

# Bronchoscopic evaluation of peripheral lung tumours

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**ABSTRACT** The results obtained from fibroptic bronchoscopy performed under fluoroscopic guidance were evaluated in a prospective study of 71 consecutive patients with a peripheral lung lesion more than 2 cm in diameter on the chest radiograph. A peripheral lung lesion was defined as a lesion that was not seen within the bronchial tree at fibroptic bronchoscopy. Small volume washings, bronchoalveolar lavage, transbronchial biopsy, and bronchial brushings were carried out and fluid or tissue was sent for cytological or histological examination as appropriate. Of the 71 patients, 51 were subsequently shown to have malignant disease. In 38 of the patients the diagnosis of malignancy was made by bronchoscopy, from histological specimens alone or in conjunction with cytological specimens in 33, from brushings alone in two, and from bronchoalveolar lavage fluid alone in three patients. There were no important complications. Thus fibroptic bronchoscopy in conjunction with fluoroscopic screening appears to be an effective and safe method for the initial investigation of a peripheral lung lesion more than 2 cm in diameter.

## Introduction

Controversy exists about whether the first diagnostic procedure in the investigation of a peripheral lung lesion should use the percutaneous or the bronchoscopic approach. With peripheral lesions 2 cm or less in diameter the diagnostic yield has been shown to be low regardless of the technique.<sup>1-4</sup>

In this study we have examined the value of fibroptic bronchoscopy under fluoroscopic screening in the diagnosis of peripheral lung lesions more than 2 cm in diameter.

## Methods

We studied 71 consecutive patients (62 outpatients and nine inpatients) referred to the respiratory disease service from January 1985 to May 1986 with a peripheral lung lesion more than 2 cm in diameter on the chest radiograph. A peripheral lesion was defined as one that was not seen within the bronchial tree at fibroptic bronchoscopy. The lung fields were divided into central and peripheral zones, the central zone being defined as being within a 4 cm radius of the hilum.<sup>5</sup>

Bronchoscopy was carried out by an experienced bronchoscopist. Each patient underwent small volume washings, bronchoalveolar lavage, transbronchial biopsy, and bronchial brushing, in that order. Two or three small volume (5 ml) saline bronchial washes of the relevant area were performed. Single plane fluoroscopy was used for bronchoalveolar lavage, transbronchial biopsy, and brushing. Exact localisation of the lesion was determined by advancement of the biopsy forceps via the bronchoscope with the patient first in the anteroposterior and then in the lateral position (the patient being rotated without any movement of the bronchoscope or forceps). Movement of the tip of the biopsy forceps in close association with the lesion on deep inspiration in both anteroposterior and lateral positions was used to confirm accurate positioning. The patient was then returned to the anteroposterior position and the forceps were withdrawn. Bronchoalveolar lavage was performed without moving the bronchoscope by injecting 100 ml of saline in aliquots of 20 ml. Washings and bronchoalveolar lavage fluid were sent for bacteriological and cytological examination. The fluid sent for cytological examination was centrifuged and the sediment smeared on to four slides, which were fixed and stained by the Papanicolaou technique. Four to six transbronchial biopsy specimens were taken, placed in formalin, dehydrated, embedded in paraffin, and stained with haematoxylin and eosin. Bronchial brushing was performed with a nylon brush (Olym-

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pus), which was smeared on to four slides that were fixed and stained by the Papanicolaou technique. Bronchoscopy was not repeated in any of the patients.

## Results

Of 71 patients who underwent bronchoscopy during the 16 months, 51 (72%) were subsequently found to have malignant disease. The patients with malignant disease had a mean age of 64 (range 43–85) years and 29 were male. The 20 patients with benign disease had a mean age of 60 (range 23–78) years and 10 were male.

The non-malignant group of 20 patients included five with surgically proved benign disease, two with pulmonary tuberculosis, and 10 whose lesion regressed and subsequently disappeared during follow up. Three patients have been followed for more than 24 months, with no change in the size of the lesion on the chest radiograph.

Of the 51 patients in whom malignant disease was diagnosed the diagnosis was obtained by bronchoscopic techniques in 38 (table 1). Both centrally and peripherally located tumours were diagnosed by bronchoscopy. Of the 13 patients with malignant disease in whom bronchoscopy gave negative results, nine were diagnosed at surgery and one at follow up examination of sputum cytology and in four patients the diagnosis was established from the clinical progression and subsequent evidence of malignant disease at other sites.

Of the 38 patients with malignancy diagnosed by bronchoscopy, 30 had a primary bronchogenic carcinoma, seven a tumour that had metastasised from another site (three breast, two large bowel, one bladder, one uterus) and one a non-Hodgkin's lymphoma. Of the 30 patients with a primary bronchogenic carcinoma, 10 had a squamous cell carcinoma, nine an adenocarcinoma, six a large cell carcinoma, and five a non-small cell carcinoma (a more specific classification was not possible). The tumour was resected in 12 of these patients; in one the histological classification was revised from squamous cell to large cell carcinoma and in another from squamous cell carcinoma to adenocarcinoma. The nine patients in

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Table 2 Results of bronchoscopic diagnostic techniques in 38 patients with malignant tumours

Diagnostic technique	No (%) of positive diagnoses	Number where sole source of diagnosis
Histology:		
Biopsy	33 (87)	16
Cytology:		
Brush	19 (50)	2
Lavage	9 (24)	3
Small volume wash	5 (13)	0

whom malignancy was diagnosed at surgery had adenocarcinoma (three), large cell carcinoma (three), squamous cell carcinoma (two), and atypical carcinoid (one).

Histological examination showed malignant cells in 33 of the 38 patients (table 2) and 22 of these were both histologically and cytologically positive. In five patients malignancy was diagnosed from cytology alone, in three from bronchoalveolar lavage fluid alone and in two from bronchial brushings alone. The small volume wash provided a diagnosis in five patients but in none was it the sole source of diagnosis.

Bronchoscopy caused few complications in the 71 patients—there was a small pneumothorax in one patient (not requiring a chest drain) and small haemoptyses in a few patients.

## Discussion

Bronchoscopy with fluoroscopic guidance made a diagnosis possible in 38 of the 51 patients with a peripheral malignant lesion more than 2 cm in diameter on the chest radiograph. We selected lesions of this size as our previous experience with smaller lesions had been disappointing, as noted by others.<sup>2</sup> In contrast, percutaneous needle aspiration of tumours with a diameter of 2 cm or less may give twice the diagnostic yield of bronchoscopic procedures.<sup>4,5</sup>

Twenty patients had benign lesions and in 10 of these inflammatory changes were seen on lung biopsy. These findings taken together with the clinical presentation prompted a conservative approach, consisting

Table 1 Diagnostic yield (No of diagnoses/No of examinations) for benign lesions and malignant tumours\* in relation to size and position

Size of tumour (cm):	Central location			Peripheral location			Total
	2-4	4-6	6-8	2-4	4-6	6-8	
Malignant	6/8	7/7	4/5	9/13	10/15	2/3	38/51
Benign:							
Inflammation	2/2	1/1	—	6/6	3/3	—	} 12/20
Other conditions†	—	—	0/1	0/6	0/1	—	
Total	8/10	8/8	4/6	15/25	13/19	2/3	

\*Definitive diagnoses.

†Sarcoidosis, hamartoma, fibrosis, and bronchiectasis.

of antibiotic treatment and close follow up. Antituberculous treatment was initiated in two patients in whom tuberculosis was confirmed. Unlike others,<sup>6</sup> we did not correctly diagnose peripherally situated non-malignant conditions such as sarcoidosis.

Left upper lobe lesions proved more difficult to diagnose correctly by the transbronchial approach (a positive diagnosis in only six out of 12 patients) and this is probably related to the eccentric position of the segments of the left upper lobe. There were no appreciable differences between the yields from other lung regions.

The bronchoscopic approach allows visualisation of the tracheobronchial tree and we confirmed the low complication rate reported by others (pneumothorax 0.01%, haemorrhage 0.01%).<sup>6-8</sup> In contrast, percutaneous needle aspiration results in pneumothorax in 20–30% of cases.<sup>9-11</sup> Of these, a third to a half require chest tube drainage.<sup>9,10</sup> Rarer complications of aspiration needle biopsy include air embolism<sup>12</sup> and implantation of tumour in the needle track.<sup>13</sup>

In our study 33 of the 38 diagnoses of malignancy were made by histological examination of transbronchial biopsy material. The yield is similar to that reported in other studies<sup>6,7</sup> and provides a clear advantage over needle aspiration, which usually obtains material for cytological examination only. Because of the high complication rate from trephine air drill biopsy<sup>14</sup> needle aspiration is the percutaneous technique of choice for peripheral and intrathoracic lesions in most centres.<sup>15</sup>

Our diagnostic yield was improved by the cytological analysis of bronchoalveolar lavage fluid and bronchial brush specimens. Small volume washings were not the sole source of a diagnosis of malignancy in any patient and should probably be replaced by bronchoalveolar lavage in the investigation of peripheral lung tumours.

In our opinion bronchoscopy with transbronchial biopsy and brushing under fluoroscopic control appears to be the best initial procedure for the investigation of peripherally placed tumours over 2 cm in diameter. Bronchoalveolar lavage should also be performed and the lavage fluid analysed for malignant cells.

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