

## A new bronchoscopy set for laser therapy

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Bronchoscopic laser therapy is now an established method of relieving neoplastic tracheobronchial obstructions. Much of the previous work, however, has been done with the flexible fiberoptic bronchoscope in conscious patients, under sedation and local anaesthesia. Besides the obvious discomfort to the patient the use of the flexible fiberoptic bronchoscope for laser therapy under local anaesthesia has shortcomings related to the bronchoscope itself. These include the inadequate provision for suction and the difficulty of removing debris, both of which adversely affect the efficiency of the operation. Some operators place a rigid bronchoscope first, through which they then introduce the flexible fiberoptic bronchoscope, to ventilate the patient, or to aspirate the tracheobronchial secretions through the rigid bronchoscope intermittently<sup>1</sup> (or both); but this is a rather cumbersome manoeuvre. We have therefore designed a new bronchoscopic set for laser therapy that overcomes these difficulties.

### Apparatus

Our instrument has three components (fig 1a and 1b): a rigid bronchoscope, a cylindrical rod that fits into the lumen of the bronchoscope, and a rigid fiberoptic telescope.

The *bronchoscope* (GU Manufacturing Company, London) has a main body modelled on the standard adult Negus rigid bronchoscope, with its fiberoptic light carrier, but it has two Venturi ports and channels instead of one for ventilation. One of the Venturi channels opens into the lumen of the bronchoscope (as with the standard bronchoscope) and the other is moulded to the exterior of the bronchoscope and runs as a 3 mm diameter metal tube along the length of the instrument to open independently into the trachea when the bronchoscope is in place.

The *cylindrical rod* is slightly longer than the rigid bronchoscope, into which it fits snugly, and contains three tubular channels, whose openings are mounted individually on a disc (the "steering wheel") placed at the proximal end of the rod (fig 2). Two of these are for suction and washout or ventilation and they open into the bronchoscope near its distal opening. The third opening and its channel protrude for 0.5 cm beyond the opening of the bronchoscope, and near its end it has a movable tip with a hinged mechanism, which allows movements of up to 80° and thus is able to direct the laser fibre and its beam to any required angle

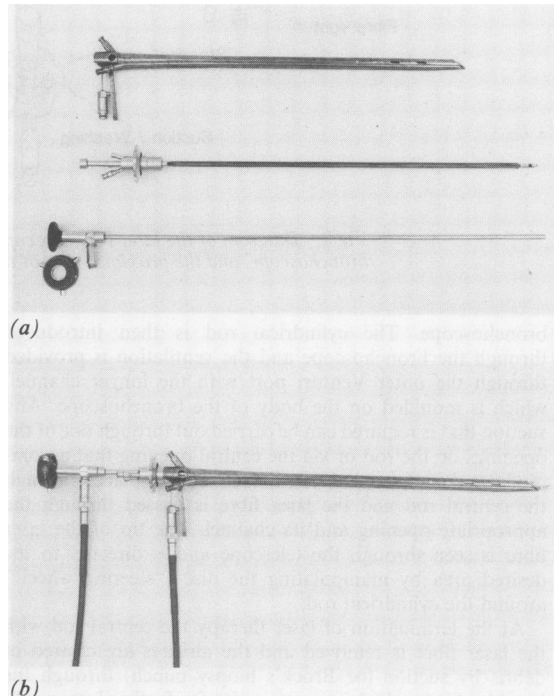


Fig 1 (a) The three components of the laser bronchoscopy set: the rigid bronchoscope (top), the central rod (middle), and the fiberoptic telescope with its eye protection filter (bottom). (b) The assembled laser bronchoscopy set.

within this range. When the laser fibre (Fiberlase 100 Barr and Stroud, manufactured by Pilkington Medical System, Scotland) is in position its movements are guided by the movable tip of its channel, which in turn is controlled by the "steering wheel" at the proximal end of the cylindrical rod. The *rigid fiberoptic telescope* is accommodated in the central opening of the cylindrical rod and has its independent light carrier. It is also fitted at its proximal optic end with a filter for eye protection.

### Technique

At the start of the endoscopic laser therapy the patient is fully anaesthetised, after which the bronchoscope is introduced into the upper airways and the tracheobronchial tree is inspected and cleared of secretions. At this stage the patient is ventilated through the inner Venturi port of the

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Accepted 29 November 1985

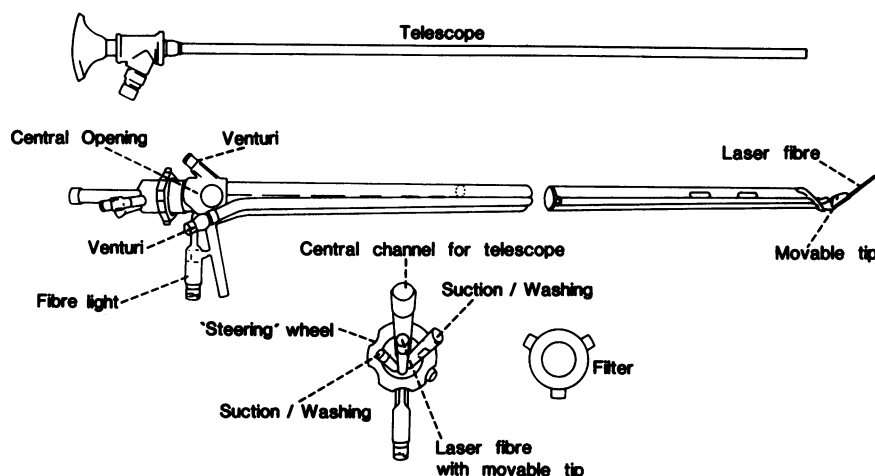


Fig 2 Diagram of the laser bronchoscopy set: the telescope, the rod placed inside the bronchoscope, and the proximal view of the central rod as seen by the operator.

bronchoscope. The cylindrical rod is then introduced through the bronchoscope and the ventilation is provided through the outer Venturi port with the longer channel, which is moulded on the body of the bronchoscope. Any suction that is required can be carried out through one of the openings on the rod or via the central opening that accommodates the telescope. Next, the telescope is placed through the central rod and the laser fibre is passed through the appropriate opening and its channel. The tip of the laser fibre is seen through the telescope and is directed to the desired area by manipulating the disc ("steering wheel") around the cylindrical rod.

At the termination of laser therapy the central rod with the laser fibre is removed and the airways are cleared of debris by suction (or Brock's biopsy punch) through the bronchoscope, which remains in situ for further laser application if required.

For general anaesthesia we have used etomidate hydrochloride 0.2–0.3 mg/kg and suxamethonium chloride 1–2 mg/kg as loading doses. During laser therapy anaesthesia is

maintained by intravenous infusion of etomidate at the rate of 0.005–0.01 mg/kg a minute and by atropium—a 0.3–0.6 mg/kg loading dose followed by infusion of 0.005–0.01 mg/kg a minute. The patient is ventilated throughout the procedure by a jet ventilator delivering 80–100% oxygen.

We have now used our laser bronchoscopy set, without complications, in 18 patients (47 sessions) receiving Nd:YAG (neodymium yttrium-aluminium-garnet) laser fulguration with Fiberlase 100. In the first 10 patients blood gas tensions were monitored during the procedure and showed that ventilation was satisfactory.

Our Fiberlase 100 and the prototype of our bronchoscope have been financed by the Laser Trust Fund in Humberside, to which we are indebted.

## Reference

- 1 Hetzel MR, Nixon C, Edmondstone WM, *et al*. Laser therapy in 100 tracheobronchial tumours. *Thorax* 1985;40:341–5.