

**Medical Thoracoscopy in Undiagnosed Pleural Effusion: Initial Experience from a Tertiary Care Hospital of Eastern India**Md Arshad Ejazi<sup>1</sup>, Satyadeo Choubey<sup>2</sup>, Manish Shankar<sup>3</sup>, Susayan Konar<sup>4</sup><sup>1</sup>Assistant Professor, Department of Pulmonary Medicine, IGIMS, Patna, Bihar, India<sup>2</sup>Associate Professor, Department of Pulmonary Medicine, IGIMS, Patna, Bihar, India<sup>3</sup>Additional Professor and HOD, Department of Pulmonary Medicine, IGIMS, Patna, Bihar, India<sup>4</sup>Junior Resident, Department of Pulmonary Medicine, IGIMS, Patna, Bihar, India.

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**Abstract****Background:** Today medical thoracoscopy or pleuroscopy is the gold standard approach for making a diagnosis of undiagnosed pleural effusion, as it is a safe and cost effective intervention.

The aim of the study is to identify the diagnostic value and yield of medical thoracoscopy in the identification of exudative pleural effusion cases with undiagnosed cause.

**Method:** This is a hospital based descriptive type of observational study done on ninety nine (99) patients, those presented with moderate to massive pleural effusion fulfilling inclusion criteria of study at department of Pulmonary Medicine IGIMS Patna Bihar between 2021-2022.

Under local anaesthesia, a semi rigid thoracoscope was used for thoracoscopy. Data related to histopathological and thoracoscopic finding of patients were collected and analysed.

**Results:** Ninety-nine (99) patients in total were enrolled in the study. These ninety-nine (99) patients ranged in age from 18-80 years, with 57 male and 42 female. Multiple variable sized pleural nodules (46.5 %) were the more frequent gross thoracoscopic finding followed by mass lesion (15.2 %). Most common histopathological diagnosis was malignancy (62.6 %) with metastatic adenocarcinoma being the most common subtype (45%).**Conclusion:** Medical thoracoscopy is a safe minimally invasive and cost effective method with significant diagnostic yield in the evaluation of undiagnosed exudative pleural effusion with very few complications.**Keywords:** Pleural effusion, Medical thoracoscopy, Malignancy.

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**Introduction**

An abnormal buildup of pleural fluid in the pleural cavity is known as a pleural effusion. In India TB, bacterial pneumonia, malignancy, congestive heart failure, renal failure, connective tissue disorders, and pulmonary embolism are prominent causes of pleural effusion. In less than 20% of instances, the diagnosis cannot be made despite a complete clinical, radiographic, and cyto-chemical evaluation of aspirated fluid and a strong medical history [1].

Today, the gold standard approach for making a diagnosis and managing these individuals is a pleural biopsy guided by thoracoscopy [2]. Thoracoscopy, is a day-care method that uses conscious sedation and local anaesthetic to safely visualise the pleural space and intra-thoracic structures, and is a minimally invasive intervention [3]. In Ireland in 1866, FR Cruise performed the first thoracoscopy using a cystoscopes. The first thoracoscopy was carried out in 1910 by Swedish

doctor HC Jacobeus as a diagnostic method for exudative pleuritis [4].

In recent years, Pulmonary physicians have taken a renewed interest in medical thoracoscopy due to the availability of better instrumentation and simpler sedation techniques [5].

Evaluation of exudative pleural effusions that remain unexplained after pleural fluid analysis is the main reason for medical thoracoscopy. Typically, cytological and biochemical tests are required to provide a diagnosis in all pleural effusions. Both rigid and semi-rigid thoroscopes are still useful for diagnosing and treating pleural illness, although most centres choose to use a rigid thoracoscope because it provides the best visibility and access to the thoracic cavity, allowing for the collection of sufficient-sized pleural biopsy samples [6].

The semirigid thoracoscope achieves a diagnostic yield similar to that of conventional rigid instrument despite the small biopsy size. Both instruments remain valuable in the evaluation and management of pleural disease [7]. When used on patients with malignant pleural illness, it has a 95% diagnostic yield, a 90% success rate of pleurodesis in malignant pleural effusions, and a 95% success rate of pleurodesis in pneumothoraces [8].

### Materials and Methods

This is a hospital based descriptive type of observational study done on 99 patients (sample size) who presented with moderate to massive exudative pleural effusion at THE DEPARTMENT OF PULMONARY MEDICINE IGIMS, PATNA, BIHAR. Once we considered the patient for thorascopic procedure, we recorded the detailed history including smoking habits, history of antitubercular treatment, occupational history, exposure to asbestos, previous history of pleurodesis along with detailed respiratory and systemic examinations in the prescribed proforma.

This study included the patients who had inconclusive inference on biochemical, cytological and microbiological pleural fluid analysis.

After a thorough history and physical examination, all eligible patients underwent the requisite haematological, and radiological tests, and thorascopy procedure was carried out after taking informed consent.

The institutional ethical committee gave its approval for the study. The following are inclusion and exclusion criteria.

#### Inclusion Criteria

1. Exudative pleural effusion as per the Light's criteria.
2. Age 18-80 years.
3. ADA level <40IU/L.
4. No endobronchial growth on assessment with fiber optic bronchoscopy.
5. No known underlying lung disease causing pleural effusion like TB or malignancy.
6. Patient willing to give consent for thorascopy.

#### Exclusion Criteria

1. Transudative pleural effusion as per Light's criteria
2. Age <18 and >80 years
3. ADA level >40 IU/L
4. Pleural fluid cytology positive for malignancy.

5. Microbiological confirmed TB.
6. Pregnant and lactating female.
7. Bleeding diathesis
8. Surgically unfit patients.

All the included patients having un-diagnosed pleural effusion were selected for medical thorascopy and guided pleural biopsy.

#### Thorascopy Procedure:

Under local anaesthesia, a semi-rigid thoracoscope was used for thorascopy. Patients were made to lie in a lateral decubitus position with the affected side facing upwards after receiving good intravenous access. Vital indicators like the ECG, blood pressure, and oxygenation were continuously tracked throughout the intervention. Typically, between the fourth and sixth intercostal spaces in the midaxillary line, the port of site was chosen under the ultrasound guidance. 10 ml of 2% lignocaine was used to numb the skin, subcutaneous tissue, intercostal muscles, and parietal pleura. To improve the comfort without impairing respiration, patients also received intravenous fentanyl. To access the pleural cavity, a 2-3 cm long incision was made at the appropriate location. The subcutaneous tissue and the intercostal muscles were bluntly dissected, to reach the pleural space and a trocar was then inserted. A semi-rigid thoracoscope was passed, and the pleural cavity and pleura were thoroughly examined.

Usually 5-7 biopsies were taken from the parietal pleura from the suspicious lesion. If no gross abnormalities were present at the parietal pleura, then multiple biopsies were taken from different sites. Pleural biopsies were taken using the lateral lift and peel technique. By using biopsy forceps, any adhesions that were present were carefully broken as much as possible. Following biopsies, the pleural cavity was thoroughly checked for signs of current bleeding. Chest tube of 24 F was then inserted through the trocar site, coupled with an under-water seal bag, duly secured by skin suture.

#### Result

99 patients in total were enrolled in the study. These 99 patients ranged in age from 18 to 80 years, with 57 (57.57%) men and 42 (42.42%) women. The age range of 61-70 years had the highest percentage of patients (29.3%), followed by 41-50 and 51-60 years, each with 17.2% and 18.2% of patients respectively. Patients between the ages of 31-40 years made up the least number. (Table 1)

**Table: 1 Age group and gender distribution**

Age group	Male	Female	Total	Percentage(%)
<30	7	6	13	13.1
31 - 40	4	8	12	12.1
41 - 50	8	9	17	17.2
51 - 60	10	8	18	18.2
61 - 70	20	9	29	29.3
> 70	8	2	10	10.1
Total	57	42	99	100.0

Multiple variable pleural nodules were the most frequent gross thoracoscopic visual observations in 46 patients (46.5%), followed by mass lesion in 15 patients (15.2%), whitish cheesy deposits in 14 patients (14.1%), sago grain appearance in 5 patients (5.1%), smooth apparently healthy pleura in 5

patients (4%), adhesion in 4 patients (4%), single nodule in 4 patients (4%), diffuse pleural thickening in 3 patients (3%), ulcerative lesion in 2 patients (3%) and hyperaemic pleura in 1 patient (1%) respectively.(Table 2)

**Table: 2 Thoracoscopic findings**

Thoracoscopic findings	Frequency	Percentage(%)
Multiple variable pleural nodule	46	46.5
Mass lesions	15	15.2
Whitish cheesy deposits	14	14.1
Sago grain appearance	5	5.1
Smooth apparently healthy pleura	5	5.1
Adhesions	4	4.0
Single nodule	4	4.0
Diffuse pleural thickening	3	3.0
Ulcerative lesions	2	2.0
Hyperemic pleura	1	1.0
Total	99	100.0

Out of the 99 patients, 62 (61.36%) had malignant effusion, out of which 28 patients (28.3%) were diagnosed to have adenocarcinoma, 24 patients (24.2%) were diagnosed as tuberculosis and 13 patients (13.1%) had inconclusive diagnosis.(Table 3)

**Table: 3 HPE based diagnosis**

HPE based diagnosis	Frequency	Percentage(%)
Confirmed malignancy-Adenocarcinoma	28	28.3
TB	24	24.2
Confirmed malignancy-unspecified	19	19.2
Inconclusive	13	13.1
Suspicious of malignancy	9	9.1
Confirmed malignancy-Mesothelioma	4	4.0
Confirmed malignancy-Metastatic SCC	1	1.0
Confirmed malignancy-Lymphoma	1	1.0
Total	99	100.0

Out of the 62 patients diagnosed to have malignancy, 28 patients (52.83%) had adenocarcinoma, followed by 19 patients (35.84%) with unspecified malignancy, 4 (7.54%) patients had mesothelioma, 1 patient (1.88%) had lymphoma and 1 patient (1.88%) had metastatic small cell carcinoma (SCC).(Table 4)

**Table 4 Types of malignancy**

Type of malignancy	Frequency	Percentage (%)
Adenocarcinoma	28	52.83
Unspecified	19	35.87
Mesothelioma	4	7.54
Lymphoma	1	1.88
Metastatic SCC	1	1.88
Total	53	100

Out of the 99 patients, 85.9% had dyspnoea on exertion (DOE), 79.8% had chest pain, 45.5% had cough and 19.2% had fever respectively. (Figure 1)

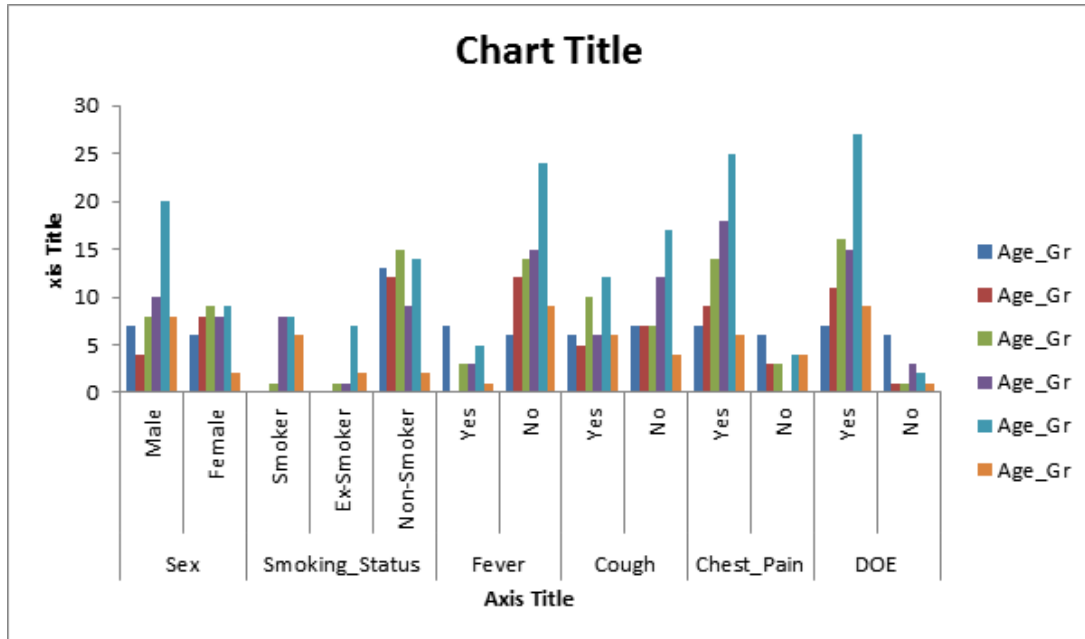


Figure: 1 Bar chart showing distribution of gender, smoking status, symptoms in various age grouping

**Discussion**

In this study, pleural effusions that remained unexplained after careful microbiological, cytological and biochemical examinations were the primary rationale for thoracoscopy. Thoracoscopy is a preferable alternative, as the percutaneous blind needle biopsy has a lower diagnostic sensitivity [9]. Thoracoscopy is more cost-effective overall since it produces better results and requires less hospital stay [10]. A significant benefit of medical thoracoscopy is the direct visualisation of the pleural surface and to aid the targeted biopsy from the suspicious lesion. Additionally, loculated effusions can be treated using adhesionolysis.

In our study 24.2% of patients had granulomatous inflammation suggestive of tuberculosis, which were later proved by CBNAAT. According to Prabhu et al., 23.53% of patients had tuberculosis as their final diagnosis [17]. In a similar vein, Wang et al. reported tuberculosis as the final diagnosis in 22% of patients. Helala et al. recorded a definitive diagnosis of tuberculosis in 22.5% of patients, and Jiang et al. reported tuberculosis pleurisy in 21.6% of the patients [15,18,19].

In the current study, malignancy was the most typical histological diagnosis (61.36%). Hucker et al. reported a malignancy incidence of 59%, Dhanya et al. reported a rate of 55.8%, Hansen et al. reported a rate of 62%, and Patel et al. reported a rate of 56.6% [11,12,13,14]. In contrast, Prabhu et al. observed that only 35.3% of the research participants had cancer.

In our analysis the most common malignancy was adenocarcinoma in 28 patients (52.83%), followed by 19 patients (35.84%) having unspecified malignancy, 4 (7.54%) mesothelioma, 1 (1.88%) lymphoma and 1 (1.88%) metastatic small cell carcinoma. These findings were at odds with those of the study by Helala et al., in which malignant mesothelioma was discovered in 53.6% of patients and metastatic adenocarcinoma in 35.6% of cases [15]. In most of the research, adenocarcinoma was likewise the most often reported malignancy; 62.5% by Prabhu et al. and 76.9% by Agarwal et al [16,17].

The most frequent thoracoscopic findings in the current study was multiple variable pleural nodules, which was discovered in 46.5% of patients followed by mass lesions in 15.2% of patients and sago grain appearance in 5.1% of patients. In individuals with multiple variable pleural nodules and mass lesion, the final diagnosis was malignancy in 80.43% and 86.66% of the patients respectively. Tuberculosis was the final diagnosis in all (100%) of the patients with sago grain appearance in our study.

Nodules were reported in 48.53% of patients by Prabhu et al. and sago grain appeared in 11.76%. Also 70% of patients with nodules had cancer as their final diagnosis, and similar to our data, all patients with sago grain appearance had tuberculosis [17]

Similar to the current study, 54.54% of 44 patients in a study by Elshamly MM et al. had numerous pleural nodules. 13.6% of patients had pleural masses, while 18.18% of patients had pleural

thickening. While in 6.81% of patients, pleural loculations with adhesions were discovered [20].

### Conclusion

Undiagnosed exudative pleural effusion poses a diagnostic challenge in a significant number of patients even after a dedicated battery of biochemical, microbiological and pathological examinations of the pleural fluid.

Medical thoracoscopy prove to be the minimally invasive, safe and cost-effective modality to sample the parietal pleura under vision. The diagnostic yield of the procedure has proven to be appealing in many studies including the current study. In the experienced hands the procedure is relatively safe and usually devoid of major complications.

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