To Study Efficacy of Medical Thoracoscopy in Undiagnosed Pleural Effusions

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Abstract

Background: Medical thoracoscopy has received interest in recent past for diagnostic as well as therapeutic uses. In this study we describe our experience with diagnostic medical thoracoscopy in pleural effusions of undiagnosed etiology.

Objectives: 1. To detect diagnostic yield of medical thoracoscopy in pleural effusions of unknown etiology. 2. To find complication rate in these patients.

Methodology: In a retrospective analysis of thoracoscopic procedures performed between March 2011 and December 2014, diagnostic yield and complications of thoracoscopic pleural biopsy for achieving a diagnosis in undiagnosed pleural effusions were evaluated.

Statistical Analysis: Statistical analysis of all 60 patients underwent thoracoscopy was done and findings expressed in terms of percentages.

Results: A total of 60 patients (40 males and 20 females; mean age 45 years) underwent diagnostic pleuroscopy. Tuberculosis was diagnosed in 28 patients, Malignancy was found in 26 patients, three patients had pyogenic infections (empyema) and it was non diagnostic in three patients. There were no major complications, minor complications were observed in 10 patients (17%).

Interpretations: The diagnostic yield of medical thoracoscopy in our study was 95%. Minor complications were noted in ten patients (17%).

Conclusions: Medical thoracoscopy is a valuable tool in the diagnosis of undiagnosed exudative pleural effusion. It is a simple and safe method with high diagnostic yield and with low complication rates.

Introduction

Undiagnosed pleural effusions despite thoracentesis and blind pleural biopsy procedures remain a diagnostic challenge for pulmonologists.¹ Thoracoscopy remains gold standard in providing diagnosis and management of these cases.²

Thoracoscopy is a minimally invasive procedure that allows visualization of the pleural space, taking of pleural biopsies, drainage of effusions and pleurodesis in one sitting³. Medical thoracoscopy should be considered in patients where tuberculous and malignant pleural effusion are clinical possibilities and initial pleural fluid analysis is inconclusive.⁴–⁶ The diagnostic sensitivity of thoracoscopy ranges from 80-100 percent.⁷ Rigid thoracoscopy, with or without video assistance has traditionally been the procedure of choice.⁸

In the present study we described our experience in patients who underwent thoracoscopy for diagnostic purposes.

Aims and Objectives

1. To detect diagnostic yield of medical thoracoscopy in pleural effusions of unknown etiology.
2. To find complication rate in these patients.

Material and Methods

Type of study: Retrospective study.

Study area: Pulmonary medicine department of tertiary care centre.

Study population: Patients with undiagnosed exudative pleural effusion were selected for thoracoscopy.

Study Duration: March 2011 and

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Received: 30.11.2015; Accepted: 28.03.2016
December 2014.
Sample size: 60.

Methodology

Total 60 patients were selected for medical thoracoscopy based on following exclusion criteria.

Ethical committee approval was taken from the institution prior to the study.

Exclusion Criteria for the Patient

1. Patients whose initial pleural fluid examination through thoracocentesis could reach a definitive histopathological diagnosis.

2. Patients who are not fit for undergoing thoracoscopy as in the following cases:
   - Patients with severe hypoxemia despite continuous oxygen administration.
   - Patients with unstable cardiovascular or haemodynamic status.
   - Patients with coagulation defects.

3. Absolute contraindications of pleuroscopy
   - Patients in whom the pleural space was judged to be inaccessible easily, those who had their pleural space obliterated by fibrous tissue or those who were suspected of having multiloculated effusions.
   - Patients with very thickened pleura as demonstrated by computed tomography (CT) scanning as it will impair the expansion of the underlying lung following the procedure.
   - Patients with honeycomb lung, pulmonary arteriovenous aneurysms, suspected hydatid cysts and highly vascularized pulmonary lesions.

Technique: As per British Thoracic Society Pleural Disease Guideline 2010 

The technique used was as follows

Patients were kept fasting for six hours prior to the procedure. Vascular access was achieved with intravenous cannula inserted in the upper limb opposite to the side of thoracoscopy. In patients with small pleural effusion, an artificial pneumothorax was created by injecting approximately one litre of air into pleural cavity just prior to the procedure. This allowed lung to collapse and reduces the chances of lung being injured while introduction of trocar. Patients were positioned in lateral decubitus with diseased side up. Arm on the side of thoracoscopy was positioned above the patient’s head. This allowed better access and widens the intercostal spaces.

Two punctures technique was used. A two cm stab incision was made, digital palpation determined the presence of adhesions and bleeders from the wound were checked. If none was present an 11 milimeters(mm) trocar was inserted through which a ten mm rigid thoroscope was inserted avoiding uncontrolled deep penetration. Then evacuation of the entire fluid collection and ipsilateral pneumothorax was induced on steps. Introduction of the telescope was done to explore the entire pleural cavity and Examination of the pleural cavity was done systematically starting at the apex and then the costal pleura, diaphragm and finally the mediastinal pleura, ending back at the apex.

The second point of entry was established quickly and easily, the position of the second entry was determined by viewing through a 50 degree scope, while depressing the possible entry site with an index finger. The second port was done in line with the first and ideally separated from it by two intercostal spaces.

Its track was anaesthetized followed by a five mm incision and pleural entry should be effected under direct vision from inside the pleural cavity using the thoracoscope already inserted into the first port. Successful pleural cavity entry should be confirmed by the aspiration of air. A five mm trocar was typically used for the second port site. After that, biopsies were taken from suspicious areas over costal and diaphragmatic parietal pleura and this was typically performed under direct vision. Biopsies placed in formalin for histopathology.

At the end of the procedure, a chest tube was introduced and connected to underwater seal drainage. A plain Chest X-ray (CXR) was done to confirm the tube position and correct drain function. This was removed after complete lung expansion was confirmed by repeat chest radiographs.

Statistical Analysis

Statistical analysis of all 60 patients underwent thoracoscopy was done and findings expressed in terms of percentages.

Results

A total of 60 patients underwent pleuroscopy from March 2011 to December 2014. The indications in all these patients were undiagnosed exudative pleural effusion. The mean age of the patients was 45 years. There were 40 males and 20 females. 45 patients (66%) had left-sided pleural effusion.

Medical thoracoscopy gave final histopathological diagnosis in 57 patients from total 60 patients with diagnostic yield 95%. There were only three patients undiagnosed (5%). Regarding the thorascopic findings in the studied group, nodules were found in 24 patients (40%), 28 patients (47%) had sago grain nodules, three patients (5%) had adhesions, one patient (1.7%) had a mass, one patient (1.7%) had Violaceous lesion, and three patients (5%) had normal appearing pleura. Twenty-eight patients (47%) were tuberculous, 26 patients (43%) were malignant, three patients
had empyema (5%) and there were three patients (5%) who were not diagnosed.

The most common type of malignancy obtained by thoracoscopic pleural biopsy in the studied group was malignant adenocarcinoma which was found in 18 patients (30%), followed by squamous cell carcinoma in five patients (8%) and non-Hodgkin’s lymphoma, in three patients (5%).

There were no major complications, minor complications observed in 10 patients (17%) that includes bleeding in five patients (8%), prolonged air leak (more than 7 days) in one patient (1.7%), subcutaneous emphysema in one patient (1.7%) and pain at the site in three patients (5%).

Discussion

Pleural effusion is a common presentation in clinical practice and can be caused by a large variety of malignant or benign cause.\(^9\) Investigation of a pleural effusion evident on chest radiographs should follow a stepwise approach to diagnosis. Diagnosis begins with the clinical history, physical examination and chest radiography and is followed by thoracentesis when appropriate.\(^2\) In the case of a proven exudate with nonconclusive cytology after (repeated) thoracentesis, an additional procedure to obtain pleural histology tissue is the next step. This can be done with minimal invasive procedure in following ways: closed pleural biopsy (CPB), thoracoscopy and computed tomography (CT)-guided biopsy.\(^11\)

Thoracoscopy is a safe and valuable tool for diagnosis of undiagnosed pleural effusion, particularly for patients with high probability of malignancy. Overall cost effectiveness of thoracoscopy is better in view of its better yield and lesser duration of hospital stay.\(^12\) The aim of this study was to evaluate the diagnostic yield of medical thoracoscopy in cases of undiagnosed exudative pleural effusion.

This study included sixty patients with undiagnosed exudative pleural effusion after being not diagnosed by thoracocentesis. It included 40 males and 20 females with mean age of 45 yrs. In the current study medical thoracoscopy gave a definitive diagnosis in 57 out of 60 patients with diagnostic yield of 95%. Tuberculosis was diagnosed in 28 patients (47%), three patients were diagnosed as empyema (5%), malignancy was found in 26 patients (43%), and it was non diagnostic in three patients (5%). A compelling support to the present study was given by Thangakunam et al.\(^{10}\), Prabhu and Narasimhan (2012).\(^{14}\)

In the current study Tuberculosis is proved to be the cause of pleural effusion in 28 patients (47%) from the totally studied 60 patients. Cytological examination of the pleural fluid revealed predominant lymphocytes but negative for smear examination for Acid fast bacilli (AFB). Koegelenberg and Diacon (2007),\(^{15}\) reported that Microscopy reveals inflammatory cells with lymphocytic predominance. Polymorphonuclear cells may predominate in very early exudates. The presence of >5% mesothelial cells is unusual in TB pleuritis. Microscopy and culture are often negative due to the paucibacillary nature of the disease.

The diagnostic yield for malignancy of pleural cytology is in the order of 55–60% (Loddenkemper and Boutin, 1993).\(^{16}\) Cytological examination of pleural fluid is only diagnostic in less than 20% in patients with mesothelioma (Colt, 1999).\(^{17}\) As regards in malignant pleural effusion, thoracoscopy is often recommended when both pleural fluid cytology and Closed pleural biopsy fail to yield a diagnosis.

In the current study malignancy was diagnosed in 26 patients (43%), Metastatic adenocarcinoma was found in 18 patients (30%), metastatic squamous cell carcinoma in five (8%) patients, non-Hodgkin lymphoma was found in three patient (5%). The results of our study matches the results of Prabhu and Narasimhan (2012)\(^{14}\) but contradicts the results of Abdullah et al (2010).\(^{18}\)

When these findings were compared with the final histopathological diagnosis, it was found that 92.9% of patients who had nodules had malignant pleural effusion, 100% of patients who had sago grain nodules had tuberculous pleural effusion, and 100% of patients who had adhesion had non-malignant lesion.

Serious complications following thoracoscopy are rare (Brims et al).\(^{19}\) The procedure is generally considered to be safe and well-tolerated, especially with semi-rigid instruments with no reported mortality to date (Lee and Colt;\(^{19}\) Mohan et al)\(^{20}\). Mortality rates with rigid instruments were reported to be between 0.09% and 0.24%, and with reported complication rates from 2% to 6% (Rodriguez-Panadero;\(^{21}\) Casal et al;\(^{22}\) Medford et al).\(^{23}\)

Minor complications were observed in 10 patients (17%) that includes bleeding in five patients (8%), prolonged air leak (more than 7 days) in one patient (1.7%), subcutaneous emphysema in one patient (1.7%) and pain at the site in three patients (5%). This was also comparable with most other studies like in Prabhu and Narasimhan (2012),\(^{14}\) Menzies and Charbonneau (1991),\(^{24}\) Munavvar et al. (2007)\(^{25}\) and Mehta et al. (2012).\(^{26}\)

Conclusions

1. Medical thoracoscopy is a safe, minimally invasive, well-tolerated procedure with negligible post-procedure morbidity.
2. Diagnostic yield of medical thoracoscopy is high (95%).
3. Among undiagnosed pleural effusion, tuberculosis is
the most common etiology followed by malignancy.

4. Among undiagnosed pleural effusion, malignancy is most common etiology in patients of age more than 50 yrs, while tuberculosis is found in all age groups.

References


