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INTRAVENOUS DEXAMETHASONE VERSUS LIGNOCAINE GEL FOR THE PROPHYLAXIS OF POST-OPERATIVE SORE THROAT IN PRONE POSITION SURGERIES

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ABSTRACT

Background: Post-operative sore throat is a frequent and distressing complication following endotracheal intubation under general anaesthesia. It is primarily caused by mechanical irritation and inflammation of the pharyngeal and laryngeal mucosa due to the endotracheal tube. Symptoms such as sore throat, hoarseness, and coughing may persist post-operatively, leading to increased patient discomfort, delayed recovery, and prolonged hospital stay. Several pharmacological methods have been employed for the prophylaxis of post-operative sore throat, including corticosteroids and local anaesthetics. Dexamethasone, a potent anti-inflammatory steroid, and lignocaine gel, a topical anaesthetic, are commonly used agents; however, evidence comparing their efficacy remains limited.

Methods: A randomised controlled trial was conducted at the Operation Theatre Complex, Mayo Hospital Lahore, from 1st August 2022 to 31st January 2023. Ninety adult patients aged 18 to 75 years, of either gender, scheduled for elective spine surgery under general anaesthesia were enrolled. Patients with upper respiratory tract infections, prior steroid use, neuromuscular disease, pre-existing sore throat, or multiple intubation attempts were excluded. Participants were randomly assigned to two equal groups (n=45) using the lottery method. Group A received 0.2 mg/kg intravenous dexamethasone prior to induction. Group B had 2% lignocaine gel applied to the endotracheal tube up to a length of 15 cm before intubation. Post-operative sore throat was assessed six hours following extubation in the post-anaesthesia care unit using a standardised questionnaire.

Results: The mean age of participants was 45.41 ± 12.93 years, with a male predominance (70%). The incidence of post-operative sore throat was significantly lower in the dexamethasone group (24.44%) compared to the lignocaine group (64.44%) with a p-value of 0.0001. Subgroup analysis revealed significantly higher rates of sore throat among older patients ($p = 0.0003$), females ($p = 0.034$), ASA II status ($p = 0.002$), and those with BMI >30 ($p = 0.019$). Across all stratified variables, patients receiving dexamethasone showed a consistent reduction in post-operative sore throat compared to those receiving lignocaine gel. Statistical analysis was performed using chi-square test and independent sample t-test, with significance set at $p < 0.05$.

Conclusion: Intravenous dexamethasone significantly reduces the incidence of post-operative sore throat when compared to lignocaine gel in patients undergoing intubation for elective spine surgery. Given its superior efficacy and consistent performance across patient subgroups, dexamethasone may be considered the preferred agent for prophylaxis against this common anaesthetic complication.

Keywords: Endotracheal intubation, Dexamethasone, Lignocaine gel, Post-operative sore throat, General anaesthesia, Randomised controlled trial.

1. INTRODUCTION

Endotracheal intubation is a fundamental component of general anaesthesia during most surgical procedures. Patient positioning can vary depending on the type of surgery, often leading to displacement of the endotracheal tube (ETT) and airway trauma. The incidence of post-operative sore throat ranges from 14% to 50%, influenced by factors such as age, gender, tube size, number of intubation attempts, surgical duration, and airway manipulation. ETT placement causes mucosal irritation and inflammation, commonly resulting in sore throat, cough, and hoarseness, thus prolonging hospital stay and increasing morbidity.

Various pharmacological and non-pharmacological techniques have been adopted to reduce these complications, including smaller ETTs, adequate cuff pressure, proper suctioning, and use of preoperative gargles like aspirin and ketamine. Betamethasone gel applied to the ETT has shown greater efficacy than intravenous dexamethasone (1). Nebulised ketamine with magnesium sulphate also significantly reduced sore throat and hoarseness (2). Dexamethasone, due to its anti-inflammatory and analgesic effects, has proven effective in reducing post-operative sore throat (3). Lidocaine has been used to suppress airway reflexes, although its mechanism remains uncertain (3). Combination therapies of dexamethasone and lidocaine have demonstrated superior results over dexamethasone alone (4–5).

Additional studies have reinforced dexamethasone's efficacy in both pre- and post-intubation settings (6-8), while others found lignocaine inhalation comparable to dexamethasone (9). Lumbar spine surgeries, particularly in the prone position with armoured ETTs, increase the risk of airway complications. This study aims to compare the efficacy of intravenous dexamethasone and lignocaine gel in reducing post-operative sore throat among Pakistani patients undergoing spine surgery in prone position.

2. MATERIALS AND METHODS

This randomised controlled trial was conducted at the Operation Theatre Complex of Mayo Hospital, Lahore. A total of 90 patients scheduled for elective spinal surgery were enrolled using non-probability convenience sampling. The sample size was calculated using the WHO sample size calculator with a power of 80%, significance level of 5%, and expected population proportions based on previous studies (P1: 62.9%, P2: 85.7%) (4). The participants, aged between 18 and 75 years and of either gender, were ASA I or II physical status and undergoing procedures such as spinal laminectomy, spinal decompression, or artificial disc replacement. Exclusion criteria included patients with upper respiratory tract infections, pre-existing sore throat, hoarseness, or cough, prior steroid use, neuromuscular disorders, nasogastric tube insertion, surgical duration less than 60 minutes or more than 300 minutes, and those requiring more than one intubation attempt. Ethical approval was obtained, and written informed consent was secured from all participants. Patients were randomly allocated to two groups via the lottery method. Group A received 0.2 mg/kg intravenous dexamethasone before induction, while Group B had 2% lignocaine gel applied externally to the endotracheal tube (ETT) up to 15 cm from the tip. All patients were visited preoperatively and administered oral diazepam 5 mg one hour before surgery. In the operating theatre, after intravenous access and attachment of standard non-invasive monitors (pulse oximetry, ECG, non-invasive blood pressure, temperature), patients were pre-oxygenated for three minutes and pre-medicated as per standard protocol. Induction of anaesthesia was carried out using intravenous nalbuphine 0.1 mg/kg,

propofol 2 mg/kg, and atracurium 0.5 mg/kg to facilitate tracheal intubation. Group B received lignocaine gel applied evenly to the outer surface of the ETT up to 15 cm, ensuring lubrication of the segment contacting the pharynx, vocal cords, and trachea. A standard cuffed ETT was used, with internal diameter of 7.5–8.0 mm for males and 7.0–7.5 mm for females. Cuff pressure was kept below 20 cm H_2O using a cuff manometer. Patients not intubated on the first attempt were excluded. After confirmation of ETT placement via end-tidal CO_2 monitoring, patients were turned prone, with the face supported on a jelly pillow to minimise pressure-related complications. The ETT position and cuff pressure were reconfirmed after positioning. Anaesthesia was maintained using isoflurane (1.2–1.5%), oxygen, and atracurium 0.1 mg/kg. Tidal volume was set at 8–10 ml/kg with an end-tidal CO_2 range of 30–35 mmHg. Following surgery, patients were repositioned supine and given intravenous neostigmine 0.04 mg/kg with glycopyrrolate (1/5th of neostigmine) for reversal of neuromuscular blockade. Gentle suctioning of the pharynx was performed under direct vision. Once spontaneous ventilation and airway reflexes returned, patients were extubated awake after demonstrating purposeful movements or sustained head lift. Six hours post-extubation, patients were assessed in the post-anaesthesia care unit for the presence of post-operative sore throat, defined as pain or scratchy throat, difficulty swallowing, erythematous patches on the palate, or swollen tonsils. Data were recorded on a structured proforma and analysed using SPSS version 25. Quantitative variables such as age and BMI were expressed as mean ± standard deviation, while qualitative variables like gender, ASA status, and sore throat incidence were expressed as frequencies and percentages. Effect modifiers such as age, gender, ASA grade, and BMI were controlled through stratification, and post-stratification chi-square test was applied, considering a p-value ≤ 0.05 as statistically significant.

3. RESULTS

Age range in this study was from 18 to 75 years with a mean age of 45.41 ± 12.93 years. The mean age in Group A was 45.56 ± 12.99 years and in Group B 45.33 ± 12.51 years. A majority of the patients (54.44%) were between 18 and 45 years of age as shown in Table I. Among 90 patients, 63 (70%) were male and 27 (30%) were female, with a male-to-female ratio of approximately 2.3:1. ASA I status was observed in 51.11% and ASA II in 48.89% of the cohort. The mean BMI was 29.62 ± 3.22 kg/m², with more than half the patients having BMI ≤30.

The incidence of post-operative sore throat (POST) was significantly lower in Group A (24.44%) than in Group B (64.44%), with a p-value of 0.0001, as demonstrated in Table II. Stratification analysis in Table III showed a statistically higher incidence of POST in patients aged 46–75 years, females, those with ASA II status, and those with BMI >30. Across all subgroups, dexamethasone consistently reduced POST compared to lignocaine gel.

Table I: Demographic and Baseline Characteristics of Both Groups (n=90)

Characteristic	Group A (n=45)	%	Group B (n=45)	%	Total (n=90)	%
Age 18-45 years	25	55.56	24	53.33	49	54.44
Age 46-75 years	20	44.44	21	46.67	41	45.56
Mean ± SD (years)	45.56 ± 12.99		45.33 ± 12.51		45.41 ± 12.93	
Male	31	68.89	32	71.11	63	70.0
Female	14	31.11	13	28.89	27	30.0
ASA I	26	57.78	20	44.44	46	51.11
ASA II	19	42.22	25	55.56	44	48.89
BMI ≤30	27	64.29	25	55.56	52	57.78
BMI >30	18	35.71	20	44.44	38	42.22
Mean BMI ± SD (kg/m²)	29.44 ± 3.37		29.87 ± 3.14		29.62 ± 3.22	

Table II: Comparison of Post-Operative Sore Throat Between Groups

POST Outcome	Group A (n=45)	%	Group B (n=45)	%
Yes	11	24.44	29	64.44
No	34	75.56	16	35.56
P-value				0.0001

Table III: Stratification of Post-Operative Sore Throat According to Age, Gender, ASA, and BMI

Variable	Group	POST Yes	POST No	P-value
Age 18-45	Group A	7 (28.0%)	18 (72.0%)	0.063
Age 18-45	Group B	13 (54.17%)	11 (45.83%)	
Age 46-75	Group A	4 (20.0%)	16 (80.0%)	0.0003
Age 46-75	Group B	16 (76.19%)	5 (23.81%)	
Male	Group A	8 (25.81%)	23 (74.19%)	0.002
Male	Group B	21 (65.63%)	11 (34.38%)	
Female	Group A	3 (21.43%)	11 (78.57%)	0.034
Female	Group B	8 (61.54%)	5 (38.46%)	
ASA I	Group A	8 (34.78%)	18 (65.22%)	0.018
ASA I	Group B	16 (64.0%)	9 (36.0%)	
ASA II	Group A	3 (15.79%)	16 (84.21%)	0.002
ASA II	Group B	13 (65.0%)	7 (35.0%)	
BMI ≤30	Group A	7 (25.93%)	20 (74.07%)	0.002
BMI ≤30	Group B	17 (68.0%)	8 (32.0%)	
BMI >30	Group A	4 (22.22%)	14 (77.78%)	0.019
BMI >30	Group B	12 (60.0%)	8 (40.0%)	

4. DISCUSSION

Post-operative sore throat (POST) and hoarseness are frequent complications following endotracheal intubation, with an incidence ranging between 6.6% and 90% depending on various contributing factors (10,11). These symptoms can be distressing and significantly affect patient satisfaction, often leaving an unpleasant memory of the surgical experience (10,12). The occurrence of POST is influenced by patient age, sex, endotracheal tube (ETT) size, cuff pressure, duration of intubation, number of intubation attempts, and frequency of suctioning (10). Numerous interventions have been investigated to mitigate these symptoms, including the use of azulene sulphate (13), ketamine gargles (14), steroid gels (10), and steroid injections (11).

This study was conducted to evaluate the comparative effectiveness of intravenous dexamethasone and lignocaine gel in preventing POST. Findings revealed that 24.44% of patients in Group A (dexamethasone) experienced POST compared to 64.44% in Group B (lignocaine gel), demonstrating a statistically significant difference (p=0.0001). Supporting evidence from a related study showed a significantly reduced incidence of sore throat in patients who received a combination of dexamethasone and lidocaine for 24 hours post-extubation compared to those who received dexamethasone alone (62.9% vs. 85.7%, p=0.029) (4). This combination also demonstrated reduced severity of hoarseness and sore throat, though no difference was noted in cough severity.

Park et al. (12) reported a reduction in sore throat incidence by 22% and 42% at one hour post-extubation using IV dexamethasone at 0.1 mg/kg and 0.2 mg/kg doses, respectively, and a 30% decrease at 24 hours with 0.2 mg/kg. Thomas et al. (15) documented a 36.3% reduction at 24 hours post-extubation following an 8 mg dose of IV dexamethasone administered preoperatively. Other researchers observed a 56.7% decline in POST at 2 hours post-extubation using 0.1 mg/kg dexamethasone (16), and a similar reduction at 6 hours with a 10 mg dose (17).

Bagchi et al. (18) concluded that IV dexamethasone 0.2 mg/kg reduced POST incidence by approximately 30% at one hour post-extubation, with an efficacy rate of around 60%. Moreover, studies comparing dexamethasone gargles (0.05%) and dexamethasone-impregnated ETTs also reported reduced POST severity (19). Thomas et al. (15) again confirmed that 8 mg IV dexamethasone significantly decreased POST incidence and severity. Kumar et al. (21) supported this, showing reduced sore throat, cough, and hoarseness with dexamethasone compared to saline, with greater effectiveness at 0.2 mg/kg than at 0.1 mg/kg.

However, contrasting findings have also emerged. Ruangsin et al. (20) and another study conducted at Kurdistan University of Medical Sciences (22) concluded that IV dexamethasone was not effective in reducing POST, cough, or hoarseness. These discrepancies may be explained by differences in surgical types, anaesthetic techniques, confounding factors, and preventive protocols. As Ruangsin et al. (20) suggested, such variations could obscure the true efficacy of dexamethasone.

Subedi et al. (5) observed a 36% incidence of POST following an 8 mg IV dose of dexamethasone administered just before induction. In a meta-analysis by Jiang et al. (23), prophylactic IV dexamethasone $\geq$ 0.2 mg/kg administered within 30 minutes before or after anaesthesia induction was recommended with Grade 1A evidence for safety and effectiveness in eligible patients. Similarly, Sun L et al. (24) demonstrated that IV dexamethasone reduces POST risk and severity at 24 hours' post-intubation, recommending 0.1 mg/kg as an effective dose. The proposed mechanism involves dexamethasone's anti-inflammatory action. It inhibits leukocyte migration, cytokine release, and fibroblast proliferation while maintaining cellular integrity (14, 24-26). Additionally, dexamethasone suppresses arachidonic acid metabolism, reducing leukotriene B4 production and interleukin-2 activity, thus modulating inflammation (27).

This study was limited by its single-centre setting and modest sample size, which may constrain generalisability. Furthermore, POST was assessed only at 6 hours post-extubation, possibly overlooking variations in onset or persistence of symptoms.

5. CONCLUSION

This study demonstrates that intravenous dexamethasone significantly reduces the incidence of post-operative sore throat compared to lignocaine gel. Based on these findings, we recommend the routine use of intravenous dexamethasone for the prophylaxis of post-operative sore throat to minimise patient discomfort and associated morbidity. Future research should explore varying doses of dexamethasone, as well as the combined use of dexamethasone and lignocaine, to further optimise preventive strategies and enhance post-operative recovery outcomes.

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