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يسرنا اعلامكم ان هيئة التحرير في اجتماعها الثاني عشر المنعقد بتاريخ ١٩٩٩/١٢/٦ قد درست نتائج التقويم العلمي لبحثكم المعنون:

DIAGNOSTIC YIELD OF PLEURAL BIOPSY

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DIAGNOSTIC YIELD OF PLEURAL BIOPSY

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DIAGNOSTIC YIELD OF PLEURAL BIOPSY

Contents

Summary

This is a study of 50 patients with exudative pleural effusions in whom pleural aspirate and biopsy were done.

The two commonest causes of pleural effusions were tuberculosis in 23 patients (46%) and malignancy in 22 patients (44%).

Pleural biopsy is useful to perform in every patient with undiagnosed pleural disease, specially when tuberculous pleurisy is clinically suspected.

In this study pleural biopsy was diagnostic in 13 patients (56%) of tuberculous effusions, and in 11 patients (50%) of malignant effusions.

The commonest age for tuberculous pleurisy were adolescents and young adults.

Cytologic analysis of pleural fluid is more sensitive than needle biopsy for diagnosing malignant effusion.

Introduction

Pleural effusion is a common clinical and diagnostic problem, which is not in itself a disease entity, but asign of underlying disease. The relative incidence of the causes of pleural effusion varies in different regions of the world, cancer being commonest cause in developed countries, while tuberculosis is probably the commonest cause in developing countries.(1)

Either pleural surfaces can be the site of a primary disease process and pleural disease, however is most often an extension of, or a reflection of, disease that arise elsewhere.(2)

The cause of the majority of pleural effusion can be identified if a careful history is taken and comprehensive clinical examination performed .(3)

Unless an effusion is rapidly diminishing with therapy for example during the treatment of cardiac failure with diuretics a diagnostic aspiration should be performed, this is usually accompained by pleural biopsy.

Biopsy of the parietal pleura was originally carried out by thoracotomy in 1954 (4) . The first report of needle biopsy of the parietal pleura was that of DeFrancis et al. 1955 who used avim_silverman needle to establish a diagnosis of tuberculosis in two of the six patients with pleural effusion.(5)

The technique of punch biopsy of the pleura was described by Abrams in 1958 which have proved capable of obtaining satisfactory specimens for histologic analysis.(6)

The reported diagnostic accuracy of needle biopsy of the pleura has varied, depending on case selection and the number of biopsies performed as pleural implants may be patchy so that diagnostic yield increases with the repeat of the biopsy.

In general, needle biopsy has proved efficacious for the diagnosis of tuberculous pleural effusion and malignancy.(7)

In some cases of pleural effusion a diagnosis cannot be established on the initial evaluation with thoracentesis and pleural biopsy, alternative approach by bronchoscopy, surgical exploration of the pleura or visualisation of the pleura by thoracoscopy will usually provide the diagnosis.

The complication which may rarely result from pleural biopsy include pneumothorax, Bleeding from the site of needle puncture and pain.

The present study involving 50 Iraqi patients with exudative pleural effusion analysing the diagnostic yield of pleural biopsy in community where tuberculosis is still prevalent and known to be the commonest cause of pleural effusion .(8,9,10)

Patients and methods

Fifty patients were included in this study with pleural effusion, who were admitted to general medical ward

Twenty seven were male and twenty three female, their ages ranged from 14 to 70 years (mean 38.3 years) as shown in table 1.

Table 1

Age and sex distribution of cases

	Age (years)						
	(10-20)	(21-30)	(31-40)	(41-50)	(51-60)	(61-70)	total
male	4	4	4	1	5	9	27
female	3	6	3	5	5	1	23
total	7	10	7	6	10	10	50

Full history was taken and physical examination performed chest X-ray was done and sputum when present was examined for acid fast bacilli and subjected to cytological examination, Blood count and ESR done. The pleural fluid was aspirated and its appearance noted. Protein and sugar content were measured. White blood cell and differential counts were obtained and the fluid send for cytological examination.

Pleural biopsy was carried out using Abrams needle and it was repeated in five patients in whom the histological appearance on initial biopsy were inconclusive. A pleural biopsy needle was inserted under local anesthesia through an intercostal space at the area of maximum dullness on percussion and at the site of maximum radiological opacity as shown by postero anterior and lateral films, pleural biopsies were taken after pleural fluid has been aspirated for diagnostic purposes. Specimens were fixed in 10% formalin or Bouin's solution.

Biopsy is usually reserved for those patients who have sufficient pleural fluid to separate safely visceral and parietal pleura.

Complications as a result of pleural biopsy were recorded.

Other investigations like bronchoscopy was performed when it was thought to be indicated, so that the final diagnosis could be made by the above investigations or by follow_up and clinical reevaluation of the patients.

Results

Table 2 shows the final diagnosis of the patients.

Table 2

Causes of pleural effusion in 50 cases

Causes		No. of patients (%)
1- Tuberculous effusion		23 (46%)
2- Malignant effusion		
- Bronchial ca	12	
- Metastatic	9	22 (44%)
- Lymphoma	1	
3- Post pneumonic		1 (2%)
4- Heart failure		1 (2%)
5- Chest trauma		1 (2%)
6- Liver abscess		1 (2%)
7- Undiagnosed		1 (2%)
	total	50

Table 3 shows the clinical features of 23 patients with tuberculous effusion and 22 patients with malignant effusions.

Table 3

Clinical feature	Number of patients	
	Tuberculosis	Malignancy
Fever	18	15
Cough	13	17
Chest pain	13	11
Dyspnea	11	19
Sputum	4	13
Haemoptysis	1	6
Night sweat	16	4
Weight loss	2	12
Clubbing of fingers	-	3
Lymphadenopathy	-	2

The radiological appearance of the patients shows, right sided pleural effusions in (28) patients, left sided in (20) patients, right sided pleural effusion with minimal effusion on the left in one patient and right sided hydropneumothorax in one patient.

WBC ranged from 4.200 - 12.500 mm^3

The ESR is elevated in most patients encluded in the study and it range from (12-140) mm/hour (mean 84 mm/hour).

Sputum was present in 17 patients and it was negative for (AFB) in all of them, the cytological examination was positive in only two patients showing infiltration of malignant cells.

The pleural fluid appeared straw coloured in 20 (87%) of the tuberculous effusions; and haemorrhagic in 9 (41%) of the malignant cases and also haemorrhagic in one patient with chest trauma.

The pleural fluid was an exudate in all patients; the protein content in tuberculous effusions ranged from 3.2 - 5.9 g/dl (mean 4.9 g/dl); and in malignant effusions ranged from 3.4 - 6.5 g/dl (mean 5.1 g/dl), the concentration of glucose in pleural fluid in 5 of the 23 tuberculous cases was 60 mg/dl or below while 6 of the 22 malignant cases have glucose content in pleural fluid 60 mg/dl or below.

In both tuberculous and malignant effusions the cellular content of the fluid was predominantly lymphocytic (80 - 100 %) of the total leucocyte count.

In the examination of AFB in the pleural fluid it was negative in all patients.

In malignant effusions the pleural fluid was positive for malignant cells in 12 (54%) out of 22 patients.

The results of pleural biopsy in (55) biopsy specimens send were either caseating granuloma, malignancy, chronic inflammation with non specific cells infiltration or mesothelial cells proliferation and there were no pleural tissue seen or only muscle tissue seen in 5 of biopsy material.

Table 4 show the results of pleural biopsy in 23 cases of tuberculous and 22 of malignant effusion.

Table 4

Eventual diagnosis	Result	No.of cases (%)
Tuberculosis	Diagnostic	13 (56%)
	Non-diagnostic	10 (44%)
Malignancy	Diagnostic	11 (50%)
	Non-diagnostic	11 (50%)

Tuberculous effusion occurs in younger age group, the mean age was 29.5 years; while in malignant effusion the mean age was 58.7 years.
Table 5 show the methods of determining the final diagnosis in 22 patients with malignant pleural effusions.

Table 5

Method	No. of patients	%
1- Closed pleura biopsy	11	50%
2- Pleural fluid cytology	12	54%
3- Both cytology & pleural biopsy	6	27%
4- Bronchoscopy	5	22%

There were three cases with complications in the series of 50 patients, all occurred during Abrams needle biopsy of the pleura, three patients had pneumothorax noted on postprocedure chest radiographs, no patient required insertion of chest tube for pneumothorax, because they were asymptomatic and had spontaneous resolution of the pneumothorax.

Discussion

Several studies of pleural biopsies have appeared in the literature. The percentage of adequate biopsies in these series have ranged from 75 - 100% (5,6,7,8,11,12). These differences can be attributed to differences in technique or type of needle used. Adequate tissue has been obtained more frequently in recent years, possibly reflecting increasing experience and improved biopsy needle. In this study pleural tissue was identified in 91% of the samples.

A diagnosis reflecting the true clinical problem can be rendered by the pathologist if the specimen is adequate. Several factors determine the accuracy of the needle pleural biopsy of which :

experience of the person performing the procedure, size of the sample, type of needle employed, and most important, the specimen obtained from an involved area of the pleura. As the biopsy sample are such aminute portion of the vast area of pleural surface, and since many of the lesions affecting the pleura (chiefly granulomas and tumour implants) tend to be focally distributed, the chance of missing diagnostic tissue is great. Hence the information afforded the clinician by a negative pleural biopsy does not assure him of a non-diseased pleura.

Pleural biopsy in this study provided an accurate diagnosis in the cases of 13 of 23 patients (56%) with tuberculous pleural effusions, the other 10 patients the results of pleural biopsies were chronic non-specific inflammatory cells infiltrate, no granuloma or malignancy seen. We diagnosed them as tuberculosis according to clinical features as being a younger age group, with unilateral exudative pleural effusion, high ESR, the cells in the pleural fluid are mainly lymphocytes. Follow up of those 10 patients showed response to antituberculous chemotherapy with improvement of their symptoms.

This study indicates clearly that tuberculosis is still the most common cause of pleural effusion in Iraq. Cancer is, however, becoming more common as a cause than it was many years ago. (9)

Table 6 shows the comparison with the previous studies done in Iraq.

Table 6

Study	No.	Tuberculous effusion	%	Malignant effusion	%
This study	(50)	23	46%	22	44%
F. AL-Alusi (1982-1985)	(80)	38	47%	34	42%
Farhan Bakir (1977)	(36)	24	66%	7	19%

The relative frequency of the two most common causes of pleural effusion differs from that found in other countries.(13)

In Iraq as well as in other developing countries(15), tuberculosis is still a common cause of pleural effusions. A similar distribution was found in developed countries 30 or 40 years ago, when tuberculosis was still prevalent there.

In our country tuberculous pleural effusion is mainly a disease of adolescents and young adults. Apart from the history and physical findings, we found that the two most useful diagnostic methods were pleural biopsy as a means of differentiating between tuberculosis and malignancy and cytological examination of pleural fluid as a means of confirming the diagnosis. The diagnostic yield of pleural biopsy in this study was 56% in tuberculosis and 50% in malignancy, this is low compaired with the results of other studies which ranged from 60 - 80% in tuberculosis (11,13,15,16) and 50 - 70% in malignant effusions (7,11,13,15,16).

Table 7 shows the diagnostic yield of pleural biopsy in comparison with other studies.

Table 7

Study	Tuberculosis (diagnostic)%	Malignancy (diagnostic)%
This study	56%	50%
Hampson et al (18),1961	70%	55%
ONADEKO et al (15),1978	60%	74%
AL-ALUSI (8),1985	47%	61%
Poe RE et al (19),1983	90%	68%

In This study pleural biopsy was done for those patients who have sufficient pleural fluid to separate safely visceral and parietal pleura. Recently, experience has been gained in the use of ultrasound and computed tomography to guide a variety of thoracic procedures, including thoracentesis and pleural biopsy.(14). The indications for an image-guided pleural biopsy are:

1- Pleural masses or thickening that were either not seen on chest radiograph or seen only in one view.
2- Small or loculated pleural effusion of unknown cause.

This will increase the yield and safety of pleural biopsy, furthermore, it could be argued that in cases of large pleural effusions not fully characterized after thoracentesis, image-guided pleural biopsy should be performed in the most abnormal portion of the pleura.(14)

The cytological examination of the pleural fluid in this study yielded positive result in 12 (54%) of 22 patients with malignant effusion. In reviewing of other studies, the cytological analysis of pleural fluid is reported to be diagnostic in malignant disease in 30 - 80% of cases, but in most series the success rates is about 60% (7,8,16). This percentage is relatively high, and a diagnostic rate of 100% can not be expected because the pleural effusions of malignant disease may be due to lymphatic obstruction in the mediastinum or to parapneumonic effusion caused by postobstructive pneumonitis. Thus the pleural fluid may not contain neoplastic cells and the pleural surfaces may not be involved with malignant process.(7)

So cytological analysis and pleural biopsy should be done concurrently to obtain the highest diagnostic rate for malignant pleural effusions. Furthermore, all studies demonstrated that cytologic study of the pleural fluid alone had higher sensitivity than needle biopsy for the diagnosis of malignant pleural effusion. Hence, a pleural biopsy may be considered after a negative cytological study in patients suspected of having malignant pleural effusions, and the delay for pleural biopsy until the result of cytology obtained will avoid unnecessary biopsies.(7,16)

In other types of effusions a combination of the clinical features of the accompanying disease and the results of relevant tests were usually adequate to make the diagnosis.

We have one patient with post pneumonic effusion who respond satisfactory to the antibiotics.

The other patient with exudative right-sided pleural effusion was attributed to heart failure and he responded to antifailure measures. Inspite of the most common cause of pleural transudate is congestive heart failure and the pleural effusion resulting from cardiac failure is most often bilateral and usually larger on the right side, if unilateral, right-sided effusion are most frequent. Furthermore, chronic pleural effusion from cardiac causes may increase their protein concentration such that the fluid may appear exudative.(2)

The other three patients, one with history of chest trauma and the fluid is haemorrhagic he responded to conservative treatment. The other one with infected hydatid cyst of the liver and right sided pleural effusion.

The last one diagnosed as Postpneumonic pleural effusion and recieves antibiotics initially but with no response, then antituberculous chemotherapy tried also with no response and the patient remains undiagnosed.

In pleural effusion 5 - 10% of cases a diagnosis can not be established on the initial evaluation, in most instances, if one waits, either the effusion will not recur or its cause will become evident. The alternative approach, surgical exploration of the pleura or exploration of the pleura through a thoracoscope inserted percutaneously under general anesthesia, will usually provide the diagnosis.(2)

Significant complications occuring with closed pleural biopsy are relatively infrequent (2 - 8%), and these can be preventable if image-guidance were used. The complications which could occur are: pneumothorax, hemothorax, puncture of liver or spleen, spread of infection or tumour to the thoracic wall, extravasation of pleural fluid and intercostal neuralgia.

There is a report of a case of breakage and detachment in the pleural cavity of the tip of Abrams needle during performance of a pleural biopsy (17), there is no similar accidents reported and do not know what later complications may be produced by the metal body in the pleural cavity.

In this study there are three patients (6%) develop pneumothorax after pleural biopsy, all treated conservatively without chest tube.

In conclusion, whenever pleural effusion is seen in Iraq, specially in an adolescent or young adult the most likely cause is tuberculosis. Malignancy becoming an increasing cause of pleural effusion in this country.

Pleural biopsy and cytological examination of the pleural fluid were the most helpful diagnostic investigations available.

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