



Diagnostic Yield of Medical Thoracoscopy in Undiagnosed Exudative Pleural Effusion

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KEYWORDS

Medical thoracoscopy, Pleural effusion, Cancer Lung, Tuberculosis.

ABSTRACT:

Background: The diagnosis of few pleural effusions remains undiagnosed inspite of all the biochemical and microbiological tests performed. Medical thoracoscopy has the advantage of direct visualization of pleural and real time biopsy can be taken. In areas with high tuberculosis prevalence, Medical Thoracoscopy should be particularly helpful in the differential diagnosis of tuberculous pleural effusion. Medical thoracoscopy increases the diagnostic yield in patients with pleural disease when thoracentesis and closed pleural biopsy are non-diagnostic.

Aim of the Study: To evaluate the diagnostic yield of Medical thoracoscopy in undiagnosed exudative pleural effusions.

Patient and Methods: A total of 53 patients who underwent Medical thoracoscopy during the one-year study period were included in the study and all these patients had unilateral exudative pleural effusion which remained undiagnosed after initial pleural fluid analysis.

Results: Out of 53 patients, 27 patients had malignancy, 17 patients had tuberculosis, 9 patients had non-specific inflammation suggestive of chronic pleuritis. The diagnostic yield for a Medical thoracoscopy guided biopsies was 83.1%.

Conclusion: Medical thoracoscopy is a good diagnostic procedure for pulmonologists to evaluate undiagnosed exudative pleural effusions. It is safe and has a high diagnostic yield with minor complications.

INTRODUCTION

Medical thoracoscopy also known as pleuroscopy as of today remains the gold standard technique for diagnosing the undiagnosed exudative pleural effusions. In 1866, S. Gordon introduced medical thoracoscopy who observed the thoracic cavity with a binocular instrument in a case of purulent effusion. Gordon was followed by Hans Jacobaeus, a Swedish internist in 1910⁽¹⁾. Between 1915 and 1955 thoracoscopy was almost exclusively used

therapeutically in the pneumothorax treatment of tuberculosis. Due to technical improvements, thoracoscopy was rediscovered by thoracic surgeons at the beginning of this decade, and renamed "surgical" thoracoscopy, better known as video assisted thoracic surgery (VATS), requiring general anaesthesia with selective end-bronchial intubation, disposable equipment, and at least three points of entry^(2,3). Medical thoracoscopy is a minimally invasive procedure performed by the pulmonologists. It is less invasive and



done under local anaesthesia with conscious sedation. Thoracoscopy aids in the diagnosis of 25% of pleural effusions that remains undiagnosed despite primary biochemical tests and Cytology. (5) It allows for diagnostic and therapeutic procedures like pleurodesis to be performed safely under direct visualisation (6,7). As a therapeutic procedure, chemical pleurodesis performed during or after Medical Thoracoscopy for recurrent and symptomatic malignant pleural effusions has a success rate of ~90%⁽⁸⁾. The present study was done to find out the diagnostic yield of medical thoracoscopy for undiagnosed exudative pleural effusions over one year.

Over the ensuing decades, and particularly in this new era of high-tech video endoscopy and advanced anaesthesiology, pleuroscopic diagnosis has become increasingly effective. It remains a safe and simple procedure with low complication rate.⁽⁴⁾

Aim of the study

To evaluate the diagnostic yield of Medical thoracoscopy in undiagnosed exudative pleural effusions.

MATERIAL AND METHODS

The present study is prospective observational study. It was conducted in a tertiary care hospital over a period of one year. The patients with unilateral exudative pleural effusion, who remain undiagnosed after the pleural fluid analysis were included in the study. The written informed consent was taken from all the patients. We recorded basic patient information, including age, sex, results of lab tests including complete blood count, coagulation (PT, partial thromboplastin time and international normalized ratio), Serum Lactate Dehydrogenase, viral markers were done. Chest X-ray of Postero-Anterior view was done for all the patients. Diagnostic pleural aspiration was done to all patients. The aspirated fluid was analysed for Glucose, Protein, Lactate Dehydrogenase, Cell count, Cell type, Cytology and Adenosine deaminase.

Procedure

The procedure was performed with Karl Storz Rigid Thoracoscope under Short Intravenous anaesthesia with the presence of aesthesiologist. Patients were positioned in the lateral decubitus position with the pleural effusion side facing up and their hands were positioned over their heads to widen the intercostal space. Patient's vital

parameters, including Electro cardiogram, Blood pressure and oxygenation by means of pulse oximetry were monitored. Patients received oxygen via nasal cannula during the procedure. After administration of local anesthesia (lidocaine 10%), a 1-cm incision was made on the mid-axillary line above the costal ridge over the intercostal space. The location of thoracoscope entry was mainly between the 4th and 7th intercostal space. The anterior, posterior, mediastinal and diaphragmatic pleura were inspected thoroughly. The pleural biopsies were taken from the suspicious areas of the pleura and they were subjected to histo-pathological examination. The intercostal drain with size of 24F or 28F were inserted at the end of the procedure. Chest X-ray was taken in the immediate post-operative period (usually after 2-4 hours of the procedure). All patients were under observation in the procedure room for about 2 hours and then in the ward for 2-3 days and were then discharged with after the inter costal drain removal.

Statistical analysis: SPSS 20 software was used for statistical analysis. Descriptive analysis was performed. Categorical variables were reported as frequency (%), and quantitative variables were reported as mean \pm SD.

Author 1 did the study, Author 2 helped in the procedure and needed anaesthesia and Author 3 helped in the statistical evaluation.

RESULTS

The total number of patients included in the study were 53. All of them underwent thoracoscopy with Rigid thoracoscope. All these patients had unilateral exudative pleural effusion which remained undiagnosed after initial pleural fluid analysis. The mean age of the patients was 54.1 \pm 14.5 years. Out of the 53 patients who were included in the study 32 (60.4%) were males and 21 (39.6%) females.

Table 1: Baseline Characteristics of the Patients

Total Patients	53
Male	32 (60.4%)
Female	21 (39.6%)
Mean Age	54.1 \pm 14.5 years
Left Sided Effusion	22 (41.5%)
Right Sided Effusion	31 (58.6%)

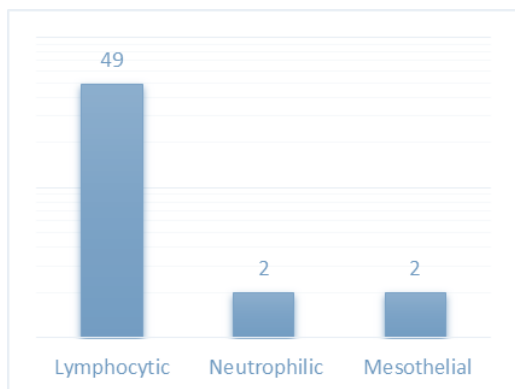


Figure 1: Differential counts of pleural fluid

Table 2: Pleural fluid Analysis report.

Pleural Fluid Analysis Report	Mean Values
Proteins	4.3 +/- 0.8mg/dl
LDH	630.5 +/- 194.3U/I
Glucose	38.3 +/- 17.4 mg/dl
ADA	23.4 +/- 10.3 IU/I
Total serum Proteins	5.5 +/- 3.1mg/dl
Serum LDH	206.7 +/-22.9 U/I

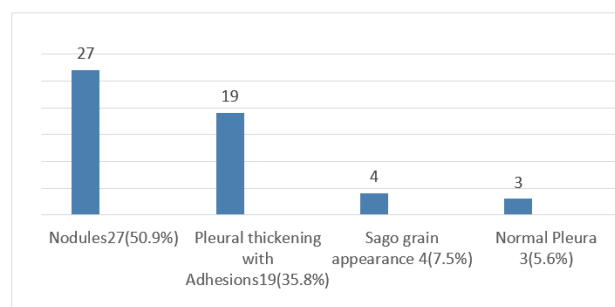


Figure 2: Thoracoscopic appearance of pleura.

The final diagnosis after the histopathological examination were, out of 53 patients, 27 patients had malignancy, 17 patients had tuberculosis, 9 patients had non-specific inflammation suggestive of chronic pleuritis. The diagnostic yield for a Medical thoracoscopy guided biopsies was 83.1%.

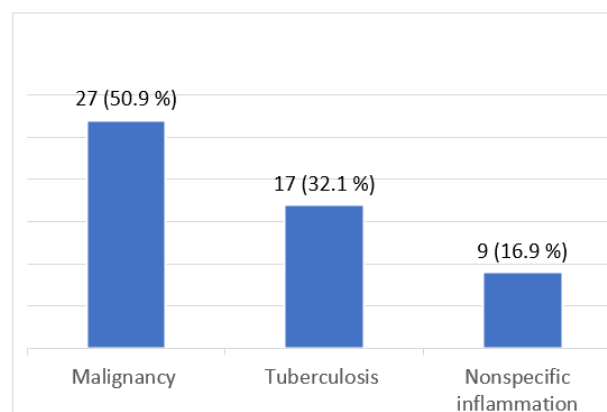


Figure 5: Final diagnosis after Medical Thoracoscopy

The most common thoracoscopic finding were nodules which was seen in 27 patients followed by adhesions, seen in 19 patients and 7 patients had whitish plaques.

In the histopathological examination 27 patients had malignancy, out of which 21 (39.6%) patients had Metastatic Adenocarcinoma, 3 (5.6%) patients had Metastatic Squamous cell carcinoma, 2 (3.7%) had Malignant mesothelioma and 1 (1.9%) patient had the diagnosis of Spindle cell carcinoma.

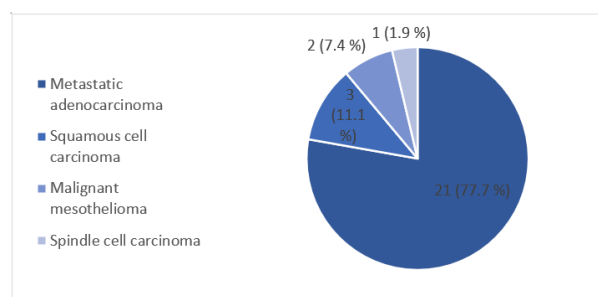


Figure 6: Types of Malignancy.

There were no major complications associated with the procedure. But out of 53 patients who underwent the procedure 3 (5.6%) patients had Subcutaneous Emphysema and Pneumothorax which needed longer intercostal tube drainage and Postoperative pain was noted in 10(18.8%) of cases.

DISCUSSION

Even after extensive diagnostic evaluation of a patient with pleural effusion, the etiology may remain unknown. Pleural fluid studies and blind pleural biopsy have their own limitations. Cytological examination is diagnostic in only 60–80% of the patients with metastatic pleural involvement and in 20% of the patients with



mesothelioma⁽⁶⁾. Biopsy procedures play an essential role in the diagnostic evaluation of patients with respiratory diseases. Most of the basic techniques we use today were mainly developed and refined during the 20th century. Pleural cavity inspection was first performed in 1910, mainly for tuberculosis-led pneumothorax diagnosis, and the utility of the procedure decreased with new and effective tuberculosis medications. One of the most prevalent indications for pleuroscopy is undiagnosed pleural effusion; of these cases, 50% will eventually turn out to be malignant pleural effusions. There are two types of scopes available Rigid and Semi-Rigid. The rigid body allows for easy steering within the pleural cavity^(9,10). It also has a 2.8-mm working channel that accommodates biopsy forceps, needles, and other accessories and is compatible with various electrosurgical and laser procedures. The other advantage of the semi-rigid pleuroscope is that it interfaces easily with existing processors. The direct visualization of the pleural surfaces had an advantage in arriving diagnosis.

Visually assisted thoracic surgery is another technique with more diagnostic yield for pleural abnormality detection as compared to Medical Thoracoscopy, which is more aggressive, performed by the Cardiothoracic surgeons or the Thoracic surgeons. The VATS not available in all centers, and is of higher cost as compared to medical thoracoscopy is one of the two diagnostic modalities performed when pleuroscopy results are inconclusive. The other modality is Thoracotomy and lung pleural biopsy.

There are few contraindications for the Medical thoracoscopy procedure which includes pleural adhesions, patients who are not able to lie in the lateral decubitus position, and patients with severe coagulopathy, severe cough and hypoxia. In the present study necessary tests were performed prior to procedure and the physical status of the patient was thoroughly assessed.

The 2000 American Thoracic Society statement on management of malignant pleural effusion says that in undiagnosed exudative effusions with a high clinical suspicion for malignancy, the clinicians may proceed directly to thoracoscopy if the facilities for medical thoracoscopy are available^[8,9]. Several studies suggests that medical thoracoscopy is useful in diagnosis and increases the diagnostic yield in patients with benign and

malignant pleural disease when thoracocentesis is non diagnostic.

Medical thoracoscopy has the advantage of direct visualisation of the pleura and the biopsy can be taken from the suspicious area real time. In this study, thoracoscopic findings included the presence of nodules in 27(50.9%), Pleural thickening with adhesions in 19(35.8%), Sago grain appearance in 4(7.5%) and normal pleural in 3(5.6%). Similar observations were made in a study done by Prabhu and Narasimhan⁽¹¹⁾.

The diagnostic yield in the present study was 83.1%. This was comparable with most other studies conducted by Patil *et al.*⁽¹²⁾ where the diagnostic yield was 85.3%, Kaini *et al.* was 87%⁽⁴⁾.

In the present study, the most common yield of histopathological results of diagnosed patients was malignancy, found in 27 (50.9%) patients, followed by Tuberculous pleuritis cases, Chronic pleuritis. Similar results can be seen in the study done by Wang *et al.*⁽¹³⁾ who found that out of 27 patients, 55.5% 15 patients had malignancy, and the second most common diagnosis was tuberculosis in 22% (6 patients), nonspecific inflammation in 7% (2 patients), septic empyema in 4% (1 patient) and normal pleura in 4% (1 patient). Only 2 (7%) patients could not get definite diagnosis. Similar results were seen in several other studies done by Kaini *et al.*⁽⁴⁾, in which malignancy was the final diagnosis in most of the studied patients with undiagnosed pleural effusion. Among patients with malignant pleural effusion, metastatic adenocarcinoma was the most common pleural malignancy, observed in 21 (39.6%) patients, 3 (5.6%) patients had Metastatic Squamous cell carcinoma, 2 (3.7%) had Malignant mesothelioma and 1 (1.9%) patient had the diagnosis of Spindle cell carcinoma. This could be attributed to the fact that the most common cause of malignant pleural effusion is metastatic adenocarcinoma of the lung, breast, and ovaries.

Medical Thoracoscopy has an excellent safety profile when performed by a trained physician, and a mortality rate associated with MT is always $\leq 0.8\%$. Medical Thoracoscopy procedures were well tolerated with a low rate of complications without serious adverse events. In the present study, there was no mortality among the studied patients. The most common complications that were reported in our study were minor complications. 3



(5.6%) patients had Subcutaneous Emphysema and Pneumothorax which needed longer intercostal tube drainage and post-operative pain was noted in 10(18.8%) of cases. The studies done by Mohamed and Shaban *et al.* ⁽¹⁴⁾ reported no mortality and no major complications. However, minor complications reported by them included subcutaneous emphysema, prolonged air leak, wound infection and empyema. As reported by Prabhu and Narasimhan⁽¹⁰⁾ in their study that out of 68 patients only 4 patients had minor complications like subcutaneous emphysema (3 patients) and prolonged air leak (1 patient). Mootha *et al.* ⁽¹⁵⁾ reported that out of 35 thoroscopic procedures, 2 cases (5.2%) developed empyema with no other complications.

CONCLUSION

Medical thoracoscopy is a good diagnostic procedure for pulmonologists to evaluate undiagnosed exudative pleural effusions. This procedure is safe and well-tolerated under local and conscious sedation. It has a high diagnostic yield and results. With excellent safety profile, well tolerated and lower rate of complications.

Conflict of interest: The authors declare no conflict of interest.

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