

Pleural Effusion - Video-assisted Thoracoscopic Surgery - Two-Port Technique: Our Experience

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Abstract

Introduction: Video-assisted thoracoscopic surgery (VATS) is a minimally invasive procedure employed as a diagnostic and therapeutic procedure in diseases of the pleura and lung.

Materials and Methods: A total of 15 patients who presented with pleural effusion, after a trial of intercostal drainage, underwent VATS.

Results: Histopathological examination of tissue in five cases showed granulomatous inflammation, one showed poorly differentiated malignancy, and remaining nine showed empyema with inflammatory pathology. None of the cases required conversion to open surgery. The average period of intercostal drainage tube was 8.4 days, postoperatively. There were no complications such as bronchopleural fistula or hemorrhage.

Conclusion: VATS is an effective diagnostic as well as therapeutic tool in cases of pleural effusion, with an acceptable complication profile. The two-port technique modification yields the results comparable to the three-port technique.

Key words: Pleural effusion, Vats, Two ports

INTRODUCTION

Pleural Effusion

Many benign and malignant pleural space diseases can cause effusion. The amount of pleural fluid is controlled by a balance of oncotic and hydrostatic pressure within the pleural space.

Empyema

It is the infection of the pleural space, commonly an exudate. It progresses from an auto phase with fluid that is thin and can be drained completely with a chest tube, typically worsening as the fluid becomes turbid and thick and begins to loculate. This debris can compress lung parenchyma.

Tuberculous Pleuritis

The pleural space is the second most common site of extrapulmonary tuberculosis,^[1] the first being the lymphatic system. Positive diagnosis relies on direct sampling of pleural fluid and pleural biopsies.

Analysis of fluid will show exudative, lymphocyte predominant picture. Other studies such as ADA (non-specific and non-sensitive) and AFB are not reliable. The most reliable investigation being pleural biopsy.

MATERIALS AND METHODS

This was a retrospective observational study conducted in General Surgery Department, Unit III of St. Martha's Hospital, Bengaluru, from August 2015 to August 2016. The medical records of the 15 patients, age ranging from 15 to 44, were reviewed to conduct this study [Table 1].

The patients have undergone pre-operative evaluation of pleural effusion in the form of chest radiograph posteroanterior view, ultrasound chest, or computed

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Table 1: Summary

Patient, Fluid and Surgery Details	Results
Mean age	33.7 years
Male/Female	15/0
Presenting complaints (%)	
Pleuritic chest pain	7 (46.67)
Fever+cough	6 (40)
Breathlessness	1 (6.7)
Pleural fluid characteristics	
C/S positive	1
Mean lymphocyte %	47
Mean total count	6895/mm ³
Malignant cytology positive	1
Operative results (%)	
Mean operative time	1.7 h
Conversion	0
Post-operative ventilatory support	0
Post-operative mean ICU stay (%)	1 day
Chest tube duration	8.7 days
Air leak	0
Peri-operative mortality	0

tomography thorax. Thoracocentesis and fluid analysis were done in all the cases which included total and differential leukocyte count, adenosine deaminase, malignant cytology, acid-fast bacilli, and culture + sensitivity. Routine blood investigations done were hemoglobin, total leukocyte count, differential count, erythrocyte sedimentation rate, and renal function test in all patients.

Video-assisted Thoracoscopic Surgery (VATS)

General anesthesia with selective one-lung ventilation and with double lumen endotracheal tube was employed in all cases. The first port was placed in the previous implantable cardioverter-defibrillator (ICD) site, 5 mm 30-degree scope used. Two-port technique was employed in all the cases, and the second port was placed according to the findings, under vision. After port placement, fluid was collected for analysis, the loculations broken, decortication done if required, and tissue was sampled for biopsy.

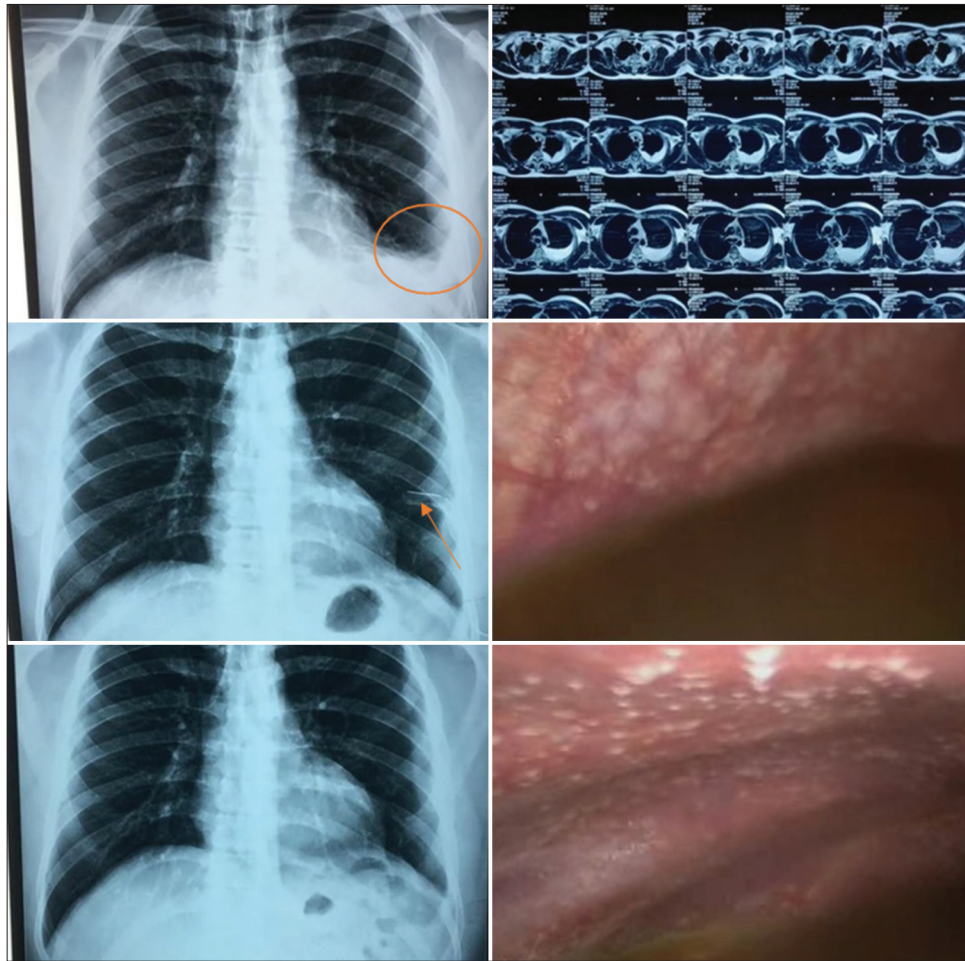


Figure 1: (a-f) Anti-clockwise from top left - (1) Pre-operative chest X-rays (CXR) (blunting of costophrenic angle indicated by circle) posteroanterior (2). Post-operative day 1 CXR (ICD indicated by arrow) (3). POD 14 CXR (4). Pre-operative computed tomography thorax (5 and 6). Intraoperative findings - Nodular lesions on the parietal pleura with effusion 33-year-old male, left-sided pleuritic chest pain

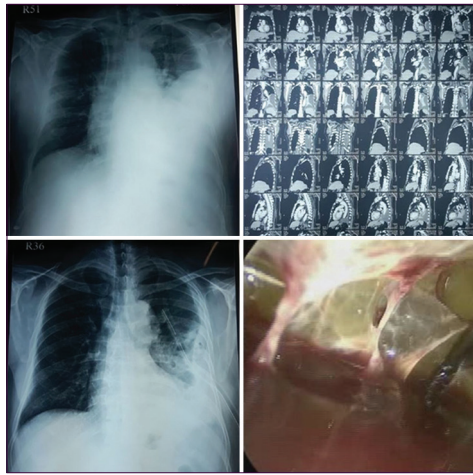


Figure 2: (a-d) Anti-clockwise from top left - (1) Pre-operative chest X-rays (CXR) posteroanterior (2). Post-operative day 1 CXR (3). Pre-operative computed tomography Thorax (4). Intraoperative findings - Thick loculations and empyema 67-year-old male, cough, fever, and breathlessness

Frozen section was done for one case to rule out malignancy - came as granulomatous lesion and was started on ATT. The effusion was evacuated, chest tube placed, and port closed.

All patients were observed in SICU post-operatively, chest X-rays was done on post-operative day 1 for all patients [Figure 1]. 12 patients were discharged with ICD *in situ*. Follow-up period was a minimum of 2 years. Treatment of the underlying cause was initiated once holoprosencephaly (HPE)/fluid analysis helped us arrive at a diagnosis.

RESULTS

15 patients with pleural effusion who underwent VATS were included in the study, and all patients were males ranging in the age range from 15 to 44, with a mean age of 33. The most common presentations were pleuritic chest pain (46%) on the affected side and fever associated with cough (40%). 53% of the patients were smokers. All the patients underwent thoracentesis and fluid analysis.

All samples had elevated TC, mean TC being 6895/mm³, and lymphocyte predominant picture was seen in all patients, with mean percentage being 47%. Pleural fluid cultures yielded no growth in all except one in which the sample yielded *Burkholderia* species and was treated as per sensitivity pattern. The fluid was sent for gene Xpert study which yielded negative in all but one, which showed indeterminate result. Fluid study for malignant cytology was positive in one patient, the HPE was in agreement with it, the patient was diagnosed to have poorly differentiated malignancy, and the patient was further managed by our

oncology team. In view of advanced malignancy, the patient was treated by chemotherapy.

The patients underwent adequate pre-operative evaluation, and the procedure was on an elective basis. The mean operative time was 1.7 h, ranging from 45 min to 3 h. All the patients were shifted out from OT after extubation in a stable condition with ICD *in situ* and were observed in SICU for 1 day [Figure 2]. Incentive spirometry and chest physiotherapy started from POD1, and 12 cases were discharged within 6 days post-operative with ICD *in situ*. The remaining three patient's chest tubes were removed before discharge. Mean duration of ICD was 8.4 days.

The histopathology study revealed empyema with inflammatory etiology in 9 cases, granulomatous inflammation in 5, and poorly differentiated malignancy in 1. Follow-up data showed that all patients had a resolution of symptoms, and none of them underwent re-surgery. None of the cases had complications such as sepsis or bronchopleural fistulae.

DISCUSSION

The human body contains two non-communicating pleural spaces in contrast to other mammals such as horses, which have extensive communications between the right and the left thoracic spaces, effectively rendering them with a single pleural cavity. The anatomy in humans allows for selective one-lung ventilation, affording ample room in the pleural cavity for instrument maneuvering, making it ideal for minimal access surgery.^[2]

Thoracoscopy was first introduced by Jacobaeus, a Swedish internist, in 1910, as a diagnostic procedure for exudative pleuritis, and published his case series in 1921, describing its value in TB and malignant pleural effusions.^[3]

Around 1990, instruments such as endoscopic stapler and biopsy forceps were introduced, and this has helped to broaden the vistas of thoracic surgery. Thoracoscopy can be diagnostic as well as therapeutic, and pleural effusion being the most common indication. The common indications for thoracoscopic surgery are pleural effusion, infiltrates, pneumothorax, pleural mass/thickening, mediastinal mass, and empyema.^[4]

CONCLUSION

VATS is an effective diagnostic as well as therapeutic tool in cases of pleural effusion, with an acceptable complication profile.^[5,6] The two-port technique modification yields the results comparable to the three-port technique.^[7]

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