Original Article

Medical Thoracoscopy: A Helping Hand in Undiagnosed Pleural Effusions

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Abstract

Background. In clinical practice pleural effusions often remain undiagnosed despite repeated thoracentesis and closed needle biopsy.

Methods. We prospectively studied the diagnostic yield and complications of medical thoracoscopy performed using semi-rigid thoracoscope under conscious sedation in patients presenting with undiagnosed exudative pleural effusions.

Results. During the period from June 2013 to May 2014, 25 patients presenting with moderate to massive pleural effusions who remained undiagnosed after initial pleural fluid analysis were enrolled for the study. Overall diagnostic yield of medical thoracoscopy was 88%. Malignancy was confirmed in 40%, tuberculosis in 48% and non-specific pleuritis was diagnosed in 12%. Diagnostic yield of the medical thoracoscopy in cases suspected to have malignancy was 88.9% and in tubercular suspect cases was 85.7%. No major complication other than minor bleeding (n=2) and empyema (n=2) occurred during the study.

Conclusion. Medical thoracoscopy being a very simple and safe procedure is an essential investigation unless contraindicated in all cases of undiagnosed pleural effusions.
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Key words: Lung cancer, Pleural disease, Tuberculosis, Thoracoscopy.

Introduction

Undiagnosed pleural effusions remain a diagnostic challenge for pulmonologists since 20% to 25% of cases of pleural effusion remain undiagnosed even after repeated diagnostic pleural aspiration and 'blind' pleural biopsy procedures.[1,2] There is increasing evidence that 'blind' pleural biopsy is less sensitive in the diagnosis of malignant pleural disease than computed tomography (CT)-guided pleural biopsy or local anaesthetic thoracoscopy.[3,4] Medical thoracoscopy allows direct visual assessment of the pleura and subsequent biopsy of visually abnormal areas, hence maximising the diagnostic yield.[5-7] A diagnosis could be achieved in 95% of patients through medical thoracoscopy as against 44% patients using closed pleural biopsy.[8] We studied the diagnostic efficiency and complication rates of medical thoracoscopy in undiagnosed pleural effusions using semi-rigid thoracoscopy.

Material and Methods

A cross-sectional, prospective study was conducted from June 2013 to May 2014 in Kamla Nehru Chest Hospital, Department of Pulmonary Medicine, S.N. Medical College, Jodhpur, a tertiary care centre for respiratory diseases in western part of Rajasthan state of India. Twenty-five patients with moderate to massive pleural effusions were included in the study. Patients with obliterated pleural space, minimal pleural effusion, refractory cough, hypoxia, coagulopathy/ bleeding diathesis, thrombocytopaenia and unstable cardiovascular status were excluded from the study.

All patients underwent complete clinical work-up including history and clinical examination. Laboratory investigation including complete blood count, prothrombin time (PT), activated plasma thrombin time (aPTT), blood urea, serum creatinine, serological testing for human immunodeficiency virus (HIV), hepatitis B surface antigen (HBsAg) were performed on all patients. Chest radiograph (posterio-anterior view), CT and ultrsonography of the chest were done to assess the feasibility of thoracoscopy. In all of these, aetiological diagnosis of pleural effusion was not established on thoracocentisis and pleural fluid analysis after carring out biochemical testing (including adenosine deaminase estimation), microbiological and cytopathological testing.

We used Olympus semi-rigid thoracoscope (Olympus LTF-160; Olympus Corporation, Japan). The

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semi-rigid pleuroscope consisted of a handle and a shaft that measures 7mm in outer diameter and 27cm in length. The shaft was made up of two sections, a 22cm proximal rigid portion and a 5cm flexible distal end. The tip was flexible and mobilised by a lever on the handle. It had two-way angulations capability of 160° up and 130° down. It had a 2.8mm working channel that accommodated biopsy forceps, needles, and other accessories and is also compatible with various electro-surgical and laser procedures.

Patients were kept fasting for minimum of four hours prior to the procedure. After securing informed consent, explaining the procedure and probable complications during and after procedure, thoracoscopy was performed under conscious sedation. Intravenous midazolam (0.25-0.5 mg/kg) and analgesic (intravenous tramadol 5mg) were given prior to the start of the procedure. Vascular access was secured with intravenous cannula inserted in the upper limb opposite to the side of thoracoscopy. Patients were positioned in the lateral decubitus with the diseased side up and arms were positioned above the patients head. Vital parameters, namely, electrocardiogram, blood pressure, and oxygen saturation by pulse oximetry were monitored. The port of entry was at the mid-axillary line between fourth and sixth intercostals spaces, assessed with ultrasonography of the chest to mark the site. Local anaesthesia was administered to the skin, subcutaneous tissue, muscle, and parietal pleura in the same order. A 1 to 2 cm skin incision was made with a scalpel, which was followed by a blunt dissection of intercostal muscles using curved artery forceps until the pleural space is reached. Once pleural space was entered a disposable flexible trocar with cannula of an inner diameter of 8mm was inserted through the chest wall. This was followed by the insertion of the semi-rigid thoracoscope through the cannula after removing trocar. Pleural fluid was suctioned to enable clear visualisation of entire pleural surface. Thoracoscope was manoeuvered systematically to see visceral, costal, diaphragmatic surface as well as the costophrenic recess. After selecting suitable site on parietal pleura for biopsy, biopsy forcep was introduced through working channel of the thoracoscope. Pleural biopsy samples (usually 8-10) were obtained from the parietal pleura with biopsy forceps, particularly where it appears abnormal under direct vision with a shearing movement of thoracoscope. After obtaining satisfactory biopsy specimens, pleuroscope was removed, followed by trocar. A chest tube (24F) was introduced through the same space and connected to the underwater seal. Chest radiograph was taken in the immediate post-operative period. The chest tube was removed the next day, if there is good lung expansion and fluid drainage was minimal (less than 50 mL/24 hours).

Results

During the study period, 25 patients [mean age 47.7 years; 16 males] with undiagnosed pleural effusion underwent medical thoracoscopy through semi-rigid thoracoscope. Their characteristic features including pleural analysis are mentioned in table 1. Prior to procedure, initial clinical diagnosis was made based on clinical findings and pleural fluid analysis as suspected malignancy (n=9); suspected tuberculosis (TB) (n=5); in 11 patients there was no clear-cut initial diagnosis.

Thoracoscopic findings were divided into four groups (Figure), namely, nodules (n=10), sago grain lesions (n=8), slough with (n=4) and without (n=3) adhesions.

Table 1. Patient characteristics

Variable	Observations
Symptoms (No.)	Chest pain (22) Breathlessness (20) Cough (19)
Pleural fluid characteristics	
Side of pleural effusion (No.)	Left (14) Right (11)
Appearance (No.)	Straw coloured (16) Haemorrhagic (11)
Grade (No.)	Massive (10) Moderate (15)
Protien (g/dL) (mean±SD)	4.6 (±0.7)
Differential count	Lymphocytic (23) Neutrophilic (2)
Pl glucose (avg) (mg/dL)	64.6 (±13) (overall) 58.2 (in haemorrhagic effusions)
Pl fluid ADA (avg) U/l	31.4 (±10.8)
AFB	–
Malignant cells	–

Definitions of abbreviations: SD=Standard deviation; Pl=Pleural; avg=Average; ADA=Adenosine deamixase activity AFB=Acid-fast bacilli

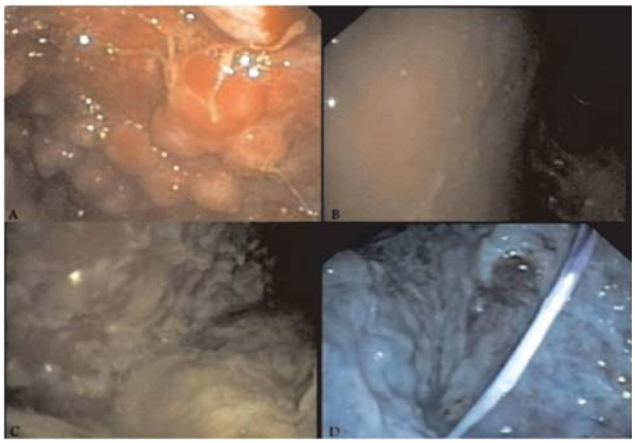

Figure. Thoracoscopic images of lesions, (A) nodules; (B) sago-grain lesions; (C) slough; and (D) slough with adhesions.

Table 2. Thoracoscopic findings and histopathological diagnosis

Thoracoscopic Findings	Malignant (n=10)	Non-malignant (n=15)	
		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**

Table 3. Initial clinical diagnosis and final diagnosis after medical thoracoscopy

Initial Clinical Diagnosis	No. of Cases	Final Histopathological Diagnosis	No. of Cases
Malignant pleural effusion	9	Malignant pleural effusion	8
		Tubercular pleural effusion	-
		Non-specific pleuritis	1
Tubercular pleural effusion	5	Malignant pleural effusion	-
		Tubercular pleural effusion	4
		Non-specific pleuritis	1
No inital diagnosis	11	Malignant pleural effusion	2
		Tubercular pleural effusion	8
		Non-specific pleuritis	1

Ten of the 25 (40%) patients were found to have malignancy, out of which five (20%) had mesothelioma and remaining five (20%) had metastatic malignancy (4 from the lung, 1 from breast). Of the remaining 15 patients, 12 (48%) had TB and the remaining three (12%) were found to have non-specific (idiopathic) pleuritis. Comparison of thoracoscopic findings with the final diagnosis is shown in table 2. Comparison of initial clinical diagnosis with final diagnosis after medical thoracoscopy is shown in table 3. There were no major procedure related complications, other than minor bleeding and empyema in two cases each.

Discussion

The present study aimed at studying the diagnostic yield of medical thoracoscopy in undiagnosed pleural effusions and to assess the complication rate. Overall diagnostic yield of the medical thoracoscopy using semi-rigid thoracoscope in our study was 22 out of 25 (88%) patients. Our results are comparable with the observations reported in other studies where a diagnosis could be established in 83% to 93.6% cases.[9-11] Malignancy was confirmed in 10 out of 25 (40%) of cases in our study. The yield was similar to the figure 35.3%,[12] and 44.4%[13] reported in other studies. Among the non-malignant cases, 48% were diagnosed to have TB. In comparison, Huang *et al*[11] reported a yield of 36.2%. In the present study, 12% patients had non-specific pleuritis. Yield in other studies ranged from 5% to 14.3%.[14-16] In our study, among the malignant cases, mesothelioma was diagnosed and metastatic malignancy in five cases each. In another study[16] mesothelioma was reported in 53.6% and metastatic malignancies were reported in 35.6% cases. Medical thoracoscopy confirmed the diagnosed in majority of patients with nodular lesions and sago grain lesions. In the present study, 90% of nodular lesions were diagnosed to be malignant; comparative figures in other studies ranged from over 70%[12] and 92.9%.[16] All eight cases of sago grain lesions were diagnosed to have TB in the present study. Similar results were reported in other studies.[12,16]

Diagnostic yield of the medical thoracoscopy in malignancy and TB suspect cases was 88.9% and 85.7%, respectively. Similar results were reported by Thangakunam *et al*[13] and Loddenkemper *et al*.[8]

There was no mortality and no major complications were encountered during the study, except for few minor complications like minimal bleeding and empyema. These observations are similar to complication rates observed in other studies where 5.8%,[12] 8.5%[17] and 10%[16] complication rates were described.

Conclusions

Medical thoracoscopy being a very simple and safe procedure is an essential investigation unless contraindicated in all cases of undiagnosed pleural effusions. Our observations suggest that it is useful in cases with undiagnosed lymphocytic, exudative pleural effusions and is helpful in differentiating between malignancy and TB.

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