



The Egyptian Society of Chest Diseases and Tuberculosis
Egyptian Journal of Chest Diseases and Tuberculosis

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ORIGINAL ARTICLE

Ultrasound guided pleural biopsy in undiagnosed exudative pleural effusion patients



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Received 10 December 2015; accepted 15 December 2015

Available online 11 January 2016

KEYWORDS

Pleural biopsy ultrasound;
CT guided;
Thoracoscopy

Abstract *Introduction:* Pleural biopsy for pathological confirmation is the standard diagnostic procedure for pleural diseases, transthoracic ultrasonography (TUS) has evolved as an important imaging tool for diagnosing pleural and pulmonary conditions.

Aim of the study: To assess the diagnostic yield of TUS guided pleural biopsy versus both CT guided and thoracoscopic pleural biopsy in the diagnosis of undiagnosed exudative pleural effusion.

Patients and methods: The study was conducted at chest department, Zagazig University Hospitals. The study included 60 patients with undiagnosed exudative pleural effusion. They were assigned randomly (by systematic randomization) after signing an informed consent into three groups according to the method by which pleural biopsy was obtained (Group A, TUS guided biopsy group, Group B, CT guided pleural biopsy, Group C, MT pleural biopsy) each included 20 patients.

Results: The mean age of the studied patients was 52 ± 10.3 years; they were 27 females and 33 males with no statistical significance. There was no statistical significance between the 3 studied groups regarding, co-morbidities, side of effusion, smoking pattern, and pleural fluid parameters except pleural fluid WBCs (was higher in group B). Malignancy was the most common etiology in 48/60 patients (80%). The diagnostic yield of TUS guided pleural biopsy was 80% versus 85% for CT guided pleural biopsy and 92.5% for thoracoscopic pleural biopsy. Reported complications were (for TUS guided pleural biopsy were; pain in 90% of patients, pneumothorax 5%, hemoptysis 35%, biopsy site bleeding 20% and shock in 15%), (for CT guided biopsy; pain in 100% of patients, pneumothorax 15%, hemoptysis 50%, biopsy site bleeding 60% and shock in 10%), and (for medical thoracoscopy; intra-operative bleeding 3.7%, broncho-pleural fistula 7.4%, failure of lung expansion 14.8%, surgical emphysema 18.5%, post-operative empyema 3.7%). MT was superior in the detection of pleural septations and visceral pleural nodules; the incidence of complication was correlated to the length of the procedure time in MT group.

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Peer review under responsibility of The Egyptian Society of Chest Diseases and Tuberculosis.

<http://dx.doi.org/10.1016/j.ejcdt.2015.12.012>

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In conclusion: Thoracic ultrasound (TUS) guided pleural biopsy had a diagnostic yield which was slightly lower but comparable to both CT guided pleural biopsy and medical thoracoscopic pleural biopsy (MT).

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Introduction

Pleural biopsy for histologic confirmation is the standard diagnostic procedure for pleural diseases. The pleural involvement by tuberculosis or by a malignancy is not uniform. The result of a blind closed biopsy without any guidance may not be diagnostic [1]. Transthoracic ultrasonography (TUS) has evolved as an important imaging technique for diagnosing pleural and pulmonary conditions [2]. Ultrasonography may detect abnormal areas of the pleura that may be targeted for biopsy. Yield is improved with this approach when compared with random pleural sampling. [3]. Thoracoscopy remains the most efficient and the gold standard; however cost-effective approach to the diagnosis of pleural exudates, it allows for the direct inspection of the pleura and biopsies taken under direct vision, and has a diagnostic yield of 91–95% for malignant disease and as high as 100% for pleural tuberculosis [4].

Aim of the study

To assess the diagnostic yield of TUS guided pleural biopsy versus both CT guided and thoracoscopic pleural biopsy in the diagnosis of exudative pleural effusion.

Patients and methods

Study design

Observational prospective clinical comparative study.

The study was conducted at chest department, Zagazig University Hospitals in the period from January 2013 to June 2015. The study included 60 patients with undiagnosed exudative pleural effusion.

Tools and instruments used for data collection included:

1. Thorough medical history.
2. Full clinical examination including: General and local examination.
3. Radiological investigations:
 - (a) Plain chest X-ray (P.A & lateral views); was done before & after any pleural intervention to exclude complications.
 - (b) Pelvi-abdominal ultrasound and contrast enhanced CT to exclude abdominal malignancy.
4. Routine hematological investigations:
 - (a) CBC, ESR, Liver function tests, Kidney function tests, bleeding profile, BT, PTT, PC.
 - (b) Fasting and two hours post prandial blood glucose, simultaneous with measurement of pleural fluid glucose level.

5. Specific and pleural fluid investigations:

- (c) Serum total protein, LDH simultaneous with measurement of pleural fluid values.
- (d) Serological analysis.
 - Serum rheumatoid factor (RF).
 - Serum antinuclear antibody (ANA).
 - Cytological examination for malignant cells, adenosine deaminase (ADA), rheumatoid factor.

Patient enrollment in the study

Patients with exudative pleural effusion who fail to be diagnosed by the previously mentioned conventional methods, after signing an informed consent were assigned according to the method by which pleural biopsy was obtained into three groups (A, B, C). They were assigned randomly (by systematic random methods, the first patient underwent US guided pleural biopsy; next patient CT guided pleural biopsy, and the third patient thoracoscopic pleural biopsy and so on). Patients who failed to reach final diagnosis by TUS or CT guided biopsy were referred to medical thoracoscopy group and managed accordingly.

Group A: 20 Patients with exudative pleural effusion for whom Chest US guided pleural biopsy was done (Samsung, Medison Sono, Ace R3, ultrasound system, Korea) using 18-gauge needle of 20 cm length (TSK UROCUT biopsy needle).

Group B: 20 Patients with exudative pleural effusion for whom CT guided pleural biopsy was done. Scan was done using multi-slice CT scanner (General Electric, Milwaukee, USA). After identification of the maximum area of pleural thickening, under aseptic technique and local anesthesia, an 18-gauge needle of 20 cm length (TSK UROCUT biopsy needle, Japan) was inserted tangentially and closed until the area of maximum thickness of the parietal pleura is reached, then opened to gain an adequate core of pleural tissue.

Group C: 27 Patients with exudative pleural effusion for whom medical thoracoscopic guided pleural biopsy was done (karl Storz LTD, Germany), 20 patients plus 4 patients who failed to be diagnosed by US guided biopsy and 3 patients who failed to be diagnosed by CT guided biopsy. Inspection of the pleural cavity, biopsy and electrocoagulation of any resultant serious bleeding was done. Pre-thoracoscopic chest US was done for the detection of any encystment or pleural thickening before procedure.

End point of the study

To reach final diagnosis by any of the previous method patients, i.e. who were undiagnosed by US guided pleural biopsy (Group A) or CT guided pleural biopsy (Group B),

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