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The role of the fibreoptic bronchoscope in otorhinolaryngological practice

by

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Abstract

Flexible fibreoptic bronchoscope has been employed in the examination of the nasopharynx, pharynx, larynx, trachea, bronchus and intrathoracic oesophagus under local anaesthesia. It is used either for diagnostic or therapeutic purposes. A total of 1690 procedures have been performed with no complication. The indications and findings in these procedures are listed. The advantages and limitations of the use of flexible fibreoptic bronchoscope as a 'panendoscopic examination' instrument are discussed.

Introduction

Over the past 20 years, flexible fibreoptic instruments have played an increasing role in nearly all fields of medical practice (BMJ 1974). These endoscopes have been used widely to examine most hollow viscera of the human body. Fibreoptic endoscopes of different diameter and length are now available to enable surgeons to carry out diagnostic and therapeutic procedures. The head and neck surgeon, by tradition, relies more on rigid instruments, which are used to show areas covered by mucosal folds within organs in the head and neck region. Most departments, however, now possess a flexible fibreoptic nasoendoscope and have found it to be an accurate, safe and inexpensive way of examining the nasopharynx, pharynx and larynx (Lancer and Moir, 1985; Shanmugham, 1985). Other otorhinolaryngologists have been employing the fibreoptic gastroscope in the investigation of pharyngeal, laryngeal and upper gastrointestinal problems (Batch, 1985).

We, however, have been employing the fibreoptic bronchoscope in examination of the upper aerodigestive tract. The bronchoscope, because of its length, allows adequate examination of the nasopharynx, larynx, pharynx, trachea, bronchus and the whole thoracic oesophagus. Guide wires, snares and forceps etc. can be inserted through the biopsy channel for therapeutic measures and tissue can be obtained for histological examination. The following review reports our experience in both the diagnostic and therapeutic use of the flexible fibreoptic bronchoscope in the field of head and neck surgery.

Procedure

These procedures were performed under local anaesthesia and patients were not given any premedication. After choosing the more patent nasal passage, the nasal cavity was anaesthetised topically with 1 per cent lignocaine solution. The posterior pharyngeal wall was sprayed with Cetacaine. The endoscopist stood in front of the patient who was usually

sitting. The Olympus flexible fibreoptic bronchoscope either model B3R (outer diameter 6.0 mm.) or 3C4 (outer diameter 3.9 mm.) was introduced into the nasal cavity after lubrication with K-Y jelly. The endoscope went in usually on the floor of the nasal cavity. Abnormalities in the turbinates or pathologies in the nasal cavity could be visualized (Fig. 1).

At the choana, the Eustachian tube opening and the nasopharynx came into view. With manipulation, the Eustachian tube opening of the opposite side could be visualised. Pathologies in the nasopharynx could be accurately located and biopsies performed if indicated (Fig. 2). Then the endoscope could be advanced beyond the soft palate into the pharynx, and the epiglottis would come into view. By asking the patient to protrude his tongue, the valleculae could be examined and also lesions on the wall of pharynx could be seen (Fig. 3). By manipulating the scope behind the epiglottis, the laryngeal inlet could be seen. Pathologies of the larynx could also be clearly identified, the extent of tumours of the larynx could be delineated and the mobility of the cords ascertained (Fig. 4 and 5).

When an examination of the bronchial tree was indicated, the vocal cords were anaesthetised with 1 per cent lignocaine injected *via* the biopsy channel accurately onto the cords and the same endoscope could be inserted beyond the vocal cords to examine the trachea, the carina and the bronchi (Fig. 6). When the scope was in the pharynx, both pyriform sinuses could be examined and the scope could be advanced beyond the cricopharyngeus muscle into the oesophagus. A flow of oxygen at 1 litre/min. connected to the biopsy channel would distend the oesophageal mucosa and the whole thoracic oesophagus could be examined (Fig. 7).

When a patient undergoes a fibreoptic endoscopic examination, usually the whole procedure of examination is carried out, including the nasopharynx, pharynx, larynx and oesophagus. The trachea and bronchi are examined only when there are specific indications. For a patient with a tracheostomy, when the procedure is for examination of the bronchus, the endoscope can be introduced *via* the tracheostome.

Results

From July 1983 to October 1985, in the Department of Surgery, University of Hong Kong, Queen Mary Hospital, Hong Kong, a total of 1690 endoscopic procedures were performed on 1282 patients using the fibreoptic flexible bronchoscope. The indications for the 1690 endoscopic procedures are listed in Table I.

Of the 1282 patients, the male to female ratio was 3:1 and the age ranged from 3 days old to 82 years, with a mean value of 59.9 years. Of the 1690 procedures, 1322 were done on an elective basis and 368 outside normal examination time. The flexible bronchoscope model B3R was used for 1677 procedures and the 3C4 model for 13 procedures. Around 10 per cent of the fibreoptic procedures revealed positive findings. These findings are listed in Table II. Foreign bodies were removed from the pharynx and bronchus in 7 patients and in 1 patient, a nasal polyp was snared (Fig. 8). There were no complications in any of the 1690 fibreoptic endoscopic examination procedures.

Discussion

The use of the flexible fibreoptic bronchoscope in examination of the nasopharynx, pharynx and larynx are well documented (Donnelly, 1985). In addition to these, we have also employed the endoscope in the examination of the nasal cavity and the oesophagus. This 'panendoscopic examination' enables the whole examination to be carried out with the endoscope introduced once only and there is no need to change from one instrument to another.

The Olympus flexible bronchoscope model B3R with an outer diameter of 6.0 mm. can be inserted comfortably into the nasal cavity and yet its length allows visualization of most parts of the upper aerodigestive tract. The 3C4 bronchoscope, with an outer diameter of 3.9 mm., is used for examination in children or in

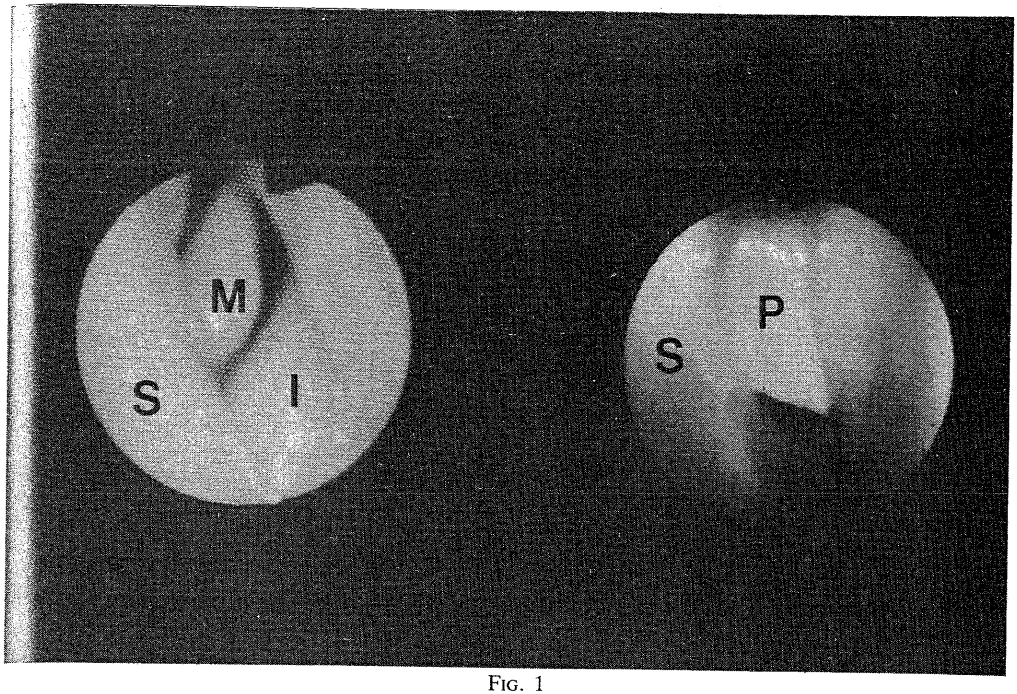

FIG. 1
Left: Normal nasal cavity showing the middle(M) and inferior(I) turbinates and the nasal septum(S).
Right: Nasal cavity showing a nasal polyp(P).

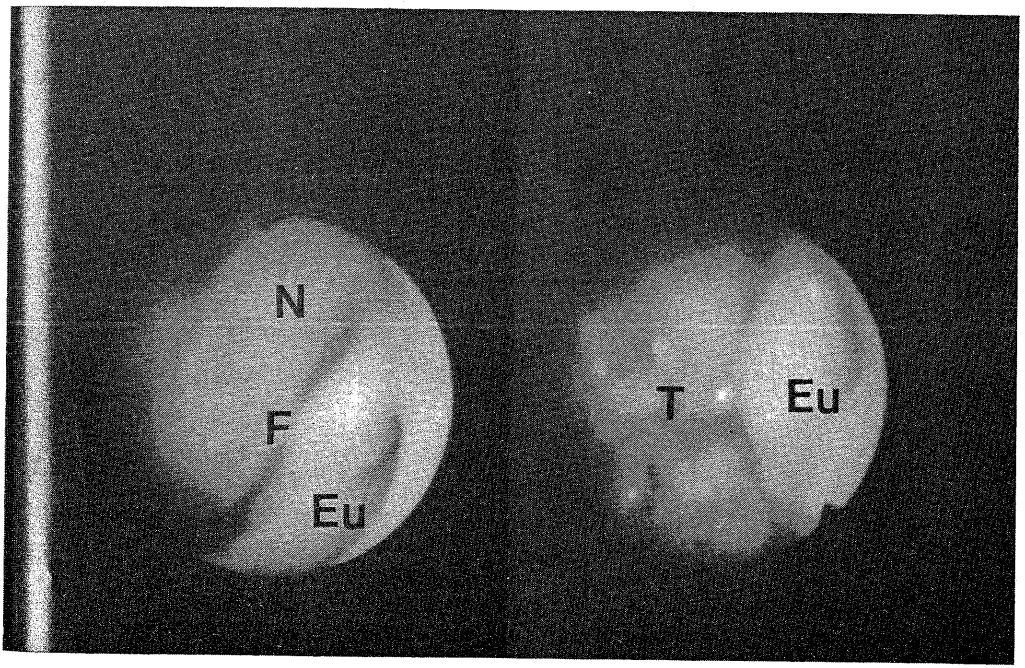

FIG. 2
Left: Normal nasopharynx(N) showing the Eustachian tube opening(Eu) and fossa of Rosenmuller(F).
Right: Tumour in nasopharynx(T).

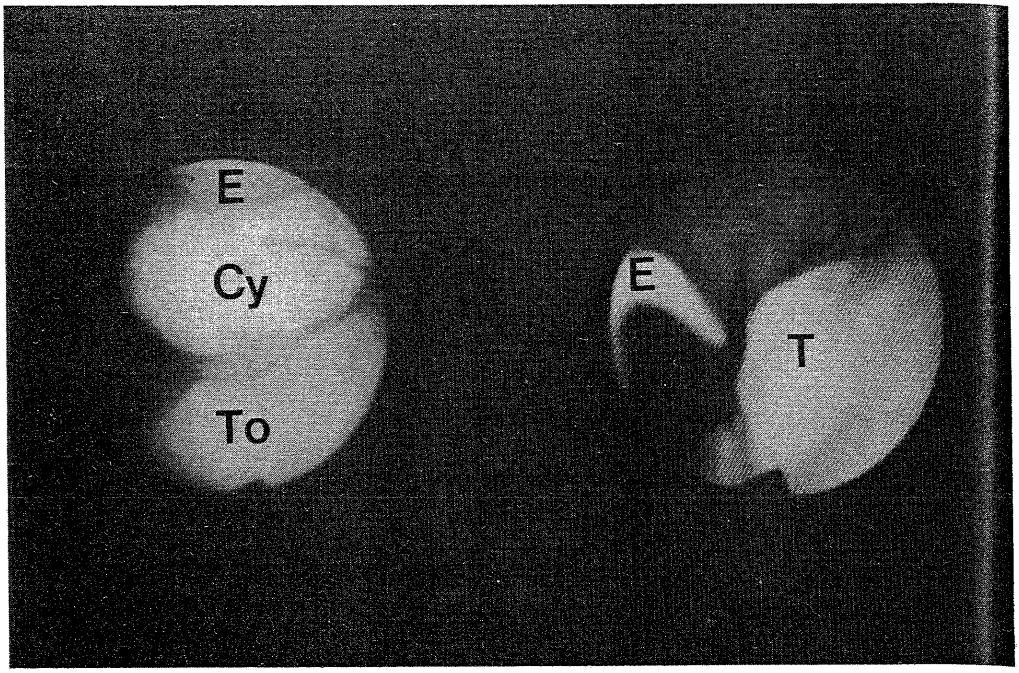

FIG. 3

Left: Vallecular cyst(Cy) between the tongue(To) and the epiglottis(E).
Right: Tumour(T) on the lateral pharyngeal wall, the epiglottis (E) just coming into view.

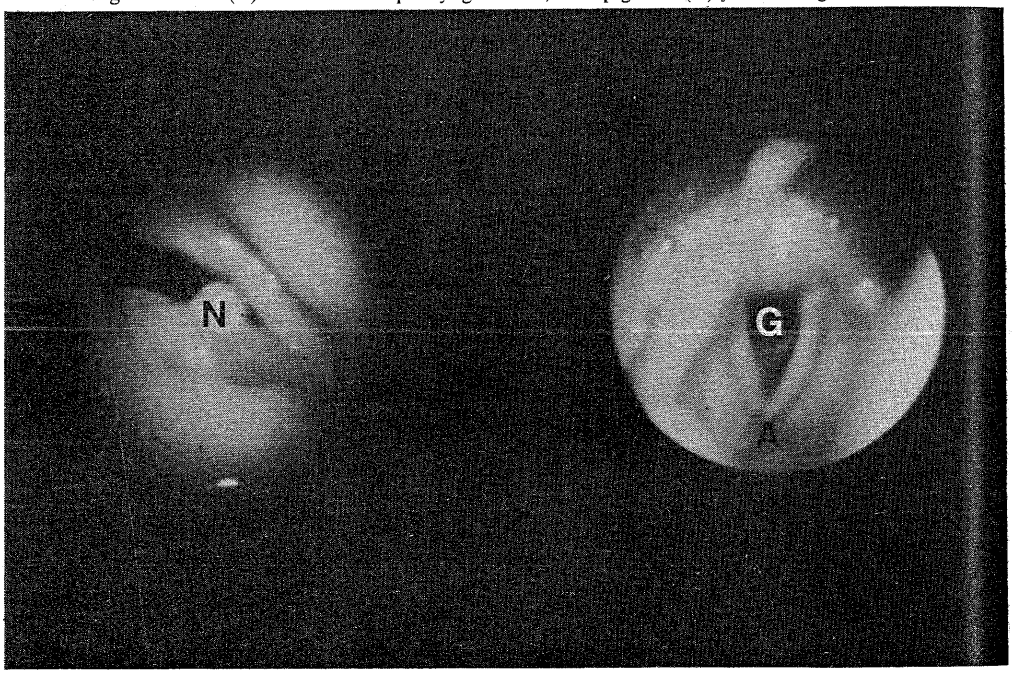

FIG. 4

Right: Normal larynx with the cords abducting, showing the anterior commissure(A) and the glottic opening(G).
Left: Vocal nodule(N) on one of the vocal cords.

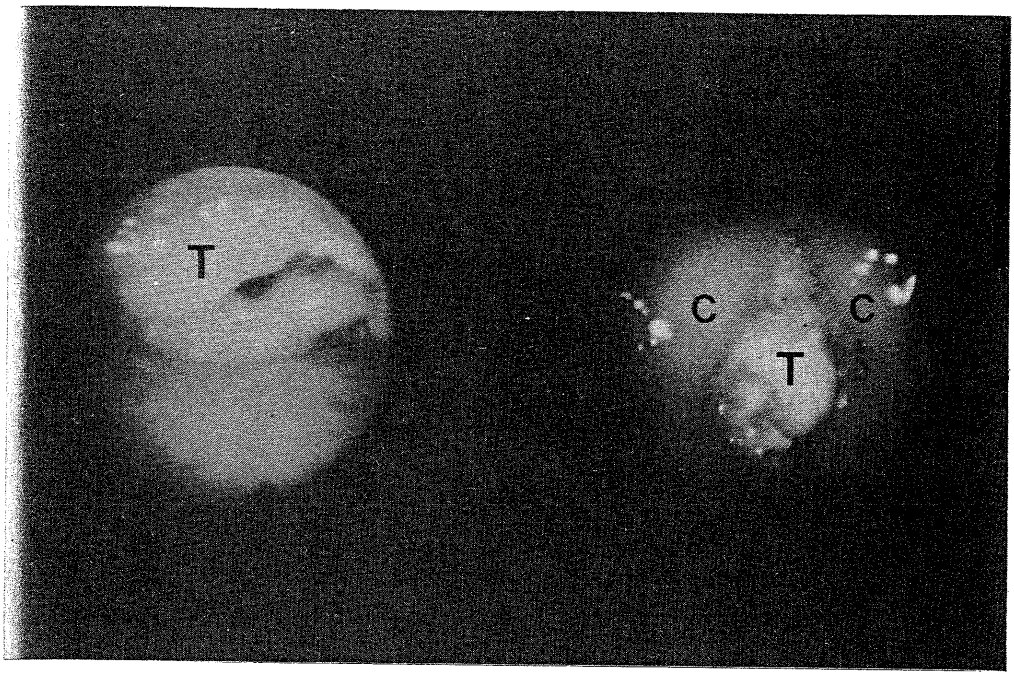

FIG. 5
Left: Ulcerative tumour(T) affecting the epiglottis.
Right: Subglottic tumour(T) seen before the cords(C).

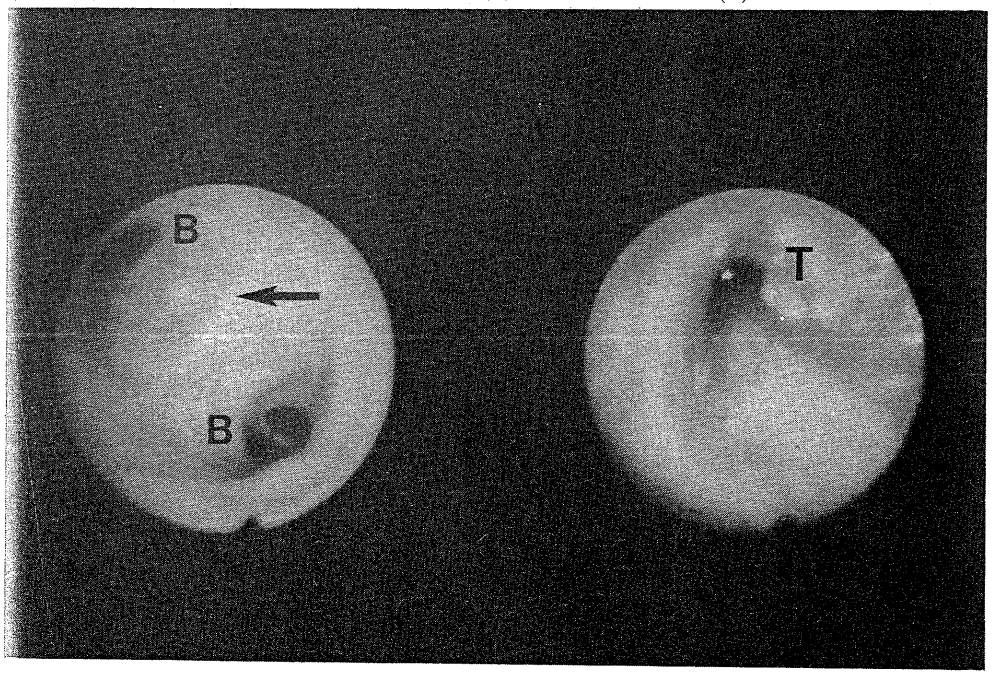

FIG. 6
Left: Normal trachea showing both bronchi(B) and the carcina (arrow).
Right: Tumour(T) of the bronchial tree.

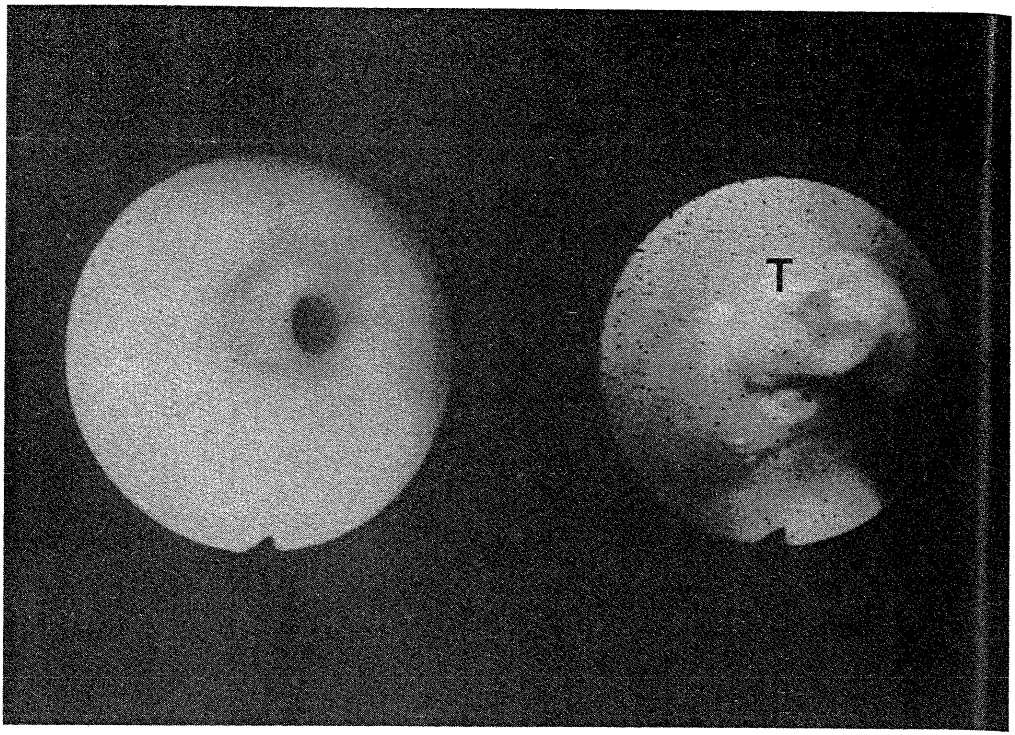

FIG. 7
Left: Normal oesophageal mucosa on distending with flow of oxygen.
Right: Tumour(T) of the oesophagus.

patients where there is narrowing of the examination passage, such as tracheal stenosis. The 3C4 endoscope can be used to negotiate these narrow segments. Although it gives a comparable visual field to the B3R, the smaller outer diameter allows only a narrower suction channel, thus the suction facility of the 3C4 is inferior to that of the B3R.

The presence of the suction channel in the bronchoscopes is a definite advantage. Besides the removal of secretions to enable a clear field on performing diagnostic endoscopy, the endoscope can be used therapeutically to remove sputum plugs from different areas in the bronchial tree. Different solutions can be injected through the channel and, by tilting the tip of the flexible scope, the jet of fluid can be directed to precise sites. Normal saline solution can be injected to remove dried blood clots or debris and local anaesthetic solutions can be accurately injected onto the area to be biopsied, or on to the vocal cords before the scope is passed into the trachea. Needless to say, biopsies can be obtained with the biopsy forceps. Although only a small amount of tissue can be obtained with the flexible instruments, biopsies can be carried out from exact locations.

In our review, the flexible bronchoscopy application was more for diagnostic than for therapeutic purposes. For diagnosis, it was most frequently used to search for primary pathology in the upper aerodigestive tract giving rise to cervical lymphadenopathy or abnormal shadows on chest X-ray such as a coin lesion or persistent pneumonia. In other patients, the endoscopic examination was performed for symptoms related to the upper aerodigestive tract (Table I).

The fibreoptic flexible endoscope is especially helpful in certain anxious patients or in those patients with an overhanging epiglottis,

TABLE I

INDICATIONS FOR 1690 FLEXIBLE FIBREOPTIC ENDOSCOPIC PROCEDURES

Diagnostic	Number of procedures	Therapeutic	Number of procedures
Shadow on X-ray chest	241	Sputum retention	234
Cervical lymph node	236	Chest infection	86
Hoarseness	224	Foreign body	7
Dysphagia	139	Others	36
Assessment	105		363
Epistaxis, nasal obstruction, etc.	66		
Stridor and dyspnoea	67		
Haemoptysis and cough	75		
Other pharyngeal problems	42		
Others	132		
	1327		

TABLE II

FINDINGS OF THE FLEXIBLE FIBREOPTIC ENDOSCOPY

Area examined	Pathologies				
	Tumour	Infection	Others	Normal	Total
Nasopharynx	86	9	72	1295	1462
Pharynx and oesophagus	67	12	52	1310	1441
Larynx	197	11	169*	1068	1445
Trachea and bronchus	67	122	328†	321	838

* Of the 169, 99 had cord paralysis.
† Of the 328, 269 had sputum retention.

when the vocal cords cannot be adequately and closely examined. It is also useful in certain areas such as the nasopharynx where examination by the mirror is sometimes not entirely satisfactory. All our patients tolerated the procedure exceptionally well and we recommend this procedure to all our patients whenever indicated. In our Chinese patients with symptoms related to the nasopharynx, the clinical examination is considered incomplete without passing a fibreoptic flexible endoscope.

As for the findings, it depends on the region examined and the presenting symptoms. Not all patients had examination of all the regions. After examining the nasopharynx, in most patients, the pharynx and the oesophagus or larynx were examined either alone or together depending on the symptoms. If it was indicated, then the trachea and the bronchial tree were examined. About 10 per cent of the examinations of the nasopharynx and pharynx and oesophagus revealed positive findings. Laryngeal tumours and cord paralysis were common findings on examination of the larynx and sputum retention was the commonest indication as well as the findings on examining the trachea and bronchi (Table II).

For therapeutic purposes, the commonest use is to remove sputum and mucous plugs from the bronchial tree. This is more efficiently done with the larger endoscope B3R. With the passing of snares, forceps etc through the biopsy channel, foreign bodies of reasonable size can be removed. It is difficult to remove large or heavy objects, as the dimension of the biopsy channel limits the size of the instruments that can be inserted. In one patient, a nasal polyp was removed with the snare inserted through the bronchoscope. This is not recommended as the standard treatment for nasal polypi, but in certain patients, with small polypi hanging down from the roof of the nasal cavity, the endoscope

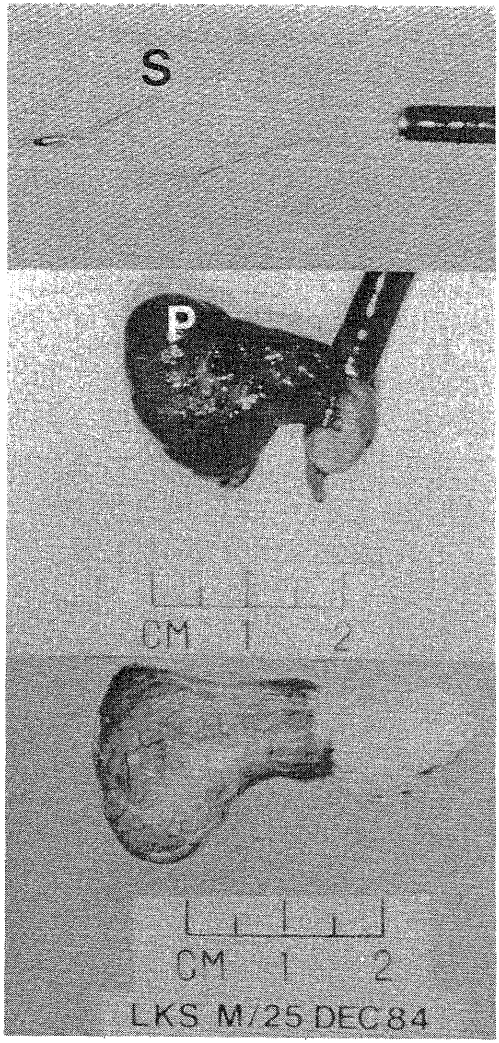

FIG. 8
Upper: Snare(S) inserted through the tip of the flexible bronchoscope.
Middle: Nasal polyp(P) removed with a snare inserted through the bronchoscope.
Lower: The removed polyp.

gives a better view of the stalk of the polyp and the snare can be applied accurately. In 14 patients an endotracheal tube was inserted on top of the flexible scope to relieve obstruction of the upper airway. The obstructions were either in the larynx or in the trachea and were caused by either benign or malignant pathologies.

Although the flexible endoscopy can be performed under local anaesthesia on an out-patient basis with minimal complications there are certain limitations: first, the postcricoid area cannot be examined adequately; secondly, the small amount of tissue obtained for biopsy is sometimes not adequate for diagnosis; thirdly, clinical pictures taken through the flexible endoscope are inferior to those taken with a rigid endoscope. However, with improved optics and technology, producing finer endoscopes with a larger biopsy channel, future fibreoptic bronchoscopes will be more versatile and useful in otorhinolaryngological practice.

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