ORIGINAL ARTICLE

Pleural Biopsy with the Tru-cut Needle

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Summary

The standard diagnostic procedure for pleural diseases is pleural biopsy. The Abrams needle, the most commonly used instrument for closed pleural biopsy, is not suitable when the pleural effusion is minimal in amount or loculated. In such situations, the Tru-cut needle, a disposable cutting needle can be used instead if the parietal pleura is thickened. This paper describes the use of the Tru-cut needle for pleural biopsy in six patients with thickened pleura associated with minimal or no pleural effusion. The pleural thickening in three patients was due to involvement by malignancies while the other three patients had tuberculous pleuritis.

Key Words: Tru-cut needle, Lung cancer, Tuberculosis, Pleural biopsy

Introduction

Pleural biopsy for histological confirmation is the standard diagnostic procedure for pleural diseases. The Abrams needle[1] is the instrument most commonly used for closed biopsy of the parietal pleura[2]. It allows aspiration of pleural fluid and therefore, confirmation that the needle has entered the pleural space. However, the Abrams needle is not suitable in a patient with a small amount of free or loculated effusion because of the danger of lacerating the lung, liver or spleen. The Tru-cut needle (Travenol Laboratories, Inc., Deerfield, Illinois 60015, USA) is a thin, disposable instrument with a sharp cutting edge. It combines an interlocking 4 1/2 inch or 6 inch cannula and trochar which has a 20 mm long specimen notch cut out of one side and a tissue core up to 20 mm in length can be obtained with its use. Its inner diameter is 1.4 mm while the outside diameter is 2.032 mm. It is used as previously described[3] primarily for biopsy of solid lesions including intrapulmonary masses, breast lumps, liver and kidneys[4,5,6].

Although the Tru-cut needle may appear to be unsuitable for pleural biopsy because there is no facility for aspiration of fluid to confirm entry into the pleural space, it is particularly useful in the presence of thickened pleura, such as is found in tuberculosis and certain malignant processes[4,7]. The depth of insertion can be guided by the thickness of the pleura as measured by computerised tomography.

The use of the Tru-cut needle for closed pleural biopsy in six patients with thickened pleura associated with minimal or no pleural effusion is reported.

Patients and Methods

Patients admitted to the University Hospital, Kuala Lumpur during April 1994 to July 1995 with physical and chest radiographic findings which suggested the presence of pleural effusion underwent diagnostic thoracentesis with a 21 gauge needle. Any pleural fluid aspirated was routinely submitted for cell counts, biochemical analysis, bacterial culture including culture for *Mycobacterium tuberculosis*, and cytological studies. Patients in whom initial needle thoracentesis yielded minimal or no pleural fluid and in whom preliminary analysis of the pleural fluid obtained were unrevealing apart from it being an exudate, underwent computerised axial tomography (CT) of the chest. Six patients were found to have thickened parietal pleural on CT scanning of the chest. The distance between the skin surface and the inner edge of the thickened parietal pleura was measured during CT scanning of the chest. Informed consent was obtained from each

of these patients for Tru-cut needle pleural biopsy when CT showed that the pleura was thickened.

Pleural biopsy was performed with the patients seated with the exception of patient number 4 in whom it was performed lying supine. Each patient was made to sit on a chair leaning slightly forward with his arms folded before him and resting on a pillow placed on a couch in front and with his back facing the operator. A posterior intercostal space was chosen based on chest radiograph and CT findings as well as dullness on chest percussion. A right lateral intercostal space was chosen for patient number 4 because of the location of his thickened pleura.

No premedication was given. After the skin had been cleaned with iodine solution and surgical spirit, local anaesthesia was achieved by infiltrating about 10 ml of 1% lignocaine (Xylocaine) into the skin, subcutaneous tissue and the pleura using a 21 gauge needle at the chosen intercostal space. The inferior border of the upper rib was avoided to prevent injury to the intercostal neurovascular bundle. At the time of injecting the lignocaine the resistance of the thickened pleura could be felt. Suction was applied as the needle was advanced to ascertain whether any fluid could be aspirated and to ensure that the tip of the 21 gauge needle had not gone beyond the thickened parietal pleura. A small vertical skin incision (3-5 mm) was made with a sharp, pointed scapel blade to facilitate the entrance of the Tru-cut needle. The Tru-cut needle in "closed" position was inserted perpendicular to the skin, just above the superior margin of the rib below the chosen intercostal space. When the tip of the needle had approached the pleura, as felt by a resistance, the inner stylet of the needle was pushed forward, exposing the specimen notch up to 20 mm in length. Special care was taken so that the tip of the needle did not go beyond a depth corresponding to the measured thickness of the parietal pleura. While holding the stylet firmly, the outer cutting sheath of the needle was then rapidly advanced forward, resulting in biopsy of up to 2 cm of the parietal pleura and intercostal muscle. The needle with the encased specimen was then withdrawn. The procedure was repeated if an adequate specimen was not obtained. One to three biopsies were performed and the specimens were placed in 10% formalin for histopathological analysis. An erect frontal view chest radiograph was routinely obtained within 4 hours after the biopsy to exclude any pneumothorax.

Results

The cases are summarised in Table I. The chest radiograph of the first patient is shown in Figure 1 (a) to illustrate the findings of a representative patient. The CT chest findings of the patients are as shown in the other figures. The Tru-cut needle biopsy procedure was uncomplicated in all six cases.

Discussion

Using a Cope or an Abrams needle for closed pleural biopsy, it is possible to obtain adequate specimens and achieve a 57 to 80 per cent diagnostic rate in tuberculous pleuritis[8] and a rate of 48 to 70 per cent in neoplastic pleural involvement[9]. Compared with the Tru-cut needle, the main disadvantages of the Abrams needle are its wide bore and its blunt tip[4]. However, pleural fluid can be aspirated through it and this allows confirmation that the needle has entered the pleural space. It is not safe to perform pleural biopsy with the Abrams needle in patients with small amounts of free or loculated effusions because of the danger of lacerating the lung, liver or spleen. The alternative

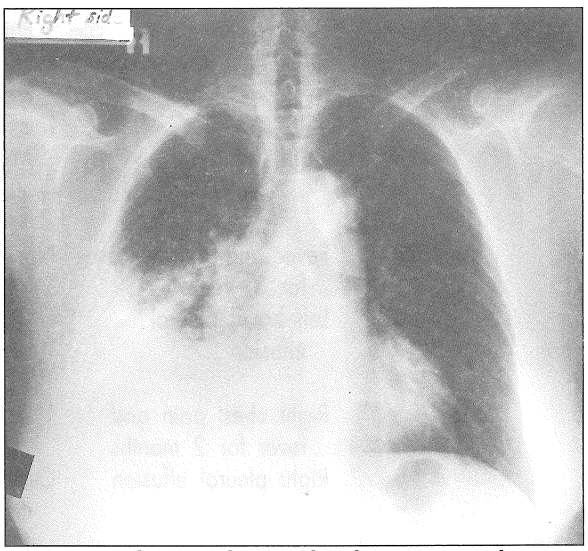

Fig. 1(a): Chest radiograph of patient 1 showing right pleural effusion

Table I
Summary of patients

Patient no.	Sex/age (years)	Clinical history, physical and chest radiograph findings	Thoracentesis with 21 gauge needle	Tru-cut needle biopsy – intercostal space – (no. of passes)	Histology of biopsy specimen
1	Female/53	Wertheim hysterectomy 5 years earlier for carcinoma of cervix Cough and dyspnoea for 3 months Right pleural effusion	1 ml yellow fluid Atypical cells	8th (2)	Mucinous adenocarcinoma
2	Female/29	Chronic smoker Right chest pain and dyspnoea for 6 months Right pleural effusion	No fluid	8th (1)	Adenocarcinoma
3	Male/49	Total laryngectomy for carcinoma of larynx 13 months earlier Right chest pain for 3 months Right pleural effusion	30 ml blood-stained fluid No malignant cells Abrams needle biopsy unsuccessful	9th (2)	Squamous cell carcinoma
4	Male/40	Diabetic Fever for a month Right pleural effusion	4 ml yellow fluid Increased lymphocytes Later grew *Mycobacterium tuberculosis*	9th (3)	Non-caseating epithelioid cell granulomas
5	Male/23	Fever and weight loss for 3 weeks Left basal pleural effusion	No fluid	9th (2)	Epithelioid cell granulomas with central caseation necrosis
6	Male/25	Right chest pain and fever for 2 months Right pleural effusion	1 ml golden yellow fluid Culture negative for *Mycobacterium tuberculosis*	9th (2)	Epithelioid cell granulomas with central caseation necrosis

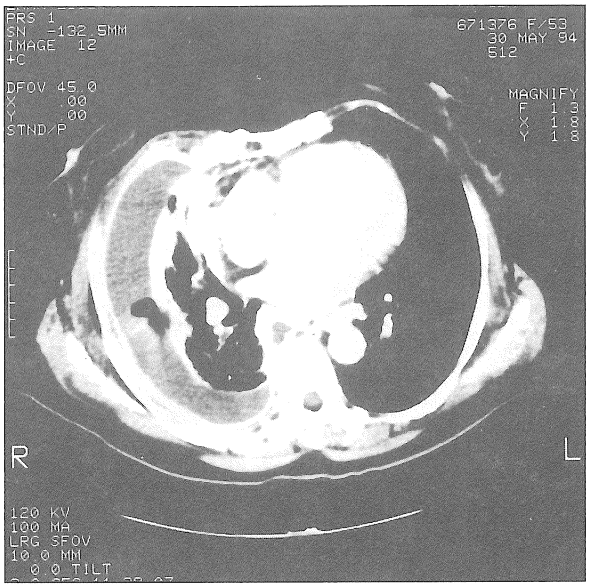

Fig. 1(b): CT scan of the thorax of patient 1 showing right pleural effusion and pleural thickening

Fig. 2: Chest CT scan of patient 2 showing gross thickening of right parietal and mediastinal pleura

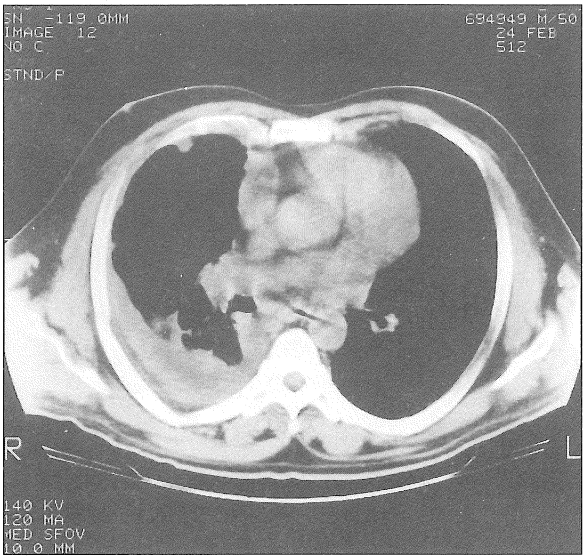

Fig. 3: Chest CT scan of patient 3 showing irregular thickening of right parietal and mediastinal pleura

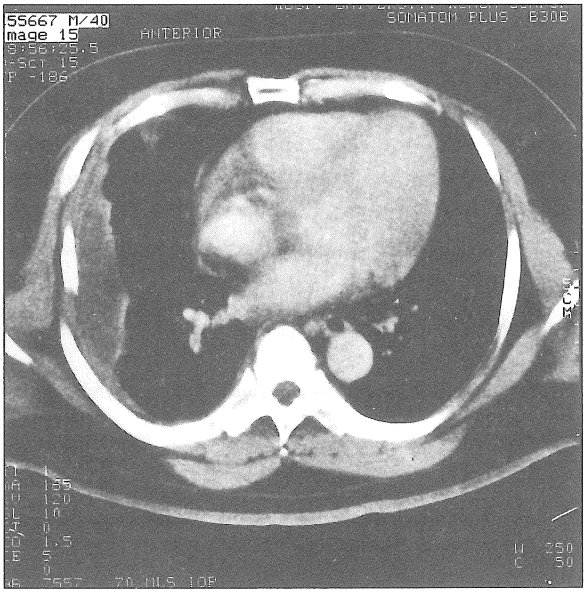

Fig. 4: Chest CT scan of patient 4 showing right lateral pleural thickening

procedure is thoracoscopy which has a diagnostic yield of 95% for pleural diseases[10]. However, thoracoscopic pleural biopsy is a more invasive investigation which requires general anaesthesia and it is not suitable for patients with dense adhesions in the pleural space.

The Tru-cut needle is particularly useful for pleural biopsy in the presence of a thickened pleura, as demonstrated by the cases described here and also by reports in the literature[4,7]. One study which compared

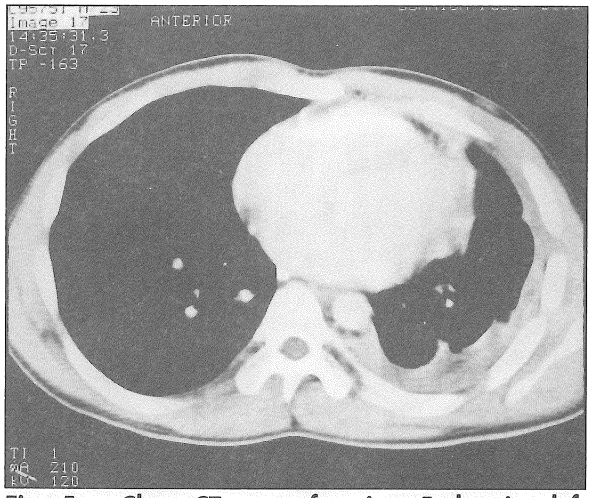

Fig. 5: Chest CT scan of patient 5 showing left posterior basal pleural thickening

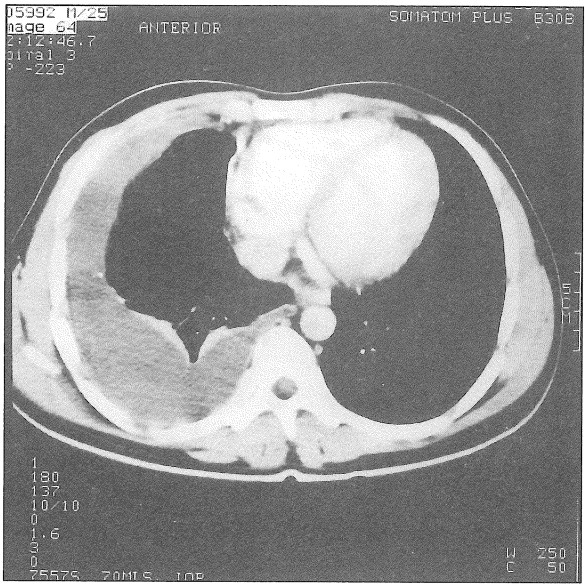

Fig. 6: Chest CT scan of patient 6 showing greatly thickened right parietal pleura

the use of the Tru-cut needle and Abrams needle for pleural biopsy in patients with at least 1.5 litres of pleural effusion fluid found that the Tru-cut needle yielded a greater amount of pleura when the pleura was greatly thickened[4]. Tru-cut needle may appear to be unsuitable for pleural biopsy because there is no facility for aspiration of fluid to confirm entry into the pleural space. However, the depth of its insertion can be guided by the thickness of the parietal pleura as measured on CT scan. Other authors have also shown that it is safe to biopsy the pleura with the Tru-cut needle under ultrasound guidance in situations in which the pleura is thickened and when the pleural effusion is small in amount or loculated[7]. The Tru-cut needle is not suitable for pleural biopsy in usual pleural effusions without thickened pleura because the lung may be lacerated.

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