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ORIGINAL ARTICLE

Ultrasound guided needle pleural biopsy in patients with undiagnosed pleural effusion

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KEYWORDS

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Abstract *Background:* Cases of pleural effusion represent a great challenge for pulmonologists and ultrasound is considered as an important tool for diagnosis of these cases.

Aim: To identify the role of percutaneous ultrasound guided needle biopsy in patients with undiagnosed pleural effusion.

Patients and methods: This study was conducted on 30 patients (26 males & 4 females) with undiagnosed pleural effusion using ultrasound guided pleural biopsies using a tru-cut needle. Diagnostic yield, pathological tissue characterization, complications were recorded.

Results: The total number of diagnosed cases was 24 (80%); malignancies detected in 17 cases (9 as mesothelioma (30%), 8 as bronchogenic carcinoma with pleural metastasis (26.7%)), tuberculous effusion in 2 cases (6.7%), inflammatory lung masses in 3 cases (10%), para-pneumonic effusion in 2 cases (6.7%) and 6 cases were not diagnosed (20%). In diagnosed cases tissues were classified according to pathological characterization into pleural tissue in 4 cases (16.7%), pleural mass tissue in 8 cases (33.3%), mixed pleural tissue and pleural mass tissue in 2 cases (8.3%) and mixed pleural tissue with pleural and parenchymal mass tissue in 10 cases (41.7%). Complications were in the form of bleeding at the site of procedure in 1 case (3.3%), shock in 1 case (3.3%) and pneumothorax

Abbreviations: FNAB, fine needle aspiration biopsy; US, ultrasound; TUS, thoracic ultrasound

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in 2 cases (6.7%). Sensitivity, specificity and accuracy of ultrasound guided pleural biopsy were 80, 76 and 80% respectively.

Conclusions: Ultrasound-guided pleural biopsy is an effective and safe technique in patients with undiagnosed pleural effusion. It allows accurate needle placement, shorter procedure time.

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Introduction

Exudative pleural effusions are frequently encountered in pulmonary practice. [1] Determination of a specific diagnosis can represent a major challenge. Pleural biopsy is indicated to improve the diagnostic yield of unexplained pleural effusion, particularly when pleural carcinomatosis or tuberculosis is suspected [2].

Thoracic ultrasound (TUS) is a valuable clinical tool which is increasingly being performed by chest physicians. In the UK, guidelines have recently been published with suggested training for physicians with an interest in practising TUS [3].

Blind pleural biopsies have varied sensitivities from 24% to 66% using Abrams needle. Complications of pneumothorax, haemothorax and accidental breaking of needle have been described [4].

Sensitivity index for pleural fluid cytology is low and the diagnostic yield improves when combined with pleural tissue, examined histologically and cultured for mycobacteria [5].

Large vessels and aerated lung parenchyma can easily be detected with ultrasound, which minimizes the risk of pneumothorax and improves safety. US also can be performed at the bedside and in any body position allowing for swift procedures with minimal distress even in patients in poor general condition [6].

A prospective study found that US-assisted cutting-needle biopsy performed by a pulmonologist is safe and effective in lesions ≥ 20 mm in diameter abutting or involving the pleura [6].

Patients and methods

Patients

This study was conducted on 30 patients (26 males & 4 females) their ages ranged from 32 to 86 years. All of them were admitted in the chest department of Tanta University Hospitals in the period from November 2010 to February 2012. Patients fulfilled the criteria of exudative pleural effusions with uncertain diagnosis by routine radiological, chemical, bacteriological and cytological methods. This study was approved by the research ethics committee, Quality assurance unit, Faculty of medicine, Tanta University.

Inclusion criteria

- (1) Chest X-ray or CT chest or sonar evidence of pleural effusion or pleural lesion.
- (2) The cause of pleural effusion was not established by chemical, bacteriological or cytological methods.
- (3) Pleural lesion must be more than 2 cm in diameter if present.

Exclusion criteria

- (1) Clinical or radiological features of empyema.
- (2) Patients with transudative pleural effusion.
- (3) Patients have bullous emphysema.
- (4) Patients on anticoagulant therapy.
- (5) Uncooperative patients.

The patients were subdivided into three groups

Group A: Patients with undiagnosed pleural effusion without any underlying pleural or lung lesions. *Group B:* Patients with undiagnosed pleural effusion with underlying pleural lesions and without lung lesions. *Group C:* Patients with undiagnosed pleural effusion with underlying pleural lesions and lung lesions.

Methods

- (1) Thorough history taking and complete clinical examination.
- (2) Plain X-ray chest (P-A view), lateral view, thoracic ultrasonography to demonstrate lesion site, size, possibility of biopsy taking and CT chest if needed.
- (3) Blood examination in the form of complete blood picture, erythrocyte sedimentation rate, coagulation time and prothrombin time and activity.
- (4) Tuberculin test.
- (5) Sputum examination for acid fast bacilli and malignant cells.
- (6) *Complete examination of pleural fluid:* Pleural fluid was taken by a disposable syringe in a clear dry tube. The sample was taken by local subcutaneous injection of xylocaine 2%. Aspiration of pleural fluid was done by a wide bore canula (18 G) at scapular line at the level of most dullness by percussion and the following were done: Protein, LDH, total and differential cell count, Adenosine Deaminase, culture and sensitivity, cytological examination and Zheil nelson of pleural fluid.
- (7) *Ultrasound guided needle aspiration biopsy:* Patient was kept fasting at least 6 h before biopsy. A sterile field was created. The transducer which was used for biopsy was the convex one with a frequency of 2–5 MHz. Patient was allowed to sit exposing his back. Local anesthesia in the form of subcutaneous injection of xylocaine 2% is injected. Core biopsies of pleural or lung lesions were performed using tru cut needle (Gauge 18) with a specimen notch of 20 mm. In group A, the site for biopsy taking was decided according to the area of pleural thickening present in CT scan.

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