



Original Research Article

Pleural biopsy: A useful diagnostic tool in undiagnosed pleural effusion

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ABSTRACT

Introduction: Sometimes etiological diagnosis of pleural fluid is not possible even after complete biochemical and cytological examinations and labeled as undiagnosed pleural effusion. So, there is a need of simple, rapid, easily available and reliable diagnostic test to establish the etiology of pleural effusion. Our aim of this study is to make an etiological diagnosis in such undiagnosed exudative effusion with pleural biopsy.

Materials and Methods: In this study, patients with undiagnosed exudative pleural effusion where the diagnosis was not made by complete analysis and cytological examination of pleural fluid were included. Pleural tissue was obtained by Abram's Needle after obtaining proper consent and sent it for histopathological examination to find out the etiology.

Result: Out of 92 patients, 68.50% (n=63) were males and 31.50%(n=29) were females. The side of pleural effusion was right-sided in 36.95% (n=34) and left-sided in 63.05% (n=58). The mean value of polymorphs and lymphocytes count was 30.35% and 64.92% respectively. Pleural fluid was hemorrhagic in 32.60% (n=30) patients, straw-colored in 58.7% (n=54) patients and clear in 8.7%(n=8) patients. The mean level of protein was 4.5gm/dl (range 3.59-5.41). Histopathology showed granulomatous inflammation compatible with tuberculosis in 62% (n=57) cases, metastatic malignancy in 38% (n=35) cases. Among 35 cases of malignancy, 51.42% (n=18) cases showed adenocarcinomas, 28.57%(n=10) cases showed squamous cell carcinoma, 11.42%(n=4) cases showed lymphoma and 8.57%(n=3)cases showed solitary fibrous tumor.

Conclusion: Our study suggests that tuberculosis and malignancy are the two common etiologies for exudative pleural effusion. Closed pleural biopsy using Abram's needle is easily available, inexpensive and has good yield accuracy of diagnosis in cases with uncertain etiology by pleural fluid analysis and has low complication rate.

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1. Introduction

Pleural effusion is an abnormal collection of fluid in the pleural space between the lung and the chest wall. Pleural fluid accumulation is a result of disruption in the balance between production and reabsorption. Pleural fluid is produced primarily by the parietal pleura and reabsorbed

via the pleural lymphatics. Pleural effusion occurs when production exceeds absorption or when mechanics of resorption have been disrupted, the latter being more common. It is of two types i.e. transudative or exudative.¹ Transudative effusion has low protein levels and mostly due to systemic pathology like cardiac, hepatic or renal disorders. In contrary, exudative effusions have high protein content and are mostly due to pleural pathologies like tuberculosis, malignancy or any other pleural infection.²

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Despite good history, clinical and radiological investigation, complete analysis and cytological examination of pleural fluid, as many as in 15-20% of the cases, it is not possible to make the diagnosis.³ In these cases, many times, the patient receives empirical treatment, without any confirmed diagnosis. Therefore, in such situation, it is essential to make the etiological diagnosis in exudative pleural effusion to give proper treatment to patients. One of the method is percutaneous needle biopsy of parietal pleura, which can diagnose up to 50% of cases.⁴ The first pleural biopsy was done by using Vim Silverman needle in 1955.⁵ But from 1958, Abram's pleural biopsy needle is used as it is safe, easy to perform, and inexpensive.⁶ The aim of this study is to make an etiological diagnosis of undiagnosed exudative pleural effusion when complete analysis and cytological examination of pleural fluid has failed to make a diagnosis and to find the role of percutaneous Abram's needle pleural biopsy in cases of undiagnosed exudative pleural effusion.

2. Materials and Methods

This study was done in Sir Sunderlal hospital, BHU, Varanasi for two years from July 2018 to May 2020. This was a cross-sectional study. One hundred and ninety -six patients who had pleural effusion were evaluated thoroughly. Clinical, radiological, and laboratory investigations were done in all cases. Thoracocentesis was done and pleural fluid was sent for cytological (cell type and malignant cells), biochemical (protein, LDH and ADA) and microbiological (Gram stain and Z-N staining and culture) examinations to determine the cause of the effusion. If the diagnosis was done by these examinations, then those cases were excluded by the present study. But if not, then those cases were labeled as undiagnosed cases and pleural biopsy using Abram's needle was done after taking informed consent.

2.1. Inclusion criteria

1. All patients who gave consent and aged more than 18 years who were able to understand the procedure.
2. Patients with normal coagulation profile.

2.2. Exclusion criteria

1. Age less than 18 years
2. Hemodynamically unstable patients
3. Patient non co-operative, not giving consent
4. Patients with bleeding disorders
5. Patients with severe respiratory distress
6. Patients who are infected with HIV and Hepatitis B virus
7. Patients with local skin infection

Total ninety-nine patients were eligible for this study. Among them, seven patients pleural tissue was inadequate

to give opinion, so it was excluded. Total ninety-two cases were included for final examination.

2.3. Pleural biopsy

The patient is positioned and the biopsy site is selected after careful physical examination and review of imaging. Under aseptic measures, lidocaine is injected locally to anaesthetize the selected site. A small skin nick is made with a scalpel blade. The Abram's needle with stylet is introduced through the skin incision at the upper surface of the rib in order to prevent neurovascular bundle damage. The needle is advanced until pleural fluid is obtained. The stylet is then removed and the biopsy trocar introduced. A 50ml syringe is attached with a biopsy needle, which provides a closed system through which pleural fluid may be withdrawn, confirming the location of the biopsy needle in the pleural space. The biopsy needle is turned, with the right-angled projection facing downward. Both the outer cannula and the biopsy trocar are partially withdrawn until the parietal pleura is engaged. Gentle traction is applied to the biopsy trocar with one hand, and the outer cannula is advanced with a rotatory motion. This action allows dissection of pleural tissue and the intercostal muscle.

The biopsy needle is removed, during which the patient is instructed to make an "EEEEEE" sound to minimize the risk of air entry. The biopsy specimen is collected with the attached syringe applying positive pressure.^{7,8} On an average, three biopsy specimens were sent in 10% formalin jar. The needle site is observed for bleeding complications, and a pressure dressing is applied to prevent subcutaneous accumulation of pleural fluid. All patients underwent an expiratory chest x-ray one hour after the procedure to monitor the complications. Ethical clearance was taken from the editorial committee of the hospital. All the data collected was saved in an excel sheet and statistical analysis was done by using SPSS software.

3. Result

This study included ninety-two patients of exudative pleural effusion in whom the diagnosis was not made by cytological, biochemical, and microbiological examinations. Out of ninety-two, 63 (68.50%) were males and 29 (31.50%) were females.

Table 1: Descriptive analysis of sex in study population (N=92)

Sex	Frequency	Percentage
Male	63	68.5%
Female	29	31.5%
Total	92	100%

The side of pleural effusion was right-sided in 34 (36.95%) cases and left-sided in 58 (63.05%) cases.

Table 2: Pleural effusion site of total study population (N=92)

Pleural Effusion Site	Number of cases	Percentage
Right	34	36.95%
Left	58	63.05%

Common clinical presentation in our study population was cough in 87(94.56%) cases, fever in 76(82.6%) cases, shortness of breath in 59(64.13%) cases, chest pain in 48(52.17%) cases, expectoration in 45(48.91%) cases and hemoptysis in 26 (28.26%) cases.

Table 3: Clinical presentation of total study population (N=92)

Clinical Features	No. of Cases	Percentage
Cough	87	94.56
Fever	76	82.60
Shortness of Breath	59	64.13
Expectoration	45	48.91
Chest Pain	48	52.17
Hemoptysis	26	28.26

The majority of pleural effusion were lymphocytic. The mean value of polymorphs and lymphocytes count was 30.35% and 64.92% respectively. Pleural fluid was haemorrhagic in 30 (32.60%) patients, straw coloured in 54 (58.70%) patients and clear in 8 (8.7%) patients. The mean level of protein was 4.5±0.91 gm/dl.

ADA was measured and the average value in tuberculosis and malignancy was 79.14±10.77 U/L and 19.58±18.87 U/L respectively. Tuberculin test was positive in 13 patients, who were later diagnosed as tubercular pleural effusion by histopathology.

Histopathology showed granulomatous inflammation compatible with tuberculosis in 57 (62%) cases, metastatic malignancy in 35 (38%) cases. Among 35 cases of malignancy, 18 (51.42%) cases showed adenocarcinomas, 10 (28.57%) cases showed squamous cell carcinoma, 4 (11.42%) cases showed lymphoma and 3 (8.57%) cases showed solitary fibrous tumor.

Table 4: Descriptive analysis of HPE in study population (N=92)

HPE	Frequency	Percentage
TB (N=57)		
Granuloma positive consistent with TB	57	62%
Malignancy (N=35)		
Adenocarcinoma	18	19.6%
Lymphoma	4	4.3%
SCC	10	10.9%
SFT	3	3.3%
Total	92	100%

In our study, twelve patients developed pain at biopsy site which was relieved by NSAIDs and minor bleeding in five

patients, just a few drops of blood at biopsy site were noted and no case of pneumothorax was found.

4. Discussion

This study shows that most of the patients were males. The probable reason may be because males commonly come for medical help than females and they tend to have smoking habits more than females. In our study, we noted down that more patients presented with left sided (63.05%) pleural effusion than right sided (36.95%) pleural effusion. Our findings were similar to that of Abdul Rasheed Quereshi et al., 2018.⁹ Common clinical presentation in our study population was cough (94.56%), fever (82.6%), shortness of breath (64.13%), chest pain (52.17%), expectoration (48.91%), hemoptysis (28.26%). Our findings were similar to that of Abdul Rasheed Qureshi et al., 2018.⁹

In the present study, pleural biopsy showed 62% cases of tuberculosis, 38% of malignancy which is similar to other studies. The diagnostic yield of this study for malignancy was 38% which is similar to other studies done by Menzies et al., 1991¹⁰ which showed a diagnostic yield of 30-70%.

Among the malignancy cases, the most common malignancy was adenocarcinoma (51.42%) which is similar to a study done by Bhattacharya et al., 2012.¹¹

Biswas et al., 2008¹² found that histopathology report of the pleural biopsy showed granulomatous inflammation compatible with tuberculosis in 15 (29.4%), metastatic malignancy in 10 (19.6%) and chronic inflammation in 9 (17.6%) cases. In 17 (33.3%) cases, histopathology did not reveal any abnormality. Among 10 cases of metastatic malignancy, most 7 (70%) were adenocarcinoma which is similar to the present study.

The study done by Rajawat et al., 2017¹³ showed malignancy (37.17%) followed by tuberculosis (32.98%) as etiology which is contrast to the present study.

Common complications of the pleural biopsy procedure were vasovagal attack, pain at the biopsy site, hematoma at the biopsy site, seepage of fluid from the site, pulmonary edema and pneumothorax. In the present study, twelve patients developed pain at biopsy site which was relieved by NSAIDs and minor bleeding at the biopsy site with just a few drops in five patients were noted. No case of pneumothorax was found. This shows very good safety which is similar to the results of Gupta et al., 2010¹⁴ and Dixon et al., 2015.¹⁵ This study was done at one centre only and so limited data was collectable. Hence, further studies should be done in multicenters and data collected should be evaluated for a better understanding of etiologies.

5. Conclusion

This study suggests that tuberculosis and malignancy are the two common etiologies for exudative pleural effusion. On the basis of results of our study, we conclude that closed

pleural biopsy using Abram's needle is easily available, inexpensive and has the good yield accuracy of diagnosis in cases with uncertain etiology by pleural fluid analysis especially when malignancy was suspected and has low complication rate. It is a good diagnostic tool particularly in country like India where tuberculosis is a common disease and facilities like thoracoscopy and image guided needle biopsy are not so easily available.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

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