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Dexamethasone Versus Lidocaine: Evaluation of Their Roles in Reduction of Sore Throat after Endotracheal Extubation Following General Anaesthesia

*Islam MS[1], Bhowmick LK[2], Khan MMR[3], Mahabubuzzaman M[4], Rahim MA[5], Kabir MH[6], Sheikh MZA[7]

Abstract

Postoperative sore throat (POST) is a common complaint in patients requiring general anaesthesia with endotracheal intubation (ETI) for surgery. Many procedural modifications and drugs were tried to reduce such discomfort. This prospective randomized controlled study was conducted in a tertiary care hospital in Dhaka, Bangladesh, between July and December of 2024, to determine the efficacy of dexamethasone and lidocaine in reducing postoperative sore throat in patients receiving general anaesthesia with endotracheal intubation. A total of 150 patients were enrolled and divided into 3 groups in this study with 50 patients in each group. Simple Random sampling technique was used. Group D (dexamethasone) received 5 mg dexamethasone and group L (lidocaine) received 1.5 mg/kg lidocaine 30 minutes before operation. However, group C (control) did not receive any study drug. Data was collected through semi-structured questionnaire in patient data sheet and analyzed. The incidence of POST was found 30%, 38% and 52% in dexamethasone, lidocaine and control groups respectively ($p<0.05$). Dexamethasone reduced the incidence of POST in the first 24 hours (OR=0.4, 95% CI=0.17–0.9). However, there was no significant difference of severity of POST at 3 hours, 6 hours, 12 hours and 24 hours ($p>0.05$) after extubation. To conclude, intravenous dexamethasone was found more effective than intravenous lidocaine in reducing the incidence of postoperative sore throat after endotracheal extubation following general anaesthesia.

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Introduction

Postoperative sore throat (POST) is a subjective unpleasant sensation caused by damage to the tracheal mucosa after endotracheal tube (ETT) cuff inflation during general anesthesia (GA).[1] It can cause discomfort and pain after extubation following surgery. Hoarseness, cough, swallowing and speech difficulty are also complained, which causes people to delay returning to normal activities due to pain.[2] Some studies show that the incidence of POST is 30% to 70%.[2] There are many factors that may causes POST, including the size of the endotracheal tube (ETT), number of attempt to ETI, trauma to the airway during ETI, the placement technique and lubrication of ETT, the tension of the ETT cuff and duration of ETI.[3] Study by Obsa *et al.* in Ethiopia showed that the overall prevalence of POST was 40.48%, which is very high.[4] As many patients may not seek medical attention for POST, anesthesiologists may not be aware of the presence of sore throat in their workplace.[5]

1. *Dr. Md. Saiful Islam, Assistant Professor, Department of Anaesthesiology, Green Life Medical College, Dhanmondi, Dhaka.*
2. *Dr. Lipon Kanti Bhowmick, Assistant Professor, Department of Anaesthesiology and Intensive Care Unit (ICU), Community Based Medical College, Mymensingh, Bangladesh.*
3. *Dr. Md. Mashfiqur Rahman Khan, Specialist (Anaesthesia, ICU and Pain Medicine), Sheikh Fazilatunnessa Mujib Memorial KPJ Specialized Hospital, Dhaka, Bangladesh.*
4. *Dr. Mohammad Mahabubuzzaman, Junior Consultant, Department of Anaesthesiology and Intensive Care Unit (ICU), NITOR, Dhaka Bangladesh.*
5. *Dr. Md. Abdur Rahim, Assistant Professor, Department of Anaesthesiology and ICU, TMSS Medical College, Bogura, Bangladesh.*
6. *Dr. Md. Humayun Kabir, Junior Consultant, Department of Anaesthesiology and ICU, Mugda Medical College, Dhaka, Bangladesh.*
7. *Dr. Md. Zubyeer Ali Sheikh, Associate Professor, Department of Anaesthesia and critical care medicine, Khulna City Medical College, Khulna, Bangladesh.*

Address of Correspondence:
Email: msisaurav@yahoo.com

Many pharmacological and non-pharmacological interventions have been suggested, including use of the correct size and type of ETT, lubrication of the endotracheal tube, intraoperative cuff pressure testing, inflation of cuff with lidocaine, lidocaine spray or injection, dexamethasone, magnesium sulfate, ketamine mouthwash and stellate ganglion block to reduce the incidence and severity of POST. All the facilities are not available in all operation theatre. However, dexamethasone and lidocaine are available in all operation theatres of our country.[6] These are convenient and can be administered safely in the operating room.[7] Utilizing the protective effects of intravenous dexamethasone and lidocaine, the incidence and severity of POST after GA with ETI can be reduced. Therefore, this study aimed to compare the protective effects of intravenous dexamethasone and lidocaine in reducing POST after GA with ETI.

Methods

This prospective randomized controlled study was conducted in a tertiary care hospital in Dhaka, Bangladesh, from July to December of 2024. A total of 150 patients who chose to have surgery under general anesthesia with endotracheal intubation (ETI) were enrolled and divided into 3 groups in this study with 50 patients in each group. Simple Random sampling technique was used. Group D (dexamethasone) received 5mg dexamethasone and group L (lidocaine) received 1.5 mg/kg lidocaine 30 minutes before operation. However, group C (control) did not receive any study drug. Our patients were between 18 and 65 years; ASA-I and II were included. Patients with recent URTI, smokers, patients undergoing maxillofacial surgeries, patients with expected difficult intubation, patients who have used steroids for any disease process, surgery duration 4 or more hours, patient developing critical condition or requiring transfer to ICU were excluded from study. Dependent variables of this study was the incidence and severity of postoperative sore throat (POST), while the independent variables were age, gender, preemptive analgesia, types of surgery, attempt of ETI, ETT size and ETI duration.

To complete the whole procedure of data collection, two anesthesiologists were required for blinding purpose. One anaesthesiologist was concerned about pre and postoperative data collection and another one was concerned for conduction of anaesthesia including intraoperative data collection. Patients undergoing elective surgery with GA and ETI were randomized via lottery method. All patients received preemptive analgesia with inj. paracetamol (20mg/kg, highest 1gm) and inj. tramadol (1.5mg/kg: highest 100mg). Surgical patients receiving intravenous 5 mg dexamethasone or 1.5 mg/kg lidocaine 30 minutes before anaesthesia induction were included in the exposure group (either group D or group L), while patients who did not receive intravenous dexamethasone or lidocaine were in control group. All patients received inj. propofol (2mg/kg), inj. fentanyl (2mcg/kg), inj. suxamethonium (2mg/kg) during induction. Anaesthesia was maintained with inhalational isoflurane and nitrious oxide with oxygen. Vecuronium was used for muscle relaxation. At the end of the operation, 0.05 mg/kg neostigmine and 0.02 mg/kg atropine was used to reverse muscle power. After achieving the extubation criteria, the patient was extubated and taken to the PACU and subsequently transferred to the ward. Postoperative data were collected by other anaesthesiologist who was blinded about the study drug which was given to the patient. Data were collected for a period of 24 hours, which includes postoperative vitals, incidence and severity of POST, postoperative analgesia consumption etc. Data collection began when patient was fully awake and aware and then continued at 3,

6, 12, and 24 hours. In this study, postoperative sore throat (POST) was defined as when the patient complaints of pain and/ itching in throat after surgery. Therefore, data was recorded as "yes", if POST occurs within 24 hours of extubation and as "no", if not within the above time period. Patients rated the severity of their throat using a verbal scale described previously.[8] The degree of sore throat was represented by the following pain assessment tool: 0=no sore throat; 1=minimal sore throat (complaints of sore throat only on asking); 2=moderate sore throat (complaints of sore throat on his/her own); and 3=severe sore throat (change in voice or hoarseness associated with throat pain) over 24 hours.

Statistical analysis was performed by using Statistical Package for the Social Sciences (SPSS) version 22.0 for windows. Descriptive analysis (as frequency and percentage and mean±SD) was computed and presented in tables. One-way ANOVA, Kruskal-Wallis test and Chi-square test ($\chi 2$) were carried out to assess the relationship between variables, as appropriate. To assess the strength of associations, Odds Ratio (OR) and their corresponding 95% confidence interval (CI) were calculated. Statistical significance was defined as $p<0.05$.

Results

In this study, a total 150 participants were included. The findings suggest that there were no significant differences in demographic parameters, surgical features, or perioperative profiles among the three study groups (Table-I).

Table-I: Demographic and clinical characteristics of the study participants

Characteristics	Group D	Group L	Group C	p-value
Age (in years)[a]	39.5±11.92	39.6±11.87	39.66±12.15	0.998
Gender[c] Male Female	 22 (44) 28 (56)	 23 (46) 27 (54)	 24 (48) 26 (52)	0.922
BMI (kg/m^2)[b]	24.79	24.98	25.35	0.778
ASA status[c] ASA I ASA II	 24 26	 25 25	 28 22	0.7
Types of surgery[c] Abdominal Breast Hepatobiliary Orthopedic Ear & Nose Gynae & Obstetrics Urology Vascular	 14(28%) 12(24%) 5(10%) 8(16%) 5(10%) 3(6%) 3(6%) 0(0%)	 17(34%) 10(20%) 3(6%) 7(14%) 7(14%) 2(4%) 3(6%) 1(2%)	 15(30%) 13(26%) 2(4%) 6(12%) 6(12%) 4(8%) 4(8%) 0(0%)	0.97
Surgical position[c] Supine Lateral Prone	 43(86%) 3(6%) 4(8%)	 44(88%) 3(6%) 3(6%)	 44(88%) 4(8%) 2(4%)	0.92
Laryngoscopic grade[c] Grade-I Grade-II	 42 8	 44 6	 40 10	0.55
Attempts of ETI[c] One attempt Two attempt	 49 1	 49 1	 48 2	0.62
Size of ETT[c] 6.5 Fr 7 Fr 7.5 Fr	 2 20 28	 5 17 28	 4 25 21	0.39
Duration of ETI (min)[a]	140±22	131±22	135±35	0.23
Postoperative analgesia consumption[c] Diclofenac Pethidine	 49 1	 48 2	 45 5	0.18

[a]mean±SD, tested by one way ANOVA, [b]median, tested by Kruskal-Wallis test, [c]number(%), tested by Chi-square test

The occurrence of postoperative sore throat (POST) within 24 hours following extubation was reported as 30% in the Dexamethasone group, 38% In the Lidocaine group and 52% in the Control group. There was a significant difference among three groups regarding incidence of POST after tracheal extubation ($p<0.05$) (Fig. 1). However, no significant correlation was observed in the severity of POST at various intervals (e.g., at 3, 6, 12, and 24 hours) within the 24 hours post-extubation among three groups ($p>0.05$) (Table-II). Dexamethasone reduced the incidence of POST in the first 24 hours than in the control group by 60% (OR=0.4, 95% CI=0.17–0.9) ($p<0.05$); however, for lidocaine, it was OR=0.57 (95% CI: 0.26–1.25) ($p>0.05$) (Table-III).

Table-II: Severity of postoperative sore throat (POST) among three groups

POST at different time interval	POST scale	Group D	Group L	Group C	p-value
Severity at 3 hours	No POST	35(70%)	31(62)	24(48%)	0.24
	Minimal POST	11(22%)	14(28%)	18(36%)	
	Moderate POST	3(6%)	5(10%)	5(10%)	
	Severe POST	1(2%)	0(0%)	3(6%)	
Severity at 6 hours	No POST	36(72%)	32(64%)	24(48%)	0.26
	Minimal POST	11(22%)	14(28%)	19(38%)	
	Moderate POST	3(6%)	4(8%)	6(12%)	
	Severe POST	0(0%)	0(0%)	1(2%)	
Severity at 12 hours	No POST	37(74%)	33(66%)	25((50%)	0.22
	Minimal POST	11(22%)	13(26%)	18(36%)	
	Moderate POST	2(4%)	4(8%)	6(12%)	
	Severe POST	0(0%)	0(0%)	1(2%)	
Severity at 24 hours	No POST	40(80%)	35(70%)	27(54%)	0.16
	Minimal POST	8(16%)	12(24%)	17(34%)	
	Moderate POST	2(4%)	3(6%)	5(10%)	
	Severe POST	0(0%)	0(0%)	1(2%)	

Data expressed as frequency and percentage; p-value reached from Chi-square test.

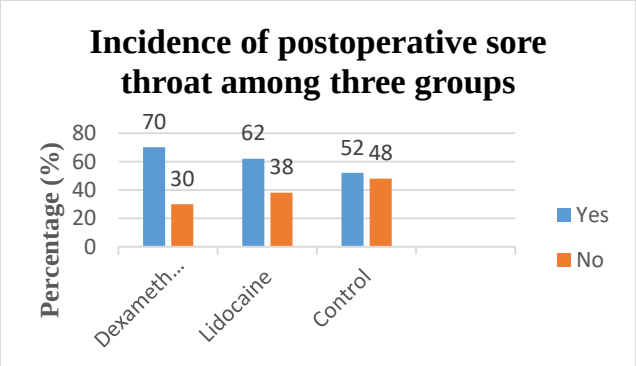

Fig. 1: Incidence of post operative sore throat (POST) during 24 hours of post-extubation in three groups

Table-III: Odd Ratio (OR) showing the association among the groups

Drugs	Incidence of POST		OR (95% CI)	p-value
	Yes	No		
Dexamethasone	15	35	0.4 (0.17–0.9)	0.027
Lidocaine	19	31	0.57 (0.26–1.25)	0.16
Control group	26	24	1	

Discussion

This study compared the effects of intravenous dexamethasone and lidocaine in reducing POST in patients undergoing elective surgery with GA and ETI. We observed the incidence of POST within the first 24 hours were 30%, 38%, and 52% in the dexamethasone, lidocaine, and control groups respectively. A similar study conducted in Ethiopia demonstrated that the incidence of POST in patients requiring GA with an ETT were 32%, 40%, and 57.1% in the dexamethasone, lidocaine, and control groups respectively.[9] the results are consistent with that of ours. Our study also showed that the incidence of POST within the first 24 hours after extubation was lower in the dexamethasone group than in the control group by 60% (OR=0.4, 95% CI=0.17–0.9). This result is consistent with studies conducted in Iran, Palestine, and India, which found that intravenous dexamethasone was effective in reducing the incidence of POST in patients requiring ETI.[2,10,11] The possible mechanism is its anti-inflammatory property, which is mediated by a reduction in prostaglandin synthesis, which in turn decreases the release of inflammatory mediators.[12] Two separate studies done in India and Korea also showed that those patients received intravenous dexamethasone before induction of anaesthesia had lower incidence of POST than those who received placebo.[13,14] In another study done in Ireland also demonstrated that intravenous dexamethasone reduced the incidence of POST within 24 hours after surgery.[15]

In this study, intravenous lidocaine (1.5 mg/kg) did not significantly reduce the incidence of POST (compared to control group) in patients who underwent elective surgery with GA and ETI. Similar findings were observed in a study conducted in Ethiopia, which revealed that intravenous lidocaine alone was ineffective in reducing incidence of POST after surgery.[9] In the present study, we found that intravenous administration of dexamethasone or lidocaine to patients undergoing elective surgery with GA and ETI was not associated with the severity of POST at different time intervals (e.g., 3, 6, 12 and 24 hours). Almost similar result was reported in a study done in India, which showed that there were no significant differences of POST severity at 12 and 24 hours in different groups after surgery. In contrast, another study conducted in Iraq showed that preoperative administration of intravenous dexamethasone reduced the severity of POST after endodotracheal tube extubation at 1 hour, 3 hours, and 6 hours after surgery.[16] The difference is probably due to the use of higher dose of dexamethasone (8 mg).

In our study, female patients were more prone to develop (2.5 times more) POST than males. This finding is consistent with that of two separate studies conducted in Ethiopia, as they found that female are more prone to develop POST after surgery.[3,5] The reason may be due to sensitivity issue, as women are more sensitive and likely to report such postoperative complaints.

The strength of this study was its baseline variables, including demographic, surgical, and perioperative characteristics, which were homogenous. The sample size is reasonable and the response rate is high. Experienced anaesthesiologists were involved in data collection, which increases the reliability of the data. This study addresses an important clinical issue and provides valuable insights for clinical practice and future research into the prevention of POST, as no published research was found here in Bangladesh.

However, one of the main limitations of this study was that tracheal cuff pressure was not monitored here because of lack of equipment, which may result in

high cuff pressure and tracheal mucosal ischaemia. Another hindrance was that this study was conducted at single center; hence, it may not reflect the whole population of the country.

Conclusion

Our data suggests that intravenous dexamethasone (5 mg) showed lower incidence of postoperative sore throat (POST) as compared to lidocaine (1.5 mg/kg) and control group in 24 hours post-extubation period in patients who underwent elective surgery under GA with ETI. However, no differences were observed in the severity of POST at various intervals (e.g., at 3, 6, 12, and 24 hours) within the 24 hours post-extubation among those three groups.

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