Original Article

Endotracheal Tube Insertion Conditions - Comparison Between Topical and Intravenous Lignocaine with Ketamine

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Endotracheal Tube Using Topical and Intravenous Lignocaine Alongside Ketamine

ABSTRACT

Objective: To compare the insertion conditions of endotracheal tube using topical and intravenous lignocaine alongside ketamine induction.

Study Design: Randomised control trial study

Place and Duration of Study: This study was conducted at the department of Anaesthesiology, ICU and Pain medicine at Mohiuddin Islamic Medical College teaching hospital, Mirpur, Azad Kashmir and Akhtar Saeed Medical College Farooq teaching hospital, Rawalpindi from 6th April 2023 to September 2025.

Methods: This study included one hundred ASA I, II and stable III elective surgical patients in our two tertiary care hospitals between 2023 and 2025. Patients were randomized into group T (topical lignocaine) and group I (intravenous lignocaine). Endotracheal tube was inserted after modified rapid sequence induction general anesthesia with ketamine. After optimal insertion conditions ensured consultant anesthetist intubated the patient. Conditions for endotracheal intubations recorded during and post intubation in both groups.

Results: Fifty elective surgery patients were randomly assigned in two groups, group T (Topical lignocaine) and group I (Intravenous lignocaine). The mean age in group T was 43 years and in group I it was 41 years. There were 8 males in group T and no males in group I while 42 females in group T and 50 females in group I. At induction gagging was noted in 2 (4%) patients in group T while 14 (28%) patients in group I patients ($p < 0.001$). At induction coughing was noted in 2 (4%) patients in group T while 14 (28%) patients in group I ($p<0.001$). Laryngospasm was not noted at induction in patients in group T while mild laryngospasm only in one patient in group I ($p<0.31$). Post operative sore throat (POST) found significant ($p<0.001$) in group I (22%) after 1st hour of extubation.

Conclusion: Topical lignocaine gargles for endotracheal tube insertion improves the acceptable endotracheal tube insertion conditions compared to intravenous lignocaine in elective surgeries with ketamine induction making it a valuable choice in low income countries for elective and emergency surgeries anaesthesia.

Key Words: Coughing, Gagging, Laryngospasm, POST, Lignocaine, Ketamine.

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INTRODUCTION

Managing emergency surgery anaesthesia is a special scenario to be managed in resource deprived settings in low income countries. Trauma and atraumatic emergencies require specialized monitoring and equipment for standard vigilant emergency management. Airway management is of prime importance in elective and emergency surgical cases[1].

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Difficult airway leading to failed intubation is also a major concern during emergency surgeries. Pressor response, traumatic and atraumatic complications can occur during laryngoscopy and endotracheal intubation. Hemodynamic stability is also a major challenge in emergency management of surgical patients.

Successful endotracheal intubation requires an adequate suppression of upper airway reflexes with hemodynamic stability. Lignocaine is a local anaesthetic that can be used intravenously and topically to improve endotracheal tube insertion conditions. Propofol is most commonly used intravenous agent for general anaesthesia in induction doses of 2-2.5 mg/kg. Propofol is associated with hypotension and hemodynamic instability because of peripheral vasodilatation. Ketamine and etomidate are the intravenous anaesthetics mainly used in the emergency anaesthesia management, globally [2]. Hemodynamic stability is associated with both agents because of cardiac stable properties[3,4,5] . Ketamine, close to an ideal anesthetic, is a cheaper choice because of low cost so preferred choice in low income countries (LICs) ,

providing new evidence for clinical practice during emergencies with less complications. Etomidate and Esketamine not easily available nor cost effective in low income settings so through this study strived to find a better airway management plan with minimal resources and complications during elective and emergency surgeries.

METHODS

The study was conducted at the department of Anaesthesia, Akhtar Saeed Medical college Farooq teaching hospital, Murree expressway, Rawalpindi and Mohiuddin Islamic Medical College, Mirpur, Azad Kashmir after proper approval from institutional ethical review committees. The patients were classified as Class I-II-III according to the American Society of Anesthesiologists (ASA) classification. Exclusion criteria was any emergency or refusal to consent, allergic to any study drugs, hepatic and renal function impairments or difficult airway. Randomisation was conducted using a computer-generated randomisation sequence to ensure allocation concealment. Group assignments were placed in sealed opaque envelopes that were opened sequentially by an anesthesia technologist immediately before administering the allocated intervention. This ensured strict adherence to the randomisation protocol and prevented selection bias.

One hundred consecutive patients meeting the inclusion criteria divided into two groups, group I (intravenous lignocaine group) and group T (topical lignocaine group) each with fifty patients. All patients will have a running intravenous cannula and standard monitors (non invasive blood pressure, pulse oximeter and ECG) before starting. Group 1 will receive intravenous lignocaine 1.5 mg/kg followed by pre-oxygenation for three minutes. Group 2 will receive 4mg/kg of 4% lignocaine for oral gargles by patients till tolerated in sitting position. The patient will be turned supine immediately followed by pre-oxygenation for 3 minutes. After 3 minutes pre-oxygenation, both groups will receive intravenous nalbuphine 150 mcg/kg followed by 1 mg/kg ketamine over 45 seconds. Suxamethonium 1 mg/kg will be given intravenously. All patients received midazolam 0.05mg/kg. The endotracheal tube inserted 45 seconds post suxamethonium after loss of consciousness and eye lash reflex. In case, eye lash reflex is still intact further boluses of 0.5mg/kg ketamine intravenously used. All endotracheal tube insertions done by consultant anaesthetist. The endotracheal tube insertion conditions assessed by a person blinded with the induction method. The number of attempts made at endotracheal tube insertion and the number of patients requiring top-up doses of ketamine noted. The data recorded on the study proforma.

RESULTS

Data entry and analysis was done by using SPSS version 27. This study included 100 elective surgical patients divided into two groups. Group T consisted of 8 males and 42 females and with a mean age was 41.8 years, and Group I consisted of no males and 50 females with mean age of 43.5 years. ASA I two patients in group I while no one in group T. ASA II , 27 patients in group I while 45 in group T. ASA III, 21 patients in group I while 5 in group T (fig. 2). Most surgical patients 96% included underwent laparoscopic cholecystectomy as been shown in fig. 1.

Table No. 1: General Mean Findings

ASA Intravenous Topical	II 27 I 2 III 45 I 0	III 21 III 05
Weight Intravenous Topical	 72 KG 70 KG	
Height Intravenous Topical	 154 CM 157 CM	
BMI Intravenous Topical	 30 KG.M^2 28 KG.M^2	
Nalbuphine Intravenous Topical	 0.15 MG 0.15 MG	
Ketamine Intravenous Topical	 1.16 MG 1.0 MG	

Table No.2: Inter group comparison of gagging

Gagging	Group T N = 50	Group I N = 50	P Value
Induction	2 (4%)	14 (28%)	0.001
1 Minute	2 (4%)	11 (22%)	0.007
2 Minutes	0	4 (8%)	0,041
5 Minutes	0	0	-
10 Minutes	0	0	-

Table No.3: Inter group comparison of coughing

Coughing	Group T N = 50	Group I N = 50	P Value
Induction	2 (4%)	14 (28%)	0.001
1 Minute	2 (4%)	11 (22%)	0.007
2 Minutes	0	4 (8%)	0.041
5 Minutes	0	0	-
10 Minutes	0	0	-

General demographics, nalbuphine and ketamine mean findings shown in table 1. The primary outcome measure of this study was the incidence of Postoperative sore throat (POST) was more at 1st,6th and 24 hours in group I when compared with group T (Table 5, fig. 3,4). The secondary outcome measures

gagging, coughing and laryngospasm were also found significant in group I in comparison with group T (Table 2,3,4). The statistically significant difference considered as p <0.05 level.

Table No.4: Inter group comparison of laryngospasm

Laryngospasm	Group T N = 50	Group I N = 50	P Value
Induction	0	1 (2%)	0.31
1 Minute	0	0	-
2 Minutes	0	0	-
5 Minutes	0	0	-
10 Minutes	0	0	-

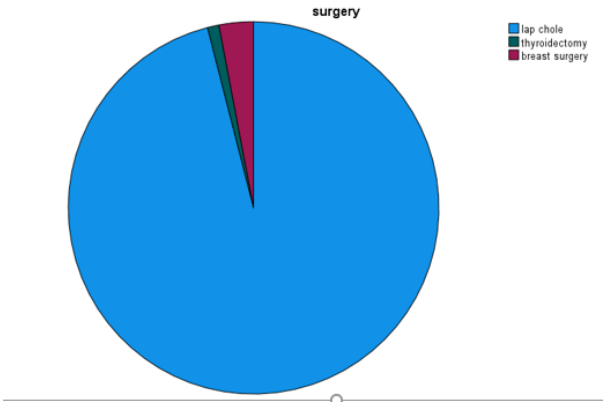

Figure No. 1: Surgery Distribution

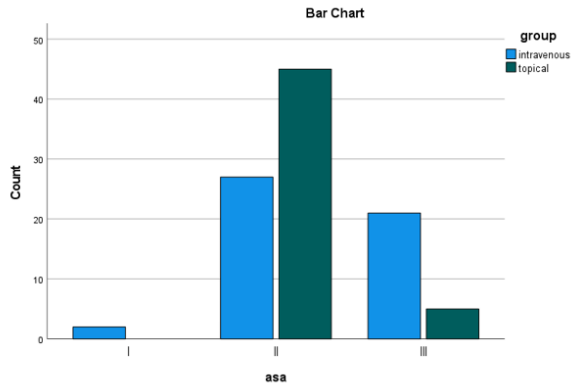

Figure No. 2: ASA Groups

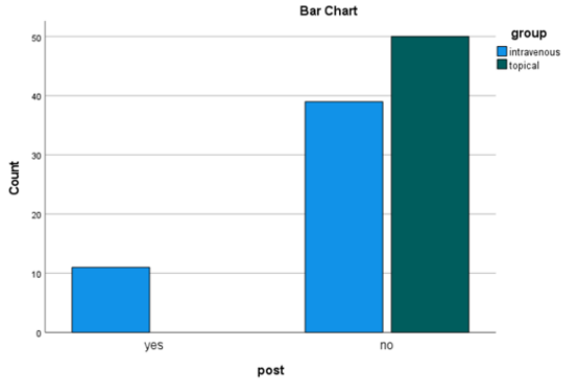

Figure No. 3: Post in 1ST Hour

Table No.5: Inter-group comparison post operative sore throat (POST)

Post	Group T N = 50	Group I N = 50	P Value
Post 1	0	11 (22%)	0.001
Post 6	5 (10%)	15 (30%)	0.01
Post 24	5 (10%)	15 (30%)	0.01

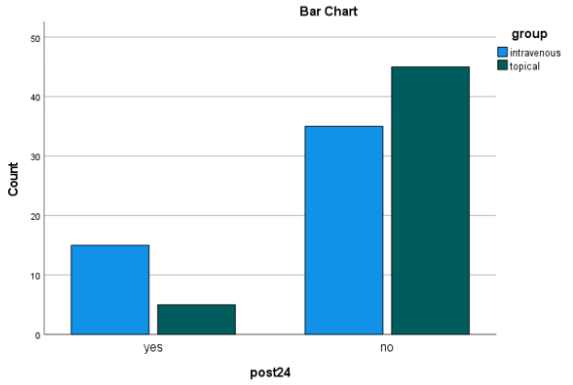

Figure No.4: Post 24 Hours

DISCUSSION

Post-operative sore throat (POST) may be any discomfort in throat post extubation ranging from pain in throat to dysphagia[6]. POST incidence is multifactorial depending on every step of intubation and induction[7]. Our study compared the topical and intravenous lignocaine with ketamine to strive forward for a technique suitable for both elective and emergency surgeries with minimum complications. The results found significant differences in reducing coughing, gagging and laryngospasm with topical lignocaine administration with ketamine induction. The incidence of postoperative sore throat (POST) also reduced significantly in topical lignocaine group.

Cost reduction in low income countries is not merely low prices of medications but freedom from complications and fast rehabilitation. Recently, Jun Ji et al [8] published an excellent study on reducing incidence of coughing [9,10] associated with Sufentanil. High risk of aspiration pneumonitis if airway conditions not adequate for airway management especially in emergency cases.[11] A new version of Ketamine, Esketamine gaining acceptance because of lower incidence of adverse reactions[12]. Historically, low-dose ketamine successfully reduced fentanyl-induced cough during the induction of anaesthesia[13], and esketamine, as the S-enantiomer of ketamine, acts strongly on glutamate through the N-methyl-D-aspartate (NMDA) receptor with about twice the potency of ketamine not adding value immediately but also in reduction of opioids usage postoperatively. Both ketamine and esketamine proposed to inhibit the cough response through the modulation of the N-methyl-D-aspartate (NMDA)

receptors. Lignocaine synergistic role with ketamine already gaining acceptance especially in suppressing opioid induced coughing[14]. Lignocaine was tested with thiopentone using intravenous and topical modes of administration. Topical lignocaine provided superior LMA insertion conditions (86%) than intravenous lignocaine (63%) when used with thiopentone. Intravenous lignocaine can be effective for decreasing airway sensitivity (55%) to instrumentation by depressing airway reflexes and decreasing calcium flux in airway smooth muscles. The overall incidence of postoperative sore throat (POST) after general anesthesia ranges from 20% to 74%[15] but this is with different set of medications available in different regions. Putting 2% lignocaine into the ETT cuff lowers the risk of and severity of POST because it acts as a local anesthetic and lowers inflammation in the trachea[16]. The various pharmacological agents studied to reduce the incidence of POST are corticosteroids, lidocaine, NSAIDs, NMDA receptor antagonists and the list goes on[17]. In the past, we published a study on LMA insertion conditions using topical and intravenous lignocaine with propofol induction[18]. Moving forward now studied the inter group POST incidence at different time intervals along with endotracheal tube insertion conditions. We found that the incidence of POST in group T was negligible while in group I, it was 16% at 1hour interval but decreases significantly after 6 and 24 hours. Similarly, incidence of gagging and coughing remained more in topical lignocaine group in comparison with intravenous group.

This study has several limitations. Firstly, the sample size was relatively small, which may have introduced a statistical bias. Secondly, majority of patients were females so we need a larger group with more males representation. Third, new novel agents like esketamine and dexmedetomidine needs to compare for ideal outcomes in larger diversified groups.

CONCLUSION

This study demonstrates that topical lignocaine with ketamine is an effective and safe option for reducing the incidence and severity of post operative sore throat alongwith gagging, coughing and laryngospasm in patients undergoing general anaesthesia making it a reliable preventive measure in clinical practice in emergency and elective procedures under general anesthesia.

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Author's Contribution:

Concept & Design or acquisition of analysis or interpretation of data:	Muhammad Shazad
Drafting or Revising Critically:	Muhammad Shazad
Final Approval of version:	The above author
Agreement to accountable for all aspects of work:	The above author

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