Diagnostic utility of sonar guided biopsy in tuberculous effusion

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Abstract 
Background/aim: Tuberculous pleural effusion remains the commonest cause of exudative effusions in areas with a high prevalence of tuberculosis and histological examination of pleural tissue is the gold standard for its diagnosis. This study was to assess the diagnostic utility of sonar guided biopsy in tuberculous pleural effusion.

Patients and methods: 50 patients (34 men) of mean ± SD age 38.7 ± 16.7 years with pleural effusions and a clinical suspicion of tuberculosis were enrolled in the study. Transthoracic ultrasound was performed on all patients, who were then randomly assigned to undergo Abram’s needle biopsies followed by Tru-Cut needle biopsies or vice versa.

Results: Pleural tuberculosis was diagnosed in 31 patients, alternative diagnoses were established in 16 patients and 3 remained undiagnosed. Pleural biopsy specimens obtained with Abram’s needles contained pleural tissue in 29 patients (92.0%) and were diagnostic for tuberculosis in 26 patients (sensitivity 82%), whereas Tru-Cut needle biopsy specimens only contained pleural tissue in 21 patients (78%) and were diagnostic in 21 patients (sensitivity 64%).

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Introduction

Undiagnosed exudative pleural effusion is one of the most important dilemmas in chest practice added to the high prevalence of tuberculosis and TB is the second cause of death among communicable diseases. All of these items enforce the presence of a gold method for diagnosis of tuberculous effusion [1]. Pleural TB remains a common form of extra pulmonary TB [2–4] and it is the most common cause of exudative effusions in areas with a high prevalence of TB [2,5,6]. Although a diagnosis of pleural TB is often based on raised levels of adenosine deaminase (ADA) and interferon γ in pleural fluid, actual histological confirmation of TB pleurisies remains the gold standard [5,6]. Pleural tissue can be harvested either by means of closed biopsies, thoracoscopy or open surgical biopsies [5,6]. Again we retained to another dilemma both thoracoscopy and open biopsy have many complications and usually present in tertiary hospitals in developing areas but TB usually treated and present in low socioeconomic places. That is why we must search for another way to get a sample.

Closed pleural biopsy needles were introduced in the mid-1950s and early 1960s and various types were used, including the Abrams, Cope and Vim-Silverman needles [7–11]. Of these devices, the Abrams needle was consistently shown to have a high yield and became the most widely used device [11–13]. In 1989 Macleod et al, described blind cutting needle (True-Cut) biopsies as an alternative to Abrams needles in patients who present with large pleural effusions [14]. Around the same time, transthoracic ultrasound (US)-assisted biopsy techniques were pioneered and the indications were soon expanded to include cutting needle pleural biopsies [15–18]. Focal pleural abnormalities (e.g. thickening) and fluid collections could be identified by means of US and biopsy may be aimed at these areas of interest [19].

The aim of this study was to assess the diagnostic utility of sonar guided biopsy in tuberculous pleural effusion.

Patients and methods

All adult patients (≥18 years) referred to Chest department Tanta University hospital with radiological evidence of a pleural effusion and clinical suspicion of pleural TB were potential candidates for this study.

Patients referred to Chest Department were screened for indicators of a high clinical suspicion of TB which, for the purposes of the study, included, (1) persistent cough more than 3 weeks, (2) hemoptysis, (3) weight loss, (4) intermittent fever, (5) night sweats, (6) exudative effusion with high protein, elevated LDH, lymphocytic predominance and ADA more than 50 IU/L. Patients were included in the study if they have two possibilities. After that every patient was subjected to CT chest to determine the area showing pleural thickening to facilitate the site of entrance.

Under sterile technique and local anesthesia, closed pleural biopsies were subsequently performed on all patients. Patients were suspected to ≥4 Abrams needle biopsies followed by ≥4 True-Cut needle biopsies or ≥4 True-Cut needle biopsies followed by ≥4 Abrams needle biopsies. These biopsies were performed from the same incision site (5 mm in lengths). Abrams needle biopsies were performed according to standardized guidelines [20,21]. Biopsies were taken with the distal tip of the needle facing up to 45° down in order to avoid laceration of the intercostal vessels. Cutting needle biopsies were performed by means of manually operated 14-gauge True-Cut biopsy needles with a specimen notch of 20 mm. Abrams and True-Cut needle biopsy specimens were harvested until each technique yielded at least three macroscopically satisfactory specimens for histological evaluation and were transported in 4% formalin.

The incision site was re-examined by means of US immediately after the procedures for suspected pneumothorax and a chest X-ray was done pre- and post-procedure. All patients were observed for at least 1 h before discharge.

Results

A total of 50 patients (34 men) of mean age 38.7 ± 16.7 years were enrolled over a one year period. Pleural TB was diagnosed in 31 cases (62%). Of the remaining 19 patients, 16 (32%) had an alternative diagnosis and 3 (6%) remained undiagnosed (Table 1). Pleural tissue was present at histology in 92% of Abrams needle biopsies and 74% of True-Cut biopsies (p = 0.033). Abrams needle biopsies had a yield for tuberculous effusion diagnoses of 83.8% compared with 54.8% for True-Cut needles (p = 0.027) (Tables 2 and 3).

Malignant pleural effusions were diagnosed in 13 patients. All had diagnostic closed pleural biopsies: Abrams needle biopsies yield histological confirmation in 11 (84.6%) patients and True-Cut needle biopsies yielded histological confirmation in 9 (69.2%) patients (Table 2, Fig. 1). With regard to patients diagnosed with parapneumonic effusions; they had positive gram stain on culture. There was positive correlation between the presence of pleural tissue and diagnostic utility. Only two cases suffered from complication, one complicated by pneumothorax and the other complicated by neurogenic shock from the agonizing pain.

Conclusions: Ultrasound-assisted pleural biopsies performed with an Abrams needle are more likely to contain pleural tissue and have a significantly higher diagnostic sensitivity for pleural tuberculosis.

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Table 1 Final diagnosis established in all patients (n = 50).

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
<th>%</th>
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</thead>
<tbody>
<tr>
<td>Pleural tuberculosis</td>
<td>31</td>
<td>62</td>
</tr>
<tr>
<td>Malignancy</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>Parapneumonic effusion (bacterial)</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Sarcoïdosis</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Undiagnosed pleural exudates</td>
<td>3</td>
<td>6</td>
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Discussion

Sonar guided Abrams needle biopsies had a diagnostic yield of 82% for TB effusion. The present study establishes sonar guided Abrams needle biopsies as effective technique for obtaining pleural tissue in patients with suspected tuberculous effusion.

In general, blind Abrams needle biopsies have a yield of 50 – 85% for TB pleuritis [6,22–26]. Valdés and coworkers reported a diagnostic sensitivity of 79.2% when they analyzed the case histories of 254 patients with confirmed pleural TB in a Spanish University hospital [24]. Diacon et al found Abrams needle biopsies to have a diagnostic yield of 79% in patients with undiagnosed exudative pleural effusions [6]. The use of US prior to closed pleural biopsies is currently advocated [19,27] both as a safety measure and to detect localized pleural thickening and other abnormalities.

Tru-Cut biopsies yielded pleural tissue in 74% of patients in our study, with a diagnostic sensitivity of 54.8% for pleural TB and 69.2% for malignancy while in Abrams needle biopsies the pleural tissue yielded 92% of patients with a diagnostic sensitivity of 83.8% for pleural TB and 84.6% for malignancy. Chang et al conducted a study that specifically compared the diagnostic yield of US-guided pleural biopsy with a Tru-Cut needle and (blind) pleural biopsy with an Abrams needle [17]. They enrolled 49 patients with unilateral pleural effusions, 24 of whom underwent pleural biopsy with an Abrams needle and 25 underwent US-guided pleural biopsy with a Tru-Cut needle. Only 17 patients had pleural TB. Abrams needle biopsies were diagnostic in 20% (2/10) whereas Tru-Cut needle biopsies were diagnostic in 86% (6/7). The diagnostic yields for malignancies were 44% and 77%, respectively.

All pleural malignancies were diagnosed by means of either the Abrams or Tru-Cut needles, because malignant disease tends to give rise to focal involvement [23].

We found the Abrams needle to have a significantly superior yield for all diagnoses and our data even suggested a comparable yield for pleural malignancy. Tru-Cut pleural biopsies can safely be performed in the presence of very little pleural fluid and have a diagnostic yield for pleural malignancy that is generally reported to be superior to that of Abrams needle biopsies [17,19,24].

Conclusion

Sonar guided pleural biopsies performed with an Abrams needle are more likely to be effective solution for the dilemma of undiagnosed exudative pleural effusion with clinical susceptibility of tuberculosis.

References