

## Original Article

### Diagnostic utility of thoracoscopic pleural biopsy in histopathological confirmation of undiagnosed pleural effusions cases

<sup>1</sup>K C Agarwal, <sup>2</sup>Madhu Gupta \*, <sup>3</sup>J Mohan, <sup>4</sup>Ramakant Dixit

<sup>1</sup>Senior Professor, <sup>2</sup>Professor, <sup>3</sup>Resident, Department of Respiratory Medicine & Pathology\*, S N Medical College, Jodhpur, <sup>4</sup>Professor, Department of Respiratory Medicine, J L N Medical College, Ajmer

#### Abstract

*Background:* Pleural diseases affect over 3000 people per million populations each year worldwide and present a significant contribution to the workload in clinical settings. About 20% to 25% of pleural effusions remain undiagnosed despite repeated thoracentesis and closed needle biopsy.

*Objective:* To analyze the outcome of medical thoracoscopy in undiagnosed pleural effusions and evaluate complications with this procedure.

*Material and Methods:* The present study was conducted with an aim to study the diagnostic yield of medical thoracoscopy in cases of undiagnosed pleural effusion. This was a cross sectional descriptive study in 25 patients of undiagnosed pleural effusion. The pleural effusion cases which remained undiagnosed after routine pleural fluid analysis were subjected for the medical thoracoscopy using semi-rigid thoracoscope.

*Results:* Medical thoracoscopy using semi-rigid thoracoscope in undiagnosed pleural effusion cases has diagnostic yield of 88% in our study. Diagnostic yield of the medical thoracoscopy in malignant suspect cases was 88.88% and in tubercular suspect cases was 85.71%. Medical thoracoscopy with nodular lesions and sago grain lesions has got good diagnostic yield. Medical thoracoscopy is a minimally invasive procedure with very low complication rates.

*Conclusions:* Medical thoracoscopy is a relatively simple and safe procedure for a definite and histopathological confirmation of pleural effusion of unknown etiology. This should be considered in patients with lymphocytic predominant, exudative, effusions where tuberculosis and malignant pleural effusion are clinical possibilities with inconclusive initial pleural fluid analysis, so that wrong treatment can be avoided.

*Keywords:* Pleural effusion, thoracoscopy, pleural biopsy

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#### Introduction

The first step in evaluation of a pleural effusion is a detailed history and physical examination. Diagnosis of the cause of many pleural effusions is based on the clinical settings and exclusion of other alternative causes<sup>1</sup>. The next step is sampling of the pleural fluid, i.e. thoracentesis followed by microbiology, biochemistry and cytological examination of the pleural fluid<sup>2</sup>.

In clinical practice about 20-25% cases of pleural effusions remain undiagnosed after

simple diagnostic pleural aspiration, which requires further investigations. Traditionally, blind pleural biopsy (non-image guided pleural biopsy, also known as closed pleural biopsy using Abrams needle biopsy) has been the next step in investigating a cytology negative, exudative pleural effusion of unknown cause<sup>3</sup>. However there is increasing evidence that blind pleural biopsy is less sensitive in diagnosis of malignant pleural disease than CT guided pleural biopsy or thoracoscopy. This is understandable when

one considers that direct visualisation of the pleura in malignancy often reveals patchy abnormalities with disease affecting the more dependent part of the pleura near the diaphragmatic surface<sup>4</sup>.

Local anaesthetic thoracoscopy also known as medical thoracoscopy allows direct visual assessment of the pleura and subsequent biopsy of visually abnormal areas, hence maximising the diagnostic yield<sup>5</sup>. The present study was planned to analyze the outcome of medical thoracoscopy in undiagnosed pleural effusions and evaluate complications with this procedure.

### Material and Methods

The present study was conducted at tertiary care center for respiratory diseases in western part of Rajasthan, India. This was a cross sectional, prospective type of study.

Patients of all ages with history, signs and symptoms suggestive of pleural effusion, which were confirmed radiologically to be having moderate to massive pleural effusion and willing to participate in the study were selected. The protocol was explained to the patient/care provider before enrolment and informed consent was taken from each patient. Patients were assessed for their ability to comply with the requirements of study design. A total of 25 subjects were enrolled for the study in one year duration of study. All patients underwent complete clinical workup.

Diagnostic thoracentesis of the selected patients was performed followed by pleural fluid analysis (cytology, biochemical and microbiological including ADA). Sputum smear for acid fast bacilli (AFB) was also examined to exclude pulmonary tuberculosis. Medical thoracoscopy was performed using semi-rigid thoracoscope in thoracoscopy suite at our hospital.

### Patient Selection

Inclusion criteria in this study were -all the moderate to massive pleural effusions in whom diagnosis was not confirmed by pleural fluid analysis only and young patients in whom the initial diagnosis of tuberculosis was made on biochemical tests & ADA etc, but not responding to antituberculosis treatment. Exclusion criteria in this study were-obliterated pleural space, minimal pleural effusion, transudative pleural effusion, Pleural effusions with AFB detected in pleural fluid analysis, Pleural effusions with malignant cells in pleural fluid cytology. Those having refractory cough, hypoxia, coagulopathy/ bleeding diathesis, thrombocytopenia, unstable cardiovascular status and young patients with high chances of tuberculosis (based on biochemical tests, DNA PCR for TB, ADA >60 U/L etc) were also excluded.

### Pre procedure assessment, Procedure and care:

Patient information leaflet was given to the patient prior to obtaining consent. Preoperative investigations were measurement of full blood count, platelet count, coagulation profile, electrolytes, renal function and serum glucose. The temperature, pulse, blood pressure, respiratory rate and oxygen saturations were recorded prior to the procedure. Oral anticoagulants if any were stopped at least 3 days before the procedure.

The patients were most commonly positioned in the lateral position with the side to be examined uppermost. Oxygen saturation was monitored continuously via a pulse oximeter. Under full aseptic technique thoracoscopic procedures were performed using semirigid thoracoscope, under local anesthesia with intravenous conscious sedation using midazolam.

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### Statistical Analysis

Data were entered and analysed by using Microsoft Excel Version 2007 and Statistical Package for social science ver.16 (SPSS.16). The statistical analysis was performed by using Chi Square test to find out the significance of difference in mean between two variables.

### Results

A total of 25 patients constituted the final study population. 40% of patients in the study were in the age group of 20-40 years, followed by 41-60 years (28%). The male to female ratio was 1.7:1. 44% of the patients of the study were smokers (28% current smokers and 16% ex smokers). 54.54% patients had 20-40 pack year history of smoking. Chest pain (88%) was the most common symptom followed by breathlessness (80%) and cough (76%). Fever of low grade was also present in 60% of cases.

Table 1 shows the medical thoracoscopy findings in study patients. Nodular lesions (40%) were major thoracoscopic findings followed by sago grain appearance and whitish patches (slough).

Majority of the study population had moderate pleural effusion (60%). Massive effusion was observed in 40% cases. There were only two cases of neutrophilic

predominant pleural effusions; remaining 23 cases had predominantly lymphocytic pleural effusion.

**Table 1. Medical Thoracoscopy findings**

Thoracoscopy findings	No	%
Nodules	10	40
Sago grain appearance	8	32
Whitish patches with adhesions	4	16
Whitish patches without adhesions	3	12
Total	25	100

**Table 2. Histopathological diagnosis in biopsy**

Histopathological diagnosis	No	%	
Malignant	10	40	
Non malignant	Tuberculosis	12	48
	Non specific pleuritis	03	12
Total	25	100	

Table 2 shows histopathological diagnosis on pleural biopsy. Malignancy was confirmed in 10 patients (40% of cases). Lesions on the mediastinal pleura was visualised in the 9 patient, out of which 8 patients were diagnosed as malignant. Sensitivity of 80% and specificity of 93% with this observation was found in predicting malignancy. Among the non malignant cases 48% were diagnosed as tuberculosis and 12% as non specific pleuritis.

**Table 3. Comparison of thoracoscopic findings with the histopathological diagnosis**

Thoracoscopic findings	Malignant	Tuberculosis	Non specific pleuritis
Nodules (10)	9	1	-
Sago grain appearance (8)	-	8	-
Whitish patches with adhesions (4)	-	3	1
Whitish patches without adhesions (3)	1	-	2
Total (25)	10	12	3

(chi square = 18.47, df = 3, p value < 0.001)

Among the malignant cases, mesothelioma (primary pleural malignancy)

was diagnosed in 5 cases. Metastatic malignancies were adenocarcinoma of lung in

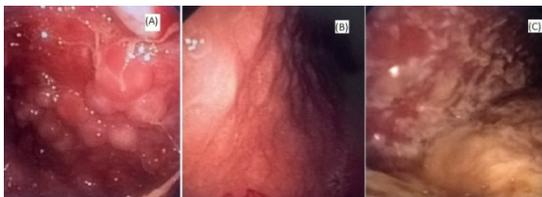
3, squamous cell carcinoma of lung in 1 and breast carcinoma in 1 case each.

Table 3 shows comparison of thoracoscopic findings with the histopathological diagnosis. 90% of nodular lesions were diagnosed as malignant. All the 8 cases (100%) having sago grain lesions were tuberculosis. 75% of patients with whitish patches (slough) with adhesions were also tuberculosis (Figure 1).

No major complications were observed. Few minor complications like minimal bleeding (8%) and empyema (8%) were seen following the procedure (Table 4).

**Table 4. Complications of the study**

Complications	No	%
Major bleeding	-	-
Minor bleeding	2	8
Empyema	2	8
Post procedure fever	-	-
Subcutaneous emphysema	-	-
Total	4	16



**Figure 1. Thoracoscopic view of nodular lesions in malignancy (A), sago grains appearance (B) and white patches (C) in tuberculosis.**

### Discussion

The overall diagnostic yield of the medical thoracoscopy using semi-rigid thoracoscope in our study was 88%. This is slightly superior with a yield of 83% by Kendell et al<sup>6</sup> and slightly inferior i.e. 93% by Wang Zhen et al<sup>7</sup> and 93.6% by Huang et al<sup>8</sup>. Malignancy was confirmed in 40% of cases in this study. Malignancy was also the cause in 35.29% cases in study of Prabhu et al<sup>9</sup> and in 44.4% cases by Thangakunam et al<sup>10</sup>.

Among the non malignant cases, 48% were diagnosed as tuberculosis and 12% as non specific pleuritis. Huang et al<sup>8</sup> found tuberculosis only in 12% cases in their series reflecting low prevalence of tuberculosis in that geographic location. Among the malignant cases, mesothelioma (primary pleural malignancy) was diagnosed in 5 cases (50%). Metastatic malignancies were adenocarcinoma of lung in 3 (30%), squamous cell carcinoma of lungs in 1 and breast carcinoma in remaining 1. These observations are comparable with study of Helala et al.<sup>11</sup>

Medical thoracoscopy with nodular lesions and sago grain lesions has got good diagnostic yield as 90% of nodular lesions were diagnosed as malignant and all 8 cases (100%) which had sago grain lesions were tuberculosis. Nodular lesions were found malignant in 92% by Helala et al<sup>11</sup> and in more than 70% by Prabhu et al.<sup>9</sup> Similarly 100% sago grain appearance in tuberculosis was observed by same authors. 75% of patients with whitish patches (slough) with adhesions were also having tuberculosis in present study. Diagnostic yield of the medical thoracoscopy in malignant suspect cases was 88.88% and in tubercular suspect cases was 85.71%, this yield is comparable with 88.9% by Thangakunam et al.<sup>10</sup> Majority of simple effusion (66.66%) cases were diagnosed as tuberculosis while majority of the haemorrhagic effusions were diagnosed as malignant (88.88%). Study showed that higher the age group, more the chances of malignancy. 90% of malignant cases were in those with age > 40 years.

There was no mortality or major complications observed with this procedure, except for few minor complications like minimal bleeding and empyema in two cases (8%) each. Similar minor complications were

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also noted by Helala et al<sup>11</sup> (10%) and Prabhu et al<sup>9</sup> (5.8%).

### Conclusion

In conclusion, we found thoracoscopic biopsy a useful diagnostic tool in histopathological confirmation of undiagnosed exudative pleural effusions thereby avoiding wrong treatment in such cases. The procedure is safe with no major complications.

### Limitations of the study

Sample size of the study was small on comparison with few other contemporary studies. Immunohistochemistry (IHC) of the biopsy sample could not be done to differentiate between various malignancy types.

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