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Original Article

Evaluation of the effect of video-assisted thoracoscopic surgery on early postoperative pain and quality of life

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ABSTRACT

Background: Video-assisted thoracoscopic surgery (VATS) is more advantageous than open surgery. In particular, VATS is superior in terms of pain, physical functioning, and overall patient satisfaction. The aim of this study was to evaluate factors affecting early postoperative pain and quality of life in patients who underwent VATS for benign or malignant disease.

Materials and Methods: Seventy-seven patients who underwent VATS in our hospital between March 1 and June 30, 2018 were evaluated retrospectively. Postoperative pain was assessed at 2, 6, and 24 hours postoperatively using Visual Analogue Scale (VAS). The short-form 36 (SF-36) quality of life questionnaire was used to assess early quality of life.

Results: Of the 74 patients in the study, 50 were male (67.6%) and 24 were female (32.4%). Mean VAS score was 6.84 ± 1.63 at postoperative hour 2, 4.19 ± 1.36 at postoperative hour 6, and 2.58 ± 1.20 at postoperative day 1. Geriatric patients had significantly higher VAS pain scores at postoperative hour 6 and day 1 ($p = 0.011$, $p = 0.013$). Patients with benign disease had significantly higher quality of life compared to patients with malignancy ($p < 0.001$). The presence of complications and advanced age were associated with lower postoperative quality of life.

Conclusions: Although VATS patients have less severe pain and better quality of life in the early postoperative period, patients with malignancy had worse physical, psychological, and emotional state. In addition, geriatric patients and patients with early postoperative complications showed larger decreases in early postoperative quality of life.

Key Words: quality of life, video-assisted thoracoscopic surgery, tumor, lung cancer, treatment

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Introduction

Video-assisted thoracoscopic surgery (VATS) is a minimally invasive approach commonly used in thoracic surgeries for both diagnostic and treatment purposes. VATS is particularly advantageous compared to open methods in terms of pain, complications, and length of hospital stay [1]. This is primarily due to better pulmonary function, activity level, muscle power, and walking capacity.

Postoperatively, the patient's quality of life is as important as treating the disease. There are publications suggesting that quality of life must be improved to increase treatment adherence, especially for patients who require long-term treatment. However, it is still uncertain whether thoracoscopic surgery is superior in terms of quality of life. The main reasons for this are that previous studies applied different scales, had patient selection bias, and were conducted in selected populations [2-6].

The aim of this study was to evaluate factors affecting early postoperative pain and quality of life in patients who underwent VATS for benign or malignant disease.

Materials and Methods

Seventy-seven patients who underwent VATS in our hospital between March 1, 2018 and June 30, 2018 were evaluated for the study. Three patients did not provide consent and were excluded from the study. Thus, the records of 74 patients were analyzed retrospectively from a database created with standardized data collection.

The patients in the study were divided into those with malignant disease and those with benign disease. Postoperative pain was assessed at 2, 6 and 24 hours postoperatively using the visual analog scale (VAS) (0 = "no pain" to 10 = "worst pain").

The patients were analyzed in terms of demographic data, morbidity, length of hospital stay, and histopathological characteristics. Ethics committee approval for the study was obtained from the Istanbul Training and Research Hospital.

Patient Selection

For patients with malignancy, tumor location and invasion were assessed preoperatively with routine thoracic computed tomography (CT). Positron emission tomography was used to assess distant and mediastinal metastases. Contrast-enhanced cranial magnetic resonance imaging was performed to assess cranial metastases. All patients underwent preoperative bronchoscopy. Mediastinal examinations were performed with endobronchial ultrasound (EBUS) and/or mediastinoscopy. Pulmonary function testing (PFT), arterial blood gas analysis, and electrocardiography (ECG) were requested routinely to evaluate cardiopulmonary capacity. Patients with cardiac comorbidities were assessed with ECG by the cardiology department. Patients with percent predicted forced expiratory volume in 1 second (ppFEV1) of 40% or below in preoperative PFT were subjected to further pulmonary assessment with diffusing capacity of the lung for carbon monoxide (DLCO) testing, pulmonary perfusion scintigraphy, and 6-minute walk test.

For patients with bullous pulmonary disease, preoperative thoracic CT was requested for those with suspected secondary pneumothorax. Patients with benign disease underwent the same preoperative pulmonary and cardiac evaluations as those with malignancies.

Comorbidity score was calculated according to the 19-parameter Charlson Comorbidity Index (CCI), introduced in 1987 [5]. Patients were divided based on CCI values into a 0-1 group and ≥2 group.

Postoperative Pain Management

Intercostal blockage with bupivacaine hydrochloride is performed at intraoperative in all patients. In the postoperative period, pain control of the patients was achieved with paracetamol and diclofenac sodium.

Complications that occurred in hospital or within the first 30 days postoperatively were evaluated as early complications. Quality of life was assessed at postoperative 1 month using the short-form 36 questionnaire (SF-36).

Statistical Analysis

Numerical variables were evaluated using mean and standard deviation or median (minimum-maximum) and categorical variables using number and percentage. Parametric test assumptions (normality and homogeneity of variances) were checked before comparing the groups in terms of numerical variables. Dependent samples t test was to analyze the differences between pre- and postoperative quality of life scores. Kruskal-

Wallis test was used to compare the surgical treatment groups with respect to quality of life. P value <0.05 was considered statistically significant. All analyses were done using SPSS (version 22, SPSS Inc., Chicago, IL, USA) package software.

Results

Of the 74 patients in the study, 50 were male (67.6%) and 24 were female (32.4%). Their mean age was 45.18 ± 17.06 years. Ten (13.5%) of the patients were over 65 years old and 64 patients (86.5%) were less than 65 years old. The mean length of hospital stay was 4.77 ± 2.41 (range, 2-13) days. Twenty-seven (36.5%) of the patients had no comorbidities. The demographic features of the patients are summarized in table 1.

Table 1. Demographic characteristics of the patients.

Variables		n	%
Age (years)		45.18±17.06	
Age	<65 years	64	86.5
	>65 years	10	13.5
Gender	Male	50	67.6
	Female	24	32.4
Comorbidity (CCI)	0	27	36.5
	1	9	12.2
	2	11	14.9
	3	3	4.1
	4	7	9.5
	5	2	2.7
	6	6	8.1
	7	2	2.7
	8	3	4.1
	9	3	4.1
	12	1	1.4
Procedure	Therapeutic	46	62.2
	Diagnostic	28	37.8

Abbrev.: Vats; video Assisted Thoracoscopic Surgery, CCI: Charlson Comorbidity Index

Histopathology results indicated malignancy in 18 (24.3%) of the patients in the study and benign disease in 56 (75.3%). Surgery was performed on the right side in 44 patients (59.5%) and on the left side in 30 patients (40.5%). There were no statistically significant differences between patients with malignant and benign disease in terms of operated side, number of ports, or type of procedure (p > 0.05).The histopathological and surgical data of the patients included in the study are presented in table 2.

Table 2. Histopathological and surgical data of the patients.

Variables			n	%
Operated Side	Right		44	59.5
	Left		30	40.5
Number of ports	1		33	44.6
	2		36	48.6
	3		5	6.8
Procedure	Wedge resection		35	47.3
	Biopsy		31	41.9
	Lobectomy		5	6.8
	Cyst Excision		3	4.1
Histopathology	Malignant		18	24.3
	Benign		56	75.7
Malignant	Pleural Biopsy	Mesothelioma	5	27.8
		Adenocarcinoma metastasis	1	5.6
	Resection	Primary lung carcinoma	4	22.2
	Metastasectomy	Secondary lung carcinoma	5	27.8
Benign	Resection	Bronchiectasis	1	1.8
		Hamartoma	3	5.4
	Wedge	Pneumothorax	12	21.4
		ILD / Organized pneumonia	17	30.4
		Bronchogenic cyst	1	1.8
	Cyst excision	Pericardial cyst	1	1.8
		Thymic cyst	1	1.8
	Pleural biopsy	CNP	21	37.5

Abbrev.: CA: carcinoma, CNP: chronic nonspecific pleuritis, ILD: interstitial lung disease

Eleven patients (14.9%) developed complications. Prolonged air leak occurred in 5 patients (6.8%), postoperative hemorrhage requiring revision in 1 patient (1.4%), chylothorax in 1 patient (1.4%), atelectasis requiring bronchoscopy following secretion retention in 1 patient (1.4%), and pulmonary expansion deficit in 3 patients (4.1%).

Mean WBS pain score was 6.84 ± 1.63 at postoperative hour 2, 4.19 ± 1.36 at postoperative hour 6, and 2.58 ± 1.20 at postoperative day 1. Geriatric patients had significantly higher VAS pain scores at postoperative hour 6 and day 1 (p = 0.011, p = 0.013). There were no statistically significant differences in visual analog scale (VAS) scores according to gender, CCI, operated side, procedure type, or number of ports (p > 0.05). Similar results were obtained in the subgroup analysis of patients with malignant and benign disease, with no significant relationship

between VAS score and number of ports or procedure ($p > 0.05$). No statistical difference was found between the number of ports, therapeutic or diagnostic treatment and postoperative pain scores ($p > 0,05$). There was a correlation between port size and mean early postoperative pain ($r = 0.121$). Pain scores of patients in the malignant and benign groups are shown in table 3.

Table 3. Comparison of VAS scores in patients with malignant and benign disease.

Variables	Malignant	Benign	p value
Postoperative 2 hours	7.17±1.65	6.73±1.63	0.715
Postoperative 6 hours	4.33±1.18	4.14±1.42	0.067
Postoperative 1 day	3.11±1.23	2.41±1.15	0.027

Patients with benign disease had significantly higher quality of life compared to patients with malignancy ($p < 0.001$). No statistically significant differences in quality of life were observed according to gender or type of procedure ($p > 0.05$). Number of ports had a significant effect on general health perception ($p = 0.016$), but the impact on quality of life was not significant. The presence of complications significantly affected physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional wellbeing, and general health perception ($p = 0.030$, $p = 0.028$, $p = 0.028$, $p = 0.005$, $p = 0.008$, $p = 0.024$). Patients aged 65 and older showed significantly poorer results in the physical functioning, role limitations due to physical health, role limitations due to emotional problems, energy/fatigue, emotional wellbeing, pain, and general health perception scales ($p = 0.05$). There was no significant relationship between quality of life and gender, operated side, port location or number, CCI, or procedure type ($p > 0.05$). Table 4 shows the evaluation of quality of life according to malignant and benign disease.

Table 4. Quality of life according to malignant and benign disease.

	Malignant	Benign	p value
Role limitations due to physical health	16.6±38.3	75±43.6	<0.001
Role limitations due to emotional problems	16.6±38.3	75±43.6	<0.001
Pain	52.5±19.03	73.2±20	<0.001
Social functioning	30.2±19.7	57.9±22.1	1
General health	44.16±23.6	68.5±25.04	0.001
Energy and vitality	30.2±19.7	51.9±22.10	<0.001
Emotional wellbeing	76.6±19	60±22.7	0.003

Discussion

Thoracotomy is recognized as one of the most painful surgical procedures. In particular, early postoperative pain increases complications such as secretion retention, limited physical movement, atelectasis, and pneumonia, while chronic neuropathy reduces quality of life in the long term [7-9]. Stammberger et al. [10] reported that 50% of patients who underwent VATS had no pain at postoperative 2 weeks. In our study, early postoperative pain was less severe in patients who underwent VATS, consistent with the literature. On the other hand, we noted that geriatric patients had significantly more pain at 6 hours and 1 day postoperatively ($p = 0.011$, $p = 0.013$). Early postoperative pain was less severe in patients with benign disease compared to those with malignancy. However, early postoperative pain levels were not associated with procedure type, gender, number of ports, and CCI in our study.

In our study, the quality of life of benign diseases was better than malignant diseases. In particular, their emotional, psychological, and physical scores were better than those in the malignant group. In their study on quality of life among patients with lung cancer, Hopkins et al. [11] reported that patients had more pain and mood disorders in the first 6 months postoperatively. However, long-term quality of life was similar in patients who underwent VATS and those who had thoracotomy. In another study conducted with thoracotomy and VATS groups, Wilson et al. [9] stated that VATS patients had better quality of life and less pain, but the differences were statistically nonsignificant. Other authors have expressed contradictory views. Zieren et al. [12] emphasized that postoperative quality of life reached a maximum level by 9 months in patients undergoing VATS and was better than in those who had open surgery. In their prospective study, Dales et al. [13] observed that patients' quality of life decreased in the first 3 months but returned to near preoperative levels 6-9 months postoperatively. Sugiura et al. [14] compared long-term outcomes of VATS and open surgery and determined that quality of life was higher following VATS. In another prospective study, Balduyck et al. [15] analyzed quality of life in patients who underwent lobectomy by VATS or anterolateral thoracotomy and showed that physical

functioning at postoperative 6 months was significantly better in VATS patients ($p < 0.001$).

However, all of these studies involve limitations. The most important of these is that early complications and age were not evaluated with quality of life. In the present study, we determined that complications influenced early postoperative quality of life. Minor complications occurring in the early postoperative period disrupt emotional, psychological, and overall health perceptions. Studies on open heart surgery have revealed no differences in postoperative quality of life between older and younger patients. In a meta-analysis by Shan et al. [16], postoperative changes in quality of life after similar surgeries were equivalent regardless of age, though older patients tended to have more mood disorders. Demmy et al. [17] emphasized that patients aged 75 or older required postoperative rehabilitation and inpatient treatment more often. In our study, geriatric patients reported lower quality of life than the younger patients.

Limitations of the Study

The present study has certain limitations. The study is retrospective and included a small, heterogeneous patient group. Data regarding the patients' preoperative quality of life was not available, and early postoperative quality of life was assessed without considering presence or history of depression and anxiety.

As a conclusion, although VATS patients have less pain and better quality of life in the early postoperative period, patients with malignancy had worse physical, psychological, and emotional state. In addition, geriatric patients and patients with early postoperative complications showed greater decreases in early postoperative quality of life. Therefore, we believe that supportive psychotherapy in the early postoperative period may lead to better quality of life outcomes.

Declaration of conflicting interests

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