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# COMPARISON OF THE EFFICACY OF INTRAVENOUS LIGNOCAINE WITH COMPOUND LIDOCAINE/PRILOCAINE CREAM IN PREVENTING POST EXTUBATION COUGH IN PATIENTS UNDERGOING GENERAL ANAESTHESIA FOR LAPAROSCOPIC CHOLECYSTECTOMY: A RANDOMIZED CONTROL TRIAL

*Original Research*

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## ABSTRACT

**Background:** Post-extubation cough is a frequent complication following general anaesthesia, occurring in up to 60% of patients and often leading to discomfort, delayed recovery, and postoperative complications such as wound disruption or cardiovascular stress. Strategies including intravenous lignocaine and topical anaesthetics have been employed to mitigate this complication, yet their comparative effectiveness remains uncertain. Given the clinical impact of airway irritation on patient recovery, identifying the most effective preventive measure is essential.

**Objective:** To evaluate and compare the effectiveness of intravenous lignocaine with topical compound lidocaine/prilocaine cream in reducing the incidence of post-extubation cough in patients undergoing laparoscopic cholecystectomy.

**Methods:** A randomized controlled trial was conducted at the Department of Anaesthesia, Mayo Hospital, Lahore, over six months. Seventy-two patients aged 18–60 years, classified as ASA I–II, and scheduled for laparoscopic cholecystectomy under general anaesthesia were enrolled and randomly assigned into two groups using computer-generated randomization. Group A received intravenous lignocaine 2% at a dose of 1.5 mg/kg 1.5 minutes before extubation, while Group B had 2 g lidocaine/prilocaine cream (5%) applied evenly on the endotracheal tube cuff at intubation. Standardized anaesthesia protocols were followed. The primary outcome was the absence of post-extubation cough observed within two hours postoperatively. Data were analyzed using SPSS version 23, with chi-square tests applied for group comparisons, considering $p \leq 0.05$ statistically significant.

**Results:** Efficacy in preventing post-extubation cough was significantly higher in Group B compared to Group A (66.7% vs. 38.9%, $p = 0.01$). Subgroup analysis showed superior outcomes in Group B among females (71.4% vs. 28.6%, $p = 0.008$), ASA I patients (57.1% vs. 42.9%), ASA II patients (80.0% vs. 20.0%, $p = 0.05$), patients with BMI ≥25 kg/m² (65.6% vs. 34.4%, $p = 0.006$), and surgeries lasting <90 minutes (61.5% vs. 38.5%, $p = 0.03$).

**Conclusion:** Topical lidocaine/prilocaine cream demonstrated superior efficacy compared with intravenous lignocaine in preventing post-extubation cough, offering a simple and effective intervention to improve patient comfort and postoperative recovery in laparoscopic cholecystectomy.

**Keywords:** Anesthesia, General; Laparoscopic Cholecystectomy; Lidocaine; Lignocaine; Post-Extubation Cough; Prilocaine; Randomized Controlled Trial.

## INTRODUCTION

Post-extubation cough is one of the most challenging complications encountered in patients undergoing surgery under general anesthesia, particularly when an endotracheal tube is used. Although coughing serves a protective physiological role by clearing the airway and preventing aspiration, it becomes harmful in the postoperative setting, leading to increased pain, surgical site disruption, hemodynamic stress, and in severe cases, life-threatening complications such as neck hematoma or raised intracranial pressure (1,2). With more than 30 million major surgeries performed globally each year, the burden of postoperative airway complications is significant, and strategies to reduce their incidence are a clinical priority (3). The occurrence of post-extubation cough has been reported to range from 15% to 94%, and its pathophysiology is multifactorial, involving mucosal ischemia from cuff pressure, mechanical irritation during intubation or extubation, airway inflammation, and patient-related risk factors such as younger age, lung disease, gastroesophageal reflux, and larger tube size (4,5). The consequences extend beyond immediate airway irritation, contributing to respiratory complications such as bronchospasm and atelectasis, cardiovascular events including hypertension, tachycardia, and arrhythmias, and neurological risks like raised intracranial pressure (6). These effects may delay recovery, prolong hospitalization, and reduce patient satisfaction (7). Various preventive strategies have been explored. Non-pharmacological methods such as humidification, deep extubation, and gentle airway handling may reduce irritation but are not consistently effective and carry risks of their own (8,9).

Pharmacological interventions remain central, with agents such as corticosteroids, NSAIDs, opioids, magnesium sulphate, dexmedetomidine, and particularly lidocaine showing promising results in modulating the cough reflex (10). Lidocaine is of special interest due to its local anesthetic, anti-arrhythmic, and anti-inflammatory effects, achieved through suppression of sensory C-fiber activity, inhibition of peripheral nerve discharge, and reduction of airway inflammation (11). However, the short half-life of intravenous lidocaine presents limitations, particularly in longer procedures, while topical forms may offer more prolonged mucosal anaesthesia (10). The eutectic mixture of lidocaine and prilocaine cream (EMLA) provides a synergistic effect by combining the rapid onset and strong tissue penetration of lidocaine with the prolonged and relatively safer action of prilocaine (11–13). Its application on the endotracheal tube cuff has been associated with significantly reduced incidence of post-extubation cough compared with normal saline (14,15). Despite the individual benefits of intravenous lignocaine and lidocaine/prilocaine cream, direct comparative evidence remains limited, leaving uncertainty as to which modality offers greater efficacy and safety in preventing postoperative airway complications. Given the clinical significance of minimizing coughing in the postoperative period and its potential impact on patient outcomes, this study seeks to compare the effectiveness of intravenous lignocaine versus lidocaine/prilocaine cream in preventing post-extubation cough in patients undergoing laparoscopic cholecystectomy. The objective is to identify a safer and more effective strategy to reduce the incidence of this complication, thereby improving patient comfort, surgical outcomes, and overall postoperative recovery.

## METHODS

This randomized controlled trial was conducted in the Department of Anesthesia, King Edward Medical University/Mayo Hospital, Lahore, over a period of six months, following ethical approval of the synopsis from the Institutional Review Board. Written informed consent was obtained from all participants prior to enrolment, ensuring voluntary participation and confidentiality. A non-probability consecutive sampling technique was employed to recruit patients. The sample size was calculated to be 72 (36 in each group) at a 5% significance level with 90% power, based on previously reported incidences of post-extubation cough of 72% with intravenous lignocaine and 38.5% with lidocaine/prilocaine cream (14). Patients aged between 18 and 60 years of either gender, classified as ASA physical status I or II, and scheduled to undergo laparoscopic cholecystectomy under general anesthesia were included. Exclusion criteria comprised individuals with chronic cough, active upper respiratory tract infections, smoking history, drug allergies, or anticipated difficult intubations, as these factors could confound the outcomes.

Randomization was carried out to allocate patients into two equal groups. Group A received intravenous lignocaine 2% at a dose of 1.5 mg/kg administered 1.5 minutes before extubation, whereas Group B received 2 g of lidocaine/prilocaine cream (5%) applied evenly to the endotracheal tube cuff at the time of intubation (16). The anesthetic technique was standardized across both groups. Induction was achieved with nalbuphine 0.1 mg/kg, propofol 2–3 mg/kg, and atracurium 0.5 mg/kg. Patients were ventilated with oxygen and

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isoflurane at a minimum alveolar concentration of 1.2. Proper endotracheal tube placement was confirmed through auscultation and continuous capnography. Reversal of neuromuscular blockade was performed with neostigmine 0.03–0.07 mg/kg and atropine 0.01–0.02 mg/kg. Gentle suctioning with a 16 Fr catheter at 150 mmHg was performed prior to extubation. Extubation was carried out once patients demonstrated spontaneous respiration and the ability to follow verbal commands.

The primary outcome was the incidence of post-extubation cough, defined according to the operational definition of the study. Patients were observed for two hours in the post-anesthesia care unit (PACU) under continuous monitoring of electrocardiography, pulse oximetry, and non-invasive blood pressure. In the event of cough, rescue measures such as gentle suctioning, nebulization, head elevation, deep breathing exercises, and administration of bronchodilators or anti-inflammatory drugs were implemented if the cough persisted. Data were analyzed using SPSS version 26. Quantitative variables such as age and duration of surgery or anesthesia were expressed as mean ± standard deviation, while qualitative variables such as gender, ASA status, and incidence of cough were presented as frequencies and percentages. Comparison of outcomes between the two groups was performed using the Chi-square test, with a p-value ≤0.05 considered statistically significant. To minimize confounding, stratification was performed for age, gender, body mass index, ASA status, and duration of surgery, with post-stratification analyses carried out using Chi-square tests.

## RESULTS

The demographic and baseline characteristics were comparable between the two groups. The mean age of participants was 44.1 ± 10.4 years in Group A and 45.9 ± 8.4 years in Group B, while the mean body mass index was 27.6 ± 3.4 kg/m² and 27.1 ± 3.1 kg/m², respectively. Gender distribution was similar in both groups, with a predominance of female participants. The distribution of ASA physical status I and II was also comparable, with 63.9% and 36.1% in Group A and 55.6% and 44.4% in Group B, respectively. Operative and anesthetic durations were slightly longer in Group B, with mean surgery time of 91.3 ± 14.2 minutes compared to 87.3 ± 16.8 minutes in Group A, and mean anesthesia duration of 92.5 ± 13.2 minutes compared to 89.7 ± 17.2 minutes, though these differences were not statistically significant. Importantly, efficacy in preventing post-extubation cough was significantly higher in Group B, observed in 66.7% of patients, compared to 38.9% in Group A (p = 0.01). Based on the study objective, the primary outcome was the incidence of post-extubation cough. In Group A (intravenous lignocaine), 22 out of 36 patients (61.1%) developed cough post-extubation, whereas in Group B (lidocaine/prilocaine cream), 12 out of 36 patients (33.3%) experienced cough. This difference demonstrates a markedly lower incidence in Group B compared with Group A, aligning with the observed higher efficacy percentage in the cream group. The reduction in cough episodes was statistically significant (p = 0.01), indicating that lidocaine/prilocaine cream was more effective in minimizing this complication. However, the severity of cough episodes, whether mild, moderate, or severe, was not reported, which remains a limitation as it would provide additional clinical insight into patient comfort and recovery.

**Table 1: Demographic and Baseline Characteristics of Study Participants**

| Variable | Group A (IV Lignocaine) n=36 | Group B (Lidocaine/Prilocaine Cream) n=36 | p-value |
|---|---|---|---|
| Mean Age (years) ± SD | 44.1 ± 10.4 | 45.9 ± 8.4 | NS |
| Gender | | | NS |
| Male | 12 | 20 | |
| Female | 24 | 26 | |
| Mean BMI (kg/m²) ± SD | 27.6 ± 3.4 | 27.1 ± 3.1 | NS |
| ASA I (%) | 63.9 | 55.6 | NS |
| ASA II (%) | 36.1 | 44.4 | NS |

**Table 2: Operative and Anesthetic Durations**

| Variable | Group A (IV Lignocaine) Mean ± SD | Group B (Lidocaine/Prilocaine Cream) Mean ± SD | p-value |
|---|---|---|---|
| Surgery Duration (minutes) | 87.3 ± 16.8 | 91.3 ± 14.2 | NS |
| Anesthesia Duration (minutes) | 89.7 ± 17.2 | 92.5 ± 13.2 | NS |

**Table 3: Primary Outcome: Incidence of Post-Extubation Cough**

| Outcome | Group A (IV Lignocaine) n=36 | Group B (Lidocaine/Prilocaine Cream) n=36 | p-value |
|---|---|---|---|
| Cough Present, n (%) | 22 (61.1%) | 12 (33.3%) | 0.01* |
| Cough Absent, n (%) | 14 (38.9%) | 24 (66.7%) | |

**Table 4: Efficacy in Preventing Post-Extubation Cough (Primary Objective)**

| Group | Total Patients (n) | Efficacy (%) | p-value |
|---|---|---|---|
| Group A (IV Lignocaine) | 36 | 38.9 | 0.01* |
| Group B (Lidocaine/Prilocaine Cream) | 36 | 66.7 | |

**Table 5: Incidence of Post-Extubation Cough in Both Study Groups**

| Group | Total Patients (n) | Patients with Cough, n (%) | Patients without Cough, n (%) | p-value |
|---|---|---|---|---|
| Group A (IV Lignocaine) | 36 | 22 (61.1%) | 14 (38.9%) | 0.01 |
| Group B (Lidocaine/Prilocaine Cream) | 36 | 12 (33.3%) | 24 (66.7%) | |

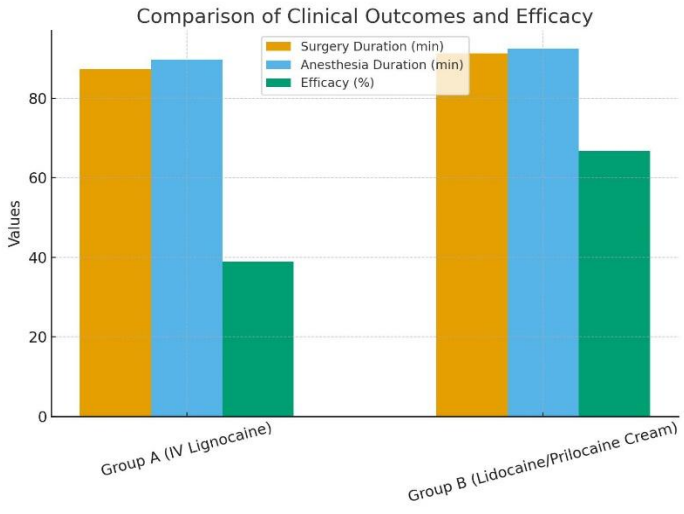


*Figure 1 Comparison of Clinical Outcomes and Efficiency*

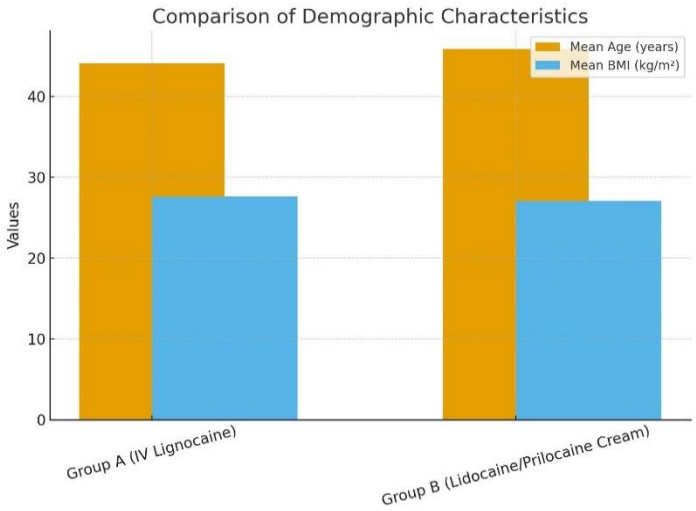


*Figure 2 Comparison of Demographic Characteristic*

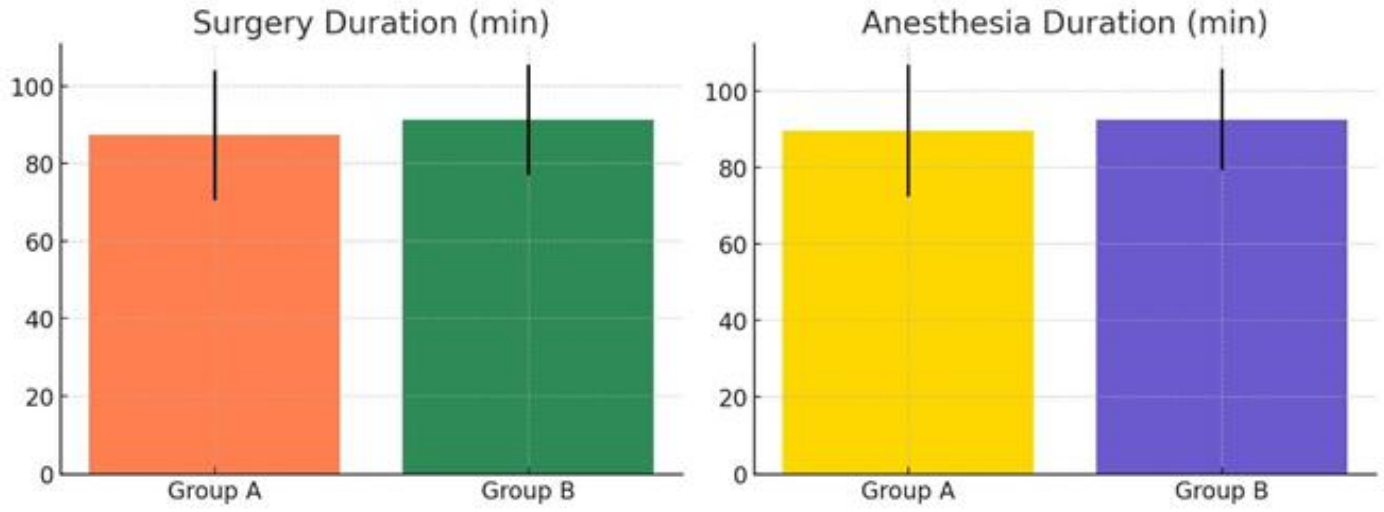


*Figure 3 Surgery Duration (min) & Anesthesia Duration (min)*

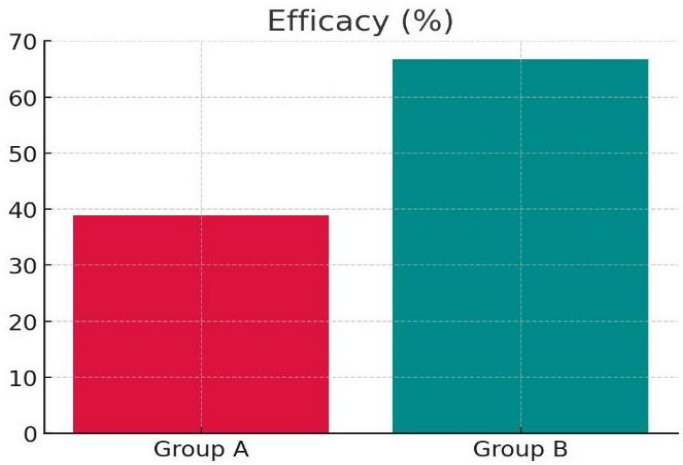


*Figure 4 Efficacy (%)*

## DISCUSSION

Post-extubation cough remains a well-recognized complication of general anesthesia, frequently resulting in pain, cardiovascular stress, and surgical wound disruption. The present study demonstrated that topical anesthesia using lidocaine/prilocaine cream was significantly more effective in reducing the incidence of cough compared with intravenous lignocaine in patients undergoing laparoscopic cholecystectomy. Baseline demographics, including age, gender, and body mass index, were comparable across groups, thereby strengthening the internal validity of the findings. The predominance of female participants observed in both groups is consistent with earlier reports suggesting that female gender is a recognized risk factor for airway complications following intubation (17). The higher efficacy observed with lidocaine/prilocaine cream supports previous evidence indicating that topical anesthetics reduce airway sensitivity by providing direct mucosal anesthesia, thereby attenuating airway reflexes and decreasing cough incidence (18-20). Intravenous lignocaine, while long established in anesthetic practice, is limited by its short half-life and variable systemic distribution, factors that may explain its comparatively lower efficacy in this trial (21). Studies have similarly reported that topical agents, particularly lidocaine/prilocaine mixtures, outperform intravenous lignocaine in reducing postoperative cough, cardiovascular responses, and sore throat while improving overall patient comfort (22). Comparable outcomes have also been achieved with dexmedetomidine, intracuff lidocaine, and other adjuncts in specific populations such as pediatric patients or those undergoing bronchoscopy, reflecting the diversity of available preventive strategies (23,24).

The findings of this study carry clinical implications, as the use of lidocaine/prilocaine cream provides a simple, non-invasive, and effective method for reducing postoperative airway complications, which can translate into improved patient recovery and satisfaction. The avoidance of cardiovascular stress and wound-related complications further supports its value in patients at higher perioperative risk. This study also has important limitations. The relatively small sample size and single-center design limit the generalizability of the results to broader populations. The short observation period restricted the evaluation of long-term outcomes such as delayed airway irritation or secondary complications. Furthermore, the absence of detailed assessment of cough severity and the lack of systematic monitoring for potential drug-related side effects preclude a comprehensive evaluation of safety and tolerability. Despite these limitations, the study had notable strengths, including a randomized controlled design, standardized anesthetic techniques, and careful monitoring in the immediate postoperative period, which ensured methodological rigor and reduced bias. Future research should aim to validate these findings in larger, multicenter cohorts with extended follow-up to capture long-term safety and efficacy outcomes. Incorporating assessments of cough severity, patient comfort scales, and detailed adverse event reporting would provide a more holistic understanding of the comparative benefits of topical and intravenous agents (25). Comparative trials against other effective pharmacological strategies such as dexmedetomidine or intracuff lidocaine may further refine clinical decision-making. In summary, the study contributes evidence that lidocaine/prilocaine cream provides superior efficacy to intravenous lignocaine in preventing post-extubation cough, reinforcing the role of topical anesthetics in perioperative airway management. While limitations remain, these findings support broader clinical adoption and provide a foundation for future investigation into optimizing strategies for reducing postoperative airway complications.

## CONCLUSION

The study concluded that compound lidocaine/prilocaine cream was more effective than intravenous lignocaine in preventing post-extubation cough among patients undergoing laparoscopic cholecystectomy. By providing direct mucosal anesthesia through application on the endotracheal tube cuff, it offered superior protection against airway irritation, thereby enhancing patient comfort and facilitating smoother postoperative recovery. These findings highlight the clinical value of topical anesthetic strategies in reducing airway complications and emphasize their potential role in improving perioperative outcomes.

### AUTHOR CONTRIBUTION

| Author | Contribution |
|---|---|
| Syeda Ayesha Siddiqa* | Substantial Contribution to study design, analysis, acquisition of Data<br>Manuscript Writing<br>Has given Final Approval of the version to be published |
| Farrukh Afzal | Substantial Contribution to study design, acquisition and interpretation of Data<br>Critical Review and Manuscript Writing<br>Has given Final Approval of the version to be published |
| Muhammad Suhaib Anwer | Substantial Contribution to acquisition and interpretation of Data<br>Has given Final Approval of the version to be published |
| Maham Tariq | Contributed to Data Collection and Analysis<br>Has given Final Approval of the version to be published |

## REFERENCES

1. Yang SS, Wang N-N, Postonogova T, Yang GJ, McGillion M, Beique F, et al. Intravenous lidocaine to prevent postoperative airway complications in adults: a systematic review and meta-analysis. Br J Anaesth. 2020;124(3):314-23.

2. Wang X, Zhu G, Tan J, Cao X, Duan M. Effects of continuous and slow tracheal tube cuff deflation on cough reflex during extubation in noncardiac surgery patients: a randomised clinical trial. BMC Anesthesiol. 2023;23(1):45.

3. Grabczak EM, Stec S, Dabrowska M, Plevkova J, Krenke R. Cough as a Cause and Consequence of Heart Dysfunction - Current State of Art. Physiol Res. 2020;69(Suppl 1):S105-s21.

4. Lv L, Yan L, Liu X, Chen M. Effectiveness of lidocaine/prilocaine cream on cardiovascular reactions from endotracheal intubation and cough events during recovery period of older patients under general anesthesia: prospective, randomized placebo-controlled study. BMC Geriatrics. 2020;20(1):157.

5. Buchanan C, Burt A, Moureau N, Murray D, Nizum N. Registered Nurses' Association of Ontario (RNAO) best practice guideline on the assessment and management of vascular access devices. J Vasc Access. 2024;25(5):1389-402.

6. Zheng K, Han M, Kang F, Yang C, Li J. A comparative study on the effect of dopamine vs phenylephrine in improving the cutaneous analgesic effect of mexiletine in rats. Periop Med. 2023;12(1):26.

7. Zhang E, Zhao X, Li T, Wang M, gao J, Zhang H, et al. Compound lidocaine/prilocaine cream combined with tetracaine prevents cough caused by extubation after general anaesthesia: a randomised controlled trial. BMC Anesthesiol. 2023;23(1):2.

8. Mohamed GSEN, Farag HM, Mostafa RH, Aly SMM. POST-EXTUBATION SORE THROAT; HOW FAR NEBULIZ. Ain Shams Med J. 2021;72(1):119-27.

9. Vaida S, Gaitini L, Somri M, Matter I, Prozesky J. Airway Management During the Last 100 Years. Crit Care Clin. 2023;39(3):451-64.

10. Liuru T, Pang D, Kong FM, Zhang J, Shao G, Chen Z. P67.01 Cough in Patients After Thoracic Surgery: A Pilot Study. J Thor Oncol. 2021;16(10):S1197.

11. Reddall RE, Yeow D. Extubation techniques in anaesthesia—a narrative review. JOMA. 2023;2.

12. Ahmed Yasser R, Ahmed Adil A, Nazzal Jebur M. The Intraoperative use of Prophylactic Steroids Therapy on Postoperative Cough for Heavy Smoker Patient Under Elective Extra Thoracic Surgery. OBAT: Jurnal Riset Ilmu Farmasi dan Kesehatan. 2024;2(4):311-26.

13. Wang G, Qi Y, Wu L, Jiang G. Comparative Efficacy of 6 Topical Pharmacological Agents for Preventive Interventions of Postoperative Sore Throat After Tracheal Intubation: A Systematic Review and Network Meta-analysis. Anesthe Analg. 2021;133(1):58-67.

14. Karnina R, Arif SK, Hatta M, Bukhari A. Molecular mechanisms of lidocaine. Ann Med Surg. 2021;69:102733.

15. Kim SH, Kim YS, Kim S, Jung KT. Dexmedetomidine decreased the post-thyroidectomy bleeding by reducing cough and emergence agitation – a randomized, double-blind, controlled study. BMC Anesthesiology. 2021;21(1):113.

16. Tung A, Fergusson NA, Ng N, Hu V, Dormuth C, Griesdale DEG. Medications to reduce emergence coughing after general anaesthesia with tracheal intubation: a systematic review and network meta-analysis. Br J Anaesth. 2020;124(4):480-95.

17. Gladston DV, Padmam S, Amma RO, Cherian R, KM JK, Vijayan J, et al. A randomized controlled trial to study the effect of intratracheal and intravenous lignocaine on airway and hemodynamic response during emergence and extubation following general anesthesia. North Clin Istanb. 2022;9(4):323.

18. Ismaeil DA. Avoidance of bile duct injury in laparoscopic cholecystectomy with feasible intraoperative resources: A cohort study. Biomed Rep. 2024;21(2):110.

19. Yadav S, Ramesh R, Sheikh Z, Padala HSS, Shashank C, Kalsi J, et al. Assessment of Postoperative Complications and Outcomes in Patients Undergoing Laparoscopic Cholecystectomy. 2024;16(Suppl 3):S2595-S7.

20. Faris S, Safi MH. FREQUENCY OF PORT SITE INFECTION IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY. Biological and Clinical Sciences Research Journal. 2024;2024(1):877.

21. Matsushima K, Ciesielski KM, Mandelbaum RS, Matsuo K. Clinical Demographics of Laparoscopic Cholecystectomy: A Gender-Specific Analysis. 2024;90(4):528-32.

22. Majeedano GS, Mal L, Danish AA, Tasneem B, Tasneem A, Ilyas Y. Bleeding Origin and Its Frequency in Laparoscopic Cholecystectomy. Journal of Pharmaceutical Research International. 2022;34(36A):8-15.

23. Warrell D, Oh KE, Pessoa L, Manson D, Nageswaran H. O265: Laparoscopic Cholecystectomy in Class III (Morbid) Obesity. Brit J Surg. 2024;111(Supplement_2).

24. Artawan IM, Sagita S, Dedi MAE. Intratracheal Lidocaine Reduces Incidence of Cough During Extubation and Sore Throat After Tonsillectomy Surgery: A Randomized, Single-blind Clinical Trial. Bali J Anesthesiol. 2022;6(2):75-9.

25. Kavyashree MB, Kundra P, Vinayagam S. Efficacy of endotracheal tube cuff lignocaine in the prevention of postextubation cough in children undergoing elective surgeries – A randomised controlled trial. Ind J Anaesth. 2024;68(5):486-91.