

Postoperative complications and its relationship with the severity of postoperative pain in patients undergoing thoracic surgery

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ABSTRACT

Aim: To investigate the complications that occur in our patients who underwent thoracic surgery, as well as the relationship between postoperative pain and complications.

Method: Of the 117 patients who underwent surgery between January 2018 and December 2018, there were 99 patients with pain and the other parameters whose data's were complete. Medical records of the patients were investigated in terms of age, gender, smoking status and frequency, diagnosis, treatment, length of stay in the hospital, postoperative complications and visual analog scale (VAS). The postoperative complications and VAS values were compared statistically.

Results: The mean age of the patients was 50.52±18.46 years, 26 (26.3%) patients were female and 73 (73.7%) were male. The average length of stay in hospital was 4.08±3.06 days and average pain severity was 3.92±2.07. The most common diagnosis in our cases was lung cancer, and the most common complication was prolonged air leakage. There was a significant relationship between the severity of pain and the presence of postoperative complications in our patients ($p=0.001$). However, the correlation relationship was found to be low ($r=0.322$).

Conclusion: The results of our study revealed that optimal postoperative pain control is an important factor for preventing postoperative complications.

Keywords: Thoracic surgery, chest surgery, postoperative complications, pain, visual analog scale.

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Introduction

Since thoracic surgery is one of the most painful surgical procedures, the severity and duration of the pain associated with this surgery is remarkable. The most common causes of pain after thoracic surgery include multilayer intercostal incisions, rib injury or resection,

surgical drains and thoracostomy tube insertion, and suturing technique [1,2]. Acute, moderate to severe pain levels due to this diversity of insults may not significantly decrease during hospital stay or the first month after surgery. In addition, poor management of acute postoperative pain can lead to the development of chronic pain syndromes. Chronic pain can last for years, and even lower pain levels can reduce patient satisfaction [3]. Post-thoracotomy pain syndrome is common in patients undergoing thoracotomy and occurs in approximately 50% of patients. It is estimated

that these patients have persistent pain at 6 months and even 20% may continue to experience pain in 6 to 7 years [4-6]. In a previous study, it was reported that patients described pain one year after thoracotomy and that most continued to report pain even after years [7].

Despite improvements in anesthesia and surgical techniques, the rate of postoperative complications in thoracic procedures is still high, at 27% [8]. Thus, pulmonary and cardiovascular complications after thoracic surgery result in significant morbidity and mortality, and are also the leading cause of prolonged hospital stay with increased overall cost [9,10]. Further, complications compromise return to baseline function, may affect further cancer treatment, and overall quality of life [11]. In addition, there are common patient-specific risk factors such as age, pre-operative adverse pulmonary function tests, cardiovascular comorbidity, smoking status, and chronic obstructive pulmonary disease [12]. The main purpose of this study is to investigate the complications that occur in our patients who underwent thoracic surgery, as well as the relationship between postoperative pain and complications.

Materials and Methods

We retrospectively evaluated patients who underwent classic postero-lateral thoracotomy in our institution (Bolu Abant Izzet Baysal University, Bolu, Turkey). The study protocol was approved by the ethics committee of Bolu Abant Izzet Baysal University Human Research Ethics Committee (2018/298). Of the 117 patients who underwent surgery between January 2018 and December 2018, there were 99 patients with pain and the other parameters whose data's were complete. Medical records of the patients were investigated in terms of age,

gender, smoking status and frequency, diagnosis, treatment, length of stay in the hospital, postoperative complications and visual analog scale (VAS). The postoperative complications and VAS values were compared statistically.

In our clinic, a visual analog scale is used to evaluate the pain intensity of the patients on the first postoperative day. The visual analog scale (VAS) is widely used as an outcome measure, as in this study. It is usually presented as a 100-mm horizontal line on which the patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable." Its simplicity, reliability, and validity, as well as its ratio scale properties, make the VAS the optimal tool for describing pain severity or intensity [13,14].

Statistical analysis

Data analysis was performed on SPSS version 20.0 software (SPSS Inc., Chicago, USA). Quantitative parametric data were expressed as mean plus standard deviation (SD), and quantitative non-parametric data as median values with minimum and maximum. The Kolmogorov Smirnov and Shapiro-Wilk test was used to analyze the distribution of variables. For parametric data, correlation between groups were performed using the Pearson correlation analysis. The *p-value* <0.05 was significantly considered.

Results

Of the 117 patients who underwent surgery between January 2018 and December 2018, there were 99 patients with complete data regarding pain and the other parameters. The mean age of the patients was 50.52±18.46 years, 26 (26.3%) patients were female and 73 (73.7%) were male. The average length of stay in hospital was 4.08±3.06 days and the average

Table 1. Demographic data of the patients

Parameters	Cases (n=99)
Age (years) (Mean±SD)	50.52±18.46
Gender, N (%)	73 (73.7)
Woman	26 (26.3)
Male	
Duration of stay (days) (Mean±SD)	4.08±3.06
Cigarettes (pack-years) (Mean±SD)	18.84±22.55
Smoking status, N (%)	
Yes	59 (59.6)
No	40 (40.4)
Diagnosis, N (%)	
Nodular lesion in the lung	20 (20.2)
Lung cancer	25 (25.2)
Mediastinal LAP	6 (6.0)
Pneumothorax	15 (15.1)
Pleural effusion	9 (9.0)
Pulmonary fibrosis	5 (5.0)
Pleurisy	9 (9.0)
Pain severity (VAS) (Mean±SD)	3.92±2.07
Postoperative complications, N (%)	
Yes	22 (22.2)
No	77 (77.8)

pain severity on the visual analog scale (VAS) was 3.92±2.07. Fifty-nine (59.6%) patients were tobacco smokers (18.84±22.55 pack-years). The demographic data of the individuals included in the study are shown in Table 1. The five most common diagnoses in our patients were as follows: lung cancer (n=25, 25.25%), nodular lesions in the lung (n=20, 20.20%), spontaneous pneumothorax (n=15, 15.15%), pleural effusion (n=9, 9.09%), and hyperhidrosis (n=8, 8.08%) (Table 1). Two patients were revised (air leakage n=1, hemorrhage n=1).

Mortality occurred in one patient after surgery (1.01%).

Five of the most common complications we encountered in our cases were prolonged air leakage (n=4, 14.8%), atrial fibrillation (n=3, 11.1%), hematoma (n=2, 7.4%), hemorrhage (n=2, 7.4%), and tachycardia (n=2, 7.4%). The postoperative complications of the patients are shown in Table 2. There was a significant relationship between the severity of pain and the presence of postoperative complications in our patients ($p=0.001$) (Table 3).

Table 2. Postoperative complications.

Postoperative complication	N (%)
Atrial Fibrillation	3 (11.1)
Empyema	1 (3,7)
Apical bull perforation	1 (3,7)
Arintenoid dislocation	1 (3,7)
Atelectasis	1 (3,7)
Delirium	1 (3,7)
Diaphragm elevation	1 (3,7)
Dyspnea	1 (3,7)
Embolism	1 (3,7)
Hematoma	2 (7.4)
Hemorrhage	2 (7.4)
Hypertension	1 (3,7)
Constipation	1 (3,7)
Pericardial effusion	1 (3,7)
Secretion retention	1 (3,7)
Hoarseness	1 (3,7)
Chylothorax	1 (3,7)
Tachycardia	2 (7.4)
Prolonged air leakage	4 (14.8)

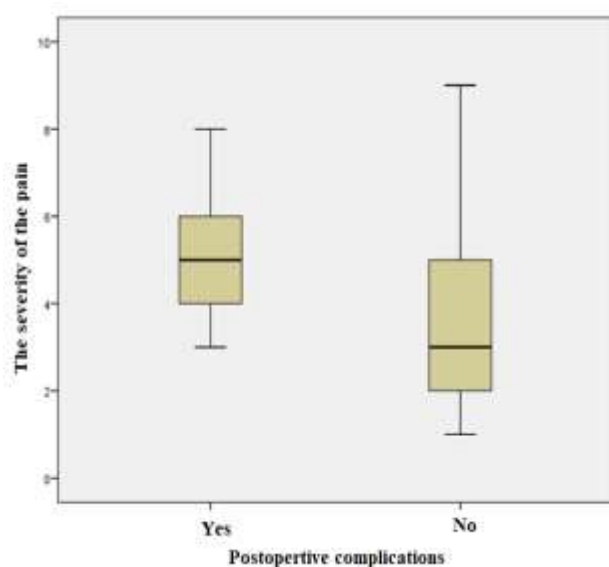


Figure 1. The relationship between the severity of pain and the presence of postoperative complications.

Discussion

In our study, a weak relationship was found between the severity of pain and the presence of postoperative complications. Therefore, at least 10% (r^2) of the pain intensity in the correlation analysis could explain the postoperative complications. In addition, the rate of postoperative complications in the patients included in our study was found to be compatible with the literature [15]. Further, as in our study, Boffa et al. reported an average of 5 days of hospital stay in their extensive study [16].

Thoracic surgery operations are usually performed with one of the classical thoracotomy, minithoracotomy, video-assisted thoracoscopic surgery (VATS) and the latest robot-assisted thoracoscopic surgery (RATS) techniques [1,2,17]. Although classical thoracotomy with a posterolateral incision provides optimal surgical access, it is also a very painful procedure as it involves the division of the latissimus dorsi, serratus anterior, rhomboids, and trapezius muscles. Therefore, thoracotomy intervention requires

good management of both postoperative complications and pain control in thoracic surgery patients. In addition, this painful procedure has been found to be an important risk factor for the development of permanent opioid use [1,2,17].

Pulmonary complications are the most important group affecting morbidity, mortality and long-term hospital stay after thoracic surgery, with an incidence of 30-50% [8]. Complications reported from lungs are prolonged air leak, pneumonia, pulmonary embolism, major atelectasis, adult respiratory distress syndrome, prolonged ventilation and need for tracheostomy [18]. In our study, the most common postoperative complications were prolonged air leakage, atrial fibrillation, tachycardia, hematoma, and hemorrhage. Impaired pulmonary function was the most studied risk factor for lung resection because it is reasonable to assume that a surgeon is the most important factor to consider when weighing the risk of lung resection [19].

Since thoracic surgery operations are one of the most painful surgical procedures, good pain management is crucial for postoperative comfort and increased mortality and morbidity [20]. As we routinely practice in our patients, opioids and NSAIDs are often sufficient to provide optimal pain control in patients undergoing VATS and sternotomy [20]. In addition, performing minimal surgical procedures, epidural analgesia, intercostal block are applications that may be required to provide good analgesia. In a study by Landreneau J et al [21], VATS was applied to 81 patients and thoracotomy to 57 patients. Patients who underwent VATS experienced significantly less postoperative pain and required less post-surgery narcotic analgesia. On the other hand, elderly patients are at a higher risk of postoperative complications, and

the severity of pain in these patients may further increase the complication rate. Therefore, analgesic methods to reduce postoperative complications in this group of patients should be chosen more carefully. In a review about the use of regional analgesia, it was reported that these methods reduce perioperative morbidity, but in addition to the side effects of the drugs used, complications such as epidural hematoma and infection may develop [22]. In our patients, there was a significant relationship between the severity of pain and the presence of postoperative complications. However, the correlation relationship was found to be low. Consequently, for patients scheduled for thoracic surgery, a successful postoperative outcome can be achieved if several conditions are met. These include optimizing patient-related risk factors such as gender, extremely low or extremely high body mass index, nicotine consumption history or pulmonary comorbidities when surgery is indicated, pulmonologist and postoperative intensive care support, choosing the right incision approach, early physical therapy. In addition, the results of our study revealed that optimal postoperative pain control is an important factor in preventing postoperative complications. However, the fact that our study is retrospective is as a limiting factor. Therefore, we believe that more comprehensive new studies should be carried out on this subject.

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Ethical statement: *The study protocol was approved by the ethics committee of Bolu Abant İzzet Baysal University Human Research Ethics Committee (2018/298).*

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