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DRILL BIOPSY IN INTRATHORACIC MALIGNANT DISEASE

BY

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The histological diagnosis of intrathoracic malignant disease is usually based on material obtained at bronchoscopy. d'Abreu (1953) estimated that 75% of lung cancers are situated in an area of the bronchial tree visible at bronchoscopy and are suitable for biopsy. Lesions lying peripheral to this area cannot be diagnosed histologically without a thoracotomy. Examination of the sputum for malignant cells has increased the number of cases in which a pre-operative pathological diagnosis has been obtained (Zaman, 1955; Jennings and Shaw, 1953). The proportion of correct positive results obtained by this test, which is applicable only when the patient can produce sputum and which requires the services of an experienced cytologist, has varied in the published reports from 41% to 88% (Kjaer, Dreyer and Hansen, 1949; Clerf and Herbut, 1952).

In an attempt to establish a histological diagnosis in peripherally placed lung tumours and also in tumours of the pleura and of the chest wall, we have used a drill biopsy machine to obtain a tissue core for examination. The object of this article is to give a description of the technique and to report our experiences up to date.

APPARATUS AND TECHNIQUE

The apparatus is illustrated in Fig. 1. A special hollow needle of 1.5 mm. internal diameter is rotated at a speed of about 20,000 revolutions per minute by a pneumatic motor driven by compressed air from a cylinder (Morrison and Deeley, 1955). The length of the needle has been limited to 7 cm. because of the risk of whipping and consequent tissue damage when rotating a longer needle at high speed. The procedure has therefore been restricted to lesions lying within this distance from the skin. Even with this limitation, a satisfactory biopsy may be obtained from many peripheral lesions of the lung, pleural tumours, and tumours of the chest wall.

In cases selected for biopsy radiographs have been taken in the postero-anterior and lateral positions to locate the tumour in relation to the chest wall. The needle is introduced in the intercostal space nearest to the tumour; this usually corresponds to the point of maximum dullness on percussion. If the lesion is small, a lead marker is placed on the skin at the proposed point of entry and its position in relation to the tumour checked by radiographs. In cases in which clinical investigations have suggested a non-malignant condition, but in which malignancy cannot be entirely excluded, a radiograph is taken with the needle in the chest to check that the core has been obtained from the intended site (Fig. 2). Anterior and axillary tumours are best approached with the patient lying in the supine position. For posteriorly placed tumours the most convenient position is with the patient sitting, with his arms supported on a bed table. The operation is performed under local anaesthetic, premedication being given only to the apprehensive patient. The skin is prepared in the usual way and the intercostal space and pleura anaesthetized with 2% procaine. A small incision is made in the skin with a tenotome and the point of the drill needle introduced into the subcutaneous

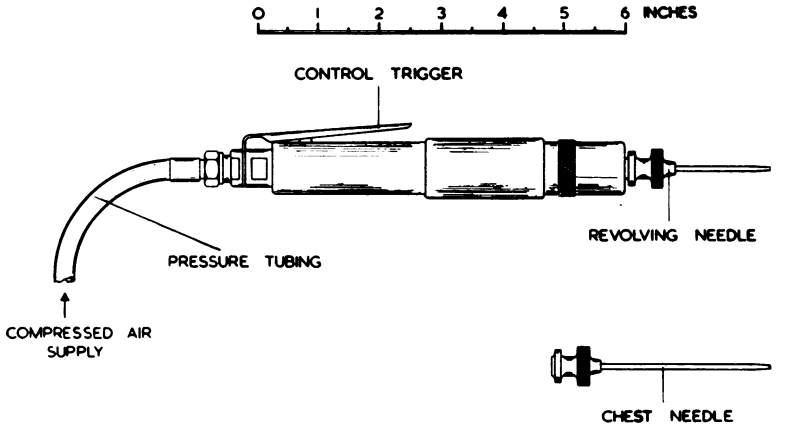

FIG. 1.—Drill biopsy apparatus (weight 10 oz.).

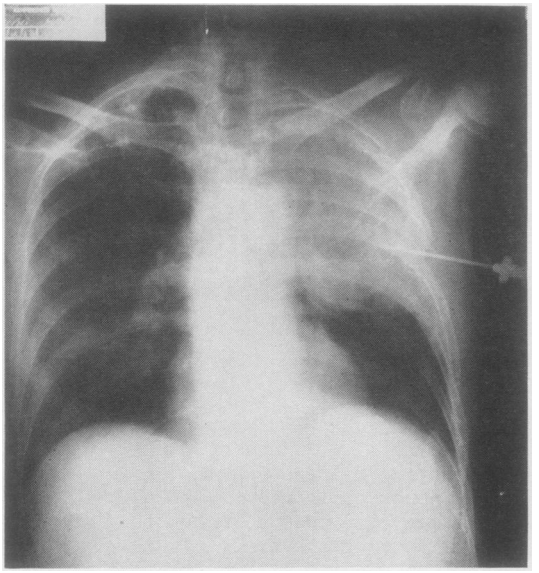

FIG. 2.—Radiograph showing the biopsy needle in position. Histologically an oat-celled carcinoma was found.

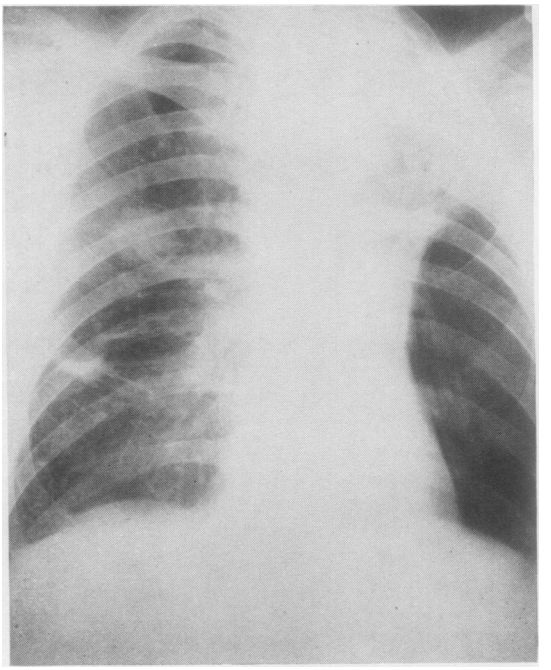

FIG. 4.—Recurrence of haemoptysis after left upper lobectomy six months previously. Drill biopsy of the lesion in the right upper lobe revealed a secondary deposit of squamous carcinoma.

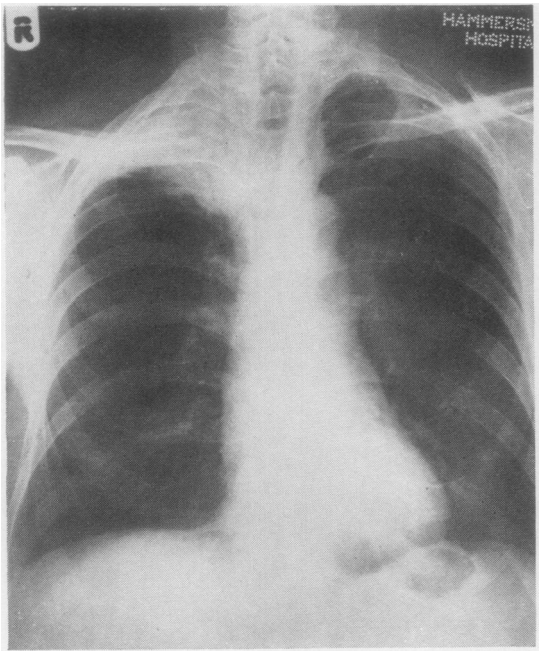

FIG. 3.—Radiograph of a patient who had a Pancoast syndrome. Histologically an undifferentiated squamous carcinoma was found.

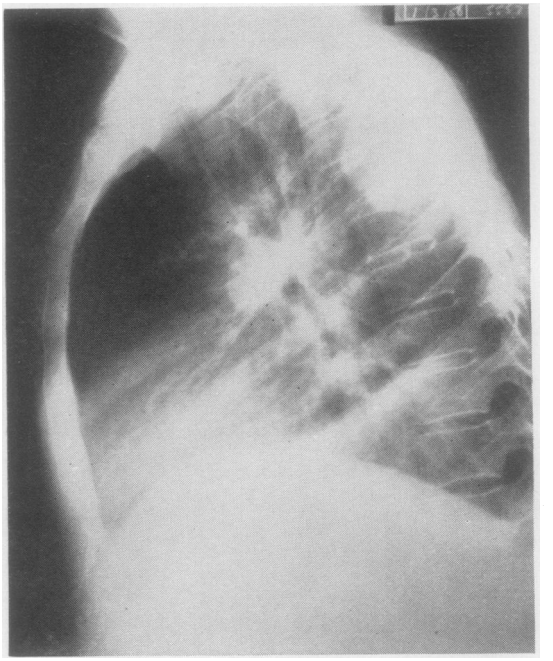

FIG. 5.—Lesion in posterior part of the chest, discovered on routine radiography. Histologically this proved to be a deposit of Hodgkin's disease.

tissues. The needle is then rotated at high speed through the chest wall into the lesion. The needle is withdrawn from the chest while steady suction is maintained from a syringe, and the core obtained is expelled directly into fixative. During the exchange from drill to syringe a finger is kept over the end of the needle to reduce the risk of air entering the pleural cavity.

Complications

When the needle perforates normal lung tissue it is inevitable that some air will escape from the lung into the pleural space. In most cases this causes little disturbance to the patient and the air is soon absorbed. In this series of 36 patients, one developed a tension pneumothorax after the procedure. This patient, an elderly man suffering from chronic bronchitis and emphysema, was found on radiological examination to have a rounded opacity lying posteriorly at the apex of the left lower lobe; bronchoscopic examination revealed no abnormality and drill biopsy was attempted to establish a diagnosis. Within a few minutes of the biopsy being performed the patient became acutely dyspnoeic and showed signs of a tension pneumothorax. His condition improved with treatment and the lung re-expanded gradually. After this incident it was thought that the necessary equipment should be readily available for dealing with this complication.

Haemorrhage into the pleura would also seem to be a possible risk, although we have not yet encountered it. In the peripheral lung and pleura the blood vessels are normally relatively small, but where a vascular growth involves the pleura the risk of perforating a large vessel would be increased.

We have not noted any signs of dissemination of tumour cells caused by the technique, and no recurrences have occurred in the track of the needle. In all cases the histological report has been obtained within 48 hours, and, where radiotherapy has been indicated, this treatment has been begun at once.

Although we have not encountered any late sequelae, we have admitted all patients to hospital and kept them in bed under observation after the procedure.

Results

The technique has been used in 36 patients. A lesion was present radiologically in the peripheral

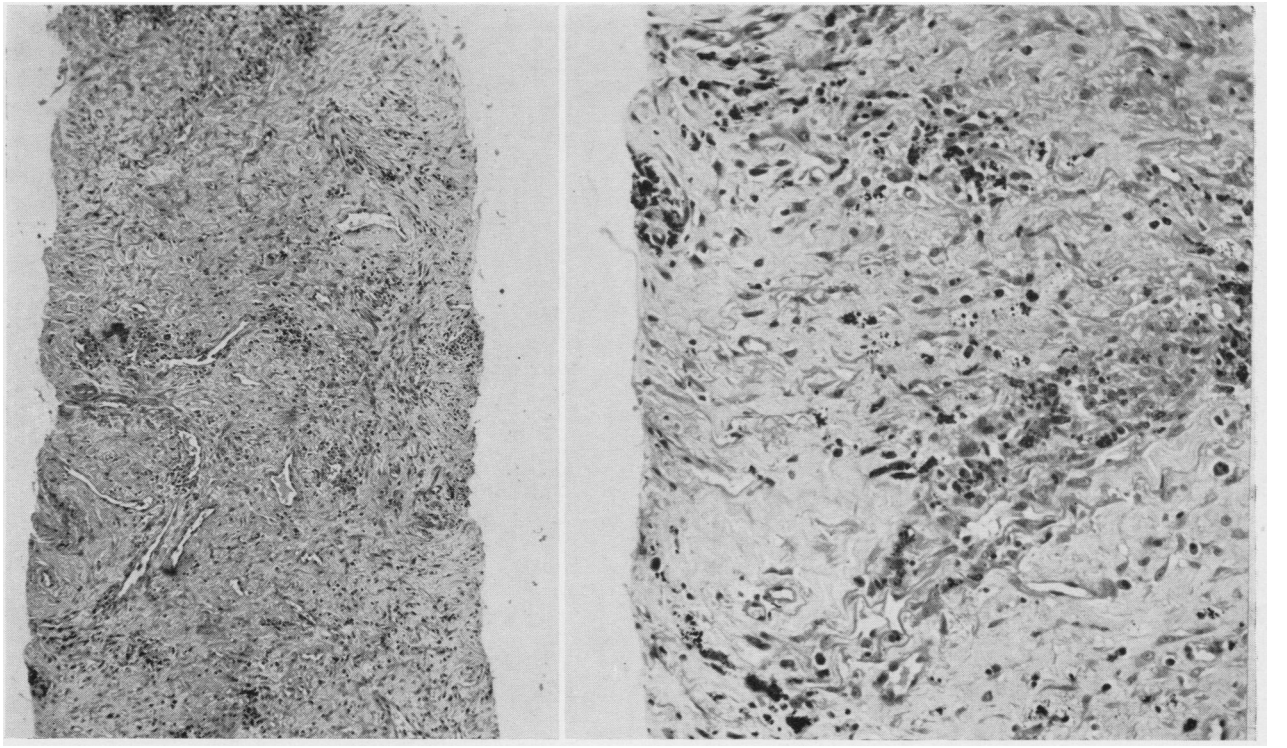

FIG. 6.—The drill biopsy specimen taken from a poorly differentiated squamous carcinoma of the upper lobe. × 63 (left) and × 180 (right).

part of the lung in 32 patients and in the pleura in four patients (Table I).

Satisfactory biopsy specimens were obtained from 26 of the 32 peripheral lung lesions. Malignancy was suspected in 29 patients and was

TABLE I
RESULTS OBTAINED BY DRILL BIOPSY

	No.	Accurate Biopsy	Failed or Inaccurate Biopsy
Lung (peripheral lesion)	32	26	6
Pleura	4	4	0
Total	36	30 (84%)	6 (16%)

proved histologically in 23 (79%). Figs. 3, 4, and 5 illustrate radiographic appearances which were elucidated by this technique, and Fig. 6 shows the histological appearance of a typical core. In five of the six unproved cases no core or an unsatisfactory core was obtained. In the remaining case biopsy showed only normal lung tissue, but the patient subsequently died, and a bronchial carcinoma was found at necropsy. It was thought that the biopsy had been taken from an area of collapsed lung lying distal to the tumour.

In two of the three benign conditions, post-radiation fibrosis was suspected and confirmed histologically; the biopsy in the third patient, presenting with a chronic lung abscess, showed organizing fibrous tissue only.

In the four pleural tumours, satisfactory biopsy specimens were obtained from all; two showed secondary carcinoma, and one a neurofibroma of the pleura. In the fourth case, only dense fibrous and collagenous tissue was obtained; the patient is alive and well 16 months after the biopsy and the appearance of the chest is unchanged.

The causes of failure of the technique are: (1) Failure to obtain a satisfactory core; this is usually because the tumour is soft and the needle tends to push the tissues aside rather than cut into them. In breaking-down tumours only necrotic debris inadequate for histological diagnosis may be obtained. (2) Failure to obtain a representative piece of tissue; this may be due to inaccurate localization of the tumour, especially if it is small, or to a biopsy being obtained from collapsed lung.

SUMMARY

A technique is described for obtaining tissue from peripheral lung and pleural lesions for histological examination.

In a series of 36 cases diagnostic reports have been obtained in 30 (84%). The risks of the procedure and the causes of failure are discussed.

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