Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **May 2022; 8(2): 279-285**

RESEARCH ARTICLE **DOI:** 10.19127/mbsjohs.1095041

Uniportal VATS Pleural Biopsy: Analysis of 50 Cases Is It Safe and Effective?

Baris Hekimoglu[1](ID)

[1]Ordu University, Faculty of Medicine, Department of Thoracic Surgery, Ordu, Turkey

Received: 29 March 2022, Accepted: 16 May 2022, Published online: 31 May 2022

Abstract

Objective: Pleural effusion may occur in patients due to benign or malignant processes. This study aimed to evaluate the efficacy and safety of Uniportal Video-Assisted Thoracoscopic Surgery (VATS) operation in the diagnosis processes of patients with pleural effusion.

Methods: The data of 50 patients who underwent diagnostic Uniportal VATS pleural biopsy between November 2018 and April 2021 were retrospectively analyzed. The patients' age, gender, postoperative hospital stay, operation-related complications, and pathology results of the pleural tissues were recorded.

Results: Thirty-five (70%) cases were male, 15 (30%) were female, mean age was 52.58 ± 20.1, mean operative time was 56.1 ± 16.8 minutes, and mean postoperative hospital stay was 2.64 ± 0.89 days. 48 (96%) of the patients were operated on under general anesthesia and 2 (4%) under sedative anesthesia. All patients were operated on with the Uniportal VATS technique. The postoperative treatment process was carried out with service follow-up without requiring intensive care follow-up. Twenty-eight (56%) patients were operated on from the right and 22 (44%) patients from the left hemithorax. When the pleural biopsy results were examined, malignancy was detected in 18 (36%) patients and tuberculosis in 8 (16%). Malignancies: 6 were adenocancer metastases (2 stomachs, 2 breast, and 2 colon cancers), 5 malignant mesotheliomas, 4 epidermoid cancer metastases (2 ovarian and 1 breast and 1 malignant melanoma), 2 lung adenocarcinoma infiltration, and 1 chondrosarcoma metastasis. No postoperative complications were observed in any of the patients.

Conclusion: Uniportal VATS is an easy-to-apply, safe, effective, and rapid method for diagnosing pleural effusion.

Keywords: Minimally invasive surgery; pleural effusion; uniportal VATS

Suggested Citation: Hekimoglu B. Uniportal VATS Pleural Biopsy: Analysis of 50 Cases Is It Safe and Effective? Mid Blac Sea Journal of Health Sci, 2022;8(2): 279-285.

E-mail: drbarishekimoglu@yahoo.com

Address for correspondence/reprints:

Baris Hekimoglu
Telephone number: +90 (505) 751 06 89

INTRODUCTION

Video-Assisted Thoracoscopic Surgery (VATS) has become the most frequently applied technique in operations performed in worldwide thoracic surgery clinics. The indications of uniportal, that is, operations performed from only one incision, are gradually expanding (1). The rapid and reliable diagnosis with the Uniportal VATS method, with almost no complications, has been evaluated as an indispensable method for investigating the etiological causes of pleural effusions (2).

Many benign and malignant diseases cause pleural effusion. While pleural effusion may occur due to primary diseases of the lung and pleura, it can also be seen frequently as a result of other system malignancies and other systemic diseases (3).

This study has aimed to share the efficacy and safety of Uniportal VATS pleural biopsy operation in patients with pleural effusion.

METHODS

The approval of the local ethics committee was obtained (Approval number: 2021/194). The authors confirmed compliance with the World Medical Association Declaration of Helsinki on the ethical conduct of research involving human subjects.

The data of 50 patients who underwent pleural biopsy with diagnostic Uniportal VATS operation between November 2018 and April 2021 were reviewed retrospectively. Patients' age, gender, postoperative hospital stays, operation-related complications, operation time, anesthesia type, Adenosine Deaminase (ADA) value of pleural effusion, and pleural pathology results were recorded. Preoperative thoracentesis results of all patients were exudative according to Light's criteria. Thoracentesis and pretreatment cytology findings revealed no cancer in any patient's pleural fluid.

All patients were operated on with the Uniportal VATS technique. In the operations, assistive hand tools, which are used both to take a biopsy and to control bleeding, with video-thoracoscope were used with a single incision made from the 7th-9th rib intervals. The same thoracic surgeon performed all operations. Due to advanced age and other conditions, two of the patients could not have general anesthesia, so the treatment was performed with sedation and a local anesthetic agent. The other 48 operations were performed under general anesthesia.

Statistical Analysis

Statistical analysis was performed using the "IBM SPSS Statistics for Windows Version 22.0 (Statistical Package for the Social Sciences, IBM Corp., Armonk, NY, USA)" program. Descriptive statistics of the study were presented with frequency and percentage for categorical variables and mean and standard deviations for numerical variables. Independent group analyses were performed using Mann-Whitney U, and a $p<0.05$ value was considered significant.

RESULTS

Of the 50 patients in the study, 35 (70%) were male, 15 (30%) were female, with a mean age of 52.58 ± 20.1 (range: 18-81). The mean age of male patients was 51.37 ± 21.8 (range: 18-81), and the mean age of female patients was 55.4 ± 19.9 (range: 35-75), but there was no statistically significant difference between the two groups.

Twenty-eight (56%) patients were operated on from the right and 22 (44%) patients from the left hemithorax. While 19 male patients had surgery on the right hemithorax and 16 on the left, 9 female

patients had surgery on the right and 6 on the left. Although effusions originating from the right hemithorax were relatively common, no statistically significant difference was found in this group comparison.

The operation of 48 patients was performed under general anesthesia. Of these, 38 (76%) were performed with single-lumen intubation and 10 (20%) double-lumen intubations. The operations of 2 patients were performed with sedation and local anesthetic application.

When the operation time was calculated as the time spent by the patient on a mechanical ventilator under intubation, it was determined as 56.1 ± 16.8 minutes (range: 35-130). In the operations of 2 patients, which lasted 110 and 130 minutes, it was observed that the pouches due to empyema were opened, and partial decortication was performed. The pathology results of these two patients were reported as benign (Table 1).

All patients were followed up in the thoracic surgery service postoperatively. There was no indication for follow-up in the intensive care unit. The mean stay in the service after the operation was determined as 2.64 ± 0.89 days (range: 2-10). No complications developed in any of the patients in the postoperative period. The 2 patients with prolonged hospitalizations lasting 9 and 10 days were the same two cases above with a prolonged operative course. It was determined that the length of hospital stay was prolonged due to the long air leak caused by partial decortication and pouches opening due to empyema (Table 1).

Table 1. General Characteristics of Patients who underwent Uniportal VATS Pleural Biopsy Operation

	Mean or N(%)
Gender	
Male	35 (70%)
Female	15 (30%)
Age	52.5
Male	51.4
Female	55.4
Operation Side	
Right	28 (56%)
Left	22 (44%)
Operation Time (min.)	56.1
Type of Anesthesia	
Single-lumen Intubation	38 (76%)
Double-lumen Intubation	10 (20%)
Non-entubated VATS	2 (4%)
Type of Surgery	
Uniportal (single incision)	50 (100%)
Bi/Triportal	0
Postoperative Complication	0
Postoperative follow-up (day)	2.64

There was no patient with a suspected or definite diagnosis of malignancy in the cytology examinations performed before the surgery. Diagnostic surgery indications of all patients were determined regarding exudative fluids (suspicion of malignancy, suspicion of Tuberculosis-Tbc, additional malignant disease, etc.) that did not resolve despite conventional antibiotic therapy. Pathological examination revealed 32 (64%) benign and 18 (36%) malignant cases. When the benign pathology results of the patients were examined; chronic nonspecific pleuritis 22 (44%) (2 cases due to empyema), tuberculous pleuritis 6 (12%), granulomatous inflammation compatible with tuberculosis 2 (4%) (total number of cases referred to tuberculosis treatment 8) and foreign body type granulation 2 (2%) were determined as cases (sailor and miner) (Figure 1 and 2). When the malignancy results were examined, 6 (12%)

adenocarcinoma metastases (2 breast, 2 stomachs, and 2 colon cancers), 5 (10%) malignant mesotheliomas, 4 (8%) epidermoid cancer metastases (2 ovarian cancer and 1 breast and 1 malignant melanoma) metastasis), 2 (4%) lung adenocarcinoma infiltration and 1 (2%) sarcoma metastasis (Table 2).

Figure 1. Thorax CT image of a 21-year-old female patient diagnosed with tuberculous pleuritis with the Uniportal VATS.

Figure 2. Thorax CT image of a 74-year-old male patient diagnosed with Primary Lung Adenocancer Infiltration with the Uniportal VATS.

In our study, tuberculosis was diagnosed in 8 patients as a result of postoperative pathology, and anti-Tbc treatment was given by this way. None of the tuberculosis diagnosed patients had preoperative ADA results. When the cut-off value for the ADA examination was taken as 40 U/L (the reference value of the working center), it was noted that 3 patients were found to be below this value and negative with an average of 23 U/L (18, 24, 27 U/L).The other 5 patients were considered positive with a mean value of 54.2 U/L (40, 42, 50, 61, 78 U/L). In summary, ADA positivity was also present in 5 of 8 patients diagnosed with tuberculosis and confirming the diagnosis.

Except for 1 patient who was diagnosed with malignant melanoma metastasis, all patients diagnosed with metastatic cancer were diagnosed with primary organ cancer such as colon, stomach, breast, etc., except lung. The case of malignant melanoma was diagnosed as a new diagnosis as a result of our operation. Patients diagnosed with malignant mesothelioma and lung adenocancer infiltration were also diagnosed after our operation. Intraoperative pleurodesis with sterile talc was performed on patients diagnosed with malignancy due to the evaluation of the biopsy taken during the operation with frozen section or who were suspected of having severe malignancy due to anamnesis and macroscopic findings.

When these pathological results were examined, the correct diagnosis rate was 100% in benign and malignant disease groups. We would like to state that no recurrence or malignancy was detected in the first 6 months of follow-up of the last benign case.

DISCUSSION

The etiology of pleural effusion is the most common indication for VATS operation (2). Thoracentesis and closed pleural biopsy performed in diagnosing patients with pleural effusion have a low diagnostic value and a higher complication rate than VATS (1,2). VATS has been defined as a minimally invasive surgical procedure that provides an early diagnosis of pleural effusion (4). Moreover, Uniportal VATS is a primary diagnostic method, especially in terms of etiological investigation of pleural effusion,

because it can be diagnosed quickly, reliably, and clearly without causing complications (2).

Table 2. Uniportal VATS Pleural Biopsy Results

Benign	N	Malignant	N
Chronic Nonspecific Pleuritis	22	Metastasis of Adenocancer	6
Tuberculous Pleuritis	8	Malignant Mesothelioma	5
Foreign Body Type Granulation	2	Metastasis of Epidermoid Cancer	4
		Primary Lung Adenocancer Infiltration	2
		Metastasis of Sarcoma	1
Total	32	**Total**	18

In the study of Kurkcuoglu et al., the diagnostic success rate of VATS was found to be 97.9% (4). In the study of Buyukkarabacak et al. on pleural effusions with a single port VATS approach, an accuracy of 100% was found in the malignancy group (5). Confirming the above studies, we found the correct diagnosis rate to be 100% in pleural biopsies performed with Uniportal VATS. Therefore, we think that Uniportal VATS is an extremely effective method for diagnostic pleural biopsy.

Postoperative hemorrhage, prolonged air leakage due to lung parenchymal injury, and other complications in pleural biopsy surgeries performed with the Uniportal VATS method have become rare conditions due to developing camera technologies and assistive hand tools (1). In our study, no postoperative complications were observed in any patients. We observed that the reliability of Uniportal VATS against complications is high.

In parallel with the increase in uniportal minimally invasive surgical methods used in other surgical branches, uniportal VATS is rapidly becoming widespread in thoracic surgery (1). It has been reported that the Uniportal VATS procedure, performed with only one incision to be used for tube thoracostomy, is less invasive, less painful, performed in a shorter time, and has a shorter postoperative hospital stay compared to the conventional VATS procedure performed through three separate ports (1,2,5,6). In addition, the Uniportal VATS application can be easily performed by a single thoracic surgeon, unlike the classical 3-port VATS application. In our study, it was seen that the operation time of the patients was as short as 56.1 minutes on average, they stayed in the hospital for an

average of 2.64 days after the operation, and all patients could be followed directly in the service without the need for the intensive care unit after the operation. They could be discharged from the hospital without complications.

When the literature is evaluated in terms of the pathology results of the pleural tissue obtained during the operation, it is seen that there are series with quite different weights for the rates of benign and malignant diseases. It has been published in different series that a varying range of malignancies was detected with a rate of 15-53% (4,5,8,9). In our study, malignant pleural tissue results were encountered with 36%. There may be many reasons for the different malignancy rates in these studies. The differences in the regions where the studies were conducted, for example, in regions where mesothelioma is more common, it is possible that malignancy will be detected more frequently. In addition, even if the initial fluid biochemistry is exudative as a result of the preoperative evaluation, patients who do not find any evidence of malignancy in the beginning patient evaluation can be followed up under medical treatment. Thus, the probability of possible benign patients diagnosed with non-VATS methods will increase. Therefore, we believe that the differences in the centers where the studies were conducted, clinical experience, and approach may result in the different malignancy rates summarized above.

Tuberculosis, one of the causes of pleural effusion, is an ongoing health problem in our country (10). Radiologically, it may present with classical cavitation findings and pleural effusion alone (3,4). In different studies, tuberculous pleuritis has been reported with 5.7-17% (4,5,8,11). In our study, the rate of tuberculosis pleuritis was 16%, and this result was found at a similar rate to the studies in our country. Six of the eight patients with tuberculosis in our study were under 35. In the light of this data, we think that the possibility of tuberculosis should be evaluated more carefully in pleural effusions seen in young adults.

Study Limitation

The fact that the study was conducted retrospectively in a single center and the small number of cases are limiting the study.

CONCLUSION

We think that the Uniportal VATS procedure, a minimally invasive surgical method, is an easy-to-apply, safe, effective, and fast-response operation for diagnosing pleural effusion.

Ethics Committee Approval: The study was approved by the decision of Ordu University Clinical Research Ethics Committee dated 26/08/2021 with the decision number 194.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept: B H , Design: B H, Literature search: B H

Data Collection and Processing: B H, Analysis or Interpretation: B H, Writing: B H

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors also decline any financial support neither from any pharmaceutical company, nor from a company that provides or produces medical instruments and materials.

REFERENCES

1. Gonzalez-Rivas D, Yang Y, Ng C. Advances in Uniportal Video-Assisted Thoracoscopic Surgery: Pushing the Envelope. Thorac Surg Clin. 2016;26:187-201. Doi: 10.1016/j.thorsurg.2015.12.007.
2. Hashimoto M, Sato A, Kuroda A, Nakamura A, Nakamichi T, Kondo N, et al. Clinical Feature of Diagnostic Challenging Cases for Pleural Biopsy in Patient with Malignant Pleural Mesothelioma. Gen Thorac Cardiovasc Surg. 2020;68:820-827. Doi: 10.1007/s11748-020-01295-5.
3. Atalay F, Ernam D, Atikcan S. Lung Cancer and Pleural Effusion. Respiratory Diseases. 2001; 12: 274-78.
4. Kurkcuoglu C, Karaoglanoglu N, Eroglu A,Unlu M. Videothoracoscopy for pleural effusion: A review of 47 cases. Turk Gogus Kalp Dama. 2000;8:712-4.
5. Buyukkarabacak YB, Sengul AT, Celik B, Pirzirenli MG, Surucu P, Gurz S, et al. The effectiveness of single port thoracoscopic approach in pleural effusions. Dicle Med J. 2014; 41: 738-742.
6. Alar T, Ozcelik C. Single-incision Thoracoscopic Surgery of Pleural Effusions for Diagnostic and Treatment. Surg Endosc 2013;27:4333-6.
7. Boutin C, Astroul P, Seitz B. The Role Of Thoracoscopy in the Evaluation and Management of Pleural Effusion. Lung. 1990;168:1113-21.
8. Eren S, Balci EA, Ulku R, Esme H, Eren MN. Role of Video-Assisted Thoracoscopic Surgery (VATS) in Pleural Effusions. Tuberk Toraks. 2002;50:53-8.
9. Dumanli A, Oz G. Vats Plevra Biopsy Experiences: Analysis Of 35 Cases. Med J SDU.2020;27:261-6. Doi: 10.17343/sdutfd.565162.
10. Yilmaz S, Daharli KE. Evaluation of tuberculosis cases followed in Erzurum tuberculosis dispensary between 2012-2018 . Turk J Public Health. 2021;19:106-115.
11. Tuluce K, Sevilgen G. Effectiveness of VATS in Pleural Diseases. Med J SDU 2021;28:269-74. Doi: 10.17343/sdutfd.837596