

# Medical Thoracoscopic Assessment of Pleural Abnormalities in Patients With Malignant Pleural Effusion: A Retrospective Analysis

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## ABSTRACT

**Background:** Medical thoracoscopy (MT) has been increasingly used among the patients with undiagnosed pleural effusion with excellent diagnostic performance. Majority of the patients with undiagnosed pleural effusion are used to diagnose as malignant. We aimed our study to assess the diagnostic utility and safety profile of medical thoracoscopy in malignant pleural effusion (MPE).

**Methods:** We retrospectively collected data of the patients with malignant pleural effusion including demographic details, clinical details, performance of thoracoscopy and related complications and histopathology of pleural biopsy. We also obtained data regarding characterization of pleural abnormalities and procedure related complications.

**Results:** 62 out of 112 patients were diagnosed as MPE. The most common histological diagnosis was adenocarcinoma (40.32%) followed by squamous cell carcinoma (20.97%) and mesothelioma (20.97%). Among the primary malignancies leading to MPE, Bronchogenic carcinoma (51.61%) was the most common etiology followed by mesothelioma (20.97%) and metastatic malignancies from extrapulmonary organs like colon, breast and ovary (14.52%). Nodules over parietal pleura was reported in 87% of patients followed by lung nodules (45.16%), pleural thickening (35.48%), adhesions (29%) and

pleural based masses (27.42%). Procedure related complications were mild and self-limiting. Post-operative pain and cough (22.58%) was most commonly observed complications among these patients.

**Conclusion:** Medical thoracoscopy has excellent diagnostic utility and safety profile. Pleural nodules are most commonly observed abnormality on MT.

**Keywords:** Medical Thoracoscopy, Malignant Pleural Effusion, Pleural Abnormalities.

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## INTRODUCTION

Malignant pleural effusion (MPE) is the second most common cause of exudative pleural effusion after parapneumonic effusion.<sup>1</sup> Approximately 40% of lung cancer develop pleural effusion during the course of the disease and half of them are used to too small for any intervention.<sup>2</sup> The presence of pleural effusion is associated with poor prognosis irrespective of the amount of pleural effusion. In patient with undiagnosed pleural effusion if the suspicion regarding malignant etiology is high, repeated thoracentesis for cytological evaluation and pleural biopsy is the first step. However, approximately one forth patient still remain undiagnosed owing to patchy involvement of pleura and pleural thickening less than 10 mm.<sup>3</sup>

Medical thoracoscopy (MT) allows direct visualization of pleural abnormalities and to obtain biopsies under vision that significantly

increases the diagnostic yield. It is particularly important where the pleural involvement is not uniform. Also, it confers some therapeutic value like adhesiolysis and carrying out pleurodesis in the same sitting.

In this retrospective study, we investigate the diagnostic utility and safety of MT among the patients with MPE. Also, we look for characteristics of pleural abnormalities in these patients.

## MATERIALS AND METHODS

We retrospectively evaluated the hospital record of our institute, a tertiary care centre in southern Rajasthan, India for duration of three years, the patients who underwent MT for undiagnosed exudative pleural effusion. We included only patients who were diagnosed as cases of MPE. We extracted information regarding

demographic details, clinical features, pleural fluid analysis, thoracoscopic performance and histopathological diagnosis of pleural biopsy. The study protocol was approved by institutional ethics committee.

Statistical analysis was done using SPSS version 21 (IBM Corp. Ltd, Newark, USA). Data analysis was done using descriptive statistics and presented as either mean and standard deviation or frequency and percentage.



**Fig 1: A: Uniform pleural nodules with flimsy adhesions; B: Varying sized pleural nodules; C: Pleural mass with diffuse pleural thickening; D: Adhesions**

## RESULTS

112 patients with undiagnosed exudative pleural effusion underwent MT. Out of the 112 patients, 62 patients were diagnosed with MPE based on pleural histopathology.

Patients demographic details are given in table 1. Among the patients with MPE, the mean age was  $60.35 \pm 10.76$  years. Majority of the male patients were farmer by occupation (28/38; 73.68%), while females were housewife (22/24; 91.67%). Majority of the patients were non-smokers (35, 56.45%). Among the clinical features, dyspnea [52 patients (83.87%)] was the most common symptom followed by chest pain and cough patients [44 patients (70.97)].

Pleural effusion occurred on right side in 39 (62.9%) patients and on left side in 23 (37.1%) patients. None of the patient was presented with bilateral effusion on radiology. Pleural fluid was hemorrhagic in 45 (72.58%) patients and straw colored in 17 (27.42%) patients. Cytological examination of the pleural fluid revealed malignant cytology in 22 (35.48%) patients (Table 2).

Data on performance characteristics of MT has been provided in table 3. Numbers of pleural biopsies obtained were  $6.69 \pm 1.87$  and the volume of pleural fluid drained during the procedure was  $1271 \pm 632.68$  ml. On thoracoscopic evaluation of pleural cavity, various abnormalities have been observed. These include pleural nodules, adhesions, lung nodules, pleural thickening and pleural based masses (Figure 1). Nodules over parietal pleura was most commonly observed abnormality [54 patients (87%)], followed by lung nodules [28 patients (45.16%)] and pleural thickening [22 patients (35.48%)]. Procedure related complications were mild and transient. Post-operative pain and cough [14 patients (22.58%)] were the most commonly reported complications. No procedure related mortality has been reported.

**Table 1: Demographic characteristics of the patients**

|  |                   |
|--|-------------------|
| <b>Total number of patients, n</b>           | 62                |
| <b>Age, years (mean <math>\pm</math> SD)</b> | $60.35 \pm 10.76$ |
| <b>Male/ Female</b>                          | 38/ 24            |
| <b>Occupation, n (%)</b>                     |                   |
| Farmer                                       | 28 (45.16%)       |
| Housewife                                    | 22 (35.48%)       |
| Stone worker                                 | 2 (3.23%)         |
| Labourer                                     | 6 (9.67%)         |
| Office job                                   | 4 (6.45%)         |
| <b>Smoking status, n (%)</b>                 |                   |
| Current smoker                               | 10 (16.13%)       |
| Ex-smoker                                    | 17 (27.42%)       |
| Non-smoker                                   | 35 (56.45%)       |
| <b>Comorbid conditions, n (%)</b>            |                   |
| Diabetes Mellitus                            | 4 (6.45%)         |
| Hypertension                                 | 2 (3.23%)         |
| Hypothyroidism                               | 2 (3.23%)         |
| Cerebro-vascular accidents                   | 2 (3.23%)         |
| <b>Clinical symptoms, n (%)</b>              |                   |
| Dyspnea                                      | 52 (83.87)        |
| Chest Pain                                   | 44 (70.97)        |
| Cough  | 44 (70.97)        |
| Hemoptysis                                   | 8 (12.9)          |
| Hoarseness of voice                          | 8 (12.9)          |
| Weight loss                                  | 18 (29.03)        |

**Table 2: Pleural fluid analysis**

|  |                   |
|--|-------------------|
| <b>Side of pleural effusion, n (%)</b>             |                   |
| Right  | 39 (62.9)         |
| Left   | 23 (37.1)         |
| <b>Pleural fluid appearance, n (%)</b>             |                   |
| Straw colour                                       | 17 (27.42)        |
| Hemorrhagic  | 45 (72.58)        |
| <b>Cytology, n (%)</b>                             |                   |
| Malignant  | 22 (35.48)        |
| Non-malignant                                      | 40 (64.52)        |
| <b>Protein (gm/dl), (mean <math>\pm</math> SD)</b> | 4.52 $\pm$ 0.9    |
| <b>Glucose (mg/dl), (mean <math>\pm</math> SD)</b> | 75.83 $\pm$ 30.84 |
| <b>ADA* (U/L), (mean <math>\pm</math> SD)</b>      | 26.45 $\pm$ 8.59  |

\*ADA- Adenosine deaminase

**Table 3: Procedural aspect of medical thoracoscopy**

|  |                   |
|--|-------------------|
| <b>Pleural fluid volume, ml, mean <math>\pm</math> SD</b>            | 1271 $\pm$ 632.68 |
| <b>Number of pleural biopsies obtained, mean <math>\pm</math> SD</b> | 6.69 $\pm$ 1.87   |
| <b>Thoracoscopic appearance, n (%)</b>                               |                   |
| Nodules over parietal pleura   | 54 (87.1)         |
| Nodules over lung surface  | 28 (45.16)        |
| Adhesions  | 18 (29.03)        |
| Pleural thickening   | 22 (35.48)        |
| Pleural masses   | 17 (27.42)        |
| <b>Complications, n (%)</b>  |                   |
| Post-operative pain  | 14 (22.58)        |
| Cough  | 14 (22.58)        |
| Subcutaneous emphysema   | 5 (8.06)          |
| Hypotension  | 3 (4.84)          |
| Prolonged air leak   | 3 (4.84)          |

**Table 4: Final diagnosis established by medical thoracoscopy in patients with malignant pleural effusion**

|   |            |
|---|------------|
| <b>Final histopathological diagnosis, n (%)</b> |            |
| Adenocarcinoma                                  | 25 (40.32) |
| Squamous cell carcinoma                         | 13 (20.97) |
| Mesothelioma                                    | 13 (20.97) |
| Small cell carcinoma                            | 3 (4.84)   |
| Undifferentiated carcinoma                      | 8 (12.9)   |
| <b>Primary malignancy</b>                       |            |
| Bronchogenic Carcinoma                          | 32 (51.61) |
| Mesothelioma                                    | 13 (20.97) |
| Metastatic carcinoma                            |            |
| Colon   | 4 (6.45)   |
| Breast  | 3 (4.84)   |
| Ovary   | 2 (3.23)   |
| Unknown primary                                 | 8 (12.9)   |

The frequency of final histopathological diagnosis of MPE was adenocarcinoma in 25 (40.32%), squamous cell carcinoma in 13 (20.97%), mesothelioma in 13 (20.97%) and small cell carcinoma in 4 (4.84%) patients. Among eight patients (12.9%), the histopathology of pleural biopsy was of poorly differentiated or of undifferentiated type. Among the primary malignancies leading to MPE, Bronchogenic carcinoma (51.61%) was most common followed by mesothelioma (20.97%) and metastatic malignancies from extrapulmonary organs like colon, breast and ovary. In eight patients (12.9%) with MPE, the primary malignancy could not be identified.

## DISCUSSION

Exploration of the pleural cavity was firstly introduced by Hans-Christian Jacobeauss for the management of tuberculous pleural effusion.<sup>4</sup> After introduction of medical thoracoscopy, the procedure gained popularity among the clinicians, particularly pulmonologists as it is less invasive, cost-effective, can be performed under conscious sedation and local anaesthesia, owing good safety profile and similar diagnostic yield as compared to video-assisted thoracoscopic surgery (VATS).<sup>5</sup>

Pleural effusion is one amongst the common clinical problem dealt by pulmonologist. Even after substantial work up (biochemical, microbiological and cytological analysis), approximately 20% to 40% of patients are remain undiagnosed.<sup>3,6</sup> Malignant pleural effusion constitutes approximately half of the cases of undiagnosed exudative pleural effusion. Presence of MPE, even minimal non-tapeable effusions is associated with poor survival which ranges from 4-7 months.<sup>2</sup> As per British Thoracic Society guidelines, thoracoscopy should be investigation of choice among the patients with pleural effusion where diagnostic pleural aspiration is inconclusive and the risk of malignancy is high.<sup>7</sup>

In the present study, we retrospectively evaluated the hospital record for performance characteristics of MT, particularly in MPE. We identified 62 patients with MPE which constitute 55.35% of total cases of MT. Munavver M et al. reported MPE among 32 patients (59%) out of the 54 patients with successful pleural biopsy.<sup>8</sup> Similarly, Nattusamy et al observed malignant etiology in 62.5% among the patients with undiagnosed exudative pleural effusion.<sup>9</sup>

We also collected data on performance characteristics of MT which includes drainage of total volume of pleural fluid, number of biopsies taken, macroscopic appearances of pleural abnormalities and procedure related complications. The mean volume of pleural fluid was 1271 ml and mean number of pleural biopsies were 6.69. Macroscopic appearances of pleural abnormalities include pleural nodules, adhesions, pleural based mass, nodules over lung surface and pleural thickening. Among these abnormalities, pleural nodules were most commonly observed finding reported in 87% of the patients. Wu et al retrospectively reviewed 833 patients and found malignant diagnosis in 342 patients. They reported nodular lesions over pleura among 71% patients of MPE.<sup>10</sup>

The leading cause of MPE is the bronchogenic carcinoma followed by pleural mesothelioma, lymphoma and various extra-thoracic malignancies metastasize to pleura notably carcinoma breast, tumours of digestive tract, bone, pancreas and ovary.<sup>11</sup> In our study, bronchogenic carcinoma was the leading cause of MPE and was found in 51% of the cases. Mesothelioma was found in

21% cases followed by carcinoma breast, colon and ovary in 14.5% cases. In eight patients (13%), we could not find the primary tumour. The most common histopathological diagnosis was adenocarcinoma (40%) followed by squamous cell carcinoma (21%) and mesothelioma (21%). Various studies reported similar findings on evaluation of the patients with undiagnosed pleural effusion.<sup>9,10,12</sup>

MT has excellent safety profile in the hands of experienced clinicians. Major complications like pneumonia, bleeding and empyema has been reported in 2.3% and death in 0.4% patients.<sup>1</sup> In the present study, only mild, self-limiting complications were noted. No procedure related mortality was observed during the study period.

## CONCLUSION

In conclusion, MT is the most efficacious diagnostic modality with excellent safety profile in the evaluation of MPE. Presence of pleural nodules increases the possibility of diagnosing malignancy. It should be considered as initial procedure when the probability of MPE is high.

## REFERENCES

1. Feller-Kopman DJ, Reddy CB, DeCamp MM, Diekemper RL, Gould MK, Henry T, et al. Management of Malignant Pleural Effusions. An Official ATS/STS/STR Clinical Practice Guideline. *Am J Respir Crit Care Med*. 2018 Oct 1;198(7):839–49.
2. Porcel JM, Azzopardi M, Koegelenberg CF, The diagnosis of pleural effusions. *Respir Med* [Internet]. 2015; Available from: <https://www.tandfonline.com/doi/abs/10.1586/17476348.2015.1098535>
3. Lodenkemper R. Thoracoscopy—state of the art. *Eur Respir J* [Internet]. 1998; Available from: <https://erj.ersjournals.com/content/11/1/213.short>
4. Jacobaeus H. Fiberoptic laparoscopy and thoracoscopy. 1913. 25(l):170.
5. McDonald CM, Pierre C, Perrot M de, Darling G, Cypel M, Pierre A, et al. Efficacy and Cost of Awake Thoracoscopy and Video-Assisted Thoracoscopic Surgery in the Undiagnosed Pleural Effusion. *Ann Thorac Surg*. 2018 Aug 1;106(2):361–7.

6. Ryan CJ, Rodgers RF, Unni KK, Hepper NG. The outcome of patients with pleural effusion of indeterminate cause at thoracotomy. *Mayo Clin Proc*. 1981 Mar;56(3):145–9.
7. Hooper C, Lee YCG, Maskell N. Investigation of a unilateral pleural effusion in adults: British Thoracic Society pleural disease guideline 2010. *Thorax*. 2010 Aug 1;65(Suppl 2):ii4–17.
8. Munavvar M, Khan M a. I, Edwards J, Waqaruddin Z, Mills J. The autoclavable semirigid thoracoscope: the way forward in pleural disease? *Eur Respir J*. 2007 Mar 1;29(3):571–4.
9. Nattusamy L, Madan K, Mohan A, Hadda V, Jain D, Madan NK, et al. Utility of semi-rigid thoracoscopy in undiagnosed exudative pleural effusion. *Lung India*. 2015 Mar 1;32(2):119.
10. Wu Y-B, Xu L-L, Wang X-J, Wang Z, Zhang J, Tong Z-H, et al. Diagnostic value of medical thoracoscopy in malignant pleural effusion. *BMC Pulm Med*. 2017 Aug 4;17(1):109.
11. Marel M, Stastny B, Melinová L, Svandová E, Light RW. Diagnosis of pleural effusions. Experience with clinical studies, 1986 to 1990. *Chest*. 1995 Jun;107(6):1598–603.
12. Prabhu VG, Narasimhan R. The role of pleuroscopy in undiagnosed exudative pleural effusion. *Lung India*. 2012 Apr 1;29(2):128.

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