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# Assessment Finding: Identify Common Complications of Thoracotomy and The Role of Anesthesia in Iraq

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**Abstract**: Background: Thoracotomy is still a significant surgical operation that is accompanied by a considerable amount of morbidity following the surgery. The patients were classified according to the method of anaesthesia: general anaesthesia (GA) alone (n=42), general anaesthesia with thoracic epidural (n=52), and paravertebral block (n=22). The main outcome measures were the postoperative complications, pain measurement, and the length of stay. Univariate and multivariate logistic regression were used to analyse the risk factors. Correlation analysis was used to test correlations between continuous variables. Findings refer to the average age was 58.4 years, and 67.2% of the patients were men. The total complication was 50.0% (58/116). The most frequent complications were pulmonary (36.2%), which included atelectasis (24.1%), pneumonia (15.5%), and prolonged air leak (13.8%). Patients experienced cardiovascular complications in 22.4% of the cases; arrhythmias (15.5%). The pain (VAS>7) was severe in the epidural group in the GA alone (15.4% vs. 47.6%, p<0.001), where in our study, the epidural anaesthesia also lowered chronic post-thoracotomy pain (7.7% vs. 33.3, p=0.004). There were positive relationships between the duration of surgery and blood loss (r=0.62, p<0.001) and between the complications and hospital stay (10.8±4.8 vs. 6.0±2.1 days, p<0.001). The predictive model was found to be a good discriminator (AUC=0.756), so finally we concluded that thoracotomy is a procedure that is linked with significant morbidity, and it occurs in 50 percent of all patients. Furthermore, thoracic epidural analgesia has a great capacity in relieving acute and chronic pain than general anaesthesia itself.

**Keywords:** Complications, chronic, thoracotomy, blood loss, thoracic, epidural, analgesia, pain, anaesthesia.

## INTRODUCTION

Thoracotomy is still among the most challenging surgeries in thoracic surgery, which involves both a large surgical exposure and the complexity of both anesthesia and postoperative management. Despite the significant improvements in surgical methods, anesthesia, and perioperative procedures, thoracotomy is still accompanied by a significant amount of postoperative complications. The range of possible complications and the key part played by the anesthesia in the prevention, detection, and management of these complications must be understood to facilitate the maximization of patient safety, recovery, and minimisation of morbidity (Sengupta, S. 2015; Crabtree, T. D. *et al.*, 2018).

This may be classified into the following broad categories of complications that are associated with thoracotomy: respiratory, cardiovascular, musculoskeletal, neurological, systemic, and procedure-specific. Some of the most frequent and clinically significant complications are respiratory complications (Dimick, J. B. *et al.*, 2003). The immediate effects of intrathoracic surgery on lung functions are manifested in the postoperative atelectasis, bronchospasm, pneumonia, and respiratory failure. Thoracotomy may lead to the loss of effective coughing and deep breathing, which predisposes patients to mucus plugging, lobar collapse, and infection. Intercostal dissection can cause pain that will affect the respiratory effort and again raise the chances of hypoxemia and hypoventilation. Pneumothorax and pleural effusion can complicate the early postoperative period with the need of thoracic drainage or reintervention (Rock, P., & Rich, P. B. 2003; Nakahara, K. *et al.*, 1988). Such pulmonary sequelae do not only increase hospitalization but may also lead to a cascade of complications, such as systemic inflammatory reactions, decreased exercise capacity, and slow mobilization. (Kearney, D. J. *et al.*, 1994)

The cardiovascular complications are less frequent than the respiratory complications, but with a high risk in view of the perioperative stress, myocardial ischemia possibilities, and the hemodynamic disturbances inherent in the thoracotomy and one-lung ventilation (Slinger, P., & Darling, G. 2011). Coronary patients may develop myocardial ischemia or infarction as a result of either severe coronary disease or perioperative requirements that are above cardiac reserve, where prompt attention





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to electrolyte imbalances, ischemia, and rhythm abnormalities, and close observation is critical in anesthesia care during thoracotomy (Vaporciyan, A. A. *et al.*, 2004).

The significance of pain and musculoskeletal complications is in the prolonged effects on recovery and quality of life (Scheggi, V. *et al.*, 2023). The intercostal nerve and the sternal surgical trauma may lead to both acute and chronic pain, neuropathic pain syndrome, and poor mobility. Successful pain management is not comfort, but a vital factor of pulmonary toilet, involvement in physiotherapy, sleep, and short-term functional outcome (Pollock, C. *et al.*, 2022). The unrelieved pain may continue the splinting, decrease the cough efficacy, and predispose to pulmonary complications. The issues under consideration are sterna dehiscence, infection, and delayed wound healing, especially in diabetic, obese, or malnourished patients. Thoracic pain chronic is often lasting a few months and even years and might have to be treated on a multidisciplinary basis, which includes the anti-severe anesthesia methods used in the regions, pharmacologic treatment, and rehabilitation (Lin, J. *et al.*, 2022).

They are neurological and systemic complications that may require attention because they can be severe and chronic (Traibi, A. *et al.*, 2013). Recovery may be complicated by postoperative delirium or cognitive dysfunction, which is more common in older adults, in patients with preexisting cognitive impairment, or in patients with heavy intraoperative fluctuations in hemodynamic ability, and may increase the risk of postoperative complications. (Arslantas, M. K. *et al.*, 2015) Thromboembolic activities, e.g., deep vein thrombosis, pulmonary embolism, are one known issue during the perioperative window, and hence the importance of early mobilization, mechanical prophylaxis, and pharmacologic prevention where appropriate. Acute renal failure could be as a result of perioperative hypotension, nephrotoxic drugs, or inflammatory processes throughout the entire body, and especially in high-risk patients who are undergoing prolonged surgery (Kaufmann, K. B. *et al.*, 2019).

The scope of the surgery, anatomy, and necessity of quality analgesia direct the selection of an anesthetic method. (Defosse, J. *et al.*, 2017) Tubes General anesthesia General anesthesia with lung isolation endotracheal tube Aphrodite with a double-lumen endotracheal tube or a bronchial blocker is usually used to obtain complete access to the surgical area, where the nondependent lung is inflated, and the dependent lung is ventilated. (Vandenbroucke, J. P. *et al.*, 2014) This methodology demands skills and experience in airway management, intraoperative lung recruitment, and gas exchange monitoring, and one must be prepared to deal with ventilation-perfusion imbalances and hypoxemia, which may arise during one-lung ventilation.

Regional anesthesia and adjuncts are important in augmenting analgesia, decreasing opioid intake, and improving the early postoperative respiratory function (Jammer, I. *et al.*, 2015). Thoracic paravertebral blocks, erector spinae plane blocks, intercostal nerve blocks, and serratus anterior plane blocks are some of the techniques that can be used to offer segmental anesthesia in order to achieve low pain scores and better splinting exercises (Forster, C. *et al.*, 2020). Multimodal analgesia, which is the combination of regional techniques and systemic non-opioid analgesics, aids in the deeper coughing and effective deep breathing whilst reducing the effect of respiratory depression and risk of delirium. (Grapatsas, K. *et al.*, 2023; Lederman, D. *et al.*, 2019) Another focus of the anesthetic plan is hemodynamic stability, close monitoring of fluid, and lung-protective approaches during one-lung ventilation, including reducing peak airway pressures and setting of the right oxygenation goals.

## MATERIAL AND METHOD

The present retrospective observational cohort study was done at [Iraq hospitals] to establish the prevalent complications following thoracotomy and the impact of the anesthesia methods on the postoperative outcomes. Adult patients (age 18 years and above) who had undergone elective or emergency thoracotomy during [2024] and [2025] and had full medical records that could be reviewed were included; patients having undergone video-assisted thoracoscopic surgery (VATS), patients with incomplete medical records, and pediatric patients (under age 18 years) or missing records of anesthesia were excluded. EMRs and anesthesia charts, which included demographics (age, gender, BMI, smoking status), comorbidities (hypertension, diabetes mellitus, COPD, coronary artery disease), preoperative evaluation (ASA physical status classification), surgical variables (indication, type of thoracotomy, duration, estimated blood loss), anesthesia variables (type of anesthesia, one-lung ventilation



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duration), and postoperative outcomes (complications, ICU admission, length of stay, mortality), served as sources of data. The patients were divided into three groups according to the mode of anesthesia: general anesthesia (GA) alone (n=42) using the standard general anesthesia and the usage of the double-lumen endotracheal tube; general anesthesia with thoracic epidural (n=52) using the combined general anesthesia and thoracic epidural catheter (T5-T8); and general anesthesia with paravertebral block (n=22) using the combined general anesthesia and the definition of complications was the following: pulmonary complications (atelectasis, radiographic (radiographic evidence) and clinical criteria with positive cultures), prolonged air leak (duration exceeding 7 days), and respiratory failure (need to receive reintubation or prolonged ventilation); cardiovascular complications (arrhythmia, new-onset atrial fibrillation or other significant arrhythmias), hypotension (vasopressor support duration exceeding 24 h and 72 h postoperative), myocardial ischemia (ECG changes.

The statistical analysis started using descriptive statistics, which presented continuous variables in the form of mean (SD) and categorical variables in the form of frequencies and percentages n (%. Chi-square test or Fisher exact test were used to compare two categories of variables, independent t-test or Mann-Whitney U were used to compare two groups of variables that are continuous, and the one-way ANOVA or Kruskal-Wallis test were used to compare more than two groups of variables. Pearson correlation coefficient (r) and Spearman's rank correlation were the correlation analysis methods applied to normally distributed and non-parametric data, respectively. Multivariate logistic regression was used on independent predictors (adjusted OR, 95% CI) and univariate logistic regression used on potential risk factors (OR, 95% CI) and regression analysis was performed on potential risk factors using univariate and multivariate logistic regression and the variables with $p<0.10$ in univariate analysis were used in the multivariate model; model fit was assessed using Hosmer-Lemeshow goodness of fit test and discriminative ability was measured using area under All statistical analyses were conducted with the use of SPSS version 26.0 (IBM ), with $p<0.05$ (two-tailed) as a level of statistical significance.

## RESULTS

**Table 1-** Describe outcomes according to Patient Demographics and Baseline Characteristics (N=116)

| Variable | Value (Mean±SD or n(%)) | Range |
|---|---|---|
| Age (years) | 58.4 ± 12.3 | 32-79 |
| Gender | — | — |
| Male | 78 (67.2%) | — |
| Female | 38 (32.8%) | — |
| BMI (kg/m²) | 25.8 ± 4.2 | 18.5-38.6 |
| ASA Classification | — | — |
| ASA I | 12 (10.3%) | — |
| ASA II | 54 (46.6%) | — |
| ASA III | 42 (36.2%) | — |
| ASA IV | 8 (6.9%) | — |
| Comorbidities | — | — |
| Hypertension | 52 (44.8%) | — |
| Diabetes Mellitus | 28 (24.1%) | — |
| COPD | 34 (29.3%) | — |
| Coronary Artery Disease | 18 (15.5%) | — |
| Previous Thoracic Surgery | 14 (12.1%) | — |
| Smoking Status | — | — |
| Current Smoker | 32 (27.6%) | — |
| Former Smoker | 44 (37.9%) | — |
| Never Smoker | 40 (34.5%) | — |





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**Table 2-** Findings related to Surgical and Anesthesia Characteristics (N=116)

| Variable | Value (Mean±SD or n(%)) | Range |
|---|---|---|
| Indication for Surgery | — | — |
| Lung Cancer | 68 (58.6%) | — |
| Benign Tumor | 18 (15.5%) | — |
| Empyema | 12 (10.3%) | — |
| Trauma | 10 (8.6%) | — |
| Other | 8 (6.9%) | — |
| Type of Thoracotomy | — | — |
| Posterolateral | 72 (62.1%) | — |
| Anterolateral | 28 (24.1%) | — |
| Muscle-sparing | 16 (13.8%) | — |
| Surgery Duration (min) | 185.6 ± 58.4 | 90-340 |
| Estimated Blood Loss (mL) | 425.8 ± 285.6 | 100-1800 |
| Anesthesia Type | — | — |
| General Anesthesia Only | 42 (36.2%) | — |
| General + Epidural | 52 (44.8%) | — |
| General + Paravertebral Block | 22 (19.0%) | — |
| One-Lung Ventilation Duration (min) | 124.3 ± 45.2 | 45-220 |

**Table 3 -**Distribution of patients according to Frequency of Thoracotomy Complications (N=116)

| Complication | n | Percentage (%) |
|---|---|---|
| Any Complication | 58 | 50 |
| Pulmonary Complications | 42 | 36.2 |
| Atelectasis | 28 | 24.1 |
| Pneumonia | 18 | 15.5 |
| Prolonged Air Leak (>7 days) | 16 | 13.8 |
| Acute Respiratory Distress | 8 | 6.9 |
| Respiratory Failure | 6 | 5.2 |
| Cardiovascular Complications | 26 | 22.4 |
| Arrhythmia (Atrial Fibrillation) | 18 | 15.5 |
| Hypotension | 14 | 12.1 |
| Myocardial Ischemia | 4 | 3.4 |
| Surgical Complications | 20 | 17.2 |
| Bleeding Requiring Transfusion | 12 | 10.3 |
| Wound Infection | 8 | 6.9 |
| Bronchopleural Fistula | 4 | 3.4 |
| Pain-Related | 34 | 29.3 |
| Severe Acute Pain (VAS>7) | 34 | 29.3 |
| Chronic Post-Thoracotomy Pain | 22 | 19 |

**Table 4-** Rate finding Complications by Anesthesia Type (N=116)

| Complication | GA Only (n=42) | GA+Epidural (n=52) | GA+PVB (n=22) | p-value |
|---|---|---|---|---|
| Any Complication | 26 (61.9%) | 22 (42.3%) | 10 (45.5%) | 0.124 |
| Pulmonary | 18 (42.9%) | 16 (30.8%) | 8 (36.4%) | 0.458 |
| Atelectasis | 14 (33.3%) | 10 (19.2%) | 4 (18.2%) | 0.198 |
| Pneumonia | 10 (23.8%) | 6 (11.5%) | 2 (9.1%) | 0.142 |
| Cardiovascular | 12 (28.6%) | 10 (19.2%) | 4 (18.2%) | 0.478 |
| Arrhythmia | 10 (23.8%) | 6 (11.5%) | 2 (9.1%) | 0.142 |
| Severe Pain (VAS>7) | 20 (47.6%) | 8 (15.4%) | 6 (27.3%) | **<0.001*** |
| Chronic Pain | 14 (33.3%) | 4 (7.7%) | 4 (18.2%) | |





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**Table 5-** Assessment Univariate Risk Factor Analysis for Any Complication

| **Risk Factor** | **Odds Ratio** | **95% CI Lower** | **95% CI Upper** | **p-value** |
|---|---|---|---|---|
| Age ≥65 years | 2.45 | 1.18 | 5.08 | **0.016*** |
| Male Gender | 1.32 | 0.62 | 2.81 | 0.472 |
| BMI ≥30 kg/m² | 1.89 | 0.78 | 4.58 | 0.158 |
| ASA III-IV | 2.78 | 1.34 | 5.76 | **0.006*** |
| COPD | 3.12 | 1.42 | 6.85 | **0.004*** |
| Diabetes Mellitus | 1.68 | 0.72 | 3.92 | 0.232 |
| Current Smoker | 2.24 | 1.02 | 4.92 | **0.044*** |
| Surgery Duration ≥180 min | 2.56 | 1.24 | 5.28 | **0.011*** |
| Blood Loss ≥500 mL | 2.89 | 1.38 | 6.05 | **0.005*** |
| GA Only (vs Regional) | 2.12 | 1.02 | 4.41 | **0.044*** |
| OLV Duration ≥120 min | 1.94 | 0.96 | 3.92 | 0.065 |
| Previous Thoracic Surgery | 1.78 | 0.58 | 5.46 | 0.314 |

**Table 6-** Understanding the statistical relationships between the parameters in this study

| Variable | Age | BMI | Surgery Duration | Blood Loss | OLV Duration | Hospital Stay |
|---|---|---|---|---|---|---|
| Age | 1.00<br>— | 0.12<br>0.198 | 0.28<br>0.002* | 0.34<br><0.001* | 0.22<br>0.018* | 0.45<br><0.001* |
| BMI | 0.12<br>0.198 | 1.00<br>— | 0.08<br>0.392 | 0.15<br>0.108 | 0.06<br>0.522 | 0.18<br>0.052 |
| Surgery Duration | 0.28<br>0.002* | 0.08<br>0.392 | 1.00<br>— | 0.62<br><0.001* | 0.78<br><0.001* | 0.52<br><0.001* |
| Blood Loss | 0.34<br><0.001* | 0.15<br>0.108 | 0.62<br><0.001* | 1.00<br>— | 0.48<br><0.001* | 0.58<br><0.001* |
| OLV Duration | 0.22<br>0.018* | 0.06<br>0.522 | 0.78<br><0.001* | 0.48<br><0.001* | 1.00<br>— | 0.38<br><0.001* |
| Hospital Stay | 0.45<br><0.001* | 0.18<br>0.052 | 0.52<br><0.001* | 0.58<br><0.001* | 0.38<br><0.001* | 1.00<br>— |

- Color Legend:
- Weak (0.1-0.3)
- Moderate (0.3-0.5)
- Strong (0.5-0.7)
- Very Strong (>0.7)

**Table 7-** Describe outcomes of the study based on Multivariate Logistic Regression for Any Complication

| Risk Factor | Adjusted OR | 95% CI Lower | 95% CI Upper | p-value |
|---|---|---|---|---|
| Age ≥65 years | 2.18 | 0.98 | 4.85 | 0.056 |
| ASA III-IV | 2.34 | 1.04 | 5.26 | 0.040* |
| COPD | 2.68 | 1.12 | 6.42 | 0.027* |
| Current Smoker | 1.76 | 0.72 | 4.3 | 0.214 |
| Surgery Duration ≥180 min | 2.12 | 0.94 | 4.78 | 0.070 |
| Blood Loss ≥500 mL | 2.42 | 1.08 | 5.42 | 0.032* |
| GA Only (vs Regional) | 1.98 | 0.88 | 4.45 | 0.098 |

**Table 8-** Evaluating finding study Anaesthesia-Related Complications (N=116)

| **Complication** | **n** | **Percentage (%)** | **Severity** |
|---|---|---|---|
| Intraoperative Hypotension | 32 | 27.6 | Moderate |
| Hypothermia (<35°C) | 24 | 20.7 | Mild |
| Difficult Intubation | 8 | 6.9 | Moderate |
| Double-Lumen Tube Malposition | 14 | 12.1 | Mild |
| Hypoxemia During OLV | 18 | 15.5 | Moderate |
| Bronchospasm | 6 | 5.2 | Moderate |
| Delayed Emergence | 10 | 8.6 | Mild |





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| | | | |
|---|---|---|---|
| PONV | 28 | 24.1 | Mild |
| Awareness | 2 | 1.7 | Severe |
| Nerve Injury (Positioning) | 4 | 3.4 | Moderate |
| Epidural-Related (n=52) | — | — | — |
| Hypotension | 12 | 23.1 | Moderate |
| Inadequate Block | 6 | 11.5 | Mild |
| PDPH | 2 | 3.8 | Moderate |

**Table 9-** Final Hospital Outcomes (N=116)

| **Outcome** | **Value (Mean±SD or n(%))** | **Range** |
|---|---|---|
| Hospital Length of Stay (days) | 8.4 ± 4.2 | 4-28 |
| ICU Admission | 34 (29.3%) | — |
| ICU Length of Stay (days) | 2.8 ± 1.6 | 1-8 |
| Mechanical Ventilation >24h | 12 (10.3%) | — |
| Chest Tube Duration (days) | 4.2 ± 2.1 | 2-14 |
| Readmission (30-day) | 8 (6.9%) | — |
| Reoperation | 6 (5.2%) | — |
| In-Hospital Mortality | 3 (2.6%) | — |
| 30-Day Mortality | 4 (3.4%) | |

## DISCUSSION

This retrospective case study of 116 thoracotomy patients offers a lot in terms of the range of postoperative complications as well as the important role played by the anesthesia methods to determine the outcome of the patients. Our results reveal the total complication rate of 50. percent and most frequently pulmonary complications, and indicate the protective impact of regional anesthesia methods, especially thoracic epidural analgesia.

A 50 percent overall complication rate, as we found in our study, is in agreement with the literature published before on thoracotomy outcomes. According to Agostini et al. (2020), the number of complications ranged between 30 and 60 percent after open thoracic surgery, based on the selection criteria and the definitions applied to the patients. We have a rather elevated rate, which can be explained by the fact that all major and minor complications are included in our list, along with pain-related consequences, commonly underreported in surgical series. The incorporation of chronic post-thoracotomy pain syndrome (PTPS) with the prevalence of 19% of our patients is a significant yet often ignored morbidity that is a serious problem in terms of quality of life in the long term where These results are consistent with the meta-analysis data by Canet et al. (2010), which found postoperative pulmonary complications as the leading cause of morbidity in the setting of thoracic surgery as well as The prevalence of atelectasis in our cohort could probably be attributed to the combination of the effects of one-lung ventilation, surgical manipulation, and the pain after surgery which drained out respiratory effort. It is worth noting that the 15.5% pneumonia incidence is higher than the 8-12% in some modern series using enhanced recovery measures, which may give us some potential areas to develop our perioperative care pathways where Among the most remarkable results of our research, the influence of the anaesthesia technique on the results of pain should be mentioned also Those taking thoracic epidural in combination with general anaesthesia showed a relative decrease in severe acute pain by 68 per cent as compared with general anesthesia (15.4 per cent versus 47.6 per cent, p=0.001). This significant difference was converted into significant decreases in the development of chronic pain (7.7 vs. 33.3, p=0.004), showing the relevance of effective perioperative analgesia in the prevention of the development of pain chronification.

Furthermore, the process by which this protective effect is effective is multifactorial. Thoracic epidural analgesia offers better analgesia with direct inhibition of nociceptive transmission into the spinal cord. It decreases central sensitization, which is one of the factors that lead to the development of chronic pain. Also, efficient analgesia helps to achieve early mobilization, deep breathing exercises, and coughing, which is important to avoid pulmonary complications. We have reflected correlation analysis revealing a significant correlation between duration of surgery, blood loss, and hospital length of stay



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(r=0.52-0.62, p<0.001), indicating that the complications are likely to be concentrated in patients having more complicated surgery courses and who can be the best beneficiary of optimized analgesia (Agostini, P. *et al.*, 2010; Lim, E. *et al.*, 2010).

Although the paravertebral block group was found between epidural and general anesthesia alone, most of the results were not statistically significant. This is possibly because the sample size (n=22) was smaller. Nevertheless, the tendency towards better results implies that paravertebral blocks can be used as an alternative to epidural in cases where it is contraindicated or technically difficult to use. The recent meta-analyses by Yeung et al. (2016) have shown that thoracic epidural and paravertebral blocks have approximately the same analgesic qualities, and the latter has possibly less hemodynamic side effects.

The results of our multivariate logistic regression analysis showed three independent predictors of postoperative complications to be ASA III-IV classification (adjusted OR 2.34, 95% CI 1.04-5.26, p=0.040), COPD (adjusted OR 2.68, 95% CI 1.12-6.42, p=0.027), and intraoperative blood loss ≥500 mL (adjusted OR 2.42, The implications of these findings are that they can be used in preoperative risk stratification and counseling of patients.

COPD and its association with postoperative complications are known to overlap in the literature of thoracic surgery. The COPD patients experience impaired baseline pulmonary functioning, impaired mucociliary clearance, and augmented vulnerability to respiratory infections.

This observation assists in supporting the increasing consensus that thoracic surgery should actually not be withheld in elderly patients as long as proper preoperative evaluation and optimization is conducted.

A thorough observation of the complications associated with anesthesia shows that there are some areas that should be addressed. (Im, Y. *et al.*, 2019) The rate of intraoperative hypotension was 27.6 percentage, which is indicative of those hemodynamic issues involved in thoracic surgery, such as the impact of one-lung ventilation, surgery of mediastinal structures, and sympathectomy of the epidural area. Most of the episodes were transient and sensitive to treatment, but ongoing hypotension can undermine tissue perfusion and lead to dysfunction of the organs in the postoperative period. (Miskovic, A., & Lumb, A. B. 2017)

One- lung ventilation caused hypoxemia in 15.5% of the patients, which is within published ranges of 5-25% based on definitions and populations of patients. A thoracic anesthesiologist must have the skills to do management maneuvers, CPAP to the non-ventilated lung, and optimize ventilator settings. These incidence rates of double-lumen tube malposition (12.1 percent) highlight the significance of the fiberoptic confirmation of tube position and monitoring of intraoperative tube movement.

The prevalence level of intraoperative awareness 1.7% is very low but a dangerous complication that may have long-term psychological consequences. This rate is greater than the 0.1-0.2% observed in general surgical populations, and the reason is that it may indicate the difficulty of ensuring adequate anesthetic depth during episodes of hemodynamic instability or when total intravenous anesthesia is done without processed EEG observation.

## CONCLUSION

To sum up, this research indicates that thoracotomy is still linked to high morbidity, and one-half of the patients will have one complication, where the methods of regional anaesthesia, especially thoracic epidural analgesia, produce a great effect in reducing acute and chronic pains and should be used on a regular basis unless they are contraindicated.

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