Original Research Article

Indian Journal of Anesthesia and Analgesia
January – February 2020; 7(1) (Part - I): 114-123
DOI: http://dx.doi.org/10.21088/ijaa.2349.8471.7120.17

Comparative Study of Magnesium Sulphate Nebulization and Lignocaine Nebulization in Prevention of Postoperative Sore Throat

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Abstract

Introduction: General anesthesia is an integral part of anesthesia and intubation is a necessary step to protect the airway from regurgitation and aspiration. Postoperative sore throat, hoarseness of voice, cough are common sequelae after endotracheal intubation. The present study was conducted to compare the efficiency of preoperative nebulization of lignocaine hydrochloride and magnesium sulphate for reducing the incidence of POST in patients undergoing surgeries in general anesthesia. *Aims and Objective:* The purpose and aim of the study was to compare the efficiency of preoperative nebulization of lignocaine hydrochloride and magnesium sulphate in reducing the incidence of POST following GA with regards to- Postoperative Sore Throat (POST), Cough hoarseness of voice, dysphagia and dysphonia and Complications from possible systemic effects, because of absorption from mucosal surfaces. *Materials and Methods:* 100 patients of Government Medical College, Kota, and attached group of hospitals, scheduled to undergo elective surgery lasting more than 1 hour but less than three hours under GA requiring tracheal intubation within the age group 40–70 years, of both sexes were randomly allocated in two groups by simple randomization using computer generated numbers. Group A: 50 patients received nebulized magnesium sulphate 4 ml. (6.25%). Group B: 50 patients received nebulized lignocaine 4 ml. (2%). *Results:* On Intergroup comparison incidence of sore throat was more common in Lignocaine Group as compared to Magnesium Group but there was no significant difference in both Groups with respect to sore throat at rest ($p > 0.05$). On Intragroup comparison incidence of hoarseness of voice decrease with time in both groups but more faster recovery in Magnesium Group. In Magnesium Group no incidence of hoarseness of voice found at 24 hr after extubation. In Lignocaine group no incidence of hoarseness of voice found at 48 hr after extubation.

Keywords: Sore throat; Hoarseness of voice; Lignocaine; Magnesium Sulphate.

How to cite this article:
Sanjay Kalani, Chiranji Lal Khedia, Gopal Sharma. Comparative Study of Magnesium Sulphate Nebulization and Lignocaine Nebulization in Prevention of Postoperative Sore Throat. Indian J Anesth Analg. 2020;7(1 Part -I):114–123.

Introduction

General anesthesia is an integral part of anesthesia and intubation is a necessary step to protect the airway from regurgitation and aspiration and to provide adequate ventilation in patients undergoing surgery.

Postoperative sore throat, hoarseness of voice, cough are common sequelae after endotracheal intubation. Mucosal injury with resulting inflammation caused by airway instrumentation causes much more distress to patients especially in

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Received on 11.10.2019, **Accepted on** 28.11.2019

presence of abdominal or thoracic incision as any attempt to cough causes significant pain.[1] Among all the complications associated with ET intubation, sore throat and hoarseness are amongst the most common one. Though modern anesthesia has evaluated a lot and is safe and reliable but for satisfactory postoperative outcome, efforts should be made to decrease the incidence and severity of Postoperative Sore Throat (POST), apart from the management of postoperative pain, nausea, vomiting etc.[3]

Measures to reduce POST[4]

1. Nonpharmacological methods for reducing postoperative sore throat are:

- Use of smaller size endotracheal tube, Careful and gentle airway instrumentation, Minimising the duration and number of laryngoscopy attempts, Intubation after the full relaxation of the larynx, Gentle oropharyngeal suctioning, Filling the cuff with an anesthetic gas mixture, Minimizing intracuff pressure < 20 mm Hg and Extubation when the tracheal tube is fully deflated.

2. Pharmacological measures for attenuating postoperative sore throat:

- Nebulization with beclomethasone and fluticasone, Gargling with azulene sulfonate, aspirin, ketamine[5], magnesium, benzydamine, green tea[6], hydrochloride and licorice etc., Local spray of benzydamine hydrochloride, Intracuff administration of alkalized lignocaine[7], Steroid gel application on endotracheal tube1. Topically dexpanthenol, use of video laryngoscope blade[8], Amyl-m-cresol lozenges, and Magnesium lozenges.[9]

Role of Aerosolized Drugs to Reduce POST[10]

For effective and satisfactory postoperative outcomes, medications chosen must reach the site of action and remain active once there, without any systemic toxicity. This could be achieved by the use of aerosolized medications *via* nebulizers or metered dose inhalers which help to increase efficacy and minimize toxicity.

An advantage of using nebulizers over metered-dose and dry powder inhalers is that less patient coordination is needed for optimum drug delivery. In addition, some drugs are only available in solution form and cannot be given through a metered-dose or dry powder inhaler.

The present study was conducted to compare the efficiency of preoperative nebulization of lignocaine hydrochloride and magnesium sulphate for reducing the incidence of POST in patients undergoing surgeries in general anesthesia, because lignocaine being local anesthetic may reduce the local nerve irritation and magnesium being NMDA receptor antagonist was tried as cost effective method to decrease POST. (NMDA has a role in nociception and inflammation associated with POST).

Aims and Objectives

The purpose and aim of the study was to compare the efficiency of preoperative nebulization of lignocaine hydrochloride and magnesium sulphate in reducing the incidence of POST following GA with regards to:

1. Postoperative sore throat (POST);
2. Cough hoarseness of voice, dysphagia and dysphonia;
3. Complications from possible systemic effects, because of absorption from mucosal surfaces.

Materials and Methods

Materials required:

1. Nebulizer (Piston compresser type nebulizer)
2. Anesthesia work station (WATO EX-35, Mindray)
3. Bain's circuit/closed circuit with circle absorber
4. Endotracheal tubes of different sizes (cuffed) with connection
5. Macintosh curved blade laryngoscope
6. Drip sets, IV cannula
7. Sterile syringes and swabs
8. Drip stand
9. Stylet
10. Multiparameter monitor (Bene View T9, Mindray) (Pulse oximetry, NIBP, $EtCO_2$, ECG, Gas analyzer)
11. Suction machine and Catheter
12. Adhesive plaster
13. General anesthesia drugs

    (Midazolam, Glycopyrrolate, Fentanyl, Propofol, Succinylcholine, Halothane, Vecuronium, N_2O, Neostigmine)
14. Emergency drugs

    (Adrenaline, Atropine, Dopamine,

Dobutamine, Deriphylline, Hydrocortisone, Mephentermine, nor adrenaline, Phenylephrine)

15. Drugs for nebulization

    (Magnesium sulphate, Lignocaine 2%)

Study Design

This was a prospective, randomized, double blinded, case control study entitled as "Comparative Study of Magnesium Sulphate Nebulization and Lignocaine Nebulization in Prevention of Postoperative Sore Throat" conducted in the department of Anesthesiology, Government Medical College, Kota, in all three attached hospitals.

Sample Size

With the level of significance (alpha) = 0.05 and power of 80%, sample size required was 40 per group. To accommodate any exclusion, 50 patients from each group were selected. 100 patients of Government Medical College, Kota, and attached group of hospitals, scheduled to undergo elective surgery lasting more than 1 hour but less than three hours under GA requiring tracheal intubation within the age group 40–70 years, of both sexes were randomly allocated in two groups by simple randomization using computer generated numbers. The study was carried out with the approval of hospital research and ethical committee, after obtaining informed consent from patient and their relatives. The study remains free from being biased as neither the Patients nor the anesthesiologist who nebulized as well as who anesthetize and recorded the finding knows about the drug group.

Group A: 50 patients received Nebulized Magnesium Sulphate 4 ml. (6.25%);

Group B: 50 patients received Nebulized Lignocaine 4 ml. (2%).

Inclusion Criteria

- Adult normotensive patients, age between 40 and 70 years of both sex;
- Undergoing surgery under general anesthesia with tracheal intubation;
- Mallampatti Grade I and II;
- ASA Grade I and II.

Exclusion Criteria

- Patients allergic to any drugs.
- ASA Grade 3 & 4.
- Pt with compromise renal function.
- Pts with severe neuromuscular disease.
- Pts undergoing head, neck, or laparoscopic surgery.
- Pts having URI, those with NG tube or any nasal or throat packs or who require these intraoperatively.
- Pts with anticipated difficult intubation.
- Pts requiring prone or lithotomy position.
- Surgery lasted more than 3 hrs.

Preanesthesia evaluation included detailed history and physical examination to rule out any systemic diseases like respiratory disease, cardiovascular diseases, neuromuscular diseases, thyroid disease, liver or kidney disease and to know contraindications to drugs and techniques.

All patients were kept fasting overnight and premedicated with oral alprazolam 0.5 mg and ranitidine 150 mg on night before surgery and in the morning of surgery. 30 minute Prior to the induction of anesthesia, patients in Group A were nebulized with 4 ml of 250 mg isotonic nebulized magnesium sulfate (6.25% solution) for 15 min and Group B were nebulized with 4 ml of 2% lignocaine.

The solution for nebulization was administered by an anesthesiologist not associated with the management of the case. The anesthesiologist anesthetizing the case and those recording the scores were blinded to it.

Patients nebulized in sitting position through piston type compresser nebulizer.

Patients were:

A. Refrained from eating or drinking during that period;

B. Educated to "turn over" if vomiting occurs or to spit out the secretions;

C. Advised to take deep inspiration by open mouth.

On arrival of the patient in the operating room, intravenous line was established by 18-gauge intravenous cannula and infusion of ringer lactate was started. The patients head was placed on a soft pillow of 10 cm before induction of anesthesia with the neck flexed and head extended. The patients was connected to multiparameter monitor to record heart rate, noninvasive SBP, DBP, MAP, $EtCO_2$, continuous ECG tracing and oxygen saturation. After recording baseline parameters, the patient was premedicated with injection midazolam

0.02 mg/kg body weight. Then the patient was preoxygenated with 100% oxygen for 3 minutes *via* a face mask with Bain's circuit.

Anesthesia was induced with fentanyl 2 mcg/kg and propofol 2 mg/kg. Once an adequate depth of anesthesia was achived, patient was paralyzed by giving intravenous succinylcholine 1.5 mg/kg body weight. Intermittent positive pressure ventilation given with 100% oxygen for 1 minute with tidal volume of 6–8 ml/kg body weight. One minute after mask ventilation, gentle laryngoscopy and intubation was performed by an experienced anesthesiologist. Patients requiring laryngoscopy and intubation for more than 30 second or requiring more than two attempts for intubation were excluded from the study. Trachea intubated with soft seal cuffed sterile polyvinyl chloride tracheal tube (Sterimed) of 7–7.5 mm inner diameter in female with Mcintosh 3 no. blade and 8–8.5 mm in male patients with Mcintosh 4 no. blade. The tracheal tube cuff was inflated with air (till slight leakage of air is observed on positive pressure on bag). Proper placement of endotracheal tube was confirmed by bilateral symmetrical chest movements, bilateral equal air entry on auscultation, square waveform on capnograph, normal end tidal CO_2. The endotracheal tube was secured with adhesive tape. After assuring the proper placement of endotracheal tube, anesthesia was maintained with 1% isoflurane and vecuronium bromide 0.08 mg/kg body weight. Ventilation was controlled using Bain's circuit or closed circuit with soda lime in circle absorber using ventilator.

Hemodynamic parameters

The following Hemodynamic Parameters were recorded in all patients:

- Heart Rate (HR) in beats per minute;
- Systolic Blood Pressure (SBP) in mm of Hg;
- Diastolic Blood Pressure (DBP) in mm of Hg;
- Saturation SpO_2.

The above Hemodynamic Parameters were monitored in the following Time Interval:

- Basal before premedication;
- Just after intubation;
- 5 min after intubation;
- 10 min after intubation;
- Just after extubation.

On completion of surgery, anesthetic agents were discontinued allowing smooth recovery of consciousness. The muscle relaxation was reversed with a combination of neostigmine 0.05 mg/kg and glycopyrrolate 0.01 mg/kg. The trachea was extubated after extubation criteria were met (immediately after recovery of respiration), and the patients were shifted to postanesthesia care unit. The primary aim of this study was to evaluate the postoperative sore throat both at rest and on swallowing. The secondary aim was to identify other laryngeal complaints, such as cough, hoarseness of voice, dysphonia and dysphagia. These symptoms were scored by nursing staff not knowing results of study. Sore throat was defined as pain at the larynx or pharynx. It was asked with a direct questionnaire survey, 'Do you have a pain throat after operation?' Presence of sore throat was noted at rest and on swallowing. Cough was defined as a sudden, strong abdominal contraction. Even a single cough was recorded as 'yes'. Hoarseness was defined as a harsh or stained voice of patients different from his/her normal voice. If a nurse observed the patient's voice change, it was scored as 'yes'. Presence of sore throat, hoarseness and cough was noted:

- Immediately after extubation;
- 2 hr postoperatively, 8 hr postoperatively, 24 hr postoperatively and 48 hr postoperatively.

In the postoperative ward, patients were also monitored for any drug-related side effects like nausea, vomiting, hypotension, respiratory depression etc.

Statistical Analysis

All recorded data were expressed as mean ± SD Unpaired *t*-test was used for numerical data to compare Two Group. Test of normality (Kolmogorov-Smirnov, Shapiro-Wilk) was done for continuous variables (height, weight, age). Categorical data (gender) was expressed as frequency of occurrence. Comparisons of categorical data between groups were done using Pearson Chi-square, continuity correction, likelihood ratio, ($p < 0.05$) and considered statistically significant. IBM SPSS-21 was used for statistical analysis.

Observations and Results

There was even distribution of age in two groups. The patients selected in the present study belonged to the age between 40 and 70 years. Table 1 shown Age distribution of the patients in both the Groups. The mean age was 47 ± 7.8 and 47.9 ± 7.8 in Group A and Group B respectively. There was no significant difference in the age of patients

Table 1: Age distribution

Age (Range) (In years)	Group A (n = 50)	Group B (n = 50)
40–50	18	20
51–60	21	22
61–70	11	8
mean age ± SD (years)	47 ± 7.8	47.9 ± 7.8
p - value	0.999 (NS)	

Table 2: Sex distribution

Sex	Group A		Group B	
	No. of patients	Percentages	No. of patients	Percentages
Male	27	54%	28	56%
Female	23	46%	22	44%
Total	50	100%	50	100%

between the Magnesium Group and Lignocaine Group. Both Groups were similar with respect to age distribution ($p > 0.05$), shows in (Table 2).

Majority of patients were male i.e. 54% and 56% in Magnesium Group and Lignocaine Group respectively. Data were analyzed statistically and results were comparable with no significant difference ($p > 0.05$).

Table 3 shown comparison of mean pulse rate in both the Groups. On Intragroup comparison mean pulse rate increase in both groups at, 1 min, 5 min, 10 min after intubation and just after extubation from the preoperative value, but mean pulse rate more increase in Lignocaine Group as compared

Table 3: Pulse Rate

Time		Group A		Group B		p - value	Statistical Significance
		Mean	SD	Mean	SD		
Preoperative		81.2	9.25	79	9.4	0.2167	
Intraoperative	1 Min	87.1	8.84	89	9.7	0.2614	
	5 Min	85	11	85	10	0.9770	p – value > 0.05 NS
	10 Min	86	8.8	86	9	0.9463	
Postoperative just after extubation		89.1	8.94	91	8.7	0.3093	

to Magnesium Group just after intubation and extubation. On Inter group comparison there was no significant difference in the mean pulse rate between the Lignocaine Group and Magnesium Group.

Table 4 shown comparison of mean SBP in both the Groups. On Intragroup comparison mean SBP increase in both Groups at, 1 min, 5 min, 10 min after intubation and just after extubation from the preoperative value, but mean SBP more increase

Table 4: Systolic BP

Time		Group A		Group B		p - Value	Statistical Significance
		Mean	SD	Mean	SD		
Preoperative		126	7.9	128	7.6	0.1309	
Intraoperative	1 Min	131	6.93	134	7.26	0.0514	
	5 Min	127	7.3	129	7.7	0.1130	p – value > 0.05 NS
	10 Min	126	6.1	129	6.6	0.0721	
Postoperative just after extubation		129	6.87	132	6.78	0.0819	

in Lignocaine Group as compared to Magnesium Group just after intubation and extubation. On Inter group comparison there was no significant difference in the SBP between the Lignocaine Group and Magnesium Group.

Table 5 shown comparison of mean DBP in both the Groups. On Intragroup comparison mean DBP increase in both groups at, 1 min, 5 min, 10 min after intubation and just after extubation from the preoperative value, but mean DBP more increase

Table 5: Diastolic BP

Time		Group A		Group B		*p* - value	Statistical Significance
		Mean	SD	Mean	SD		
Preoperative		84	7.2	85	10	0.5766	
Intraoperative	1 Min	86.84	7.06	90	9	0.0627	
	5 Min	82	9	83	8.5	0.6530	*p* - value > 0.05 NS
	10 Min	82	7.3	83	8.2	0.5222	
Postoperative just after extubation		86.5	8.65	89	8.9	0.1290	

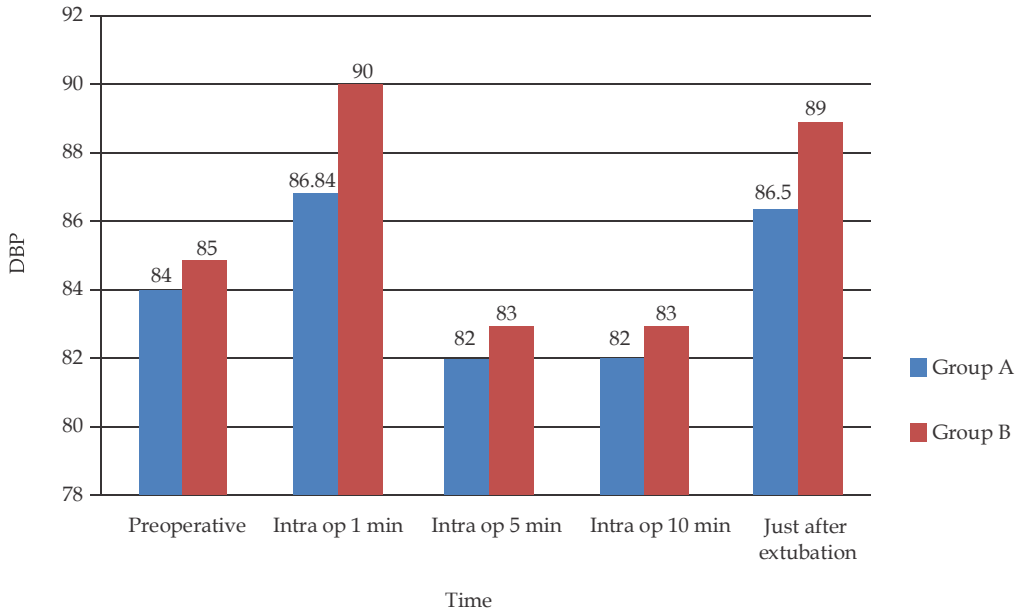

Fig. 1: Diastolic BP.

in Lignocaine Group as compared to Magnesium Group just after intubation and extubation. On Inter group comparison there was no significant difference in the SBP between the Lignocaine Group and Magnesium Group, shows in (Fig. 1).

Table 6 shown comparison of mean SpO_2 in both the Groups. On Intragroup comparison no difference in preoperative, intraoperative and postoperative means SpO_2 in both Groups. There was no significant difference in the mean SpO_2

Table 6: SpO_2

Time		Group A		Group B		*p* - value	Statistical Significance
		Mean	SD	Mean	SD		
Preoperative		98.7	0.93	98	1	0.13	
Intraoperative	1 Min	99.9	0.27	99.9	0.27	0.73	
	5 Min	99.9	0.27	99.9	0.27	0.73	*p* – value > 0.05 NS
	10 Min	99.9	0.27	99.9	0.27	0.55	
Postoperative just after extubation		98	0.7	99	1	0.29	

of patients between the Magnesium Group and Lignocaine Group. Both Groups were similar with respect to mean SpO_2.

Table 7 shown comparison of sore throat at rest in both the groups just after extubation, 2 hours, 8 hours, 24 hours and 48 hours. On intragroup comparison incidence of sore throat was more just after extubation in both groups. Sore throat incidence decrease with time in both groups. After 48 hr no incidence of sore throat found in both groups. On intergroup comparison incidence of sore throat was more common in lignocaine group as compared to magnesium group but there was no significant difference in both groups with respect to sore throat at rest ($p > 0.05$), (Fig. 2).

Table 7: Sore throat at rest

Time	Group A		Group B		*p* - value	Statistical Significance
	Nos. of patients	Percentages	Nos. of patients	Percentages		
Immediate after extubation	7	14	9	18	0.770	
2 hour	4	8	6	12	0.505	*p* - value>0.05 NS
8 hour	2	4	5	10	0.239	
24 hour	1	2	2	4	0.557	
48 hour	0	0	0	0		

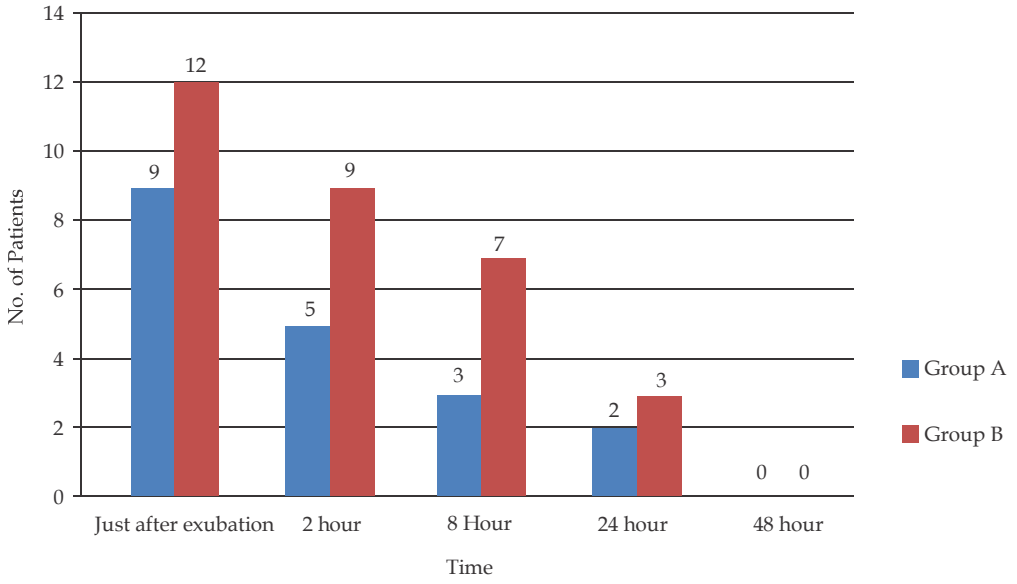

Fig. 2: Sore throat.

Table 8 shown comparison of sore throat on swallowing in both the Groups just after extubation, 2 hours, 8 hours, 24 hours and 48 hours. On Intragroup comparison incidence of sore throat on swallowing was more just after extubation in both Groups. Sore throat incidence decrease with time in both Groups. After 48 hr no incidence of sore throat found in both Groups. On Inter group comparison incidence of sore throat was more common in Lignocaine Group as compared to

Table 8: Sore throat on swallowing

	Nos. of patients	Percentages	Nos. of patients			
Immediate after extubation	9	18	12	24	0.624	
2 hour	5	10	9	18	0.249	*p* - value > 0.05 NS
8 hour	3	6	7	14	0.182	
24 hour	2	4	3	6	0.646	
48 hour	0	0	0	0		

Magnesium Group but there was no significant difference in both Groups with respect to sore throat on swallowing ($p > 0.05$).

Table 9 shown comparison of hoarseness of voice in both the Groups just after extubation, 2 hours, 8 hours, 24 hours and 48 hours. On Intragroup comparison incidence of hoarseness of voice was more just after extubation in both Groups. Incidence decrease with time in both Groups. 24 hr after extubation no incidence of hoarseness of voice found in Magnesium Groups. In Lignocaine Group no incidence of hoarseness of voice found 48 hr after extubation. On Inter group comparison incidence

Table 9: Hoarseness of voice

Time	Group A		Group B		*p* - value	Statistical Significance
	Nos. of patients	percentages	Nos. of patients	Percentages		
Immediate after extubation	4	8	7	14	0.337	
2 hour	3	6	6	12	0.294	*p* – value > 0.05 NS
8 hour	2	4	3	6	0.646	
24 hour	0	0	1	2	0.314	
48 hour	0	0	0	0		

of sore throat was more common in Lignocaine Group as compared to Magnesium Group but there was no significant difference in both Groups with respect to hoarseness of voice ($p > 0.05$).

Table 10 shown comparison of cough in both the Groups just after extubation, 2 hours, 8 hours, 24 hours and 48 hours. On Intragroup comparison incidence of cough just after extubation more in Magnesium Group as compare to Lignocaine Group patients thereafter incidence of cough more in Lignocaine Group patients. 48 hr after extubation no incidence of cough noted in both Groups. On

Table 10: Comparison of cough

Time	Group A		Group B		*p* - value	Statistical Significance
	No. of patients	Percentages	No. of patients	Percentages		
Immediate after extubation	7	14	5	10	0.538	
2 hour	3	6	4	8	0.695	*p* – value > 0.05 NS
8 hour	2	4	3	6	0.646	
24 hour	1	2	2	4	0.557	
48 hour	0	0	0	0		

Inter group comparison there was no significant difference in the incidence of cough in patients between the Magnesium Group and Lignocaine Group. Both Groups were similar with respect to cough incidence ($p > 0.05$).

Complication and side effect

As observed in Magnesium Group 2 patients (4%) developed nausea, and 2 patients (4%) developed sedation in Lignocaine Group. We conclude that the side effect profile of the both Groups was quite similar as none of the patient in both Groups had profound deep sedation or respiratory depression and does not bring any additional morbidity to patients. Incidence of side effects were comparable ($p > 0.05$) in both the Groups.

Discussion

Postoperative Sore Throat (POST), cough and hoarseness of voice is common, uncomfortable, distressing sequelae after tracheal intubation. It impacts the wellbeing of patients after surgical procedures under general anethesia and leaves the patients with unpleasant memories of surgery.

In our study we used magnesium sulphate nebulization and lignocaine nebulization for reducing postoperative throat complaints. Magnesium acts as a NMDA antagonist and NMDA recepter has a role in nociception and inflammation. Magnesium is easily available, cost effective. Lignocaine act by anti-inflammatory

action and reduce local nerve irritation. It is easily available, cost effective, less side effect and no long-term residual effects.

Sore Throat

We found that incidence of sore throat at rest and on swallowing was more in lignocaine group as compare to Magnesium Group and sore throat more common in female patients as compared to male patients during study period, but statistically there was no significant difference in the incidence of sore throat between the Magnesium Group and Lignocaine Group patients. Both Groups were similar with respect to sore throat ($p > 0.05$). On Intragroup comparison sore throat incidence decrease with time in both Groups. 48 hr after extubation there was no incidence of sore throat found in both Groups.

Our study correlated with the study of Christensen AM et al. (1994)[2] in which they found that the incidence of postoperative sore throat in women (17%) was significantly higher than that in men (9%) which was attributed to the tighter fitting of tube in women.

On swallowing incidence of sore throat after magnesium sulphate nebulization at rest just after extubation, 2 hr, 4 hr, 24 hr was 20%, 16%, 12% and 2%. Our findings are also comparable to study done by Gupta SK, Tharwani S et al. 2012.[11] In their study, they concluded that incidence and severity of POST at rest and on swallowing reduced with magnesium sulphate nebulization.

Hoarseness of Voice

It was observed that Incidence of hoarseness of voice was more in Lignocaine Group as compare to Magnesium Group and more incidence in female patients but there was no significant difference in the incidence of hoarseness of voice between the Magnesium Group and Lignocaine Group patients. Both Groups were similar with respect to hoarseness of voice ($p > 0.05$). On Intragroup comparison incidence of hoarseness of voice decrease with time in both Groups but more faster recovery in Magnesium Group. In Magnesium Group no incidence of hoarseness of voice found at 24 hr after extubation. In Lignocaine Group no incidence of hoarseness of voice found at 48 hr after extubation.

Cough

It was observed that on Intragroup comparison initially just after extubation incidence of cough more in Magnesium Group then Lignocaine Group after that incidence of cough decrease in both Groups. Incidence of cough at 2 hr and after that more in Lignocaine Group as compared to Magnesium group. In both Groups incidence of cough was more in female patients. 48 hr after extubation there was no incidence of cough noted in both Groups on Inter group comparison there was no significant difference in the incidence of cough in patients between the Magnesium Group and Lignocaine Group. Both Groups were similar with respect to cough incidence ($p > 0.05$).

Secondary Goals

Endotracheal tube intubation which is integral part of general anesthesia associated with presser response and hemodynamic variation. In cardiac disease patients during the insertion and extubation of endotracheal tube may increase the morbidity and mortality due to presser response. Preoperative nebulization with magnesium sulphate and lignocaine decrease the incidence of perioperative morbidity and mortality due to perioperative hemodynamic stability. The following hemodynamic parameters were recorded in all patients:

Basal before premedication, just after intubation, 5 min., 10 min. after intubation and just after extubation.

Heart Rate

As shown in Table 4, just after intubation, mean pulse rate increased as compared to basal value in both Groups but increase in pulse rate was much more in Lignocaine Group as compared to Magnesium Group and mean pulse rate in Lignocaine Group remained high ($p > 0.05$) as compared to Magnesium Group up to just after extubation. But, none of the patients in both either groups required any treatment for tachycardia or arrhythmia (pulse rate was never less than 60 bpm).

On Inter group comparison difference was statistically not significant ($p > 0.05$). Results suggest that increase in pulse rate in both Groups was due to intubation response.

Systolic and Diastolic Blood Pressure

As shown in Tables 5 and 6, just after intubation, both SBP and DBP increased as compared to basal value in both Groups but increase in blood pressure was much more in Lignocaine Group as compared to Magnesium Group and blood pressure remain high as compared to Magnesium Group up to

just after extubation. On Inter group comparison difference was statistically not significant ($p > 0.05$). Results suggest that increase in blood pressure in both Groups was due to intubation response.

SpO_2

As shown in Table 7 in both Groups changes in mean oxygen saturation remained statistically insignificant ($p > 0.05$). On Intragroup comparison mean oxygen saturation remained constant.

Side Effects and Complications

As shown in Table 10, in Magnesium Group 2 (4%) patients developed nausea, and 2 (4%) patients developed sedation in Lignocaine Group. Hypotension, Hypertension, Oligourea, seizure, Arrhythmias, respiratory depression, Flushing of skin, Loss of deep tendon reflex, Slurring of speech and any other complications were not observed in any patient of either group.

Our results indicate that as a nebulization, the side effect profile of the both Groups was quite similar as none of the patient in both Groups had profound deep sedation or respiratory depression and does not bring any additional morbidity to patients.

Summary and Conclusions

We conclude that incidence of sore throat, hoarseness of voice and cough was more common in Lignocaine Group as compared to Magnesium Group and more common in female patients in both Groups. So, both drugs can be used for prevention of postoperative sore throat, but magnesium sulphate was better for prevention of POST but statistically nonsignificant. However, further study required with large study group and monitoring of blood concentration of drugs.

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