



Utility of closed pleural biopsy in the diagnosis of tuberculous pleural effusion

ABSTRACT

Aims: The present study was designed to evaluate the diagnostic yield and safety of closed pleural biopsy using Abram's needle in patients with suspected tuberculous pleural effusions.

Methods: 115 patients (86 males and 29 females) with suspected tuberculous pleural effusion were retrospectively observed in the period from January 2004 to December 2006. All patients were clinically evaluated and in addition to routine laboratory investigations, chest X-ray and sputum for acid fast bacilli (AFB) were examined. Thoracocentesis, followed by closed pleural biopsy was performed in all patients in the same setting. A total of 2 - 3 pleural biopsy pieces were obtained in each patient and were sent for histopathological examination. Pleural fluid was examined for microbiology (Gram stain, Ziehl-Neelson stain), biochemistry (protein, LDH, sugar) and cytology (for malignant cells, total and differential cell count).

Results: The analysis of pleural fluid showed exudative fluid in 111 patients (97%) and transudate in four patients (3%). Histological analysis revealed caseous granulomatous inflammation in 47 patients (41%) and non-caseous granulomatous inflammation in 16 patients (14%). Non-specific inflammation was observed in 38 (33%) patients and malignancy in four patients (3%), and the biopsies were inadequate for examination in 10 patients (9%). Out of the 115 patients, 92 were finally diagnosed as pleural TB in which histopathological examination aided in the diagnosis of 63 patients (69%). The pleural fluid culture was positive in four patients (4.4%) and the direct AFB was positive in two patients (2.2%). The procedure was well tolerated and complications were detected only in 11 patients.

Conclusions: We concluded that closed pleural biopsy was a simple, safe, and effective method to rapidly diagnose pleural tuberculosis.

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Key words:

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INTRODUCTION

Tuberculous pleurisy is the most common form of extrapulmonary tuberculosis (TB); it develops when a sub-pleural TB focus ruptures into the pleural space, and elicits a significant immune response. This can happen either after the primary phase or during the secondary phase (endogenous reactivation) (1,2). Clinically, it often presents with cough, pleuritic chest pain, dyspnea, low-grade fever, and other non-specific constitutional symptoms. Tuberculin skin test is generally positive in 90% of cases although it might be negative initially. Radiographically, it is generally unilateral, small to moderate in size and is sometimes associated with parenchymal disease (ipsilateral infiltrates). The pleural fluid is serous or serosanguineous (rarely hemorrhagic), exudative, with high protein concentrations (>5 g/dL), low pH (<7.30), moderately depressed glucose levels (<60mg/dL), and usually lymphocytic (classically >90% cells) Because pleural effusion results from a hypersensitivity reaction to TB proteins and lipopolysaccharides rather than from microbial invasion of the pleura, acid-fast bacilli stains of pleural fluid are rarely diagnostic (fewer than 5% of cases). Pleural fluid cultures grow *Mycobacterium tuberculosis* in fewer than 65% of cases. The sensitivity of polymerase chain reaction (PCR) for the DNA of tubercle bacillus in pleural effusion is low (20%) (3). In contrast, histological examination of pleural tissue obtained by closed-needle pleural biopsy increase the diagnostic yield up to (65%) (4). The Abram's needle is most commonly used in closed-needle pleural biopsy. The complications of Abram's pleural biopsy include pneumothorax, haemothorax, site haematoma, and vasovagal reaction.

The present study was designed to evaluate the diagnostic yield and safety of closed pleural biopsy using Abram's needle in patients with suspected pleural tuberculosis.

MATERIALS AND METHODS

Retrospective observational study of hospital records of 115 patients admitted to Quifia hospital with suspected tuberculous pleural effusions, was conducted in the period from January 2004 to December 2006. All patients were clinically evaluated and in addition to routine laboratory investigations, chest X-ray and sputum for acid fast bacilli were examined.

Under local anesthesia (xylocaine 2%) and aseptic conditions Thoracentesis, followed by closed pleural biopsy (using Abram's pleural biopsy needle) was performed in all patients in the same setting, and was tolerated well. Pleural fluid was examined for microbiology (Gram stain, Ziehl-Neelson stain), biochemistry (protein, LDH, glucose) and cytology (for malignant cells, total and differential cell count). A total of 2- 3 pleural biopsy pieces were obtained in each patient and were sent for histopathological examination. Chest X-rays following the pro-cedure were done in all patients to rule out any complications.

RESULTS

A total of 115 patients medical records were studied; 86 of which were males (74.8%) and 29 were females (25.2%) with male to female ratio of 3:1. The analysis of pleural fluid showed exudative fluid in 111 patients (97%) and transudate in four patients (3%). Histological analysis revealed caseous granulomatous inflammation (which is considered as a definitive diagnosis of TB) in 47 patients (41%) and non-caseous granulomatous inflammation (which is considered as a highly suggestive of TB) in 16 patients (14%). Non-specific inflammation was observed in 38 (33%) patients and malignancy in four patients (3%), and the biopsies were inadequate for examination in 10 patients (9%) (Figure 1). Considering the two histopathological findings of caseous and non-caseous granulomatous

inflammation, the yield of closed-needle pleural biopsy for the diagnosis of pleural TB reached 69%.

Out of the 115 patients 92 were finally diagnosed as pleural tuberculosis, six cases as malignant effusion, three cases Congestive Heart Failure, one case nephrotic syndrome, three cases para pneumonic effusions and in ten patients the diagnosis was uncertain in the medical records.

In the 92 patients diagnosed as pleural tuberculosis, 69 were males (75%) and 23 were females (25%). The mean age was 32.6 ±11.3 year (range 15-74 year). Figure 2 shows age distribution of the 92 patients with the diagnosis of pleural TB.

The diagnosis of pleural TB was based on: histopathological examination of pleural tissue in 63 patients (69%) with definitive diagnosis of TB (caseous granulomatous inflammation) in 47 patients (52%) and high suspicion of TB (non-caseous granulomatous inflammation) in 16 patients (17%), pleural fluid culture positive in four patients (4.4%), pleural fluid for direct acid-fast bacilli (Ziehl-Neelson stain) in two patients (2.2%), positive sputum for direct acid-fast bacilli (Ziehl-Neelson stain) in four patients (4.4%), and clinical diagnosis supported with some laboratory investigations including (high ESR, positive tuberculin test and a pleural fluid analysis that is compatible with tuberculosis) and the response to empirical antituberculous therapy, in 19 patients (20.6%), in whom histopathological examination of pleural tissue was either non specific inflammation or inadequate (Figure 3).

In all the 92 patients diagnosed as pleural TB the pleural fluid was exudate (100%) and the cytology showed lymphocytosis in 81 patients (88%), the medical records of only 15 patients showed results of tuberculin test which were positive in 13 patients (86.7%) and negative in 2 patients (13.3%).

The closed-needle pleural biopsy using Abram`s needle was done under local anesthesia

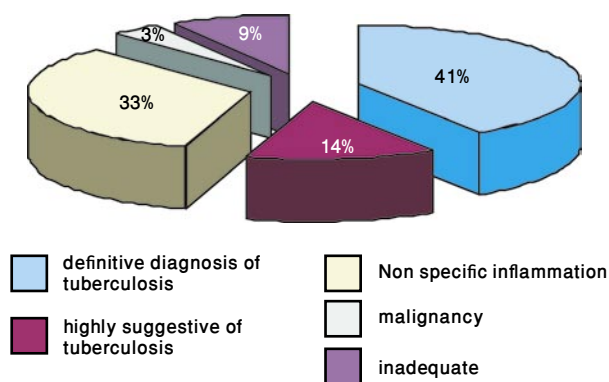


Figure 1. Results of histopathological examination of the pleural biopsy samples

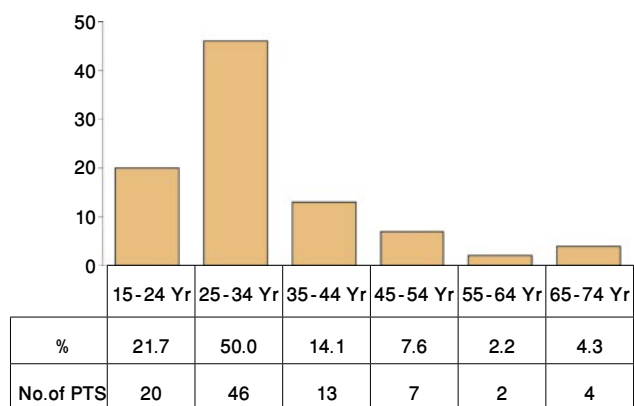


Figure 2. Age distribution of patients with pleural tuberculosis (N=92).

and was tolerated well by most patients. Complications developed in 11 patients which were: pneumothorax in two cases (1.7%), vasovagal reaction in 8 cases (6.9%), and site haematoma in 1 case (0.9%).

DISCUSSION

TB has been so far an epidemiologically important disease in Libya. The diagnosis of pleural TB is frequently difficult and in many patients is based only on clinical suspicion. However, the closed-needle pleural biopsy using Abram`s needle was practiced by many physicians as a diagnostic tool for pleural TB but was ignored by many others because of deficiency in the data supporting its diagnostic yield and fear of its possible complications.

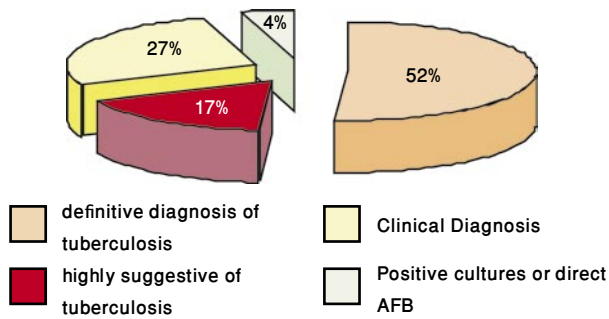


Figure 3. Distribution of the patients with tuberculous effusion according to the method of TB diagnosis (N=92).

In the present study we found that closed-needle pleural biopsy was the main diagnostic method in pleural TB providing a definitive diagnosis (i.e. caseous granulomatous inflammation) in 52% of cases and presumptive diagnosis (i.e. non-caseous granulomatous inflammation) in (17%), with a diagnosis yield reaching up to 69%. Although other diseases may produce granulomatous pleuritis including sarcoidosis, fungal infections, and rheumatoid arthritis, more than 95% of pleural granulomas are due to TB (5). Nevertheless, other methods of diagnosis using pleural fluid examination for adenosin-deaminase activity (ADA) and video-assisted (thoracoscopic) pleural biopsy were found to be more effective in diagnosis of pleural TB than closed-needle pleural biopsy in recently published studies (6-8).

We also found that performing both thoracentesis and pleural biopsy at the same time was a simple and safe techniques. Recently we started practicing pleural tissue culture which in some comparative studies increased the diagnostic yield of pleural biopsy (9), and we obtained a promising results, i.e. out of 12 patients with proven pleural TB, 5 patients gave positive cultures (41.7%) (unpublished data).

In conclusion, closed pleural biopsy using Abram`s pleural biopsy needle was found in the present study to be a simple, safe, effective and tolerable method to rapidly diagnose pleural TB. Moreover, biochemical, microbiological

and cytological examination of pleural fluid increases the diagnostic yield of diagnosis of pleural TB.

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