

Diagnostic yield of pleural biopsy in exudative pleural effusion

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ABSTRACT

To know the diagnostic role of pleural biopsy in determining underlying etiological causes of exudative pleural effusion. A total of 47 patients, aged 16 – 104 years with mean age of 47.36 years, of either sex, with exudative pleural effusion underwent closed pleural biopsy with Abram's needle in standard way. Average 4 - 6 biopsy specimens were obtained from each patient, which were sent for histopathological examination. In this study, 47 cases of exudative pleural effusion were included, among them 26 (55.31%) cases were male and 21 (44.69%) were female with mean age 47.36 years. Cough was reported by 42 (89.36%) cases, expectoration 28 (59.57%), hemoptysis 3 (6.38%), breathlessness 27 (57.44%), wheezing 3 (6.38%), chest pain 38 (80.85%) and fever by 30 (63.82%) cases. Out of 47 cases, 28 (59.57%) cases had a positive yield, whereas in 19 (40.43%) cases the result was nonspecific inflammation. Out of 28 (59.57%) cases with positive yield 21 (44.68%) were found to have granulomatous inflammation and 10 (21.28%) cases were malignant. Among malignant pleural effusion, 4 cases were squamous cell carcinoma; 3 small cell carcinoma; 1 case adenocarcinoma and 1 case found to have mesothelioma. Tuberculosis and malignancy are the two most common causes of exudative pleural effusion in our set up. Pleural biopsy is a safe, simple and well validated diagnostic tool that helps us to differentiate between malignancy and tuberculosis.

Keywords: Pleural effusion, pleural Biopsy, Exudative Pleural Effusion, Tuberculosis, malignancies.

INTRODUCTION

A pleural effusion is an abnormal collection of fluid in the pleural space resulting from excess fluid production or decreased absorption.¹ It is the most common manifestation of pleural disease, with aetiologies ranging from cardiopulmonary disorders to symptomatic inflammatory or malignant diseases requiring urgent evaluation and treatment. Pleural effusion is common clinical and diagnostic problem.^{2,3} It has various causes but the diagnosis is difficult on clinical examination and radiological findings.^{2,3} Around 4% of all attendances to general medical outpatient department are found to have pleural effusion; among them 22% remain undiagnosed despite of intensive investigations.⁴

Pleural effusions are generally classified as transudates or exudates, based on the mechanism of fluid formation and pleural fluid chemistry. Exudative effusion is produced by a variety of inflammatory conditions and often require more extensive evaluation and treatment than transudates. Exudative effusion arises from pleural or lung inflammation, impaired lymphatic drainage of the pleural space, transdiaphragmatic movement of inflammatory fluid from the peritoneal space, altered permeability of pleural membranes, and increased capillary wall permeability or vascular disruption. Leading causes of exudative effusion are tuberculosis, bronchogenic carcinoma, pneumonia and pulmonary

infarction; and other less common causes are rheumatoid pleurisy, fungal pleurisy, sarcoidosis and even parasitic diseases like echinococcus granulosis.⁵⁻⁹

Diagnostic workup includes clinical examination, x-rays, pleural fluid analysis and pleural biopsy; the latter is the investigation of choice in such cases with reported diagnostic yield of 50 to 75%.⁸⁻¹¹ De Francis and co-workers first pioneered pleural biopsy in 1955, and this was followed three years later by introduction of Abrams and Cope pleural biopsy needles.¹²⁻¹⁴ Diagnostic yield of pleural biopsy depends upon patient population, biopsy technique, number of biopsy specimens, the expertise of operator and histopathological analysis.⁹ For all diagnoses, the sensitivity, specificity, positive predictive value, and negative predictive values closed pleural biopsy of the parietal pleura with a Cope or Abrams needle were 38, 100, 100, and 51 percent, respectively. Pneumothorax remains most common complication (11%) of the procedures.¹⁵

Present study was designed to determine yield of pleural biopsy in exudative effusion.

MATERIALS AND METHODS

This prospective observational study was conducted from January 2002 to December 2012 at department of Medicine of Nepal Medical College Teaching

Hospital, Attarkhel, Kathmandu. Forty Seven patients with exudative pleural effusion undergoing pleural biopsy were included and Light's criteria were used to differentiate exudative and transudative type of pleural effusion. Patients who visit to outpatient department with symptoms and signs suggestive of effusion were admitted to medical ward. Detail clinical history was taken from every patient and a thorough clinical examination was performed, looking for signs helpful in the diagnosis of cause of the effusion. Radiological diagnostic tools like chest X-ray, ultra-sonogram of thorax and even CT scan thorax were done as a confirmatory test for effusion. Routine and specific investigations were performed to find out the cause of effusion, which includes complete blood count with ESR, kidney function test, urine routine along with serum protein and LDH. Mantoux test, sputum for microbiology including AFB and where indicated RA factor, ANA, LE cells and other appropriate tests were also performed. Abdominal ultrasound, in some cases CT scan and bronchoscopy were also done where required.

On the basis of clinical examination and radio-diagnostic tools, pleural fluid was aspirated and examined for its colour, protein, cells, LDH, glucose, malignant cells, microorganisms and AFB. Pleural fluid aspiration was performed before pleural biopsy was obtained. For exudative pleural effusion criteria, Light's criteria were applied.

Exclusion criteria include critically ill patient, all transudative effusions, any bleeding diathesis and those who did not give consent. For the pleural biopsy, Abrams pleural biopsy needle was used and standard procedure was followed in obtaining biopsies in each case. During this study a minimum of 4-6 specimens were taken from a single site which were kept in formalin containing container and sent for histopathological examination.

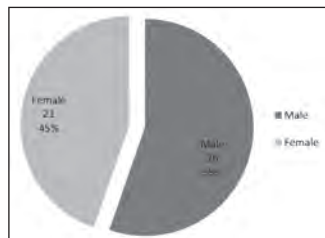


Fig.1. Age-wise distribution of the study cases

RESULTS

Forty seven cases of exudative pleural effusion were studied, among them 26 (55.31%) cases were male and 21 (44.69%) were female with mean age 47.36 years (ranges 16 – 104 years). (Fig. 1) Cough was reported by 42 (89.36%) cases, expectoration 28 (59.57%), haemoptysis 3 (6.38%), breathlessness 27 (57.44%), wheezing 3 (6.38%), chest pain 38 (80.85%) and fever by 30 (63.82%) cases. (Table-1) Among total study cases, 20 (42.55%) cases were smoker among them 55% had history of smoking more than 20 packs year and 45% had less than 20 packs year, whereas rest 27 (57.45%) among total cases were non-smoker. On examination and investigation, it was found that 28 (59.57%) cases had right sided effusion; 18 (38.30%) cases had left sided effusion and only one (2.13%) case had bilateral effusion.

Table-1: Common clinical presentation of the study cases

Clinical features	No. of cases(N= 47)	(%)
Cough	42	89.36
Expectoration	28	59.57
Haemoptysis	3	6.38
Breathlessness	27	57.44
Wheezing	3	6.38
Chest Pain	38	80.85
Fever	30	63.82

Out of 47 cases, 28 (59.57%) cases had a positive yield, whereas in 19 (40.43%) cases the result was nonspecific inflammation (Table-2).

Table-2: The yield of pleural biopsy

Yield	frequency (n=47)	%
Positive yield	28	59.57
Non specific inflammation	19	40.43
Total	47	100

Out of 28 (59.57%) cases with positive yield 21 (44.68%) were found to have tubercular granulomatous inflammation and 10 (21.28%) cases were malignant (Table-3).

Table-3: Common yields of pleural biopsy

Result	frequency (n=47)	percentage
Tubercular granulomatous inflammation	21	44.68%
Malignant neoplasm	10	21.28%
Non specific inflammation	16	34.04%
Total	47	100%

Out of 10 (21.28%) cases of malignant pleural effusion, 4 (40%) cases were found to have squamous cell carcinoma; 3 (30%) small cell carcinoma; 1 (10%) case adenocarcinoma and 1 (10%) case found to have mesothelioma. (Fig. 2)

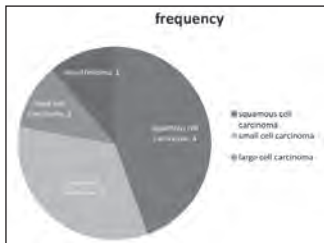


Fig. 2. Distribution of malignant neoplasm

Most common complication during biopsy was biopsy site pain in all cases. None of the patient developed pneumothorax during the procedure.

DISCUSSION

Exudative pleural effusion is a common clinical and diagnostic problem. No diagnosis is ever established in 15% of the cases.^{16,17} Most of the pleural effusions in our geographic areas are due to either tuberculosis or malignancy. Pleural biopsy is needed to establish the exact diagnosis.² By closed pleural biopsy, 49.1% of undiagnosed exudative effusions could be diagnosed. The diagnostic yield with needle pleural biopsy is 57% for malignancy and 75% for tuberculous pleurisy.¹⁸ The diagnostic yield with needle pleural biopsy according to study done by Hirasuna¹⁹ was 17% which was low diagnostic yield, the reason may be due to the fact that only patients with malignant effusions were biopsied. Ogirala et al²⁰ showed yield of 52% with Abram's needle. Maskell NA et al 2003 showed 88% positive yield.⁵ Sohail Akhter 21 also showed 70-80% diagnostic yield. Our study shows 59.57% positive yield which is more or less similar to previous studies.

Granulomatous inflammation (suggestive of tubercular pleurisy) was found to be the most common cause of exudative pleural effusions with a percentage of 44.68% in our study. It is more or less comparable to the results seen in other studies like Javaid et al² and Maskell et al.⁵

The success rate in diagnosis of tumour by needle biopsy is variable ranging for 40-69%. Pleural fluid cytology appears superior to pleural biopsy in the diagnosis of pleural malignancy,¹⁶ with cytological yields ranging

from 40 to 87%. Serial thoracentesis may increase diagnostic yield of pleural fluid cytology. The limited diagnostic success rate of pleural biopsy is due to several factors including the stage of the disease, the more frequent invasion of visceral pleura versus the parietal pleura, the focal nature of malignancy and effusions not caused by direct malignant pleural invasion.²² In this study the percentage of malignant pleural effusion was 21.28%. The result is comparable to Javaid et al² and Akhter²¹ which showed yield of 24% and 40-50% respectively. Light et al²³ showed positive yield in malignant pleural effusion of only 17% but the biopsy was done only in those patients whose pleural fluid cytology was negative. Maskell et al⁵ showed pleural biopsy yield for malignancy is 57%, which contradicts our findings. The reason may be due to a very large number of patients included. Regarding complication, in our study, the most common complication of the pleural biopsy was biopsy site pain.

Tuberculosis and malignancy are the two most common causes of exudative pleural effusion in our set up. Closed needle pleural biopsy is a safe, simple and well validated diagnostic tool that helps us to differentiate between malignancy and tuberculosis, and it should be a routine diagnostic procedure in patients with exudative effusion.

REFERENCES

- Diaz-Guzman E, Dweik RA. Diagnosis and management of pleural effusions: a practical approach. *Compr Ther Winter* 2007; 33: 237-46.
- Javaid A, Amjad M, Shah N, Samad A, Ullah Z. Diagnostic evaluation of exudative pleural effusion the value of pleural biopsy. *Pak J Chest Med* 2001; 7: 12-20.
- Hussain SF, Mujahid S, Khan JA. Diagnostic Evaluation of pleural effusion and the role of needle pleural biopsy. *J Pak Med Assoc* 1995; 45: 127-9.
- Light RW, Jenkinson SG, Minch Vo, George RB. Pleural diseases observations on pleural fluid pressure as fluid is with drawn during thoracentesis. Cells in the pleural fluid their value in the differential diagnosis. *Amer Rev Respir Dis* 1990; 121: 799-804.
- Maskell NA, Buttand RJA. BTS guidelines for the investigation of unilateral pleural effusion in adults. *Thorax* 2003; 58: 125.
- Fishman AP, Elias JA, Fishman JA, Grippi MA, Kaiser LR, Senior RM. (ed) Disorders of pleural space. In: Fishman's pulmonary diseases and disorders. 3rd ed. Washington DC. McGraw-Hill 1997: 1389-1452.
- Hussain SF, Muhahid S, Khan JA. Diagnostic evaluation of pleural effusion and role of needle pleural biopsy. *J Pak Med Assoc* 1995; 45: 127-30.
- Javaid A, Amjad M, Shah N, Samad A, Ullah Z. Causes of exudative pleural effusion: an experience at LRH, Peshawar. *J Coll Physicians Surg Pak* 1997; 7: 237-9.
- Khurram M, Jaffery AH, Khar HB et al. Evaluation of lymphocytic exudative pleural effusion with pleural biopsy. *J Coll Physicians Surg Pak* 2002; 12: 74-7.

10. Collins TR, Sahn SA. Thoracentesis: clinical value, complications, technical problems and patient experience. *Chest* 1987; 91: 817-22.
11. Tomlinson SR, Sahn SA. Invasive procedures in the diagnosis of pleural disease. *Semin Resp Med* 1987; 9: 30-6.
12. De Francis N, Klosk E, Albano E. Needle biopsy of the parietal pleura. *New Eng J Med* 1955: 252; 948-57.
13. Abram LD. A pleural-biopsy punch. *Lancet* 1956; 1: 30-1.
14. Cope C. New pleural biopsy needle. *J Amer Med Assoc* 1958; 167: 1107-8.
15. Chakrabarti B, Ryland I, Sheard J *et al.* The role of Abrams percutaneous pleural biopsy in the investigation of exudative pleural effusions. *Chest* 2006; 129: 1549.
16. Mohamed KH, Mobasher AA, Yousef AI, Saleh A, Ramadhan MA, Emam AK. Pleural lavage: A novel diagnostic approach for diagnosing exudative pleural effusion. *Lung* 2000; 178: 3719.
17. Sahn SA. Malignancy metastasis to the pleura. *Clin Chest Med* 1998; 19: 3514.
18. Al Shimemeri AA, Al Ghadeer HM, Giridhar HR. Diagnostic yield of closed pleural biopsy in exudative pleural effusion. *Saudi Med J* 2003; 24: 2826.
19. Hirasuana JD. Anatomy and physiology of pleura. *Brit Med J* 2000; 320:1318-21.
20. Ogirala RG, Agarwal V, Vizioli LD, Pinsker KL, Aldrich TK. Comparison of the Raja and the Abram's pleural biopsy needle in patients with pleural effusion. *Amer Rev Respir Dis* 1993; 147: 1291-4.
21. Akhter S. How to investigate a case of pleural effusion? *Pak J Chest Med* 1997; 3: 15-7.
22. Shur D. Indications and diagnostic yields. An undiagnosed exudative pleural effusion has been the traditional indications for pleural biopsy. *T Bronchol* 1998; 5: 332-9.
23. Light RW. Pleural diseases 4th Ed. Philadelphia: Lippincott William & Wilkins, 2001.