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Use of Zinc Lozenges in the Prevention of Postoperative Sore Throat

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ABSTRACT

Objectives: To determine the efficacy of Zinc lozenges in preventing postoperative sore throat after endotracheal intubation.

Methodology: A total of 110 patients planned for low to moderate-risk surgeries with endotracheal intubation were randomized in to 2 equal groups. In Group A, patients were given Zinc lozenges (equivalent to 40 mg of elemental Zinc) 30 min before surgery. In Group B, patients were not given any such treatment. After extubation, assessment of sore throat was done using a standard 4-point scale for the incidence and severity at 0, 2, 4 and 24 hours. The incidence of sore throat at 4 hours post-surgery was defined as the primary outcome of the study. The secondary outcome was the incidence of sore throat at 0, 2, and 24 hours and the severity of incidences during 24 hours.

Results: The Mean±SD of age in this study was 44.08±6.92 years. The female gender was 52.73%, while male gender was 47.27%. The study's primary outcome showed a 22% lower incidence of postoperative sore throat at 4 hours in Group A compared to Group B (10.9 Vs 32.72, p=0.005). There were also considerably low incidences of sore throat (14% and 16% respectively) at 0- and 2-hours follow-up; however, difference observed at 24 hours follow-up was insignificant (p=0.207). The comparison of mild, moderate and severe sore throat during 24 hours also shows significantly lower incidences in Group A compared to Group B.

Conclusion: Administration of Zinc lozenges 30 minutes before surgery effectively reduces the severity and incidence of postoperative sore throat after endotracheal intubation.

Keywords: Endotracheal intubation, Postoperative sore throat, Zinc Lozenge.

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Introduction

During general anesthesia, the airway is maintained with an endotracheal tube.[1] A lot of advancements have been made regarding anesthesia techniques; however, complications related to throat, like sore throat, hoarseness, nausea, vomiting and dry mouth, are still common complaints. Postoperative sore throat (POST) is considered among the most frequent complaints.[2,3] The cough caused by POST adds to the stress of the stitches and pain at the surgery site.[4] This becomes the reason for the patient's discomfort and, therefore, dissatisfaction and restricts the patient's daily life activities even after discharge from the hospital.[5,6] The change in voice observed after the intubation can be mild hoarseness but may lead to entire aphonia. The incidence of POST may reach as high as 90%, while the incidence of hoarseness ranges from 4 to 43% in different studies.[4] Clear etiology, although unknown, the possible explanation is the inflammatory process as assessed by the inflammatory mediators detected in the tracheal mucosa after intubation.[7,8,9] The factors contributing to the POST are said to be the duration of anesthesia, use of anesthetic spray, aggressive suction in the oropharyngeal region, use of the nasogastric tube, airway managing techniques (laryngeal mask airway, face mask, ETT), cuff pressure, surgical positioning, succinylcholine usage and gender (female). [10]

POST is seen to get better with time; however, earlier recovery strategies help enhance the patient's contentment and may assist in earlier discharge from the

hospital. For this purpose, different researchers have suggested various pharmacological treatments and non-pharmacological solutions and shared their success rates. Some of these solutions, however, add discomfort for the patients during the post-surgical period, like sprays and gargles. Some others have been adopted as everyday anesthetic care, like smaller endotracheal tube sizes.[11,12] Magnesium lozenges are also used for the purpose and have shown some comfort for these patients.[13]

Zinc, a group IIb metal, is a micro-nutrient demonstrated to aid in the growth and tissue regeneration process. Additionally, Zinc is beneficial in regulating the immune system and has anti-inflammatory action.[14] This makes Zinc one of the agents, possibly useful in POST. The use of Zinc tablets reduced the incidence and severity of POST significantly. Zinc lozenges cost about the same as magnesium lozenges. They are easy to find; you can buy them at any pharmacy, as zinc lozenges have been used for many years to treat sore throats caused by upper respiratory tract infections.[15]

With the above-mentioned tissue repairing and anti-inflammatory properties, the Zinc given in the form of lozenges 30 minutes before the start of the process to the patients undergoing endotracheal intubation will lessen the POST complaint.

Limited data on the use of Zinc in patients suffering from POST is available, and no such study has been done in our local population. This study was therefore planned to determine the efficacy of Zinc lozenges in preventing the POST after endotracheal intubation. As discussed above, Zinc sulfate in the form of oral lozenges was used as it is already reported to have benefits regarding oropharyngeal mucosa. Our study's results will help formulate clear recommendations for treatment protocol for patients undergoing endotracheal intubation to decrease both the incidence and severity of POST.

Methodology

This randomized control trial was conducted at the Preoperative holding area, Operating Room (OR) and Post-Anesthesia Care Unit (PACU) at PAEC General Hospital, Islamabad, over six months from the 1st of April 2023 to the 30th of September 2023. By using WHO calculator, sample size is 110 having 55 samples in each group with level of significance 5%, power of test 80%, anticipated population proportion for group A is 0.07% and for group 2 is 0.24%.

A total of 110 patients above the age of 18 years planned for low to moderate-risk surgeries under general anesthesia while using endotracheal intubation were randomized into two equal groups using computer-generated sheets. In Group A, patients were given Zinc lozenges (equivalent to 40 mg of elemental Zinc) 30 min before surgery. It was ensured that patients did not consume any sedative before dissolving their lozenges. In Group B, patients were not given such treatment for this purpose. Inclusion Criteria were set as patients above the age of 18 years and with Physical status I or II (as per American Society of Anesthesiologists) planned for low to moderate risk surgery (with expected duration of surgery > 1h and < 6 hours). This duration of surgery was to ensure enough intubation to irritate the oropharyngeal mucosa.

Exclusion Criteria were patients with upper RTI or history of sore throat, Mallampati grade > II, smoker, known allergy to Zinc and pregnancy. Patients in whom more than one attempt for intubation was needed or patients with traumatic intubation (blood at the tip of endotracheal tube observed at extubation) were also excluded.

All the anesthetists performing intubation had a minimum of 2 years of experience. Endotracheal tubes were of standard sizes for females (7mm) and males (7.5mm).

The laryngoscopy was conducted for the participants of both these groups, and each was categorized according to the Cormack and Lehane classification.

The duration of the laryngoscopy and the intubation time were noted for each patient. The endotracheal tube cuff was inflated using 2% lignocaine solution in all patients. Anesthesia was then maintained with a mixture of 1-2% isoflurane, nitrous oxide and oxygen. A standard dose of dexamethasone and nalbuphine was administered to participants of both groups. Monitors for ECG, BP monitoring and pulse oximeter were attached as per the routine of the operating room. Any incidence of blood in the oropharynx confirming traumatic intubation was noted down, and these patients were also excluded from the study.

Any coughing or bucking was considered during the recovery period from anesthesia. The patients were extubated upon completion of surgery following careful suctioning of the oropharynx and were transferred to the Post Anesthesia Care Unit (PACU). At the time of admission to the PACU, a standard scale was used to immediately assess the patients for sore throats. This

assessment was done at 0, 2, 4 and 24 hours. The assessment scale ranged from 0 to 3, where 0 was no sore throat, 1 was mild discomfort (only complaint if asked), 2 was moderate sore throat (complaint by themselves), and 3 was severe sore throat (change in voice/ hoarseness/throat pain). The incidence of sore throat at 4 hours post-surgery was defined as the primary outcome. The secondary effect was set as the incidence of sore throat at 0, 2, and 24 hours. The overall levels of severity of POST were also compared at completion of 24 hours.

A written consent was taken from the patients for participation in the study. Permission for conducting the survey was taken from the ethical committee of the Hospital.

Data analysis was performed using SPSS (Chicago, IL, USA) version 25. Mean±Standard deviation of quantitative variables was calculated. Qualitative variables were presented in the shape of frequency and percentage. The findings of the two groups were compared by applying the Chi-square test and independent t-test, while $p \leq 0.05$ was considered significant.

Results

The Mean±SD of age in this study was 44.08±6.92 years with an age range of 31-58 years. The female gender was 52.73%, while the male gender was 47.27% of the study population. The group-wise details of demography and clinical findings are given in Table I.

Table I: Group wise demographic details and clinical findings. (n= 110)

Demographics and clinical findings		Group-A (n=55)	Group-B (n=55)
Age (Mean±SD) Years		43.30±6.83	44.79±7.05
Gender	Male n (%)	24 (43.63)	28 (50.9)
	Female n (%)	31 (56.36)	27 (49.09)
Weight (Mean±SD) Kg		72.81 ±7.61	70.21±7.47
ASA Physical State	I n (%)	34 (61.81)	37 (67.27)
	II n (%)	21 (38.18)	18 (32.72)
MP Grade	I n (%)	30 (54.54)	33 (60)
	II n (%)	25 (45.45)	22 (40)
Duration of laryngoscopy (Mean±SD) Sec		20.14 ±5.13	18.94±4.63
Duration of anesthesia (Mean±SD) Min		143.47±13.30	138.58±13.10
Duration of surgery (Mean±SD) Min		129.76±9.07	126.2±6.82

The study's primary outcome shows a 22% lower incidence of POST 4 hours follow-up time in Group A compared to Group B. There were also considerably low incidences of POST (14% and 16% respectively) at 0 and 2 hours follow-up time in Group A compared to Group B. However, no significant difference was observed at 24 hours follow-up, as shown in Table II.

Table II: Incidence of POST in both groups at follow up visits (n=110)

Follow up visits	Group-A (n=55)	Group-B (n=55)	p-value
	Patients complaining of POST n (%)		
0 hours	2 (3.63)	10 (18.18)	0.014
2 hours	4 (7.27)	13 (23.63)	0.017
4 hours	6 (10.9)	18 (32.72)	0.005
24 hours	7 (12.72)	12 (21.81)	0.207

The comparison of overall mild, moderate and severe incidences of POST also shows a significantly lower incidence of all levels of POST in Group A compared to Group B, as shown in Table III.

Table III: Comparison of levels of severity of POST among two groups. (n=110)

Intensity of POST	Group-A (n=55)	Group-A (n=55)	p-value
	Number of patients complaining POST n(%)		
Mild	13 (23.63)	24 (43.63)	0.014
Moderate	5 (9.09)	23 (41.81)	0.000
Severe	1 (1.81)	6 (10.9)	0.05

Discussion

No precise mechanism of sore throat is suggested in the postoperative period after intubation; however, some studies have discussed the efficacy of Zinc in sore throat. This efficacy is presumed to be due to the lowered local inflammatory response originated by a reduction in reactive oxygen species (ROS), which causes a decrease in PGE-2 production and expression of COX-2.

In different studies, Zinc has been found effective for curing xerostomia oral mucositis and relieving sore throat caused by radiation and chemotherapy.[16,17]

Hayashi H studied the role of Zinc lozenges or suspension in preventing oral mucositis in hematological cancer patients undergoing chemotherapy. The results proved that the incidence of oral mucositis, an inflammation of the oral mucosa, was significantly lower in patients using Zinc suspension or tablets compared to patients without this treatment (23% with suspension and 13% with lozenges Vs 74% without medication, p=0.01). These Zinc preparations also effectively reduced pain and decreased the need for anti-inflammatory agents or local anesthetics. The results of both these Zinc formulations were comparable, and Zinc lozenge was proposed to be practical and helpful in preventing oral mucositis.[18]

Farhang B conducted a study to determine the efficacy of Zinc lozenges in reducing the incidence and severity of POST in patients planned for low or moderate-risk surgeries using endotracheal intubation. The study results confirm that the incidence of POST was significantly decreased at 4 hours follow-up time in the group taking Zinc lozenges compared to the group not taking this medication (7% Vs 29% respectively, p=0.046). There was also a significant difference in the incidence at 0- and 2-hours follow-up time (0% Vs 24%, p=0.004 and 10% Vs 34%, p=0.049, respectively). There was, however, no significant difference in the incidence of POST at 24 hours. The results also proved a significantly lower mild incidence (p=0.003) and moderate incidence (p=0.004) of POST in the Zinc group. The researchers concluded that Zinc lozenges in a single dose containing 40 mg Zinc 30 minutes before the operation reduce the incidence of POST at the initial 4 hours after surgery and reduce the severity in the post-operative phase.[15]

Sarkar T and Mandal T used Zinc tablets in dispersible formulation to determine their efficacy in POST. The results of this study also reported a significantly lower incidence of POST in the Zinc group compared to the control group at 4 hour time (6.8% Vs 31.8%, p=0.003). Severe POST was reported in 3 patients in the control group, while no severe POST was reported in the Zinc group. The severity of POST was also lower at 0 hours, 2 hours, and 4 hours follow-up times (P= 0.003, P<0.001 and p=0.001, respectively). The study concluded that the Zinc 40mg dispersible tablets administrated preoperatively reduce both the incidence and severity of POST.[19]

Jandial K and Tabassum S, in a study conducted in 2021, aimed to evaluate the reduction in POST caused by endotracheal intubation by using preoperative oral Zinc (dispersible tablet containing 40 mg Zinc, 30 min before the surgical procedure). This study also reported that the incidence and severity of POST were significantly lower in the Zinc group compared to the placebo group.[20]

The Mean±SD of age in our study was 44.08±6.92 years. The female gender was 52.73%, while the male gender was 47.27% of the study population.

The study's primary outcome showed a significantly lower incidence of POST at 4 hours of follow-up time in Group A compared to Group B (10.9 Vs 32.72, p=0.005). These results align with studies discussed above, which mentioned the highest efficacy of Zinc tablets at 4 hours post-operative time.[15,19, 20]

There were also significantly low incidences of POST at 0 hours (3.63 Vs 18.18, p=0.014) and 2 hours (7.27 Vs 23.63, p=0.017) follow-up time in Group A compared to Group B; however, no significant difference was observed at 24 hours follow up (12.72 Vs 21.81, p=0.207). The comparison of overall mild, moderate and severe incidences of POST also shows a significantly lower incidence of any levels of POST in Group A compared to Group B. These results regarding incidence and severity are also consistent with the results of studies conducted previously in patients suffering from sore throat after endotracheal intubation, as discussed above.[15,18,19,20] This research has demonstrated that the oral intake of zinc-lozenge 30 minutes before surgery significantly prevents the incidence and severity of sore throat during the early hours of the postoperative period.

The major limitation of our study is the small sample size. Moreover, the dose of Zinc used in this study was based on limited data available for using Zinc in POST. Future studies may determine the efficacy of different doses of Zinc lozenges and consider repeating doses in the postoperative period. Using larger sample size and lower dose of zinc lozenges in future studies can be done to find better results and improve patient care and satisfaction.

Conclusion

This study demonstrated the benefits of prophylactic use of Zinc in preventing POST as administration of Zinc lozenges 30 minutes before surgery. It effectively reduces the severity and incidence of postoperative sore throat in the early hours after endotracheal intubation.

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