Original Article

Etiological Spectrum of Exudative Pleural Effusion in a Tertiary Care Hospital Based on Closed Pleural Biopsy

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Objectives: To find the etiology of the common causes of exudative pleural effusion on closed pleural biopsy.

Study Design: Observational study.

Place and Duration: Department of Medicine, Medical B unit, Lady Reading Hospital Peshawar, from March 2009 to December 2010

Materials and Methods: Study group included one hundred patients of exudative pleural effusion where etiological diagnosis could not be yielded by conventional cytological, biochemical, and microbiological investigations. All patients underwent pleural biopsy using Abram's needle in standard way. Average 4 biopsy specimens were taken which were examined histopathologically. Histopathology results were collected and results were analyzed using SPSS 10.

Results: Out of 100 patients, 60(60%) and 40(40%) were male and female, respectively. The most commonly affected age group was 30 to 65 years (mean 47.5 years).Histopathology revealed the cause in 81(81%) cases. Tuberculosis, malignancy and non specific inflammation were seen in 53%, 28% and 19% cases respectively. Those with nonspecific inflammation were further investigated accordingly.

Conclusion: Tuberculosis is the most common cause of exudative pleural effusion followed by malignancy in our set up. The role of closed pleural biopsy in cases of exudative pleural effusion is still pivotal as it yields a specific diagnosis in image of cases. This of particular importance in our set up where the facilities of thoracoscopy and imaging guided cutting needle biopsies are not easily available. Pleural biopsy is safe and should be routine complimentary diagnostic procedure in patients with exudative pleural effusion.

Key Words: Pleural Biopsy, ExudativePleural Effusion, Tuberculosis. Malignancy.

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Introduction

A pleural effusion is an abnormal collection of fluid in the pleural space resulting from excess fluid production or decreased absorption.[1] Pleural effusion remains the most common manifestation of pleural pathology. Sometime it is difficult to differentiate between tuberculous and malignant pleural effusion on routine cytological and biochemical examination. Pleural effusion is classified as exudative and trasudative depending upon protein and LDH concentration in the fluid. It is exudative when protein concentration is 3 gm% or more and transudative when protein concentration is less than 3 gm%.[2] Thoracentesis with culture and pleural biopsy is indicated in suspected tuberculous pleural effusion. Pleural fluid culture is 44% sensitive, and the combination of closed pleural biopsy with culture and histologic examination for granulomas is 70 to 90% sensitive for diagnosis of pleural tuberculosis.[3] Between 40 and 80% of exudative pleural effusions are malignant, while over 90% of malignant pleural effusions are exudative and approximately 15% of patients dying of cancer are reported to have malignant pleural effusions.[4]

Pleural biopsy is a valuable and time tested investigation in diagnosing tuberculous and malignant pleural effusion. Closed pleural biopsy provides the

highest diagnostic yield in cases of pleural tuberculosis and malignancy, the two most important causes of pleural effusion.[5] However it can also be used to diagnose sarcoidosis, fungal, parasitic and rheumatoid pleurisy.[6] Diagnostic yield of pleural biopsy depends upon patient population, biopsy technique, number of biopsy specimen, operator expertise and histopathological analysis. [7] This study was carried out to find out the causes of exudative pleural effusion as revealed by percutaneous pleural biopsy.

Materials and Methods

This prospective study was carried out in the department of medicine PGMI Lady Reading Hospital Peshawar from March 2009 to Dec 2010. Hundred adult patients with exudative pleural effusions of both sexes were included. Patient with transudate effusion or on diuretic therapy, bleeding diathesis, patients with thickened pleura and loculated effusions were excluded. Fevers, weight loss, shortness of breath and chest pain were main complaints of patients. Detailed clinical history and physical examination of each patient was recorded. Subsequent to the conformation of pleural effusion by chest x-ray, diagnostic thoracentesis was performed. Cytological and biochemical test of pleural fluid were done which includes total and differential leukocytes count, RBCs, malignant cells and estimation of glucose, protein, LDH, amylase and rheumatoid factor.

All patients were explained the procedure, and closed needle biopsy was done on all patients using Abram's needle. The patient was seated on a couch, leaning forward arms across the chest placed on shoulders. Biopsy site two intercostals spaces below the fluid level demonstrated on physical examination was cleaned, wrapped and anesthetized with 2% Lignocaine. Small incision was made and Abram's needle was inserted and 4 to 5 biopsy specimens were obtained in each patient in a standard way. Therapeutic aspiration of pleural fluid was done when required. Biopsy wound were sealed with sterilized dressing and a follow up chest x-ray was obtained. The specimens were preserved in 10% formalin and normal saline and sent for histopathology and cultures. The histopathology and culture reports were collected for all patients and etiology determined. All the information thus collected were analyzed using SPSS version 10. Means, ratios, percentages and frequencies were calculated.

Results

The study included 100 patients of exudative pleural effusion. Sixty patients (60%) were male and forty (40%) were females. Their age rang was 20 to 70 years, mean age was 45 years with a standard deviation of ± 15.32 years. (**Table I**).Right sided pleural effusion was found in 55% cases, left sided in 40% cases and 5% were having both sided pleural effusion.

86% of cases had pleural fluid protein to serum protein ratio more than 0.5 and 65% of cases had pleural fluid LDH to serum LDH ratio more than 0.6.All patient under went pleural biopsy, adequate specimen were obtained in 90% cases. Out of 90% cases 81% had a positive yield whereas in 19% cases the histology report was non specific inflammation. Effusions were predominantly lymphocytic and in 51 out of 100 patients there were no RBCs in pleural fluid and in 25 patients fluid was frankly haemorrhagic.20 of 100 patients were found to have mesothelial cells in their pleural fluid and their count was from 5-10%.

Table I: Age groups (n=100)

Age (years)	group Number of Subjects	Percentage of
20 – 30	17	17%
31 – 40	27	27%
41 – 50	32	32%
51 – 60	21	21%
61 – 70	3	3%

Table II: Etiology (n=100)

Lesion	**Male** (n = 60)	**Female** (n = 40)	**Total** (n=100)
Tuberculosis	30 (40%)	23 (53%)	53 (53%)
Mesothelioma	08 (08%)	02 (02%)	10 (10%)
Adenocarcinoma	06 (06%)	02 (02)	08 (08)
Metastatic disease	02 (02%)	2 (02%)	04 (04%)
Lymphoma	03 (03%)	01 (01%)	04 (04%)
Rheumatoid pleurisy	0 (o%)	02 (02%)	02 (02%)
Non specific	11(12%)	08 (07%)	19 (19%)
Total	**60**	**40**	**100**

Histologicaly, tuberculosis was found to be the most frequent etiological factor, followed by malignancy (53% vs. 28%). (**Table II**)

Discussion

In this study an effort was made to reach an etiological diagnosis in exudative pleural effusion by parietal pleural biopsy. Exudative pleural effusion may be neutrophilic or lymphocytic.Tuberculosis[8] malignancy[9], lymphoma,[10] sarcoidosis[11] and rheumatoid pleurisy [12]are the common causes of lymphocytic pleural effusion. Diagnostic yield of pleural fluid analysis of 8% in 150 patients and 18% in 125 patients has been reported by various investigators.[13, 14] Closed needle

biopsy is therefore necessary for the etiological evaluation of lymphocytic exudative pleural effusion as suggested by Sahn Sa et al and Goldman L, et al as well. [15, 16]

A wide range of diagnostic yield of pleural biopsy has been reported in literature.Fishman, et al[17] reported 40%, and Baum GL et al[18] 51% diagnostic yield of pleural biopsy in meta analysis of 14 studies including 2839 patients. In our set up diagnostic yield was 81% which is comparable with 88%% diagnostic yield of another local study by Dilawar S,et all in their 50 patients.[19] Another local study reported diagnostic yield of 95% in 63 patients.[20]

Khadadah et al [21]suggested that taking 4 or more specimen increases the yield of closed pleural biopsy, another study by Chakrabarti et al[22] suggested that taking 4 to 6 pleural specimen increased the yield to 80% which is in line with this study in which minimum of 4 and maximum of 6 specimen were taken and the yield was 81%.

In this study tuberculosis was the most common cause, found in 53% patients followed by malignancy in 28% patients.Javaid A et a l[23] reported 45% diagnostic yield for tuberculosis and 24% for malignancy in their 150 patients. Another local study showed tuberculosis in 56.6% and malignancy in 40%.cases.[24] Anwar R and Farooqi[25] reported diagnostic yield of 71.62% with tuberculosis in 52.71%,malignancy in 18.91% and non specific inflammation in 28.38% 0f 74 cases.Hira and Rangan[26] reported diagnostic yield of 80% with 72% tuberculosis and 8% malignancy, while non specific inflammation was seen in 20% cases. Tomlinson SR,et al[27] reported diagnostic yield of 74% and 57% for tuberculosis and malignancy respectively in their review of 1893 pleural biopsies. In our country all lymphocytic exudative pleural effusion are presumed to be tuberculous and most clinicians prescribe anti TB drugs without going for any further investigations. This approach needs to be given up as at least one third of such effusion are caused by malignancy as found in this study as well as other local literature [28]

Our reported diagnostic yield of 28% for malignancy is comparatively low as compared to international literature[29], which suggest diagnostic yield ranging from 30% to 70%.This may be due to high prevalence of TB in our country, making frequency of malignancy relatively low.Sudita pandit et al[30] reported malignancy in 24 patients, TB in 20 patients and non specific inflammation in 18 patients, in their 72 patients.

Inconclusive histopathological report in terms of chronic non specific inflammation or acute on chronic inflammation in not uncommon.Capelozzi VI et al [31]reported chronic non specific inflammation in 34% of their 164 patients. Similarly Abu-Shams K et a[32] reported chronic non specific inflammation in 33% of their 216 patients. Khurram M, et al [7]reported chronic non specific inflammation in 51% of their 120 patients. In 19% of our patients histological diagnosis was inconclusive, also comparable with the local and international literature. In such case repeat biopsy is needed. A study from India showed tuberculosis in76%, malignancy in 08% and chronic non specific inflammation in 20% of 25 patients.[28]

Common complications of pleural biopsy include vasovagal reaction, pain at biopsy site, seepage of pleural fluid, site hematoma, pneumothorax and pulmonary edema. Other less common complications are transient fever, subcutaneous emphysema tumor seeding and air embolism. Tumor seeding following pleural biopsy appears to be more common in mesotheliema.Eight patients out of 100 developed subcutaneous emphysema at biopsy site which resolved in next few days. Most were having mild pain at biopsy site which resolved with NSAIDs. We didn't come across any major complications in this study, illustrating the safety of the procedure.

Conclusion

Tuberculosis is the most common cause of exudative pleural effusion followed by malignancy in our set up. The role of closed pleural biopsy in cases of exudative pleural effusion is still pivotal as it yields a specific diagnosis in image of cases. This of particular importance in our set up where the facilities of thoracoscopy and imaging guided cutting needle biopsies are not easily available. Pleural biopsy is safe and should be routine complimentary diagnostic procedure in patients with exudative pleural effusion.

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