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Comparison Of Magnesium Sulfate And Normal Saline (Placebo) Nebulization For Prevention Of Postoperative Sore Throat In Patients Undergoing Lumbar Spine Surgeries Under General Anaesthesia With Endotracheal Intubation In Prone Position

Anaesthesiology

KEYWORDS: Intratracheal intubation, magnesium sulfate, pharyngitis

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ABSTRACT

Background and Aims: Postoperative sore throat (POST) and hoarseness are common complaints after general anesthesia with tracheal intubation. Various nonpharmacological and pharmacological measures have been used to reduce POST with variable success. The present study was conducted to compare the efficiency of preoperative nebulization of normal saline and magnesium sulfate in reducing the incidence of POST following lumbar spinal surgeries under general anaesthesia with tracheal intubation in prone position.

Materials and Methods: After ethical committee approval and written informed consent, a prospective randomized double-blinded study was conducted in 140 cases divided into two equal groups. Patients included in the study were of either gender belonging to American Society of Anesthesiologist (ASA) status 1 or 2 undergoing lumbar spine surgery requiring tracheal intubation in prone position. Patients in Group A are nebulized with 5 ml of normal saline and the patients in Group B are nebulized with 5 ml of 225 mg isotonic nebulized magnesium sulfate for 15 min, 5 min before induction of anesthesia. The incidence of POST at rest and any undue complaints at 1, 6, and 24 hrs in the postoperative period were evaluated.

Results: The overall incidence of POST was 53%. 54(77%) patients in Group A and 21(30%) patients in Group B Experienced POST. Patients who experienced POST were compared for its severity. POST was significantly attenuated at 6hr in Group B compared to Group A.

Conclusions:$MgSO^4$ significantly reduces the incidence of POST compared to normal saline.

Introduction

Postoperative sore throat (POST) and hoarseness are common complaints after general anaesthesia with tracheal intubation. The reported incidence of PSOT is 21-65%.[1,2] and depends on various factors such as age, sex, size &cuff pressure of endotracheal tube, duration for which tube in place, number of attempts and the time and manipulations needed to insert the tube.

Although a minor complication, PSOT is a major cause of patient dissatisfaction.[3] It can also increase the duration of hospital stay, specially in day care surgeries.[4] PSOT has been attributed to direct trauma caused by laryngoscopy and intubation, tracheal tube manipulation during position change and mucosal ischaemic injury due to excess cuff pressure.[5]

Many pharmacological and non- pharmacological trials have been done for attenuation of PSOT with variable success. The pharmacological methods used to reduce PSOT include use of beclomethasone gel, lignocaine gel, gargling with azulenesulphonate, ketamine and licorice.[6,7,8] spray of benzydamine hydrochloride and intra-cuff administration of alkalized lignocaine.[6,7]

Various non-pharmacological methods to reduce PSOT are the use of smaller endotracheal tube, supraglottic devices, careful instrumentation of airway, gentle suction of oropharynx, minimizing intra-cuff pressure <20-30 cm of H_2O.[9] smaller sized endotracheal tubes and extubation when tracheal tube cuff is fully deflated. N-methyl D-aspartate (NDMA) has been known to have role in nociception and inflammation.[8,10] The experimental data have shown that NMDA receptors are found in peripheral nerve and central nervous system.[11,12] Hence NMDA receptor antagonist Magnesium Sulfate nebulization work on peripheral nerve endings in pharyngeal mucosa and is involved in antinociception and anti-inflammatory cascade.[10]Effect of nebulized Magnesium Sulfate [13] has been studied in supine position surgeries and found to reduce the incidence of PSOT significantly.

Changing of position from supine to prone can change endotracheal cuff pressure and endotracheal tube displacement which may affect the incidence of PSOT, hoarseness of voice and cough.[14] So far no study has been conducted to evaluate the effectiveness of Magnesium Sulfate nebulization in decreasing POST in prone position surgeries. Therefore we plan this study is to investigate the prophylactic effect of Magnesium Sulfate nebulization in decreasing POST in patients undergoing surgeries under general anaesthesia with tracheal intubation in prone position.

Material and Methods

After ethical committee approval and written informed consent, the prospective randomized double-blinded study was conducted in 140 cases. With the level of significance (alpha) = 0.05, and power of 80%, sample size required was 66 per group. So, 70 patients from each group were selected.

Patients included in study were of either gender, aged between 20 and 70 years belonging to American Society of Anesthesiologist (ASA) 1 or 2 status undergoing lumbar spine surgery in prone position with tracheal intubation. Patients with Pre existing hoarseness or sore throat, URTI, History of chronic treatment with calcium channel blocker, On steroid therapy or immunocompromised patients, Patients who were expected to have difficult intubation, allergic to Magnesium Sulfate, Fail to intubate in first attempt & duration of surgery >3hrs were excluded. Patients were allocated randomly to two groups, Group A and Group B.

Anaesthesia technique was standardized for all patients. On arrival in the operation theatre fasting status, consent and PAC checked.

Patients in Group saline (A) were received a saline nebulization 5.0 ml and group Magnesium Sulfate (B) were received Magnesium Sulfate 225 mg (1.0 ml) (with 4.0 ml of the saline) nebulization. The preparations of 5.0 ml each was administered by the staff nurse. The patients were received the study drug via nebulisation mask connected to wall-mounted oxygen driven source (8 L, 50 psi) for 15 min. The staff nurse later was not participated in the subsequent assessment of these patients. Patients were blinded to group allocation as both the preparations are tasteless. General anaesthesia was induced 10 min after completion of nebulization. Standard monitoring including NIBP, Spo2, ECG, Etco2 were applied. Intravenous access was secured and ringer lactate(RL) drip was started at the rate of 5ml/kg/hr.infusion rate was tailored to each patient according to intraoperative requirement.

Premedication – Every patient was premedicated with Inj. Glycopyrrolate 0.2mg IV +Inj. Midazolam 1mh IV+ Inj. Fentanyl 1.5 mcg/kg.

Induction – Anaesthesia was induced with Thiopentone 5mg/kg. Tracheal intubation was facilitated by Rocuronium 0.8mg/kg. Direct laryngoscopy and tracheal intubation was performed by an experienced anaesthesiologist with soft seal cuffed sterile polyvinyl chloride tracheal tube (portex limited) of 7/7.5 for females and 8/8.5 for male patients. Tracheal tube cuff was inflated with air until no air leakage could be heard with a stethoscope at peak airway pressure of 20 cm H2O.. The cuff pressure was checked just after intubation using handheld tracheal cuff pressure monitor and then every half hourly till the end of surgery and maintained at 20 cm of H_2O. Patient's position was changed from supine to prone for surgery, and patient's head will be positioned on the soft pillow with head rotation to one side. After position change from supine to prone the cuff pressure was readjustd between 10 and 20 cmH_2O. Ventilation was volume controlled, and no nasogastric tube was insertsd. . General anaesthesia was maintained with oxygen 33% in nitrous oxide and supplemented with isoflurane. IV ondansetron 4 mg was administered 30 min prior to end of surgery and then 8 h in the post-operative period. IV dexamethasone 8 mg as a single dose was given as rescue antiemetic.At the completion of surgery,with the patient adequetly anaesthetized the oropharynx was gently suctioned, and the isoflurane was turned off. Neuromuscular block was reversed with IV neostigmine and glycopyrrolate. During extubation if any patient has excessive coughing 1.5mg/kg lignocaine IV was administered as rescue measure. Trachea was extubated after extubation criteria will be met and patient was shifted to recovery area. Cricoid compression, duration of tracheal intubation, duration of prone position, duration of anaesthesia and incidence of cough during extubation was recorded.

Patients were interviewed in a standard fashion by blinded investigator. Sore throat assessment, and haemodynamic recording was done at pre-nebulization (baseline parameters before nebulization of patient), pre-induction (parameters after nebulization and just before induction of GA), and 1,6 ,24 hours post-operatively. The severity of PSOT was graded on a four point scale (0-3).

Grade 0: No sore throat.
Grade 1: Mild sore throat (complains of sore throat only on asking.)
Grade 2: Moderate sore throat (Complains of sore throat on his/her own.)
Grade 3: Severe sore throat (Change of voice or hoarseness associated with throat pain.)
Other side effect if any was noted. Inj. Diclofenac IV 6 hrly was used for post operative pain relief.

Results

A total of 140 patients were enrolled and randomized into two groups of 70 patients each. Both the groups were comparable as there were no significant differences between the two groups regarding age, body weight, gender distribution, height, ASA grade or duration of surgery{Fig.1}.

Demographic Variables	Group A (Mean±SD)	Group B (Mean±SD)	P value
Age (Yrs.)	39.9±12.29	37.9±12.37	0.3389
Sex (M/F)	51/19	47/23	0.524
Height (cm)	167.74±9.01	165.78±9.3	0.2075
Weight (kg)	68.11±7.1	67.01±7.73	0.3821
Duration of Surgery (min.)	127.84±9.71	131.43±8.28	0.2200
ASA Status I/II	63/7	65/5	0.245

The overall incidence of POST was 53%. 54(77%) patients in Group A and 21(30%) patients in Group B Experienced POST (Fisher's Exact P<0.0001). incidence of POST was significantly higher in group A as compared to group B at 1, 6 and 24 hrs post operatively (fig. graph). At 1 hr POST occurred in 49 patients in group A versus 10 patients in group B. the difference between the two group was statistically significant (p value 0.0001). patients who experienced POST at 6hr were 31 and 6 in group A & B respectively (p value 0.0002). At 24 hr post operatively POST occurred in 18 patients in group A while 5 patients in group B. (p value 0.0131).

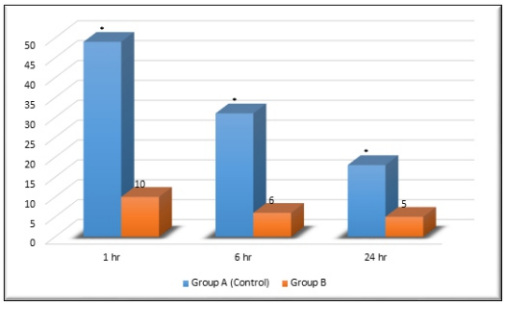

Fig.-2 Incidence of post-opetative sore throat at 1, 6, and 24 hr post-operatively in both the groups. * p < 0.05 in between group comparision considered statistically significant.

Patients who experienced POST were compared for the severity of POST graded on a four point scale (0-3). Severity of POST was attenuated significantly in group B as compared to Group A. At 1 hr 4 patients and 6 hrs 2 patients had severe POST (grade-3) in group A while none of the patients complained of severe POST in group B (P value < 0.05). there were significantly less number of patients in group B than group A suffering from moderate grade of POST at 6 & 24 hrs. (Fig. 3)

Time		Group A (Control)	Group B
1 hr	1 (mild)	31*	5
	2 (moderate)	14	5
	3 (severe)	4	0
6 hr	1 (mild)	10	4
	2 (moderate)	19*	2
	3 (severe)	2	0
24 hr	1 (mild)	8	4
	2 (moderate)	10*	1
	3 (severe)	0	0

Data expressed as number of patients. * P < 0.05 on between group comparison considered statistically significant.

No local or systemic side effects were observed.

Discussion

Post operative sore throat (POST) is the most common, undesirable and self-limiting complication with endotracheal intubation. The reported incidence of POST after general anaesthesia with tracheal intubation is 21-65%.[1,2] There are many factors contributing for POST namely sex, age, size and cuff pressure of endotracheal tubes, duration for which tube in place, number of attempts and the time and manipulations needed to insert the tube, bucking on the tube and excessive suctioning during extubation.

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Changing the position from supine to prone can alter the endotracheal tube cuff pressure and may also displace the endotracheal tube hence may affect the incidence of POST. The efficiency of administration of magnesium sulfate in the form of nebulization and lozenges has been assessed in earlier studies in supine position surgeries and it was found to reduce the incidence and severity of POST.

In our study we evaluated the effectiveness of magnesium sulfate nebulization on the incidence and severity of POST in prone position surgeries and our results are comparable to the earlier studies as the incidence (30%) and severity both were significantly less in magnesium sulfate group.

In our study, the overall incidence of POST in the control group was quite high (77%) which is consistent with the findings of earlier study of A rudra et al who studied the effect of ketamine gargle on POST and reported the incidence upto 85% at 4hr post operatively in control group.[16]

The pathological cause of POST is considered to be aseptic inflammation resulting from irritation of pharyngeal mucosa by the cuff of endotracheal tube and possibly by the trauma caused during the intubation and extubation.[5]

Magnesium sulfate is a NDMA receptor antagonist and it is a known fact that N- methyl D-aspartate (NDMA) has a role in nociception and inflammation. NDMA receptors are present in the central nervous system as well as peripheral nervous endings. Magnesium sulfate nebulization might act on NDMA type receptors found in peripheral nerve endings in pharyngeal mucosa and thereby producing anti-inflammatory and anti-nociceptive effect resulting in reduced incidence of POST in the study group in our study. We did not observe Magnesium sulfate nebulization has local analgesic and anti-inflammatory effects as it bypasses classic circulatory system.[8,10,11,12,15]

Similar effect has also been reported with gargles and nebulization with ketamine another NDMA receptor antagonist. [6]

Magnesium sulfate has been used as lozenges, gargles and nebulization in earlier studies.[15] In our study nebulization was given for the sake of convenience and it was well tolerated by the patients and can be used in pediatric patients also.

Conclusion

We conclude that the use of pre operative magnesium sulfate nebulization reduced the incidence and severity of POST in patients receiving General Anaesthesia with tracheal intubation in prone position.

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