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Effect of Magnesium Sulphate Nebulization on the Incidence of Postoperative Sore Throat in Patients Requiring Endotracheal Intubation for General Anesthesia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Short Research Article

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ABSTRACT

Background: Post-operative sore throat (POST) is one of the most common anesthesia related complication. It is one of the undesirable post-operative events. Several Non pharmacological and pharmacological methods tried to reduce POST. we planned to study the efficacy of magnsesium sulphate nebulization in reduction of post operative sore throat.
Study Design: Prospective, comparative observational study.
Place and Duration of Study: Department of anesthesiology, AVBRH, from June 2020 to November 2020.
Materials and Methods: observational study of 60 cases divided into two equal groups. Patients included in the study were of either gender belonging to American Society of Anesthesiologists (ASA) status 1 or 2 undergoing elective surgery of approximately 2 h or more duration requiring tracheal intubation. Patients in Group N were nebulized with 3 ml of normal saline and the patients in Group M were nebulized with 3 ml of 225 mg isotonic nebulized magnesium sulfate for 15 min. The incidence of POST at rest and on swallowing at 0, 2, 4,12 and 24 h in the postoperative period were evaluated.

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Results: No significant difference in postoperative sorethroat was observed on swallowing in between magnesium sulphate and normal saline at zero and 2nd hour. significant difference was observed at 4th,12th and 24th hour between magnesium sulphate and normal saline in reducing the incidence of post-operative sore throat.
Conclusion: MgSO4 significantly reduces the incidence of POST compared to normal saline.

Keywords: Postoperative sorethroat; endotracheal intubation; magnesium sulphate.

1. INTRODUCTION

Post-operative sore throat (POST) is one of the most common anesthesia related complication. It is a minor complication that remains unresolved in patients undergoing tracheal intubation for general anesthesia with a reported incidence of 6.6-90% [1]. It is one of the undesirable post-operative event. It also increase the duration of hospital stay [2]. Several Non pharmacological and pharmacological methods tried to reduce POST. Gentle orpharyngealsuction, reduction of attempting number of times of laryngoscopy, usage of small sized tracheal tubes, maintaining intracuff pressure less than 20mmhg [3] are some nonpharmacological methods are some non pharmacological methods followed to reduce post operativesorethroat. Beclomethasone and fluticasone inhalation, azukene sulphonate gargles, using ketamine and aspirin, local spray of benzydamine hydrochloride and intracuff administration of alkalized lignocaine [4,5] are some pharmacological methods tried to reduce postoperative sorethroat. It is known that N-methyl-D-aspartate (NMDA) has a role in nociception and inflammation. NMDA receptors are present in peripheral nerves and central nervous system [5]. Magnesium is an antagonist of the NMDA receptor ion channel [6]. Nebulization is a simple and cost effective method So, we planned to study the efficacy of magnesium sulphate nebulization in reduction of post operative sore throat.

1.1 Aims and Objectives

The main aim is to toknow the effect of preoperative nebulization of magnesium sulphate in reducing the incidence of post operative sore throat following General an esthesia with endotracheal intubation.

The main objective is to know the effect of magnesium sulphate in the incidence of POST
Secondary objectives are to see for haemodynamic changes and any side effects.

1.2 Study Design

Setting: AVBRH, sawangi(meghe), wardha. Study period: 6months (june 2020-november 2020).

Study design: prospective, comparative observational study

2. MATERIALS AND METHODS

2.1 Inclusion Criteria

a) Adults aged between 18- 70years of both the sex.
b) ASA Grade I & II patients.
c) Surgery lasting for more than 2 hours under GA.

2.2 Exclusion Criteria

a) Patients with neuromuscular disease
b) Allergy or hypersensitivity of drugs.
c) Patients/Parents /Guardian's refusal.
d) Patients undergoing neck surgeries and laproscopic surgeries.
e) Difficult intubation. (CL grade 3 and 4).
f) Intubation requiring more than one attempt.
g) Duration of Intubation more than 15 seconds.
h) Patients with history of recurrent sore throat.
i) Intubation resulted in injury or bleeding.

2.3 Sample Size

With the level of significance(alpha) = 0.05, and power of 80%, sample size required was 28 per group. To accommodate any exclusion 30 each group was taken.

60 patients of 18- 70 years of age group fulfilling all the inclusion and exclusion criteria and posted for surgery under general anaesthesia are divided into two groups (i.e.30 in each groups) as follows:

Group M(n-30) receiving 3ml of 225mg isotonic nebulized magnesium sulphate nebulization for 15 min.

Group N(n-30) receiving 3ml of normal saline nebulization for 15 min.

2.4 Study Procedure

A detailed history and a thorough general examination was done for all the patients who were undergoing surgery under general anesthesia.Pre-operative explaining of the procedure was done to gain the confidence of the patients and written consent was taken.

All the patients were kept fasting overnight prior to the scheduled day of operation. Patients were evaluated for vital parameters like pulse rate, respiratory rate, oxygen saturation (SpO_2), blood pressure and ECG changes in pre-operative room. Preoperatively, Group M patients were nebulized with 3 ml of 225 mg **isotonic**magnesium sulphate and Group N were nebulized with 3ml of normal saline for 15 minutes ,ending 5minutes before induction of anesthesia.Before the commencement of anaesthesia, patients were instructed on the methods of study. Non-invasive monitor was connected and baseline values of heart rate, blood pressure and oxygen saturation werenoted.All the patients were preoxygenated, following which patients were premedicated with inj.glycopyrolate 0.2mg IV, inj.butrum1mg IV, midazolam 1mg IV, and induced with inj.propofol 2mg/kg IV. Muscle relaxation was facilitated by inj.vecuronium 8mg IV, ventilated for 4min, followed which trachea intubated with soft seal cuffed sterile polyvinyl chloride tracheal tube of 7.5mm inner diameter in females and 8mm in male patients. The endotracheal tube was inflated with air. Ventilation was controlled and no gastric tube was inserted. Anaesthesia was maintained with nitrous oxide, oxygen and sevoflurane and intermittent dose of vecuronium was given to maintain adequate depth of anesthesia. The last dose of vecuronium was given 20 minutes prior to end of surgery. At the end of surgery the muscle relaxation was reversed with a combination of neostigmine and glycopyrrolate. The patient was extubated after extubation criteria were met and the patients were shifted to postanaesthesia care unit.

Presence of sorethroat was noted at rest andon swallowing immediately after extubation(0h) and 2h,4h,12hr and 24h post operatively. In the ward, patients were also monitored for any drug related side effects. Mean and 95% confidence interval of mean were used to express data. For continues variables like age,weight,gender, Kolmogorov-Smirnov test was used. Categorical data between groups were compared using pearson Chi-Square, Fishers exact test. P <0.05 was considered as statistically significant.

3. OBSERVATION AND RESULTS

The weight,gender, age distribution were compared in the two groups [Table-1].We observed that no difference in post operative sore throat at rest at 0,2^{nd},4^{th}hourly between magnesium sulphate and normal saline.significant difference seen at rest at 12^{th} hour and 24^{th}hour with Chi- square test[Table-2]. No significant difference in postoperative sorethroat was observed on swallowing in between magnesium sulphate and normal saline at zero and 2^{nd} hour. significant difference was observed at 4^{th},12^{th} and 24^{th} hour between magnesium sulphate and normal saline in reducing the incidence of post-operative sore throat with both Chi-square test and Fisher's exact test [Table-3]. There was no significance difference in POST at swallowing between normal saline and magnesium sulphate with respective age, gender and weight.

Table 1. Demographic data

Variables	Normal saline	Magnesium sulphate	P value
Age(years)(mean±SD)	19.6±10.2	22.3±10.3	0.234
Gender(male/female)	16/14	17/13	0.521
Weight (KG)	60.22±2.39	60.52±2.63	0.073

Table 2. Postoperative sore throat "AT REST"

Time (Hr)	Group N Normal saline n = 30	Post (%) Group N Normal saline	Group M $MgSO_4$ n = 30	Post (%) Group M $MgSO_4$	Pearson chi-square P value	Fischer's exact test	RR when NS is used
0Hr	8	26.64	6	19.98	0.598	0.386	1.35
2Hr	6	19.98	4	13.32	0.289	0.202	1.58

Time (Hr)	Group N Normal saline n = 30	Post (%) Group N Normal saline	Group M $MgSO_4$ n = 30	Post (%) Group M $MgSO_4$	Pearson chi-square P value	Fischer's exact test	RR when NS is used
4Hr	6	19.98	3	9.99	0.102	0.76	1.72
12Hr	5	16.65	1	3.33	0.022	0.042	1.82
24hr	4	13.32	1	3.33	0.013	0.038	1.98

Table 3. Postoperative sore throat "ON SWALLOWING"

Time (Hr)	Group N Normal saline n = 30	Post (%) Group N Normal saline	Group M $MgSO_4$ n = 30	Post (%) Group M $MgSO_4$	Pearson chi-square test Pvalue	Fischer's exact test	RR when NS is used
0Hr	6	19.98	6	19.98	1.00	0.588	1.000
2Hr	7	23.31	4	13.32	0.084	0.076	1.863
4Hr	6	19.98	3	9.99	0.042	0.048	2.432
12Hr	5	16.65	2	6.66	0.012	0.022	5.625
24hr	4	13.32	1	3.33	0.009	0.008	8.653

4. DISCUSSION

Post operative sore throat is a selflimiting undesirable condition with incidence of 0-50%. Multiple factors like laryngoscopy causing mechanical injury and intubation, inflated tracheal tube cuff causes continuous pressure on tracheal mucosa which leads to damage and dehydration of the mucosa. Our results in the control group were consistent with previous findings. In our study, magnesium sulfate lessened the pain during swallowing at 4 h postsurgery compared to normal saline. Borazan et al [7] studied the effectiveness of magnesium sulphate lozenges on reducing both incidence and severity of POST in the immediate postoperative period. Gupta et al.[8] and yadav et al [9] assessed the efficiency of preoperative nebulization of magnesium sulfate and found that the incidence and severity of POST were reduced at rest and on swallowing at all-time points ($P < 0.05$). Sore throat related to endotracheal tube might be a consequence of localized trauma, leading to aseptic inflammation of the pharyngeal mucosa. Magnesium being an NMDA receptor antagonist, has a role in preventing NMDA recept or mediated nociception and inflammation and there by reduction in POST. In a recently published study by Ahuja et al. [10] a similar mechanism of action was proposed for preoperative nebulization of ketamine. Similar to Blitz et al. [11] who used nebulized magnesium sulfate for treatment of acute asthma, we too did not find any either local or systemic adverse outcomes. The limitation in our study was we couldn't measure serum magnesium levels making it difficult to rule out the contribution of systemic effects of magnesium. When we compare the doses used in the treatment of preeclampsia and eclampsia, the dose we used in our study is very low and through nebulisation absorption is as low as (10%).

5. CONCLUSION

We conclude that magnesium sulphate significantly reduces the incidence of post operative sore throat compared to normal saline.

CONSENT

Informed consent taken from patients and preserved by authors.

ETHICAL APPROVAL

Institutional ethical committee approval taken and preserved by authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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