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ORIGINAL ARTICLE

DIAGNOSTIC ROLE OF PLEURAL BIOPSY IN EXUDATIVE PLEURAL EFFUSION

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ABSTRACT: BACKGROUND: Malignancy and Tuberculosis constitute the major diseases in differential diagnosis of idiopathic pleural effusion. Pleural biopsy has an important role in the diagnosis of pleural effusion, as it can diagnose 60-80% of tuberculous pleural effusions. Although the diagnosis of a malignant effusion may be made more frequently by pleural fluid cytology but in a significant number of malignant pleural effusions, biopsy is only positive even when cytology is negative. **MATERIALS AND METHODS:** Prospective study on thirty four patients admitted in Government Fever Hospital/Guntur Medical College, Guntur with exudative pleural effusion with uncertain diagnosis, were subjected to pleural biopsy. **RESULTS:** Adequate tissue was obtained in 33 out of 34 patients (97.05%). Definitive histo-pathological diagnosis was obtained in 23 out of 33 patients (69.69%). Thus of the sixteen tuberculous pleural effusion patients, ten occurred in patients of 40 years of age or younger and only six in patients above that age. However definite evidence of caseous necrosis was seen in three of sixteen patients diagnosed at histo-pathology as tuberculosis. Six out of the seven malignant pleural effusions were found to occur in patients of age group of 40 years, three of these patients were males and four were females. The squamous cell variety is the most common in the study group followed by adenocarcinoma and others confirming the regular pattern of occurrence. **CONCLUSION:** Pleural biopsy should be a routine complementary diagnostic procedure to be taken up in patients with exudative pleural effusions. Routine use of blind biopsy reduces the need for image guided or surgical biopsy as the cost of medical thoracoscopy or image guided biopsy. Because of its low complication rate, high diagnostic yield, simplicity of operation and minimal discomfort to the patient, pleural biopsy may be included as one of the initial diagnostic procedures for the evaluation of pleural effusions.

KEYWORDS: Exudate, Malignancy, Pleural biopsy, Pleural effusion, Tuberculosis.

INTRODUCTION: The etiology of a large number of pleural effusions especially those presenting without any other roentgenographic abnormality remains unresolved in spite of the usual investigations. In approximately 25% of cases of exudative pleural effusions the cause remains unknown after clinical evaluation, imaging and pleural fluid analysis.(1) There needs further evaluation to establish the diagnosis of pleural effusion. Two diseases in particular malignancy and Tuberculosis have been shown by several Authors in various studies to constitute the major diseases in differential diagnosis of idiopathic pleural effusion. These two diseases cause high degree of mortality and morbidity in many countries like India and tuberculosis continues to be the most common cause of pleural effusion that occurs in the absence of demonstrable parenchymal infiltration. 65% of tuberculous pleural effusions, have been found to develop active pulmonary tuberculosis if left untreated, within a year.(2) Isolation of mycobacteria in direct smear is < 10% and

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the culture for AFB is also <25%.[3] Thus the above techniques have limited value in the diagnosis of tuberculous pleural effusion. Pleural biopsy has an important role in the diagnosis of pleural effusion, as it can diagnose 60-80% of tuberculous pleural effusions. Although the diagnosis of a malignant effusion may be made more frequently by pleural fluid cytology, it is more sensitive than biopsy, but in a significant number of malignant pleural effusions, biopsy is only positive even when cytology is negative. So biopsy is indicated when clinical features are suggestive of tuberculous pleural effusion and markers for tuberculosis are negative or unavailable and in a clinically suspected case of malignant pleural effusion with negative cytology and non-availability of thoracoscopy. Advantages of pleural biopsy are many. They include ease of performance, negligible morbidity and mortality in like thoracentesis. The diagnostic yield of tissue is 80% even with a non-specialist. In view of disadvantages of a surgical biopsy, it is not worth considered as an initial investigative procedure for evaluation of idiopathic pleural effusions. However pleural biopsy is simple and convenient method available for making diagnosis of pleural effusion not diagnosed by the available non-invasive procedures.[4]

MATERIALS & METHODS:

AIM: To assess the role of pleural biopsy in determining the etiology of pleural effusion without any apparent parenchymal abnormality on conventional radiography.

Study Design: Prospective study

Study Population: Thirty four patients admitted in Government Fever Hospital/Guntur Medical College Guntur with exudative pleural effusion with uncertain diagnosis.

Study Period; November 2014 to February 2015.

Inclusion Criteria: Patients with Moderate to massive pleural effusion without any parenchymal abnormality were included in the study.

Exclusion Criteria: Patients with Evidence of parenchymal lesions, Transudative pleural effusion, Sputum for AFB positive, Loculated pleural effusion and Poor general condition were excluded from the study.

Procedure: Usually the patient is scheduled for biopsy in the morning so that follow up care can be provided and complications can be dealt with effectively. Patient is informed well regarding the biopsy procedure, risks and complications are explained. A written informed consent is obtained from the patient. The Abrams needle consists of three parts: a large outer trocar, an inner cutting cannula, and an inner solid stylet. An indicator nob in the hexagonal grip of the larger outer trocar indicate the position of the notch in the distal end of the trocar. The patient pulse, blood pressure and respiratory rate are recorded. Then the patient is positioned, and the site is selected for like that of diagnostic thoracentesis. The skin is cleaned and local anesthetic is administered liberally like thoracentesis. A small incision is made over this area to insert the Abrams biopsy needle and the stylet is placed in the inner cannula, which in turn is placed in the outer trocar. The needle is pushed into the pleural space in closed position and the nob inferiorly by exerting firm pressure on the stylet. Once the tip of needle is felt to be in the pleural space, remove the stylet and with the inner cannula in

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the closed position, a 20 ml syringe is attached to the connection. The inner cannula is rotated counterclockwise to open the distal notch and by making the nob on outer trocar looking inferior. This is important so that the blood vessels and nerves that lie immediately below the rib are not biopsied. At this time, the pleural fluid may be aspirated for diagnostic studies. The biopsy needle is then slowly withdrawn with constant aspiration until it hooks onto the pleura. Then the outer trocar is held firmly with one hand while, the inner cannula is rotated into the closed position with the other hand to cut off a small piece of parietal pleura. Once the initial biopsy specimen obtained, the needle is withdrawn in a closed position. The pleural biopsy specimen is collected from tip of needle. The needle is reinserted to take other specimen. When the biopsy needle is withdrawn from pleural space, the biopsy tract should be occluded with a finger immediately to decrease the likelihood of a pneumothorax. At least three bits of pleural tissue should be obtained from the inferior and lateral aspects. The superior aspect is avoided in order to spare the intercostal bundle from damage. The samples are then sent for histo-pathological examination in 10% formalin. When the needle is withdrawn for last time, the biopsy site should be massaged for a short time before placement of bandage to eradicate the needle tract. Then small adhesive bandage should be placed over the biopsy incision in a crosswise fashion. Occasionally, pleural fluid exits or air enters through the biopsy tract after the procedure, particularly in patients who are debilitated and thin with poor tissue turgor. If this happens, the biopsy site should be closed with a purse-string suture. Chest radiographs should be obtained on all patients after pleural biopsies.

RESULTS: The pleural effusion in this study was found to occur in the age group range of 15-80, years. In these patients, 23(67.6%) were males and 11(32.4%) were females. The male female ratio is 2.1:1. The sex and age distribution has been summarized in the following table 1. Of the 34 pleural effusions 15 (44.11%) were right sided effusions and 19 (55.9%) were left sided pleural effusions. Adequate tissue was obtained in 33 out of 34 patients with percentage of 97.05. The definitive histo-pathological diagnosis was obtained in 23 out of 33 patients (69.69%). Thus of the sixteen tuberculous pleural effusion patients, ten occurred in patients of 40 years of age or younger and only six in patients above that age. The tuberculous histology whenever seen was in the form of granulomatous pleuritis, usually without any caseation. However definite evidence of caseous necrosis was seen in three of sixteen patients diagnosed at histo pathology as tuberculosis.

Pathologists advised repeat biopsy but patient has not given consent for the repeat pleural biopsy. Pleural biopsies were done in six HIV seropositive cases, out of these, four were diagnosed as tuberculous pleuritis and remaining two were nonspecific, and the tuberculous pleuritis in HIV patients showed only non caseating granulomatous inflammation.

DISCUSSION: Adequate tissue was obtained in 33 of the34 cases (97.05%).With the frequency of obtaining adequate tissue was found to be very close to the frequency reported in the studies of R. K. Tandon and SRP Misra et al who obtained adequate tissue for 88 times out of 93(94.6%) biopsies performed on 81 cases.[5] The same kind of frequency was found in the study conducted by OP Mittal.[6] They obtained adequate tissue in 54 biopsies out of 54 cases. In the other two studies conducted by Bahadur.P.et al where adequate tissue was found in 90 biopsies out of 92 cases (i.e., 97.8%) and of Rolandas Zablockis et al where the frequency of adequate tissue was found to be in 32 biopsies out of 32 cases 100%.[7,8] In another study conducted by Biswajit Chakrabarthi et al the

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frequency of adequate tissue was less that is 78.6 %(to be precise adequate tissue was found in 59 biopsies out of 79 patients).[9]The present study high yield was probably on account of number of specimens being obtained through the same puncture wound (usually 3). In the present study histo pathological diagnostic yield is 69.69%.Which is very close to the histo pathological diagnostic yield of Anwar. R and Farooqui JC et al 71.62%, Rolandas Zablockis et al 62% and Prabhudesai PP et al 64.5%, but in two studies one conducted by Muhammad Rizwan Khaliq et al where histo pathological diagnostic yield is very high at 93.75% and in another study conducted by OP Mittal, and S. K. Katiyar et al the histo-pathological diagnostic yield was very low at 46.3%.[10,11,12,] As stated earlier, pleural biopsy obtains material from focal areas. Moreover sampling is not done under direct vision. Thus the possibility always exists that the material obtained may not be truly representative viz; it may be obtained from areas of pleura not involved by disease process. This may account for some of those patients in whom diagnostic material was not obtained on biopsy despite strong clinical suspicion.

In the present study of 34 cases, 16 were diagnosed as tuberculous, 7 as malignancy and 10 cases turned out to be of non-specific pleuritis. The more number of tuberculous cases in this study is consistent with other studies done in our country and Pakistan as incidence of tuberculosis is more in the sub-continent. The pathogenesis of tuberculous pleural effusion is due to delayed hypersensitivity reaction due to rupture of sub pleural caseous foci. The presence of sub pleural foci was demonstrated by stead et al.[13] These involved areas were very often observed in biopsy specimens; although the probability of obtaining biopsy material from uninvolved regions of pleura is very real, it is nevertheless seen that a positive specimen is obtained on the first attempt itself in the majority of cases owing to the extensive involvement of pleura. The most frequent histological pattern seen in above instances was granulomatous pleuritis without caseation in 13 of 16 cases. And caseation was seen in 3 cases only.

The demonstration of granulomas in an exudative pleural effusion is an adequate evidence for the diagnosis of tuberculous pleuritis, since the vast majority of patients (more than 95%) with granulomatous pleuritis have tuberculosis. Malignancy was the second commonest cause for pleural effusion in all studies including the present study, except the study by Rolandas Zablockis et al and Prabhudesai PP et al. Rolanda's study was conducted in Lithuania, a Western country where the incidence of tuberculosis is very less, that is why he got more number of malignancies as a cause for pleural effusion. In Prabhudesai PP et al study, inclusion criteria for study was above 40 years, with the reason for getting more number of malignancies is the cause of pleural effusion. On analysis of the present study, all the cases of malignant pleural effusions belong to above 40 years of age group. As malignancy is common in people above 40 years of age, the increased incidence of malignancy in Prabhudesai PP et al as compared to other studies can be explained. Regarding the type of malignancy, all studies have shown adenocarcinoma as a leading cause for malignant pleural effusions followed by squamous cell carcinoma and small cell carcinoma.

The present study showed 3 cases of squamous cell carcinoma, 2 cases of adenocarcinoma, one case of signet ring cell carcinoma. With one case turned out to be of cellular atypia. The common complications of needle biopsy of pleura reported were 1.Pneumothorax 2. Re-expansion pulmonary edema 3. Vasovagal reactions 4.Minor oozing from biopsy site 5. Sub cutaneous emphysema 6. Iatrogenic infection 7. Seeding of biopsy site by tumor cells. The low rate of complications reported in many studies is also seen with the present study. Of the two cases of Pneumothorax, one required intervention by intercostal tube drainage while the other subsided by conservative management.

CONCLUSION: Tuberculosis and malignancy are the commonly diagnosed causes of exudative pleural effusions by the routine diagnostic methodology. Hence, pleural biopsy should be a routine complementary diagnostic procedure to be taken up in patients with exudative pleural effusions. Routine use of blind biopsy reduces the need for image guided or surgical biopsy as the cost of medical thoracoscopy or image guided biopsy (trained medical staff, nursing assistance ,equipment ,operation theatre time and hospital stay) are considerable including the hazards of surgery and general anesthesia. Because of its low complication rate, high diagnostic yield, simplicity of operation and minimal discomfort to the patient, pleural biopsy may be included as one of the initial diagnostic procedures for the evaluation of pleural effusion

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Age	Male	Female	Total
20 or less	2	2	4 (11.76%)
21-30	5	2	7 (20.5%)
31-40	5	1	6 (17.65%)
41-50	3	3	6 (17.65%)
51-60	3	2	5 (14.7%)
61 or More	5	1	6 (17.65%)
Total	**23(67.6%)**	**11(32.4%)**	**34**

Table 1: Agent and Sex Distribution

Side	Male	Female	Total
Right	11	4	15(44.11%)
Left	12	7	19(55.9%)
Total	**23**	**11**	**34**

Table 2: The side of occurrence of pleural effusion

Sl. No	Diagnosis	No. of Cases	Percentage (%)
1	Tuberculosis	16	48.48
2	Malignancy	7	21.21
3	Non-Specific Pleuritis	10	30.31
	Total	**33**	**100**

Table 3: Histo pathological diagnosis of pleural biopsy

Age	Male	Female	Total
20 or less	2	1	3
21-30	2	1	3
31-40	4	0	4
41-50	2	1	3
51-60	1	1	2
61 or More	1	0	1
Total	**12 (75%)**	**4 (25%)**	**16**

Table 4: Age and sex distribution of tuberculous pleural effusion

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Age	Male	Female	Total
20 or less	0	0	0
21-30	0	0	0
31-40	0	1	1
41-50	1	1	2
51-60	1	1	2
61 or More	1	1	2
Total	**3**	**4**	**7**

Table 5: Age and sex distibution of malignant pleural effusions

Sl. No.	Author	Total No. of Cases	No. of cases where tissue obtained	% of Tissue Yield	Complications
1	OP. Mittal and S. K. Katiyar et al	54	54	100	Nil
2	Praveen Kumar K. et al	39	34	87.17	Vasovagal shok-1
3	R. K. Tandon et al	93-Biopsies in 81Cases	88	94.62	Pneumothorax-2 Minor-16
4	Bahadur P et al	92	90	97.82	Nil
5	Biswajit Chakrabarthi et al	75	59	78.66	Pneumothorax-8
6	Rolandas Zablockis et al	32	32	100	Vasovagal reactions-4
7	Present study	34	33	97.05	Pneumothorax-2

Table 6: Yield pleural tissue by pleural biopsy in various studies

Sl. No.	Author	Total No. of Cases	Tuberculosis	Malignancy
1	Praveen Kumar K. et al	39	20 (51.28 %)	2 (5.1%)
2	Muhammad Rizwan Khaliq	85	60 (70.05%)	18 (21.17%)
3	Bahadur P, et al	92	47 (51%)	8 (8.69%)
4	OP. Mittal SK Katiyar, et al	54	25 (46.3%)	2 (3.7%)
5	Anwar R. Farooqi JL, et al	74	39 (52.7%)	14 (18.91%)
6	Rolandas Zablockis, et al	32	6 (18.75%)	14 (43.75%)
7	Prabhudesai PP, et al	76	17 (22%)	49 (64.5%)
8	Present study	34	16 (47.05%)	7 (20.58%)

Table 7: Histopathological diagnosis of pleural biopsy in various studies

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