Occasional Survey

Fibreoptic Bronchoscopy Today: A Review of 255 Cases

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Summary

An analysis of 255 fibreoptic bronchoscopies showed that the major indication for bronchoscopy was suspected bronchial carcinoma (93% of cases). Of the 183 patients finally shown to have bronchial carcinoma 83% had abnormal bronchoscopy findings and 65% had bronchial biopsy specimens diagnostic of malignancy. These figures were superior to those obtainable with rigid bronchoscopy, particularly with upper lobe and peripheral tumours. Brush biopsy and bronchography were useful supplementary techniques. Sputum cytology gave poorer results than fibreoptic bronchoscopy, but enabled diagnosis in some otherwise undiagnosed cases. The complication rate was low and the claim of this new technique to be the investigation of choice in bronchial carcinoma seemed to be justified in clinical practice.

Introduction

After its development by Ikeda[1 2] in the late 1960s, the flexible fibreoptic bronchoscope became widely used in 1970-1 in the United States. A survey[3] in 1974 showed that 191 operators had performed 24 500 fibreoptic bronchoscopies in America in the first three years of use. Fibreoptic bronchoscopy is becoming the routine bronchoscopy technique both there and in Japan. In Britain its use is growing steadily. American workers have asserted that the fibreoptic bronchoscope is easier to use,[2] enables a larger area of the bronchial tree to be seen, down to subsegmental level and beyond,[2 5] is more acceptable to the patient, gives a higher rate of diagnosis,[2 4] and has a very low complication rate.[3] These claims, however, all come from large centres with considerable expertise. The first fourteen months' experience of fibreoptic bronchoscopy in a regional thoracic centre has been assessed to see whether such results are obtained in British practice and with little initial experience in the technique.

Patients and Methods

Selection of Patients.—From December, 1973 to February 1975 255 patients (205 men and 50 women, mean age (±S.D.) 60 ±10·6) underwent fibreoptic bronchoscopy as inpatients at Sully Hospital. These comprised 90% of all the bronchoscopies performed in the Cardiff area.

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Anaesthesia.—All patients were given papaveretum 10-15mg and atropine 0·6 mg as premedication and an amethocaine lozenge 15 minutes before bronchoscopy. On arrival at the endoscopy suite they were sedated with fentanyl 0·0025 mg/kg and droperidol 0·12 mg/kg via an intravenous cannula. With the patient sitting upright 2 ml of 2·5% cocaine was instilled by cricothyroid puncture. The coughing produced by this injection lasted less than 30 seconds. With the vocal cords anaesthetized a second cricothyroid injection of 2 ml 2·5% cocaine anaesthetized the bronchial tree. A further 1 ml of 2·5% cocaine was sprayed into the more patent nostril.

Technique of Investigation.—An Olympus fibreoptic bronchoscope (model BF-5B2) was introduced transnasally. In the two patients in whom this proved impossible it was introduced transorally. Every segmental orifice was visualized, except where obstructed by tumour, and sub-segmental orifices were inspected. At least one biopsy specimen was taken from any abnormality other than mucosal reddening. Bronchial brush biopsy was used where relevant. After bronchoscopy some patients underwent bronchography. A 150-cm Seldinger wire was introduced through the suction channel and its tip placed at carinal level under direct vision. The bronchoscope was then removed and a bronchogram catheter threaded over the Seldinger wire, which was then withdrawn. After bronchography patients received intensive chest physiotherapy.

Cytology.—At least three sputum samples were routinely examined for malignant cells in the local cytology laboratory.

Results

The diagnoses before bronchoscopy were as follows: possible carcinoma in 237 patients, tuberculosis in 5, pneumonia in 4, pulmonary embolus in 2, bronchiectasis in 2, unilateral emphysema in 1, mediastinal tumour in 1, sarcoid in 1, possible foreign body in 1, and pulmonary fibrosis in 1.

Bronchial Carcinoma.—Altogether 93% of bronchoscopies were performed to diagnose or exclude carcinoma of the bronchus. Of these patients 77% were subsequently shown to have bronchial carcinoma. Table I relates the bronchoscopy results to the type and site of the lesions seen on posteroanterior and lateral radiographs. "Hilar opacity"

TABLE I—*Bronchoscopic Findings and Bronchial Biopsy Results in Relation to Radiographic Appearances in Patients with Bronchial Carcinoma*

Radiograph	Bronchoscopy		Biopsy		
	Normal	Abnormal	Positive	Negative	Not Done
Collapse	1	13 (93%)	9 (64%)	4	1
Consolidation	2	50 (96%)	40 (77%)	8	4
Peripheral opacity	23	56 (71%)	41 (52%)	6	32
Hilar opacity	4	29 (88%)	25 (76%)	1	7
Normal	0	3	3	0	0
Diffuse opacities	2	0	0	0	2
Right upper lobe	10	42 (81%)	32 (62%)	5	15
Right middle lobe	2	10 (83%)	9 (75%)	1	2
Right lower lobe	1	13 (93%)	10 (71%)	2	2
Left upper lobe	10	20 (67%)	13 (43%)	5	12
Left lower lobe	3	27 (90%)	20 (67%)	4	6
Hilum	4	26 (87%)	22 (73%)	1	7
Whole lung (right)	0	4	3	1	0
Whole lung (left)	0	6	6	0	0
Diffuse opacities	2	0	0	0	2
Normal	0	3	3	0	0
Haemoptysis	12	77 (87%)	62 (70%)	10	17
No haemoptysis	20	74 (79%)	56 (60%)	9	29
Total	32	151 (83%)	118 (65%)	19	46

includes lesions contiguous with the hilum on anterior and lateral radiographs that did not cause radiographic collapse or consolidation. "Peripheral opacity" indicates lesions separate from the hilum on anterior or lateral view, or both, that did not produce collapse or consolidation.

Abnormal Bronchoscopy.—Overall 83% of patients with carcinoma had abnormal bronchoscopy findings. The term "abnormal" refers to any macroscopic abnormality apart from mucosal reddening. The highest percentages of bronchoscopic abnormality were seen with radiographic consolidation, collapse, or hilar opacities. The lowest proportion was seen with circumscribed peripheral opacities (table I). Abnormalities in the upper lobes were less likely to be visible bronchoscopically than those in the lower lobes, with the middle lobe giving an intermediate figure. The presence of haemoptysis, however, made a visible abnormality only slightly more likely.

Bronchial Biopsy.—A bronchial biopsy specimen diagnostic of malignancy was obtained in 65% of patients with carcinoma. Inclusion of brush biopsy and trap specimen results increased this figure to 70%. Positive specimens were again most likely from lower and middle and least likely from the left upper lobes. Again the symptom of haemoptysis made a positive biopsy specimen only slightly more likely. Table II relates bronchial biopsy results to bronchoscopic appearances. A visible tumour yielded a positive biopsy specimen in nearly all cases. Interestingly, even when biopsy specimens were taken from abnormalities other than frank tumour almost half gave positive results.

TABLE II—*Bronchial Biopsy and Sputum Cytology Results in Patients with Bronchial Carcinoma Classified According to Macroscopic Appearances at Bronchoscopy*

	Visible Tumour	Other Abnormality	Normal	Total
No. of patients	104	47	32	183
Bronchial Biopsy				
Positive	95 (91%)	23 (49%)		118 (65%)
Negative	6 (6%)	13 (28%)		19 (10%)
Not done	3	11	32	46 (25%)
Cytology Sputum				
Positive	56 (54%)	20 (43%)	11 (34%)	87 (48%)
Negative	47 (45%)	27 (58%)	20 (63%)	94 (51%)
Not done	1		1	2

Sputum Cytology.—Only 48% of patients with carcinoma had positive sputum cytology (table II). Even with bronchoscopically visible tumours the rate was only slightly higher. Of the 32 patients with normal bronchoscopy findings, however, 11 had positive cytological findings. In seven of these cases cytology provided the only histological evidence of malignancy before surgery or post-mortem confirmation.

Supplementary Techniques.—Brush biopsy was used in 22 patients with carcinoma. In 13 cases it showed malignant cells and in nine of 18 cases brush biopsy was diagnostic where bronchial biopsy was unhelpful. In seven of these nine cases brush biopsy provided the only histological evidence of carcinoma before its surgical or necropsy confirmation. For bronchography the Seldinger technique of catheter insertion was successful in all cases, and there were no complications. Of 32 patients normal on bronchoscopy 13 (41%) had a peripheral bronchographic block suggestive of carcinoma.

Final Diagnosis.—In 65 patients bronchial biopsy was unhelpful in diagnosing carcinoma. The final diagnosis was made by histological methods in 52: by cytology in 18, thoracotomy in 14, brush biopsy in 8, necropsy in 4, cervical gland biopsy in 2, pleural biopsy in 2, liver biopsy in 2, and bronchial trap cytology in 2. In the remaining 13 patients carcinoma was diagnosed on clinical grounds: one patient developed cerebral metastases, three developed diaphragmatic paralysis, and in nine the diagnoses became apparent during the clinical course of the disease. Of the 183 patients with carcinoma, 74 underwent thoracotomy: 41 had lobectomy, 24 had pneumonectomy, and nine were considered inoperable. The final diagnoses of patients with conditions other than bronchial carcinoma are shown in table III.

Complications.—One major and three minor complications occurred. One anxious patient, deliberately undersedated because of poor lung function, had a respiratory arrest as the bronchoscope tip was introduced. Spontaneous respiration returned after two minutes of hand ventilation via an anaesthetic bag and mask. Bronchoscopy was abandoned. She recovered consciousness within two to three minutes with no cerebral, respiratory, or cardiac damage. This episode was probably due to autonomic overactivity rather than oversedation since she was alert, anxious, and over-breathing immediately beforehand. Ventilatory compromise by the bronchoscope's presence was considered unimportant since only 1 cm of the instrument's tip had entered the patient's nostril. Only one patient developed epistaxis. Two patients developed transient pyrexia and purulent sputum the day after bronchoscopy; both had had bronchography after bronchoscopy.

TABLE III—*Final Diagnoses in 72 Patients without Bronchial Carcinoma who Underwent Bronchoscopy*

	No. of Patients		No. of Patients
Postinfective fibrosis	19	Empyema	1
Tuberculosis	11	Pulmonary embolism	2
Tuberculoma	3	Haemoptysis (? cause)	2
Organized pneumonia	3	Leiomyoma of bronchus	1
Sarcoid	2	Lung metastases	3
Procedure abandoned	1	Cryptogenic fibrosing alveolitis	2
Bronchiectasis	10	Progressive massive fibrosis	2
Lung abscess	1	Miscellaneous	9

Discussion

In the diagnosis of lung cancer the importance of bronchoscopy is undisputed. Several large series[2 6 7] have established the efficacy of rigid bronchoscopy, which is thus the main standard against which fibreoptic bronchoscopy must be judged. The best reported rigid bronchoscopy figures are in the review of 1109 examinations in Edinburgh,[6] even though this series was completed before more recent instrumental advances. The findings presented here were analyzed to make direct comparison with the Edinburgh review possible. The comparable Edinburgh figures appear in brackets after our results.

Abnormal Bronchoscopy.—Abnormal bronchoscopy findings were more common in our series—83% (68%). This discrepancy was greatest in the diagnosis of peripheral opacity—71% (30%)—and reflects the better view of smaller bronchi obtained with the flexible instrument. Even with central lesions likely to produce radiographic consolidation or hilar shadowing our abnormality rates were slightly higher—96% (74%) and 88% (69%) respectively. Abnormalities are more frequently seen in the upper lobes—left 67% (48%) and right 81% (60%)—whereas rigid bronchoscopy is almost as good as fibrescopy for lower lobe lesions—left 90% (88%) and right 93% (84%).

Bronchial Biopsy.—Bronchial biopsy results give the most objective assessment of the diagnostic value of bronchoscopy. In this series 65% of patients with carcinoma had a positive bronchial biopsy specimen compared with 61% in the Edinburgh review. Other rigid bronchoscopy series give poorer results—for example, a British series in 1971[7] gave a positive biopsy rate of 49·6% and a Japanese series a rate of 44%[2] in 1970. Thus the fibreoptic instrument in relatively inexperienced hands seems to give a marginally better bronchial biopsy success rate than that in the best of rigid bronchoscopy series. Again, the fibreoptic instrument was more successful in peripheral opacities—52% (30%)—and upper lobe lesions—left 43% (39%) and right 62% (53%). The presence of haemoptysis made a lesion rather more likely to be seen and biopsied in both series. A system of systematic segmental lavage can be highly effective in identifying bleeding points via fibreoscopy.[15] When tumour tissue was visible 94% of attempted biopsies gave positive specimens. With all bronchoscopic abnormalities biopsy gave diagnostic evidence of malignancy in 65% of this series and 55% of the Edinburgh series.[6] Thus the small size of fibreoptic biopsy specimens is not a handicap in practice.

Sputum Cytology.—Only 48% of patients with carcinoma had positive sputum cytology compared with the 65% positive on bronchial biopsy. About half the patients with tumours visible on bronchoscopy had no malignant cells on three or more sputum examinations. On the other hand, a few patients were cytologically positive but normal on bronchoscopy. Thus cytology and bronchoscopy remain complementary diagnostic procedures.

Brush Biopsy.—High rates of diagnosis have been claimed with the use of brush biopsy in fibreoptic bronchoscopy,[4 8]

especially under fluoroscopic control. Brush biopsy produced malignant cells in 13 of the 22 cases in which it was used. We will use brush biopsy more often in future to investigate radiographic abnormalities when bronchoscopical findings are normal.

Bronchography.—The use of bronchograms in lung cancer has been declining recently. A catheter can, however, be introduced easily and atraumatically by the technique described. In half the patients with normal bronchoscopy findings who had bronchograms the technique showed peripheral blockage which we considered useful in suggesting cancer. Thus post-bronchoscopy bronchograms should be strongly considered in such patients.

Safety.—Like others,[3] we have found fibreoptic bronchoscopy to be a basically safe technique with few complications. In a review of 24 500 examinations in the U.S.A.[3] there was a major complication rate of 0·08% and a minor complication rate of 0·2%.

Controversy has arisen in both America[9-11] and Britain[12-14] on the future role of fibreoptic bronchoscopy. Though some[9 12 14] have claimed that fibreoptic bronchoscopy should be used only as an adjunct to rigid bronchoscopy the findings presented here show that fibrescopy on its own can give practical results at least as good as those given by rigid bronchoscopy. While rigid bronchoscopy must retain a place for tasks such as the removal of foreign bodies the claim of fibreoptic bronchoscopy to be the method of choice for routine bronchoscopy is well founded in practice.

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Hospital Topics

Needling Renal Cysts and Tumours: Cytology and Radiology

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Summary

Renal masses found by intravenous urography, ultrasound scanning, and arteriography were needled in 102 patients. Simple renal cysts containing clear fluid and no cytological abnormalities were found in 85 patients. Two unsuspected renal cell carcinomas were found on puncture; cytological examination showed malignant cells in the aspirate. Another five renal tumours were needled deliberately before nephrectomy, and a firm preoperative diagnosis of renal cell carcinoma was made on aspiration cytology in three. Benign cysts which had bled were particularly hard to diagnose. With care, radiology and cytology in combination can provide the firm diagnostic base needed for sound clinical management. The radiology-cytology team must be alert to the unusual finding that indicates a complex lesion, such as an unsuspected renal tumour.

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Introduction

The intravenous urogram (I.V.U.), renal ultrasound scan, and arteriogram may be used to point to a likely diagnosis for renal masses. Some renal masses with wholly characteristic findings, such as the displaced cortical island,[1 2] should be recognized at this stage and investigation not pursued, but most lesions will demand a further step toward definitive diagnosis and management. We have aimed to puncture all masses thought to be cysts using a fine-bore needle to aspirate tissue for cytological examination. Several renal tumours have been needled and diagnosed in this way together with other solid, though benign, renal lesions. We report here on 102 patients whose renal masses were punctured, including five in whom a suspected renal tumour was needled deliberately.

Patients and Methods

During the four years since our previous report[3] we have needled the renal masses of 102 patients. Most of the masses were discovered incidentally on routine I.V.U.s performed during the investigation of unrelated urological symptoms, usually affecting the lower urinary