000;45:609–22.
9. Carlton SM, Coggeshall RE. Inflammation-induced changes in peripheralglutamate receptor populations. Brain Res 1999;820:63-70.
10. Carlton SM, Zhou S, Coggeshall RE. Evidence for the interaction of glutamate and NK1 receptors in the periphery. Brain Res 1998;790:160-9.
11. Teymourian H, Mohajerani SA, Farahbod A. Magnesium and ketamine gargle and postoperative sore throat. Anesth Pain Med 2014;5:e22367.
12. Hu B, Bao R, Wang X, Liu S, Tao T, Xie Q, et al. The size of endotracheal tube and sore throat after surgery: A systematic review and meta-analysis. PLoS One. 2013;8:e74467.
13. Tan PH, Yang LC, Chiang PT, Jang JS, Chung HC, Kuo CH. Inflammation-induced up-regulation of ionotropic glutamate receptor expression in human skin. Br J Anaesth. 2008;100:380–4.
14. Ratnaraj J, Todorov A, McHugh T, Cheng MA, Lauryssen C. Effects of decreasing endotracheal tube cuff pressures during neck retraction for anterior cervical spine surgery. J Neurosurg. 2002 Sep;97(2 Suppl):176–9
15. Lin CY, Tsai PS, Hung YC, Huang CJ. L- type calcium channels are involved in mediating the anti-inflammatory effects of magnesium sulphate. Br J Anaesth. 2010 Jan;104(1):44–51.
16. Zhu MM, Zhou QH, Zhu MH, Rong HB, Xu YM, Qian YN, et al. Effects of nebulized ketamine on allergen-induced airway hyperresponsiveness and inflammation in actively sensitized Brown- Norway rats. J InflammLond Engl. 2007 May 4;4:10.
17. Inflammation-induced changes in peripheral glutamate receptor populations.- PubMed - NCBI [Internet].
18. Carlton SM, Coggeshall RE. Inflammation-induced changes in peripheral glutamate receptor populations. Brain Res. 1999 Feb 27;820(1–2):63–70
19. Turpin F, Dallérac G, Mothet J-P. Electrophysiological analysis of the modulation of NMDA-receptors function by D-serine and glycine in the central nervous system. Methods MolBiol Clifton NJ. 2012;794:299–312
20. Kori K, Muratani T, Tatsumi S, Minami T. [Influence of endotracheal tube cuff lubrication on postoperative sore throat and hoarseness]. Masui 2009;58(3):342–5.
21. Maruyama K, Sakai H, Miyazawa H, Iijima K, Toda N, Kawahara S, et al. Laryngotracheal application of lidocaine spray increases the incidence of postoperative sore throat after total intravenous anesthesia. J Anesth. 2004;18(4):237–40
22. Borazan H, Kececioglu A, Okesli S, Otelcioglu S. Oral magnesium lozenge reduces postoperative sore throat: a randomized, prospective, placebo- controlled study. Anesthesiology. 2012 Sep;117(3):512–8
23. Gupta SK, Tharwani S, Singh DK, Yadav G. Nebulized magnesium for prevention of postoperative sore throat. BJA Br J Anaesth. 2012 Jan 1;108(1):168–9
24. Blitz M, Blitz S, Hughes R, Diner B, Beasley R, Knopp J, et al. Aerosolized magnesium sulfate for acute asthma: a systematic review. Chest. 2005 Jul;128 (1):337–4