ORIGINAL RESEARCH

Retrospective Study of Diagnostic Efficacy and Safety of Thoracoscopic Pleural Biopsy in Undiagnosed Exudative Pleural Effusion Cases

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ABSTRACT

Objective: The role of medical thoracoscopy in the diagnosis by pleural diseases is increasingly being recognized. This study was done to assess the role of medical thoracoscopy in the diagnosis of undiagnosed pleural effusion patients by pleural biopsy from abnormal pleura under direct vision.

Materials and Methods: We analyzed retrospectively data of 65thoracoscopic pleural biopsy performed at our centreon patients with undiagnosed pleurisy in the past 18 months. Medical thoracoscopy was performed under conscious sedation with midazolam (2 mg) and fentanyl (50 mcg) and local anesthesia with lignocaine 2% (10–15 ml), through a single port 10 mm diameter thoracoscope.

Results: A total of 65 patients (48 males and 17 females) underwent medical thoracoscopy during the study period. The mean age was 47.5(range, 18–72). The final diagnosis by thoracoscopic pleural biopsy was made in 59 (90.7%) patients and infective pathology were confirmed in 42 (tuberculosis in 24, parapeumoniceffusion in 8 and nonspecific inflammation in 10), malignancy in 17 patients and 6 remained undiagnosed. There were no major procedure-related complications that required intervention.

Conclusion: Pleural effusion without diagnosis after initial evaluation is a frequent problem in a respiratory division, for which thoracoscopic pleural biopsy is regularly necessary. Medical thoracoscopy has a high diagnostic yield, and is generally safe, certainly compared with the diagnostic and therapeutic importance.

Key words: Conscious sedation, medical thoracoscopy, parapneumonic effusions

INTRODUCTION

The diagnosis of unidentified pleural effusions is one of the most difficult and complicated tasks in respiratory medicine.[1] Prior to the application of thoracoscopy, hydrothorax exfoliativecytologic examination, biochemistry and closed pleural biopsy methods were typically used; however, these methods have a low positive diagnostic rate.[2]Initial work up with history, physical exam, ECG, chest X-ray, blood sample and thoracocentesis evaluation can yield a diagnosis in up to 74% of patients.[3,4]So approximately one fourth effusions remain undiagnosed. A further diagnostic procedure usually comprises repeat thoracocentesis and evaluation. After all these conventional methods of evaluation, one fourth of pleural effusion etiology remained undiagnosed. In such undiagnosed pleurisy, pleural biopsy needed for confirmation of etiology. Compared to conventional closed pleural biopsy, the

thoracoscopy has notable advantages. It overcomes the blindness of closed pleural biopsy markedly improves diagnostic accuracy of pleural effusions, and therefore improves the positive diagnostic rate of pleural diseases.[3-5]It has been reported that the overall positive diagnostic rate with thoracoscopy may reach 71-100%.[5-6]

Medical thoracoscopy also known as pleuroscopy is an endoscopic evaluation of the pleural space. It is a minimally invasive procedure that was first invented by Hans Christian Jacobeus in 1910, who is regarded as "Father of Thoracoscopy." Jacobeus also published an early report on the use of thoracoscopy to localize and diagnose benign and malignant lesions of the pleura and pulmonary parenchyma.[7] Medical thoracscopy is usually done for the cases of undiagnosed exudative pleural effusion (EPE).There are two fundamental techniques by which thoracoscopy are performed, single puncture technique and double puncture technique. The single puncture technique is commonly used by the chest physician. The present retrospective study included 65 patients with undiagnosed exudative pleural effusions who received medical thoracoscopy examination and pleural biopsy.

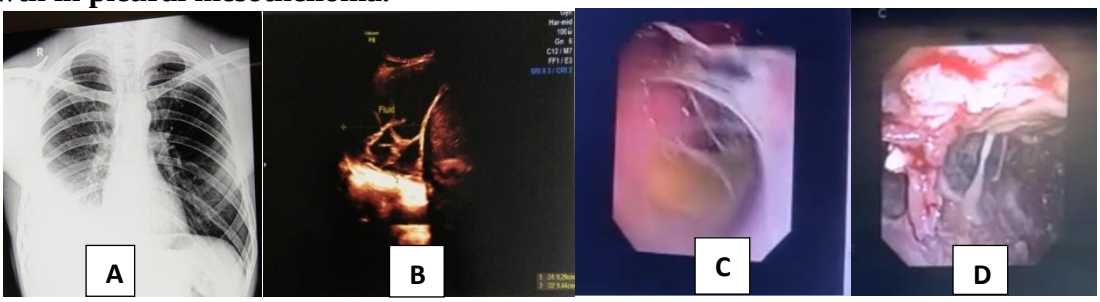
MATERIAL AND METHOD

A retrospective study was conducted on clinical data of 65 patients (48 males and 17 females; age range, 18-72 years) with pleural effusions who received medical thoracoscopy in tertiary care Hospital between July 2019 to December 2021. The indication of medical thoracoscopy was undiagnosed pleural effusion, which referred to the situation that the cause of disease could not be identified through routine examination of pleural fluid, biochemistry, bacteriology and cytology. No contraindication had been demonstrated for any patients receiving medical thoracoscopy. All patientwere signed an informed consent form prior to the procedure. Routine blood tests, bleeding and clotting time tests, and electrocardiograms were performed in all patients. Pre-anaesthesiafitnesswastaken in all patients.Sonographic evaluation of affected site of chest was done and marked site for thoracoscopy port as routine.

THORACOSCOPY PROCEDURE

The whole procedures were conducted in the endoscope room. Vitals and consciousness were closely monitored throughout the procedure. Each patient was placed in a lateral decubitus position with the affected side up. Artificial pneumothorax on the affected side was set up during local anaesthesia application at site of entry point prior to surgery. Port site draped thoroughly and a small 1-2-cm cut over skin made between ribs along the midaxillary or axillary line. Trocar cannula inserted through blunt method upto pleural cavity andthoracoscope was inserted into the pleural cavity. The pleural effusion was examined and drawn out as much as possible to obtain satisfactory exposure. The changes of parietal and visceral pleura were examined carefully for any abnormalities like pleural nodules, pleural congestion, thickening, adhesion, ulcer and abnormal site biopsied for histopathological evaluation. In figures A, B, C, D we can observe pleural disease. Following thoracoscopy, all fluid and air inside the pleural cavity were drawn out as much as possible and the closed drainage tube was left inside.

Figure A: chest xray of pleural effusion shows moderate right sided effusion. Figure B: ultrasonography chest of same patient suggestive moderate effusion with multiple septations. Figure C: thoracoscopic image of pleural space showed moderate effusion, thin to thick spetations. Figure D: Diffuse infilterate of pleural surface by nodular growth in pleural mesothelioma.



RESULT

Retrospectively we evaluated data of thoracoscopic pleural biopsy among 65 patients of undiagnosed pleural effusion. Average age was 47.5 years with male to female ratio was 2.7:1. Majority of the patients (42) were younger to 40 years of age. Unilateral effusion (Left sided in 33 and right sided in 28) was common. Various comorbidities were detected in 30.7% of cases like known Malignancy in 7, CKD in 5, Diabetes in 5 and history of TB in 3. Basic demographic and clinical status of study population was summarized in Table 1.

Table 1: Basic demographics and clinical characteristics of study patients. Male sex of younger age group with unilateral pleural effusion was common presentation with undiagnosed pleural effusion. 20 (30.7%) cases had various comorbidities.

Particulars	Parameters	N (%)
Age	< 40 years	42 (64.6%)
	>40 years	23 (35.4%)
Sex	Male	48 (73.8%)
	Female	17 (26.2%)
Site of effusion	Left	33 (50.7%)
	Right	28 (43.1%)
	Bilateral	4 (6.2%)
Smoking habits	Smoker	28 (43%)
	Non smoker	37 (57%)
Comorbidities N=20	Diabetes	5 (7.7%)
	Chronic kidney disease	5 (7.7%)
	History of tuberculosis	3 (4.6%)
	Malignancy	7 (10.7%)

In 2 patients we failed to take biopsy through thoracoscope due to extentsive fibrosis. In 63 patients we performed 3 to 5 pleural biopsies from most affected part ofparietal/ visceral pleural surface. Pleural biopsy histopathological examination results showed Infective Pathology in 42 (64.6%)(Tuberculouspleuritis in 24, Parapneumonic effusion in 8, Non-specific pleuritis in 10), in 2 patients diagnosedPleural Mesothelioma and 15 patients had Metastatic Pleural Spread (metastatic Squamous Cell Lung cancer in 5, Breast cancer metastasis in 7, Lung Adenocarcinoma metastasis in 3). Rest of 4 patients diagnosis were not possible by pleural biopsies. Overall diagnostic confirmation was made in 59 cases out of 65 cases of undiagnosed pleural effusion by thoracoscopicPleural Biopsy with efficacy of 90.7%. Etiological diagnostic results were summarised in Table 2.

Table 2: Results of pleura pathological examination of 65 patients with pleural effusions. Most common etiology was tuberculosis followed by metastatic to pleura.

Type of pleural diseases	Pathological diagnosis	N (%)
INFECTIVE PATHOLOGY 42 (64.6%)	Tuberculouspleuritis	24 (36.9%)
	Parapneumonic effusion	8 (12.3%)
	Non-specific pleuritis	10 (15.3%)
PLEURAL MALIGNANCY 2 (3%)	Pleural mesothelioma	2 (3%)
METASTATIC PLEURAL 15 (23%)	squamous cell lung cancer mets	5 (7.7%)
	Breast cancer mets	7 (10.7%)
	Lung adenocarcinoma mets	3 (4.6%)
Undiagnosed 6 (9.2%)	Undiagnosed by pathology	4 (6.2%)
	Biopsy not possible	2 (3%)

COMPLICATION

Thoracoscopic procedures were uneventful in all patients. On the same day of procedure 5 patients developed Re-expansion pulmonary edema that was managed medically on same day of procedure. 4 patients developed fever after procedure that would subsided with antibiotics and antipyretics. Average time to remove Intercostal Chest Drainage Tube was 3.5 days except 9 cases in which it was prolonged more than 7 days. 3 cases had persistent Air Leaks. No any major complications and mortality occurred.Complications summarised in Table 3.

Table 3: shows list of complications recorded in this study. Acute complication was Re-expansion pulmonary edema in 5 and fever in 4 cases. Persistent air leak in 3 and prolonged chest drain in 7 cases.

Complications	N = 65 (%)
Re-expansion pulmonary edema	5 (7.69%)
Persistent air leak (> 7 days)	3 (4.61%)
Fever	4 (6.15%)
Prolonged chest drain (> 7 days)	7 (10.76%)

DISCUSSION

Pleural effusion of unknown origin remains a frequent problem at tertiary care hospitals. Medical thoracoscopy developed in recent years is an invasive surgical technique that may be accomplished independently by a pulmonary physician under local anaesthesia. In such cases of undiagnosed pleurisy, Thoracoscopy is frequently necessary, as well for diagnostic or therapeutic reasons. Research has demonstrated that medical thoracoscopy is able to markedly increase the positive diagnostic rate of undiagnosed pleural effusions.[8]Here We shareour experience of medical thoracoscopy in a period of 18 months among 65 cases. We took pleural biopsy among 63 cases and diagnosis was confirmed among 59.

The diagnosis rate of thoracoscopy in the present study reached as high as 90.76%, which is comparable with what has been reported in previous studies. Study done by Pyng Leeet al[9]with Flex-rigid pleuroscopy was 96% accurate and yielded a diagnosis in 49 out of 51 patients.Another important study done by SakurabaMet al[5] found overall diagnostic efficacy was 97.1% (134/138). The diagnostic efficacy in the cases of carcinoma was 92.6% (25/27), in malignant pleural mesothelioma it was 100% (10/10) and in tuberculosis it was 93.8% (30/32).Study among 33 patients by ISHII et al[10] in 2020 done and found diagnostic rate in 100%, and the complication rate was 6.1%.in this study higher diagnostic yield possibly was due to cases selection bias. In 2007 another study published by M. Munavvaret al[11]involved 54 patients. The combination of clinical features, contrast CT scanning and thoracoscopic

inspection/biopsy enabled a definite diagnosis in 49 of these, giving a positive yield of 90.7%. These studies results are comparable to our study.

SAFETY

Median length of stay was 3.5 days, which is comparable to the study of McDonald et al[12]in which the average stay was 4 days. According to the standards of the British Thoracic Society and the Society of Cardiothoracic Surgeons in Great Britain and Ireland (BTS/SCTS) mortality should be less than 1.6%. In present study,no major complications and mortality were occurred. only Minor complications withrate of 13% that resolved by next day of procedure, which is little higher than reported in the studies of Colt and Harris et al (5.7% and 8.0%, respectively).[13, 14]

CONCLUSION

Pleural effusion without diagnosis after initial evaluation is a frequent problem in a respiratory division, for which thoracoscopic pleural biopsy is regularly necessary. Medical thoracoscopy has high diagnostic yield, and is generally safe, certainly compared with the diagnostic and therapeutic importance.

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