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**Original Research Article**

# "A STUDY ON DIAGNOSTIC YIELD OF MEDICAL THORACOSCOPY IN MODERATE TO MASSIVE PLEURAL EFFUSION IN A TERTIARY CARE CENTER"

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**ABSTRACT:**

**Background:** Pleural effusion is a common clinical entity encountered in pulmonary practice. Although the radiographic detection of pleural abnormalities may be obvious, determination of a specific diagnosis can present a challenge. Computed axial tomographic (CT) and ultrasound scans of the thorax and bronchoscopy with transbronchial biopsies may be helpful in selected circumstances, but the diagnostic yield for pleural disease is disappointingly low

**OBJECTIVES:**

1.To assess the Diagnostic yield of medical thoracoscopy in moderate to massive pleural effusions.

2. To observe the correlation in gross thoracoscopic findings and pleural biopsy reports among patients with undiagnosed pleural effusion.

3. To evaluate the safety and complications of the thoracoscopy.

**MATERIAL & METHODS: Study Design:** Prospective hospital based observational study. **Study area:** The present study was conducted in the department of TB & Respiratory medicine, Osmania Medical College, Hyderabad. **Study Period:** Mar. 2021 – Feb. 2022. **Study population:** Patients with undiagnosed moderate to massive exudative pleural effusion who presented to The Department of Pulmonary medicine. **Sample size:** 31 cases including male and female patients were studied and analysed.

**Results:** In hemorrhagic pleural effusion ,94.5% patients were malignant out of which 10 patients (55.5%) had adenocarcinoma, 4 patients had squamous cell carcinoma (22.2%), 1

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patient had mesothelioma (5.5%) and 2 patients had metastasis (11%) and 1 patient had tuberculosis (5.5%) whereas out of 13 non-hemorrhagic pleural effusions 10 (76.9%)patients were diagnosed to have tuberculosis and 2 patients (15.3%) had malignant etiology and 1 patient (7.6%) had inconclusive report.

**CONCLUSION:** From our study it can be concluded that Medical thoracoscopy is a safe and effective tool for diagnosis in patients with undiagnosed exudative pleural effusion with high diagnostic yield and low complication rate.

**Keywords:** pleural effusion, Light's Criteria Rule, Medical thoracoscopy

## INTRODUCTION:

A pleural effusion is collection of fluid abnormally present in the pleural space, usually resulting from excess fluid production and/or decreased lymphatic absorption. It is the most common manifestation of pleural disease, and its etiologies range in spectrum from cardiopulmonary disorders and/or systemic inflammatory conditions to malignancy.

Pleural effusion is a common clinical entity encountered in pulmonary practice. Although the radiographic detection of pleural abnormalities may be obvious, determination of a specific diagnosis can present a challenge. Computed axial tomographic (CT) and ultrasound scans of the thorax and bronchoscopy with transbronchial biopsies may be helpful in selected circumstances, but the diagnostic yield for pleural disease is disappointingly low [(1,2)]. Percutaneous access to the pleural space is diagnostically useful and relatively simple; however, approximately 25 percent of pleural abnormalities remain undiagnosed after thoracocentesis and/or closed pleural biopsies [(3–6)]. Undiagnosed pleural effusions present an increasing diagnostic burden upon healthcare providers internationally.

Determining the cause of a pleural effusion is greatly facilitated by analysis of the pleural fluid. Thoracentesis is a simple bedside procedure with imaging guidance that permits fluid to be rapidly sampled, visualized, examined microscopically, and quantified for chemical and cellular content. A systematic approach to analysis of the fluid in conjunction with the clinical presentation allows clinicians to diagnose the cause of an effusion, narrow the differential diagnoses, and design a management plan in a majority of patients who undergo pleural fluid analysis.

**PLEURAL FLUID ANALYSIS** — Tests routinely performed on pleural fluid include cell count and cell differential, pH, protein, lactate dehydrogenase (LDH), and glucose. Additional commonly performed tests in selected patients include amylase, cholesterol, triglycerides, N-terminal pro-brain natriuretic peptide (BNP), creatinine, adenosine deaminase, gram and acid-fast bacillus (AFB) stain, bacterial and AFB culture, and cytology. Initial diagnostic clues can be obtained by gross inspection of pleural fluid as it is being aspirated from the patient's chest [(7)].

**Diagnostic criteria** — The **Light's Criteria Rule** is a traditional method of differentiating transudates and exudates that measures serum and pleural fluid protein and LDH [(8)]. Abbreviated versions of Light's Criteria Rule have similar diagnostic accuracy and have been recommended for clinical use [(9)] [(10)].

Hence the present study was undertaken to detect diagnostic yield of medical thoracoscopy in cases of moderate to massive pleural effusions.

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**AIM:** To detect diagnostic yield of medical thoracoscopy in cases of moderate to massive pleural effusions.

**OBJECTIVES:**

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3. To evaluate the safety and complications of the thoracoscopy.

**MATERIAL & METHODS:**

**Study Design:** Prospective hospital based observational study.

**Study area:** The present study was conducted in the department of TB & Respiratory medicine, Osmania Medical College, Hyderabad.

**Study Period:** Mar. 2021 – Feb. 2022.

**Study population:** Patients with undiagnosed moderate to massive exudative pleural effusion who presented to The Department of Pulmonary medicine.

**Sample size:** 31 cases including male and female patients were studied and analysed.

The diagnostic yield for Thoracoscopic biopsy in cases of undiagnosed exudative pleural effusions was given as 97% (p=0.97) from the previous study[11]. Considering the 95% level of confidence interval (Z=1.96) with 6% precision (d=0.06) the minimum required sample size was calculated according to the following formula.

$$n = \frac{(Z\alpha_{/2})^2 \times p \times (1-p)}{(d)^2}$$

$$n = \frac{(1.96)^2 \times (0.97) \times (1-0.97)}{(0.06)^2} = 31.05 \cong 31$$

**Sampling method:** Simple random Sampling Technique.

**Inclusion criteria:**

1. patients with moderate to massive exudative pleural effusion.
2. age of patients: 40-80 years
3. sex: male and female
4. cooperative patients

**Exclusion criteria:**

1. Patients with Bleeding diathesis or decreased platelet count(<50,000/mm3) .
2. Occluded pleural cavity
3. Refractory cough
4. Acute coronary syndrome or uncontrolled cardiac arrhythmias
5. Hemodynamic instability,
6. Respiratory failure
7. Unable to obtain informed consent.
8. Poor General Condition/ inability of the patient to lie for 45-60 min in lateral decubitus position.

**Ethical consideration:** Institutional Ethical committee permission was taken prior to the commencement of the study.

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**Study tools and Data collection procedure:**

Study group consists of patients with moderate to massive exudative pleural effusion. Informed consent has been obtained from the patients after explaining the risks and benefits of the procedure. Any anticoagulant or antiplatelet medication has been discontinued at least 4-5 days before the procedure.

Prethoracoscopic evaluation included Routine chest radiograph which is supplemented with Ultrasound Chest and CT SCAN Chest in assessing the hemithorax of interest. Ultrasound Chest and CT chest provides basis of determining the point of inserting of the thoracoscope.

Respiratory status was evaluated with blood gas analysis and spirometry. Complete blood picture, coagulation parameters, ECG and 2DEcho were done. Patients' allergies were recorded with particular attention to anesthetic agents.

Anesthesia care providers have interviewed the patients and evaluated the patients' health status, during which he or she had advised the additional diagnostic or laboratory tests such as Blood grouping and typing and serum electrolytes etc. Anaesthesia care provider discussed the procedure from an anaesthesia perspective and then obtained well informed written consent for anaesthesia from the patient.

Thoracoscopy is performed with 2% lidocaine as local anaesthetic and for conscious sedation we use a combination of i.v narcotic (fentanyl) plus a benzodiazepine usually midazolam for analgesia, sedation and amnesia. Propofol is used in place of benzodiazepine in few cases. Single port technique is used for thoracoscopy. Patients are prepared and sterilely draped in the lateral decubitus position. A 10 mm incision is made above superior rib margin in mid axillary line, simple dissection is performed and blunt tip trocar and cannula are then introduced carefully to avoid lung injury. After careful visualization of entire pleural cavity with thoracoscope, multiple biopsy bits were taken at multiple sites. Specimens were preserved in various types of containers and were carefully labelled and dispatched. Specimens were examined by the pathologist and analysis was done. Hemostasis was secured and a chest tube was inserted for removal of air and fluid at the completion of thoracoscopic procedure. After 6 hrs of careful observation in post-operative ward with monitoring of vitals , patient was shifted to routine ward. Repeat chest x ray was adviced. Extubation of ICDT was done after full expansion of the lung and drain <50ml/day. All the collected data were tabulated and subjected to appropriate statistical analysis.

**Statistical analysis:**

For statistical calculations, data is spread in excel sheet descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean□SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5% level of significance. Chi-square/Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups. A p value $\leq 0.05$ was considered statistically significant. The Statistical software namely SPSS 21.0 was used for the analysis of the data.

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**OBSERVATIONS & RESULTS:**

**Table 1: Age wise distribution of patients.**

| Age | Frequency | Percent |
|---|---|---|
| 21 - 30 | 2 | 6.5 |
| 31 - 40 | 3 | 9.7 |
| 41 - 50 | 9 | 29.0 |
| 51 - 60 | 11 | 35.5 |
| > 60 | 6 | 19.4 |
| Total | 31 | 100.0 |

In the present study, the age of the patients ranged from 25-70 years. The mean age was 52.3 years. The median age was 55 years. The youngest patient's age was 25 years and the oldest patient's age was 70 years. The maximum number of patients were from age group 51-60 years.

**Table 2: Gender wise distribution of patients**

| Sex | Frequency | Percent |
|---|---|---|
| Females | 15 | 48.4 |
| Males | 16 | 51.6 |
| Total | 31 | 100.0 |

In this study 16 (51.6%) were males and 15 (48.4%) were females.

**Table 3: Distribution of patients according to symptoms.**

| Symptoms | Frequency | Percent |
|---|---|---|
| Chest pain | 20 | 64.5 |
| Hemoptysis | 3 | 9.7 |
| Cough | 25 | 80.6 |
| SOB | 26 | 83.9 |
| Fever | 20 | 64.5 |
| LOA | 29 | 93.5 |
| LOW | 27 | 87.1 |

Out of total 31 patients, 25 (80.6%) patients had complaints of cough, 26 (83.9%) patients had shortness of breath, 20 (64.5%) patients had complaints of chest pain, 20 (64.5%) patients had fever, 29 (93.5%) patients had associated loss of appetite and 27 (87.1%) patients had weight loss.

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Out of 31 patients, 8 (25.8%) patients had Diabetes Mellitus and 7 (22.6%) patients had systemic hypertension,10(32.3%) patients had COPD,1 (3.2%) patient had hypothyroidism, 3(9.7%) patients had history of old PTB, 1 (3.2%) patient had family history of malignancy.
Out of total 31 patients, 23 (74.2%) patients had Lymphocytic predominant cytology, no patients had Neutrophil predominant cytology and 8 (25.8%) patients had mixed cytological picture.
Out of 31 patients, 21 (67.7%) patients had right sided pleural effusion whereas 10 (32.3%) patients had left sided pleural effusion. No patient had bilateral pleural effusion. In our study, out of 31 patients, 18 (58.1%) patients had haemorrhagic pleural effusion and 13(41.9%) patients had non-haemorrhagic effusion. Of these 13 patients with non-haemorrhagic effusion, all patients had straw colored fluid.
Out of 31patients, 12(38.7%) patients were provisionally diagnosed as Pleura effusion of Infective aetiology, 19 (61.3%) patients were provisionally diagnosed as Malignant Pleural effusion. The provisional diagnosis was based on clinical history and investigations done other than Thoracoscopy.

**Table 4: Gross thoracoscopic findings in the studied group.**

| Thorascopic findings | Frequency | Percent |
|---|---|---|
| Pleural Nodules | 17 | 54.8% |
| Sago grain | 7 | 22.5% |
| Pleural Thickening | 2 | 6.4 |
| Normal Pleura | 1 | 3.2 |
| Septations | 4 | 12.9 |

In this study out of total 31 patients, 1 patient had normal thoracoscopic findings. 30 patients had abnormal findings. Among them 2 (6.4%) patients showed diffuse pleural thickening, 4 (12.9%) patients showed multiple septations ,7(22.5%) patients had sago grain appearance, 17 (54.8%) had multiple variable sized pleural nodules.

**Table 5: histopathological results obtained by thoracoscopic pleural biopsy.**

| Pleural Biopsy Report | Frequency | Percent |
|---|---|---|
| Caseous Granuloma | 11 | 35.5 |
| Ademoca | 12 | 38.7 |
| SQ Cell Ca | 4 | 12.9 |
| Small Cell Ca | 0 | 0.0 |
| Mets | 2 | 6.5 |
| Inconclusive | 1 | 3.2 |
| Mesothelioma | 1 | 3.2 |

Out of 31 patients, 11 (35.5%) patients had Tuberculosis, 12 (38.7%) patients had adenocarcinoma, 4 (12.9%) patients had squamous cell carcinoma, no patients had small cell

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carcinoma, 2 (6.5%) patients had metastasis, one (3.2%) patient had mesothelioma and for one (3.2%) patient it is inconclusive.

**Table 6: Correlation of thoracoscopic findings with pleural biopsy finding**

| Thorascopic findings | Pleural Biopsy Report | | | | | | | | | | | | P-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Caseous Granuloma | | Ademoca | | SQ Cell Ca | | Inconclusive | | Mesothelioma | | Mets | | |
| | Count | % | Count | % | Count | % | Count | % | Count | % | Count | % | |
| Pleural Nodules | 0 | 0.0% | 11 | 64.7% | 4 | 23.5% | 0 | 0.0% | 0 | 0.0% | 2 | 11.7% | 0.001* |
| Sagograin | 7 | 100% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |
| Pleural Thickening | 0 | 0.0% | 1 | 50% | 0 | 0.0% | 0 | 0.0% | 1 | 50% | 0 | 0.0% | |
| Normal Pleura | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 100% | 0 | 0.0% | 0 | 0.0% | |
| Septations | 4 | 100% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | |

In our study out 17 patients who presented with pleural nodules, 11 patients (64.7%) were diagnosed to have adenocarcinoma, 4 (23.5%) patients were diagnosed to have squamous cell carcinoma, and 2 patients (11.7%) were found to have metastasis. Among 7 patients who presented with sago grain appearance all were diagnosed to have tuberculosis (100%) and among 4 patients who had septations at thoracoscopy all were diagnosed to have tuberculosis (100%). Among 2 patients with pleural thickening 1 had adenocarcinoma (50%) and 1 patient had mesothelioma (50%) and for one patient who had normal pleura at thoracoscopy report was inconclusive.

**Table 7: Distribution of the diagnosed patients in the studied group in relation to the thoracosopic findings.**

| Thorascopic findings | Diagnosis | | | | P-value |
|---|---|---|---|---|---|
| | Non-malignant | | Malignant | | |
| | Count | % | Count | % | |
| Pleural Nodules | 0 | 0 | 17 | 100% | 0.001* |
| Sagograin | 7 | 100% | 0 | 0.0% | |
| Pleural Thickening | 0 | 0 | 2 | 100% | |
| Normal Pleura | 1 | 100% | 0 | 0.0% | |
| Septations | 4 | 100% | 0 | 0.0% | |

Out of 31 patients, 19 patients were diagnosed malignant and 11 patients were non-malignant. 1 patient remained undiagnosed. 100% of patients with nodules were malignant, which is statistically highly significant. 100% of patients with multiple septations with or without adhesions were nonmalignant. It was statistically significant. All patients (100%) with sago grain appearance were diagnosed to have Tuberculosis and for one patient who had normal pleura report is inconclusive.

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**Table 8: Correlation of type of pleural effusion with pleural biopsy findings**

| Gross Appearance | Diagnosis | | | | P-value |
|---|---|---|---|---|---|
| | Non malignant | | Malignant | | |
| | Count | % | Count | % | |
| Hemorrhage | 1 | 5.5% | 17 | 94.4% | 0.001* |
| Non-Hemorrhage | 11 | 84.6% | 2 | 15.3% | |

Of the 31 patients, 18 patients had haemorrhagic effusion and 13 patients had non haemorrhagic effusion. malignant among Among the patients with haemorrhagic effusion, 17 patients (94.4%) were diagnosed to have malignant pleural effusion and one patient (5.5%) was diagnosed as Tuberculosis. Among the patients with non-haemorrhagic pleural effusion, 2 patients had malignant etiology (15.3%) and in 11 patients (84.6%) etiology was non which 10 patients had tuberculosis and report was inconclusive for one patient.

**Table 9: Correlation of type of pleural effusion with pleural biopsy findings type of Pleural effusion.**

| Gross Appearance | Pleural Biopsy Report | | | | | | | | | | | | | | P-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Caseous Granuloma | | Ademoca | | SQ Cell Ca | | Mesothelioma | | Small Cell Ca | | Mets | | Inconclusive | | |
| | Count | % | Count | % | Count | % | Count | % | Count | % | Count | % | Count | % | |
| Hemorrhage | 1 | 5.5% | 10 | 55.5% | 4 | 22.2% | 1 | 5.5% | 0 | 0.0% | 2 | 11% | 0 | 0.0% | 0.001* |
| Non-Hemorrhage | 10 | 76.9% | 2 | 15.3% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 0 | 0.0% | 1 | 7.6% | |

In hemorrhagic pleural effusion ,94.5% patients were malignant out of which 10 patients (55.5%) had adenocarcinoma, 4 patients had squamous cell carcinoma (22.2%), 1 patient had mesothelioma (5.5%) and 2 patients had metastasis (11%) and 1 patient had tuberculosis (5.5%) whereas out of 13 non-hemorrhagic pleural effusion 10 (76.9%)patients were diagnosed to have tuberculosis and 2 patients (15.3%) had malignant etiology and 1 patient (7.6%) had inconclusive report.

The post-thoracoscopic complications in the studied group occured in 5 patients (16.1%). The complications were prolonged air leak (>7 days) in one patient (3.2%), post-operative pain in 3 patients (9.7%) and bleeding in one (3.2%) There were no complications in 26 patients (83.8%).

**Table 10: Diagnostic yield of medical thoracoscopy**

| Patients | Frequency | Percentage |
|---|---|---|
| Diagnosed | 30 | 96.7 |
| Undiagnosed | 1 | 3.3 |
| Total | 31 | 100% |

Among 31 patients, 30 patients arrived at a diagnosis. So the diagnostic yield of medical thoracoscopy guided pleural biopsy is 96.77%.

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**DISCUSSION:**

The utility of rigid thoracoscopy in undiagnosed pleural effusion has been evaluated prospectively. The aim of this study was to establish diagnostic yield of medical thoracoscopy in cases of undiagnosed exudative pleural effusion. In this study, medical thorocoscopy was done in consecutive 31 patients with moderate to massive exudative pleural effusion.

Exudative Pleural effusion of undetermined etiology has been noted in all age groups. In the present study, the age of the patients ranged from 25-70 years. The mean age was 52.3 years. The median age was 55 years. The youngest patient's age was 25 years and the oldest patient's age was 70 years. This is similar to study by Prabhu and Narasimhan et al [(11)] where mean age was 49 years. The maximum number of patients were from age group 51-70 years. Mean age was found to be 48.68 years, 51.3 years and 53 years by Mootha et al [(12)] Helala et al [(13)] and Shaheen et al [(14)] respectively in their studies.

In this study, 16 (51.6%) were males and 15 (48.4%) were females. Male to female ratio is 1.06:1 Similar observations were seen in studies by Mootha et al [(12)], Law et al [(15)], Mehta et al [(16)] and Helala et al. [(13)],Munnavar et al [(17)].

In this study maximum patients belonged to age group 51-60 years (35.5%). Maximum males and females were from age group 51-60 years. No significant observations on age sex relationship have been encountered in this study or other studies.

Out of total 31 patients, 20 (64.5%) patients had complaints of fever, 25 (80.6%) patients had cough, 26 (83.9%) patients had dyspnea, 20 (64.5%) patients had complaints of chest pain. Similar observations were seen in a study by Prabhu and Narasimhan [(11)].

In this study out of total 31 patients, 1 patient had normal thoracoscopic findings. Total 30 patients (96.7%) had abnormal findings, out of which 2 (6.4%) patients showed diffuse pleural thickening, 4 (12.9%) patients showed multiple septations ,7(22.5%) patients had sago grain appearance, 17 (54.8%) had multiple variable sized pleural nodules

Prabhu and Narasimhan [(11)] reported a study in which nodules were found in 33 (48.5%) patients, 26 (38.2%) patients had adhesions, 8 (11.76%) patients had sago grain appearance, and 1 (1.47%) patient had normal pleura.

In this study 19 patients were diagnosed with malignancy among 19 patients having malignancy as provisional diagnosis and 11 patients were diagnosed with infective etiology among 12 patients having infective etiology as provisional diagnosis and one report turned to be inconclusive.

In this study, diagnostic yield of medical thoracoscopy was 96.7% (30/31 patients). 11 (35.5%) patients had Tuberculosis, and out of 19 malignant cases, 12 (38.7%) patients had adenocarcinoma, 4 (12.9%) patients had squamous cell carcinoma, 2 (6.5%) patients had metastasis, one (3.2%) patient had mesothelioma and for one (3.2%) patient it is inconclusive. The current study outcomes were comparative with other studies.

In 2012 in a study by Prabhu and Narasimhan [(11)] diagnostic yield of pleuroscopy was 97% (66/68 patients). Compared to the present study findings were same. Malignancy was diagnosed in 24 patients, 22 patients had non-specific inflammation, tuberculosis was found in 16 patients, empyema was found in 2 patients, 1 patient had sarcoidosis, 1 patient had normal pleura and it was non-diagnostic in 2 patients. In 24 patients who had malignancy, 15 patients had Metastatic adenocarcinoma, three patients had Mesothelioma, three patients had

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undifferentiated carcinoma, one patient had lymphoma, one patient had Metastatic clear cell carcinoma and one patient had Metastatic squamous cell carcinoma.

A study was carried out by Tscheikuna et al [18] in Thailand, the diagnostic yield was 95.2%. The malignancy was diagnosed by thoracoscopy in 45.35% patients.

Similar observations were seen in a comparative retrospective study in China by Wang et al [19], diagnostic efficiency of medical thoracoscopy was 93% (25/27). Thoracoscopic pleural biopsy revealed tuberculous pleurisy in 6 patients, adenocarcinoma in 7, squamous-cell carcinoma in 2, metastatic carcinoma in 3, mesothelioma in 2, Non-Hodgkin's lymphoma in 1, and others in 4. Only 2 patients could not get definite diagnosis.

In 2014, a study by Helala et al, [13] gave a definitive diagnosis in 38 out of 40 patients with diagnostic yield 95%. Malignancy was diagnosed in 28 patients (70%), one patient was diagnosed as empyema (2.5%), tuberculosis was found in 9 patients (22.5%), and it was non diagnostic in 2 patients (5%). The results of the current study contradict with the results of Helala et al. [13] where the most common malignancy obtained by thoracoscopic pleural biopsy in the studied group was malignant mesothelioma which was found in 15 patients (53.6%).

In contrast, Law et al [15], NG et al [20] and Thangakunam et al [18] reported low diagnostic yield of medical thoracoscopy 66.7% (12/18 patients), 79% (11/14 patients) and 45.5% (10/22 patients) respectively.

In current study100% of patients with nodules were malignant, which is statistically highly significant. 100% of patients with multiple septations with or without adhesions were non-malignant. It was statistically significant. All patients (100%) with sago grain appearance were diagnosed to have Tuberculosis. Similar observations were seen in studies by Prabhu and Narasimhan [11] and Helala et al. [13].

In the current study in hemorrhagic pleural effusion ,94.5% patients were malignant, and 76.9% of non-hemorrhagic pleural effusion were found to have infective etiology.

These findings were similar to a study done by Shaheen et al [14] in which 19 (47.5%) patients presented with hemorrhagic pleural effusion, 20 (50%) patients presented with straw colored and one (2.5%) patient presented with green colored pleural effusion. The majority (79%) of patients with hemorrhagic effusions were finally diagnosed as malignant, other diagnoses were tuberculous and parapneumonic effusions.

There were no major complications reported during this study The post-thoracoscopic complications in the studied group were occurred in 5 patients (16.1%). The complications were prolonged air leak (>7 days) in one patient (3.2%), post-operative pain in 3 patients (9.7%) and bleeding in one (3.2%) There were no complications in 26 patients (83.8%).

Wang et al [19] reported following post thoracoscopic complications. The most common complication was transient chest pain (20 of 27 patients) from the indwelling chest tube, which could be managed with conventional analgesics. One case of subcutaneous emphysema and 2 cases of postoperative fever were self-limiting. No severe complications occurred.

Prabhu and Narasimhan [11] reported that there were no major complications post thoracoscopy, only four patients had minor complication like subcutaneous emphysema (three patients) and prolonged air leak (one patient).

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In the current study diagnostic yield was 96.77% which was comparative to other studies like Prabhu and Narasimhan et al [11] where the diagnostic yield was 97%, Lee P et al [21] yield was 96%, Helala et al [13] where the diagnostic yield was 95%, Huang et al [22] where the diagnostic yield was 93.6%. Tscheikuna et al [18] where the yield was 95.2% and Wang et al [19] yield was 93%.

With experience from the current study, we suggest medical thoracosopy should be performed in all patients with undiagnosed exudative pleural effusion because it has high diagnostic yield. It is a very simple and safe procedure with low complication rate.

**CONCLUSION:**

From our study it can be concluded that Medical thoracoscopy is a safe and effective tool for diagnosis in patients with undiagnosed exudative pleural effusion with high diagnostic yield and low complication rate.

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