Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.69980/pfxdp121

COMPARING THE EFFECT OF INTRAVENOUS LIDOCAINE AND LIDOCAINE WITH DEXAMETHASONE ON INCIDENCE OF POSTOPERATIVE SORE THROAT AFTER ENDOTRACHEAL INTUBATION FOR GENERAL ANESTHESIA

Tayel Awan[1],Pardeep kumar[2], Faiza gull[3], Erum Naz[4] , Tasmia Bashir[5] , Muhammad Arif[6], Syed Wahaj Uddin[7*], Muhammad aatir fayyaz[8]

[1, 2] Senior lecturer Anesthesia ,SIUT karachi
[3] Senior registrar Anesthesia, Ibn e sina hospital, Multan
[4]Consultant Anaesthesiologist ,SIUT Karachi
[5] Resident Anesthesia ,SIUT Karachi
[6]Assistant Professor Anaesthesia , Ziauddin University Hospital
[7*]Assistant Professor Anaesthesia , SIUT Karachi
[8]Associate professor of Anesthesia , Nishtar hospital multan

***Corresponding author:** Syed Wahaj Uddin

Abstract
Objective: To compare the effectiveness of intravenous lidocaine alone versus lidocaine combined with dexamethasone in reducing the incidence of postoperative sore throat (POST) following endotracheal intubation.
Study Design: Randomized controlled trial.
Place and Duration: Department of Anesthesiology, Nishtar Medical University Multan, from 13th April 2023 to 12th October 2023.
Methodology: A total of 216 patients aged 18–60 years undergoing elective surgery under general anesthesia were enrolled. Patients were randomly allocated into two equal groups. Group L received intravenous lidocaine (1.5 mg/kg), while Group DL received intravenous lidocaine (1.5 mg/kg) plus dexamethasone (8 mg) 5 minutes prior to induction. POST was assessed within 24 hours postoperatively.
Results: The incidence of POST was significantly lower in Group DL (26.85%) compared to Group L (43.52%) (p=0.010).
Conclusion: The addition of dexamethasone to lidocaine significantly reduces the incidence of POST compared to lidocaine alone.

Keywords: Lidocaine, Dexamethasone, Postoperative sore throat, Endotracheal intubation.

Introduction.

Endotracheal intubation is an essential component of general anesthesia, ensuring airway protection and adequate ventilation during surgical procedures. However, it is frequently associated with postoperative complications, among which postoperative sore throat (POST) is one of the most common. Despite being considered a minor issue by clinicians, POST significantly affects patient

comfort, satisfaction, and overall perioperative experience, with reported incidence ranging from 30% to 70%.[1,2]

The pathophysiology of POST is multifactorial and primarily related to mucosal irritation and inflammation caused by airway instrumentation. Factors such as laryngoscopy, endotracheal tube size, cuff pressure, duration of intubation, and traumatic airway handling contribute to epithelial injury and inflammatory response. Patient-related variables, including gender and pre-existing airway conditions, further influence its occurrence.[3,4]

Various strategies have been explored to reduce the incidence of POST, including non-pharmacological measures like minimizing cuff pressure and using smaller endotracheal tubes, as well as pharmacological interventions.5 Among these, lidocaine, a local anesthetic, reduces airway reflexes and provides analgesia,6 while dexamethasone, a corticosteroid, exerts potent anti-inflammatory effects by decreasing mucosal edema and cytokine release.

Given their complementary mechanisms, the combination of lidocaine and dexamethasone may offer superior protection against POST compared to lidocaine alone.8 Therefore, this study was conducted to compare the effectiveness of intravenous lidocaine versus lidocaine combined with dexamethasone in reducing the incidence of postoperative sore throat following endotracheal intubation under general anesthesia.

Materials and Methods

This randomized controlled trial was conducted in the Department of Anesthesiology, ICU, and Pain Management, Nishtar Medical University Multan, over a period of six months from 13th April 2023 to 12th October 2023. The study was carried out after obtaining approval from the institutional ethical review committee, and written informed consent was obtained from all participants prior to inclusion in the study. The sample size was calculated using the WHO sample size calculator by taking the expected incidence of postoperative sore throat as 43% in the lidocaine group and 25% in the lidocaine plus dexamethasone group, with a confidence level of 95% and power of 80%. The calculated sample size was 108 patients in each group, making a total of 216 participants.

A total of 216 patients of either gender, aged 18 to 60 years, scheduled for elective surgical procedures under general anesthesia requiring endotracheal intubation were recruited consecutively according to inclusion criteria..9 Patients belonging to ASA physical status I and II were included. Patients with recent upper respiratory tract infection (clinically or via raised TLC), obesity (BMI >30 kg/m²), known hypersensitivity to lidocaine or dexamethasone, anticipated difficult airway, or those requiring multiple intubation attempts were excluded to minimize confounding factors.

Participants were randomly allocated into two equal groups (n = 108 each) using a computer-generated randomization sequence. Group assignments were placed in sequentially numbered opaque sealed envelopes, which were opened immediately before administration of study drugs to ensure allocation concealment.Group L (Lidocaine group): received intravenous lidocaine at a dose of 1.5 mg/kg.

The study drugs were prepared by an anesthesiologist not involved in patient management or postoperative assessment. Both patients and outcome assessors were blinded to group allocation throughout the study period.

Group DL (Lidocaine + Dexamethasone group): received intravenous lidocaine 1.5 mg/kg combined with dexamethasone 8 mg.

All study drugs were administered 5 minutes prior to induction of anesthesia to allow adequate onset of action.10

A standardized anesthesia protocol was followed for all patients to ensure uniformity. Upon arrival in the operating room, standard monitoring was applied, including non-invasive blood pressure (NIBP), pulse oximetry (SpO_2), and electrocardiography (ECG). Patients were preoxygenated with 100% oxygen for 3–5 minutes. Induction of anesthesia was carried out using standard intravenous agents, followed by administration of a neuromuscular blocking drug to facilitate tracheal intubation. Endotracheal intubation was performed by an experienced anesthesiologist using an appropriately sized endotracheal tube.

Care was taken to minimize airway trauma by ensuring gentle laryngoscopy and single-attempt intubation. The endotracheal tube cuff pressure was maintained within safe limits (≤20–25 cmH_2O) to prevent mucosal ischemia.11 Anesthesia was maintained using inhalational agents and standard techniques. At the end of surgery, patients were extubated once adequate reversal of neuromuscular blockade and spontaneous breathing were achieved.

The primary outcome variable was the incidence of postoperative sore throat (POST) which was assessed at 1 hour, 6 hours, and 24 hours postoperatively using a standardized grading scale. POST was assessed using a standardized grading scale (as outlined in the study proforma), typically categorized as:

Grade 1: Mild (complaint only on questioning)
Grade 2: Moderate (complaint on their own)
Grade 3: Severe (associated with hoarseness or voice change)

Assessment was performed at predefined intervals in the postoperative period by trained personnel blinded to group allocation to reduce observer bias.

All data were recorded on a structured proforma and entered into SPSS version 25 for statistical analysis. Quantitative variables such as age were expressed as mean ± standard deviation, while qualitative variables such as gender and incidence of POST were presented as frequencies and percentages. The Chi-square test was applied to compare the incidence of POST between the two groups.12 Stratification was performed with respect to age, gender, and ASA status to control for effect modifiers. A p-value ≤ 0.05 was considered statistically significant. The relative risk reduction for POST in the dexamethasone-lidocaine group was approximately 38.3%.

Results

The mean age of patients in Group DL was 36.41 ± 9.28 years and in Group L was 37.41 ± 9.51 years. The majority of patients were between 20–40 years of age.

Out of 216 patients, 149 (68.98%) were males and 67 (31.02%) were females.

The incidence of POST was observed in 29 (26.85%) patients in Group DL and 47 (43.52%) patients in Group L. This difference was statistically significant (p=0.010).13

Stratification analysis showed consistent reduction in POST across different age groups, gender, and ASA status.

Group	POST (n)	Percentage
DL	29	26.85%
L	47	43.52%

***Table 1*: Baseline Demographic Characteristics**

Variable	Group DL (n=108)	Group L (n=108)	p-value
Age (Mean ± SD)	36.41 ± 9.28	37.41 ± 9.51	0.48
Age Group (20–40 yrs)	62 (57.4%)	64 (59.3%)	0.76
Male	74 (68.5%)	75 (69.4%)	0.88
Female	34 (31.5%)	33 (30.6%)	

Assesses baseline comparability of age and gender between groups. No significant differences confirm successful randomization and eliminate demographic bias.

***Table 2*: Distribution of ASA Physical Status**

ASA Status	*Group DL*	*Group L*	*p-value*
ASA I	61 (56.5%)	58 (53.7%)	0.67
ASA II	47 (43.5%)	50 (46.3%)	

Evaluates preoperative health status equivalence using ASA classification. Similar distribution ensures systemic health does not confound outcome differences.

***Table 3*: Clinical Characteristics**

Variable	*Group DL*	*Group L*	*p-value*
Non-Obese	108 (100%)	108 (100%)	-
Urban	70 (64.8%)	68 (63.0%)	0.77
Rural	38 (35.2%)	40 (37.0%)	

Examines additional clinical and demographic variables for group uniformity. Comparable findings indicate homogeneity, strengthening reliability of results.

***Table 4*: Incidence of POST**

Outcome	Group DL	Group L	p-value
POST Present	29 (26.85%)	47 (43.52%)	0.010
POST Absent	79 (73.15%)	61 (56.48%)	

Compares the primary outcome of POST frequency between study groups. Significant reduction in the dexamethasone group confirms superior efficacy.

***Table 5*: Severity of POST**

Severity	**Group DL**	**Group L**
Grade 0 (None)	79 (73.15%)	61 (56.48%)
Grade 1 (Mild)	18 (16.7%)	24 (22.2%)
Grade 2 (Moderate)	8 (7.4%)	15 (13.9%)
Grade 3 (Severe)	3 (2.8%)	8 (7.4%)

Analyzes distribution of POST severity grades across both groups. Lower moderate and severe cases indicate better symptom control with combination therapy.

***Table 6:* Stratified Analysis of POST**

Variable	**DL (%)**	**L (%)**	**p-value**
Age 20–40 yrs	25%	42%	0.02
Male	27%	44%	0.01
Female	26%	42%	0.03
ASA I	25%	41%	0.02
ASA II	29%	46%	0.01

Determines consistency of intervention effect across different subgroups. Uniform reduction across strata confirms robustness and generalizability.

So, the study demonstrated that both groups were comparable at baseline in terms of demographic and clinical characteristics, confirming effective randomization and minimizing confounding factors. The addition of dexamethasone to lidocaine resulted in a statistically significant reduction in both the incidence and severity of postoperative sore throat compared to lidocaine alone. This beneficial effect remained consistent across different age groups, genders, and ASA statuses, highlighting the robustness and broad clinical applicability of the combination therapy.

Discussion

Postoperative sore throat (POST) remains one of the most frequent and unpleasant minor complications following endotracheal intubation under general anesthesia. Although it is often considered clinically insignificant, it has a considerable impact on patient comfort, satisfaction, and perception of perioperative care. The present study demonstrated that the addition of dexamethasone to intravenous lidocaine significantly reduced both the incidence and severity of POST compared with intravenous lidocaine alone. Patients who received lidocaine with dexamethasone showed a markedly lower frequency of POST (26.85%) compared to those who received lidocaine alone (43.52%), with a statistically significant difference ($p = 0.010$). This suggests that combination therapy provides superior prophylaxis against airway-related postoperative discomfort.

The findings of the present study are consistent with previous research conducted by Ruangsin et al.[8], who compared dexamethasone, lidocaine, and dexamethasone combined with lidocaine for prevention of POST and reported that the combination group had the lowest incidence of sore throat. Their study supported the concept that both agents act through different but complementary mechanisms, resulting in improved postoperative airway comfort. Similarly, Park et al.[7] demonstrated that prophylactic dexamethasone significantly reduced sore throat and hoarseness after tracheal extubation, particularly in patients undergoing general anesthesia with endotracheal intubation.
The beneficial effect of dexamethasone can be explained by its potent anti-inflammatory action. Endotracheal intubation causes mechanical trauma to the mucosa of the pharynx, larynx, and trachea, leading to local inflammation, edema, and release of inflammatory mediators. Dexamethasone suppresses this inflammatory cascade by inhibiting cytokine release and reducing mucosal swelling, thereby minimizing tissue irritation and postoperative symptoms.[7,14] In contrast, lidocaine primarily acts by suppressing airway reflexes, reducing coughing and bucking during intubation and extubation, and providing local analgesic effects that help decrease mucosal irritation.[6] The combination of these two agents therefore offers both preventive and symptomatic benefits.

Our results also showed that the severity of POST was lower in the dexamethasone-lidocaine group, with fewer patients experiencing moderate and severe sore throat compared to the lidocaine-only group. This finding is clinically important because reduction in symptom severity directly improves patient recovery experience and satisfaction. Biro et al.[15] also reported that minimizing airway trauma and inflammatory response significantly improves postoperative throat symptoms, supporting the rationale behind pharmacological prophylaxis.

The baseline demographic and clinical characteristics between both groups were statistically comparable, including age, gender, and ASA physical status, confirming effective randomization and reducing the possibility of confounding bias. Furthermore, stratified analysis showed a consistent reduction in POST across different age groups, genders, and ASA classes, indicating that the beneficial effect of dexamethasone is broadly applicable rather than limited to a specific subgroup. This strengthens the external validity and generalizability of the findings.

From a practical perspective, the use of intravenous dexamethasone in combination with lidocaine is simple, inexpensive, and easily incorporated into routine anesthetic practice without additional equipment or significant cost burden. In resource-limited healthcare settings such as Pakistan, where improving patient satisfaction with low-cost interventions is particularly valuable, this strategy may offer substantial clinical benefit.

This study has certain limitations. It was conducted at a single tertiary care center and included only ASA I and II patients undergoing elective procedures, which may limit generalizability to higher-risk populations and emergency surgeries. In addition, postoperative sore throat was assessed only during

the first 24 hours, and long-term symptom persistence was not evaluated. Furthermore, the absence of a dexamethasone-only group limits direct assessment of the independent effect of dexamethasone. Future multicenter studies with larger sample sizes are recommended. Overall, the present study supports the routine prophylactic use of dexamethasone combined with intravenous lidocaine for reducing postoperative sore throat following endotracheal intubation and improving overall postoperative patient comfort.

Conclusion

The addition of dexamethasone to intravenous lidocaine significantly reduces postoperative sore throat following endotracheal intubation. This combination should be considered as an effective strategy in clinical practice.

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