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Original Research Article.

A Cross Sectional Study to Assess Various Outcomes among Undiagnosed Exudative Pleural Effusion Patients through Medical Thoracoscopy

Neerav Tyagi

**MBBS, MD (TB & Chest), Assistant Professor, Department of T.B. & Chest,
Rama Medical College Hospital & Research Centre, Hapur, Uttar Pradesh, India.**

ABSTRACT

Background: Thoracoscopy is a minimally invasive procedure that allows visualization of the pleural space and intrathoracic structures. The aim of this study to evaluated the thoracoscopic appearance of the pleura found in cases of moderate to massive pleural effusions.

Material & Methods: This is a hospital based descriptive type of observational study done on 50 patients those presented with recurrent moderate to massive exudative pleural effusion at our department, underwent thoracoscopy after detailed discussion about risk vs. benefit analysis. On the basis of which according to predefined criteria's e.g. lights criteria, patients were further divided in to two groups first having transudative pleural effusion and second having exudative pleural effusion.

Results: The present study showed that male preponderance with the overall age ranges from 18 to 79 years (mean age was 56 years). Farmers constituted the majority with 19 patients (38%). The appearance of pleural surface in CECT of chest, Mostly nodular pleural surface seen in 32 patients (64%), followed by thickened 13 cases (26%) and smooth surface seen only in 5 cases (10%).

Conclusion: The results of this study suggest that medical thoracoscopy should be considered in patients with undiagnosed exudative pleural effusions, particularly those lymphocytic exudative effusions where TB and malignant pleural effusion are clinical possibilities and initial pleural fluid analysis is inconclusive.

Keywords: Pleural Effusion, Thoracoscopy, Exudative, Undiagnosed.

***Correspondence to:**

Dr. Neerav Tyagi,
MBBS, MD (TB & Chest),
Assistant Professor,
Department of T.B. & Chest,
Rama Medical College,
Hapur, Uttar Pradesh, India.

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INTRODUCTION

Pleural effusion is an abnormal accumulation of fluid within the pleural cavity. Pleural effusion is one of the most common clinical conditions encountered in pulmonary practice. Accumulation of pleural fluid is not a specific disease, but reflects an underlying pathological process. In India common causes of pleural effusion are tuberculosis, bacterial pneumonia, malignancies, congestive heart failure, renal failure, connective tissue disorders and pulmonary embolism. The diagnostic work up in all cases of pleural effusion requires careful history, physical examination, supported by imaging studies and other specific investigation.[1]

Undiagnosed pleural effusions remain a diagnostic challenge for pulmonologists. In a patient with an undiagnosed pleural effusion, the first question to answer is whether the fluid is an exudate or a transudate.[2] 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.[3]

Thoracoscopy is a minimally invasive procedure that allows visualization of the pleural space and intrathoracic structures. It enables the taking of pleural biopsies under direct vision, therapeutic drainage of effusions and pleurodesis in one sitting.[4]

Pleural effusion of unknown origin remains the commonest indication of pleuroscopy and is considered to be one of the techniques with the highest diagnostic yield in "aspiration cytology negative exudative effusions" from the recent British Guidelines, with an efficacy almost comparable to video assisted thoracoscopic surgery (VATS).[5] Medical thoracoscopy should be considered in patients with undiagnosed pleural effusions, particularly those lymphocytic exudative effusions where TB and malignant pleural effusion are clinical possibilities and initial pleural fluid analysis is inconclusive.[6] Thoracoscopy is the gold standard for the diagnosis and treatment of pleural diseases. Its diagnostic yield is 95% in patients with malignant pleural disease, with approximately 90% successful pleurodesis for malignant pleural effusion and 95% for pneumothorax.[7]

The semirigid thoracoscope achieves a diagnostic yield similar to that of the conventional rigid instrument despite the smaller biopsy size. Both instruments remain valuable in the evaluation and management of pleural disease.[8] Thoracoscopy with flex-rigid thoracoscope is a useful diagnostic tool in the evaluation of pleural effusions with negative blind pleural biopsy and cytology.[9] The aim of this study to evaluated the thoracoscopic appearance of the pleura found in cases of moderate to massive pleural effusions.

MATERIALS & METHODS

This is a hospital based descriptive type of observational study done on 50 patients those presented with recurrent moderate to massive exudative pleural effusion at our department, underwent thoracoscopy after detailed discussion about risk vs. benefit analysis. Once we consider the patient for thoracoscopic procedure, we record detailed history including smoking habits, history of anti-tubercular treatment, occupational history, exposure to asbestos, previous history of pleurocentesis, along with detailed respiratory and other systemic examinations in a proforma.

Inclusion Criteria

1. Patient willing for participation in the study
2. All moderate to massive exudative pleural effusions remaining undiagnosed on initial & repeated cytobiochemical analysis of pleural fluid and not falling in exclusion criteria.

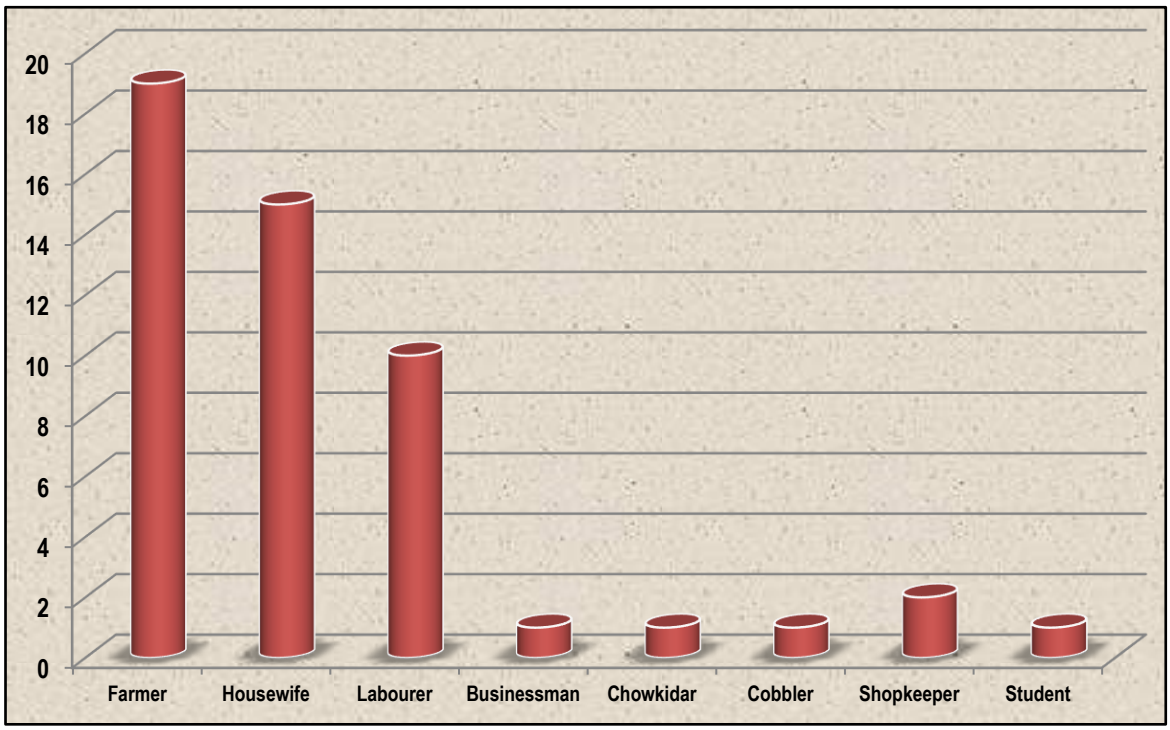
Exclusion Criteria

1. AGE <12 yr and >80 yr
2. Non co-operative patients
3. Mild pleural effusion
4. Bleeding diathesis
5. Hemodynamic unstable and intractable cough patients
6. Transudative pleural effusion
7. Local skin infection
8. Major psychiatric illness
9. Pregnancy & lactation
10. Patients having cardiac instability and other serious co-morbid illness

Informed consent was taken from all the patients included in this study. On the basis of which according to predefined criteria's e.g. lights criteria, patients were further divided in to two groups first having transudative pleural effusion and second having exudative pleural effusion. Those having transudative pleural effusion were excluded from study. All patients having exudative pleural effusion were further evaluated with above mentioned investigations. When these investigations of pleural fluid failed to provide the diagnosis, it was labelled as undiagnosed exudative pleural effusion and patient were selected for Medical thoracoscopic guided pleural biopsy. All the data were collected and analysed performing as per standard statistical tests.

Table 1: Demographic Characteristics of Study Population

Baseline Characteristics	Subjects (n)
Total Number of Patients	50
Mean Age (yrs)	56 yrs
Minimum Age	18 yrs
Maximum Age	79 yrs
Male: Female	2.12 :1



Graph 1: Distribution of Study Population According To Occupation

Table 2: Shows the Cytochemical Analysis In Study Population

Cytochemical Analysis	Mean Value	SD
TLC	1808	844.5
Neutrophil	14.04	7.672
Lymphocyte	85.68	8.004
Protein	4.567	0.566
Sugar	84.22	22.95
ADA	35.24	3.304

Table 3: Distribution of Study Population According To CECT of Chest

CECT		No. of patients	Percentage (%)
Pleural Surface	**Nodule**	32	64.0%
	Smooth	5	10.0%
	Thickening	13	26.0%
Med. Lymph node		29	58.0%

Table 4: Distribution of Study Population According To Gross Appearance of Pleural Fluid By Thoracoscopy

Colour	No. of patients	Percentage (%)
Serosanguinous	14	28%
Hemorrhagic	28	56%
Serous	2	4%
Straw	6	12%
Total	50	100%

Table 5: Total Diagnosed Yield of Thoracoscopy Based On Histopathological Results

Pathological Results	No. of Patients	Percentage (%)
Definitive diagnosis by Thoracoscopy	47	94%
Remained undiagnosed	3	6%
Total	50	100%

RESULTS

The present study showed that male preponderance with the overall age ranges from 18 to 79 years (mean age was 56 years) (table 1). Farmers constituted the majority with 19 patients (38%), 15 patients (all females except 1 was student) were housewives (30%) and 10 patients were labourer (20%) (graph 1).

In this study total mean value of TLC, Neutrophil, Lymphocyte, Protein, Sugar and ADA were 1808±844.5, 14.04±7.672, 85.68±8.004, 4.567±0.566, 84.22±22.95 and 35.24±3.304 respectively (table 2).

The appearance of pleural surface in CECT of chest, Mostly nodular pleural surface seen in 32 patients (64%), followed by thickened 13 cases (26%) and smooth surface seen only in 5 cases (10%). The median lymph node present in 29 cases (58%) (table 3). The characteristics of pleural fluid by thoracoscopy, hemorrhagic fluid in 28 patients (56%), serosanguinous in 14 patients (28%) and straw fluid seen in 6 patients (12%) (table 4). Out of 50 cases that remained undiagnosed after repeated biochemical & cytological analysis, 47 patients (94%) were diagnosed by means of thoracoscopic pleural biopsy and 3 patients remained undiagnosed (couldn't arrive at specific diagnosis to initiate treatment) (table 5).

DISCUSSION

In our study fifty patients were included in which 34 (68%) male and 16 (32%) female, most of the patient had age more than 50 year, the mean age of study population was 56 years and male: female ratio was 2.12:1. Similar results consisted with Mostafa Mahmoud Abdel Mageid Shaheen et al (2014)[10] showed the mean age of patients was 53 years and female to male ratio was 5:3 and another study done by Laila A et al[11] on diagnostic yield of medical thoracoscopy in cases of undiagnosed pleural effusion and shows the mean age of 51.3±16.3 years & male to female ratio was 7:3.

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]

In our study it was observed that farmers constituted the majority with 19 patients (38%), 15 (all females except 1 was student) were housewives (30%), 10 were labourer (20%). Accumulation of pleural fluid is not a specific disease, but reflects an underlying pathological process. A thorough occupational history should be elicited. This should include the dates and amount of exposure to

asbestos, circumstances and environment (e.g. ventilation, use of respiratory protection) and details of the employer (to aid subsequent compensation claims). High-risk occupations for asbestos exposure include construction, insulation, electrical repair, carpentry, plumbing, ship-building and petrochemical plant work.[13] Amount of effusion was massive in 15 (30%) and moderate in 35 (70%) in our study. Thirteen (86.66%) patients of massive effusion were diagnosed malignant in our observation. According to Scheurich JW et al[14], the massive effusions (complete or near-complete opacification) are most commonly malignant. A similar study done by Mostafa Mahmoud Abdel Mageid Shaheen et al in 2014[10] in which Chest X-ray and CT were done before thoracoscopy to all studied patients; 20 patients (50%) had right sided pleural effusion, 15 patients (37.5%) had left sided effusion and five patients (12.5%) had bilateral effusion. Patients with bilateral pleural effusion were finally diagnosed as tuberculous in two, combined malignancy and tuberculosis in one, metastatic adenocarcinoma from cancer breast in one and the last patient was diagnosed as brucellosis. Amount of effusion was massive in 20 patients (50%), moderate in 18 (45%) and mild only in two (5%) patients.

In this study according to characteristics of pleural fluid, hemorrhagic fluid seen in 28 patients (56%), serosanguinous in 14 patients (28%), straw coloured fluid seen in 6 patients (12%) and serous fluid seen in 2 patients (4%). In our study the majority of patients (56%) with haemorrhagic pleural effusion were finally diagnosed malignant and other were diagnosed 14 (28%) tuberculosis & 3 (6%) were non-specific. According to Mostafa Mahmoud Abdel Mageid Shaheen et al (2014)[10] the gross appearance of pleural fluid, 19 patients presented with hemorrhagic effusion (47.5%), 20 (50%) presented with straw coloured and one (2.5%) presented with green coloured pleural effusion. The majority (79%) of patients with hemorrhagic effusions were finally diagnosed as malignant, other diagnoses were tuberculous and parapneumonic effusions. So the haemorrhagic appearance of the pleural fluid narrowed the differential diagnosis predicting the malignant nature of the effusion in most of the patients.

The present study observed the mean value of ADA of study population was 34.11 IU/L. Although, lymphocytic predominant fluid is usually seen in tubercular pleural effusion but it is also seen in case of malignancy also. In our study ADA <40 IU/L patients were 30 (60%) and ADA > 40 IU/L patients were 4 (8%) were malignant. Adenosine deaminase (ADA) is an essential enzyme in the metabolism of purine nucleosides. Pleural fluid ADA estimation is quick and relatively inexpensive. The most widely accepted cut-off level of ADA for the diagnosis of tubercular pleural effusion (TPE) is 40 IU/l.[15-16] In present study we took ADA≤ 40 IU/l as in agreement with other studies. Previous studies showed that less than 3% of patients suffering from non-tuberculous lymphocytic pleural effusions have reported ADA levels over the diagnostic cut-off of 40 IU/l.[17,18]

In our study majority of patients (32/50, 64%) having nodular pleural surface followed by thickened (13/50, 26%) by CECT procedure. Majority of patients having nodular pleural surface (28/32, 87.5%) diagnosed as malignant and rest (4/32, 12.5%) were tubercular. Those having thickened pleural surface diagnosed as tuberculosis (6/13, 46.15%) followed by malignant (5/13, 38.46%) and rest were undiagnosed (2/13, 15.38%). There are features of contrast enhanced thoracic CT scanning which can help differentiate between benign and malignant disease. In a study of 74 patients, 39 of whom had malignant disease, Leung et al[19] showed that malignant disease is favoured by nodular pleural thickening, mediastinal pleural thickening, parietal pleural thickening greater than 1 cm, and circumferential pleural thickening. Scott et al[20] evaluated these criteria in 42 patients with pleural thickening; 32 of the 33 cases of pleural malignancy were identified correctly on the basis of the presence of one or more of Leung's criteria. When investigating a pleural effusion a contrast enhanced thoracic CT scan should be performed before full drainage of the fluid as pleural abnormalities will be better visualised.[21] CT scanning has been shown to be superior to plain radiographs in the differentiation of pleural from parenchymal disease.

In our study observed that the appearance of pleural surface in thoracoscopy of pleural cavity, nodular pleural surface (29/50, 58%), followed by thickened (16/50, 32%) and smooth surface (5/50, 10%). A compelling support to the present study was given by Prabhu and Narasimhan (2012)[22] who performed pleuroscopy in a total of 68 patients (55 males and 13 females; mean age 49 years), nodules were found in 33 patients, 26 patients had adhesions, 8 patients had sago grain appearance, and one patient had normal pleura. They reported that, the direct visualization of the pleural surfaces had an advantage in arriving diagnosis. When the pleuroscopic findings were compared with the final histopathological examination reports, it was found that >70% of patients who had nodules had malignant lesion, >96% of patients who had adhesion had chronic or sub-acute inflammation (non-malignant lesion) and 100% of patients who had sago grain nodules had tuberculosis.

In our study observed that the sensitivity of medical thoracoscopy in undiagnosed exudative pleural effusion was 94%. Other studies showed variable diagnostic yield; in a prospective study on 40 patents from South Africa, thoracoscopy had a diagnostic yield of 98%[23]. Kendall[24] reported yield of thoracoscopic pleural biopsy to be 83% in their study in the United Kingdom. Tscheikuna[25] reported that thoracoscopy was diagnostic in 95% of 34 patients.

CONCLUSION

The results of this study suggest that medical thoracoscopy should be considered in patients with undiagnosed exudative pleural effusions, particularly those lymphocytic exudative effusions where TB and malignant pleural effusion are clinical possibilities and initial pleural fluid analysis is inconclusive. In this study the sensitivity of medical thoracoscopy in undiagnosed exudative pleural effusion was 94%.

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