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ORIGINAL ARTICLE

Ultrasound guided pleural brushing: A new method for obtaining pleural specimen in malignant effusion



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KEYWORDS

Ultrasound;
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Abstract *Purpose:* Encouraging positive diagnostic yields in malignant pleural effusion could be obtained by pleural brushing performed through two techniques, the first was closed and the second was thoracoscopic. Until now the ultrasound guided pleural brushing is not included within these techniques and its diagnostic yield therefore is not evaluated. So the aim of this study was to evaluate the diagnostic yield of this procedure and its contributions as a technique not used previously in the interventional pulmonology practice to obtain pleural specimen for cytological examination in malignant pleural effusion.

Methods: This prospective interventional study was conducted in the Chest Department – Assiut University Hospital during the period from July 2014 to September 2015. Patients who had highly suspicious malignant pleural effusion (clinical, radiological, and laboratory) were hospitalized and enrolled in this study. Patients with bleeding tendency or coagulation profile abnormalities were excluded from the study. Patients were also excluded from this study if the etiology of effusion was proved to be benign. Informed written consent was obtained from all patients. The equipment used in our study were ultrasound apparatus (ALOKA – Prosound – SSD – 3500SV), biopsy forceps (KARL – STORZ – Germany 10329L – BS), the bronchoscopic cleaning brush (PENTAX CS6002SN) trocar and cannula of Cope's needle and the semi rigid thoracoscope (LTF; Olympus; Tokyo, Japan). Thoracentesis, pleural brushing and biopsy forceps of the pleura were performed for all enrolled patients in the ultrasound unit of the Chest Department while thoracoscopy was done in the endoscopy unit only for patients in whom the diagnosis could not be achieved by these procedures.

Results: Among 22 patients who were finally documented to have malignancy, the ultrasound guided pleural brushing provided diagnosis in 9 (41%)/22 cases, it was exclusively diagnostic in 3 patients. Interestingly, the yield of this procedure had its contributions regarding the final pathological diagnosis of our cases, it could augment the positive yield to be 55% instead of 41% (for pleural fluid cytology alone), 82% instead of 68% (for biopsy forceps alone) and 86% instead of 72% (for both fluid cytology and forceps biopsy). The recorded complications in our study were minimal and not associated with any mortality.

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Conclusions: Ultrasound-guided pleural brushing is a new method for obtaining pleural specimens. It is a simple and relatively safe procedure. This technique provides additional diagnostic yield in malignant pleural effusion. We recommend it beside others in our diagnostic practice for suspicious malignant effusion especially when thoracoscopy is not available.

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Introduction

The development of a pleural effusion in a patient with a known malignancy often raises the possibility that the effusion is due to malignant involvement of the pleura. Accurate diagnosis of the cause of the pleural effusion in such a patient is essential as the treatment and prognosis may vary. Thoracentesis and cytological analysis of pleural fluid cytology is usually the initial diagnostic step. The diagnostic yield of the latter procedure, however, is not always satisfactory and has been variably reported to be between 40% and 87% in different studies [1–3].

In addition to thoracotomy; various techniques are available to reach the pathological diagnosis of the pleural effusion through pleural biopsy and brushing. Included within these methods are the blind or closed needle biopsy of the pleura, closed pleural brushing [4], thoracoscopic pleural biopsy, thoracoscopic pleural brushing [5–7], and lastly the image guided procedures such as fluoroscopy, computed tomography (CT) and ultrasound (US) guidance [8–13].

Encouraging yields could be obtained by different ultrasound guided pleural procedures. However, until now the ultrasound guided pleural brushing is not included within these procedures and its diagnostic yield therefore is not evaluated. So the aim of this study was to evaluate the diagnostic yield of this procedure and its contributions as a technique not used previously in the interventional pulmonology practice to obtain pleural specimen for cytological examination in malignant pleural effusion.

Materials and methods

This prospective interventional study conducted in the Chest Department – Assiut University Hospital during the period from July 2014 to September 2015. Patients who had highly suspicious malignant pleural effusion (clinical, radiological, and laboratory) were hospitalized and enrolled in this study. Patient with bleeding tendency or coagulation profile abnormalities was excluded from the study. Patient was also excluded from this study if the etiology of effusion proved to be benign. Informed written consent was obtained from all patients.

The equipment used in our study were ultrasound apparatus (ALOKA – Prosound – SSD – 3500SV), biopsy forceps (KARL – STORZ – Germany 10329L – BS) (Fig. 1), the bronchoscopic cleaning brush (PENTAX CS6002SN) trocar and cannula of Cope's needle and rubber inlet seal (this piece usually fixed at the proximal port of light bronchoscope channel) as shown in (Fig. 2), and the semi rigid thoracoscope (LTF; Olympus; Tokyo, Japan). Thoracentesis, pleural brushing and biopsy forceps of the pleura were performed for all

enrolled patients in the ultrasound unit of the Chest Department while thoracoscopy was done in the endoscopy unit only for patients in whom the diagnosis could not be achieved by these procedures.

At least 50 ml of the pleural fluid was initially aspirated for cytological examination. The ultrasound guided procedures (brush and forceps) were performed under local anesthesia (Xylocaine 2%) and aseptic condition. The patients were premedicated by analgesic (Ketorolac tromethamine 20 mg) and lying either in a sitting or semi-recumbent position. The ultrasound guided forceps biopsy of the pleura was done following the same steps described by Agmy et al. [14]. Similarly, the pleural brushing was performed however, the brush introduced instead of the forceps through the Cope's cannula (Fig. 3). The brushing was done by scratching the targeted areas up and down multiple times and at least 4 samples were taken per patient. The specimens smeared from the brush onto the slides and fixed immediately by immersion in alcohol 95%. Three to five biopsy fragments were also obtained from the pleura in each case using the forceps and sent in 10% formaldehyde to the pathology laboratory. Following the procedures, all patients were observed clinically and complications



Figure 1 Biopsy forceps (KARL – STORZ – Germany 10329 – BS).



Figure 2 (top-down) PENTAX cleaning brush, Cope's cannula, Cope's trocar and the rubber piece.

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