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Unusual endobronchial extension of bronchial carcinoma treated by YAG laser and surgery

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Despite the recent advances in diagnostic techniques, most lung cancers are at an advanced stage when detected and are considered inoperable. We report a case in which neodymium yttrium-aluminium-garnet (Nd YAG) laser phototherapy permitted limited lung resection in a patient whose lung cancer had been diagnosed as inoperable.

Case report

A 54 year old man was admitted to our division as an emergency suffering from respiratory failure and haemoptysis. Chest radiographs and tomograms performed at another hospital showed collapse of the right lung (fig 1). The patient was given oxygen therapy and high dose steroid treatment (1·5 g of hydrocortisone daily) for 15 days. On his admission to hospital, blood gas analysis showed an arterial oxygen tension (Pao_2) of 54 mm Hg (7·2 kPa), a carbon dioxide tension ($Paco_2$) of 34 mm Hg (4·5 kPa), and pH 7·34. The respiratory rate was 36–40 breaths/minute. He was considered to be unable to perform spirometric tests and was excluded from surgical treatment because of his poor respiratory function and the extent of the tumour.

An emergency fibreoptic bronchoscopy was performed and a polypoid intraluminal tumour completely obstructing the orifice of the right main bronchus was detected (histological examination later showed this to be a squamous cell carcinoma).

At the same session, after informed consent by our patient, YAG laser phototherapy was carried out to give immediate relief from the obstruction. The fibre of the YAG laser was introduced through the operative channel of a fibreoptic bronchoscope (Olympus BF1T10) and treatment was begun with the patient still under local anaesthesia with 4% lignocaine. The first treatment lasted 50 minutes; 6570 joules were delivered in a 60 watt power setting in short pulses (lasting less than one second). As a result the mainstem bronchus and the right upper lobe bronchus were partially reopened. Immediately the patient's clinical condition improved and his respiratory distress diminished. The chest radiograph showed the partial reaeration of the lung; arterial oxygen and carbon dioxide tensions were 66 mm Hg and 42 mm Hg (8·8 and 5·6 kPa) respectively without further supplementary oxygen.

Three more YAG laser treatments using the same technique were necessary to reopen the right mainstem bronchus completely. A total of 25 500 J were delivered. Finally, the primary focus of the tumour was detected in the B6 bronchus and its extension showed a cranial polypoid tumour. Endoscopy and tomography showed no evidence of neoplastic infiltration of the main or right upper lobe bronchus (fig 2). Examination of many biopsy samples and brushings obtained from different levels of the bronchial wall excluded invasion of the mucosa by cancer cells. After laser treatment removal of the tumour by lower and middle lobectomy appeared possible. Thirty days after the first laser treatment the patient underwent surgery.

At thoracotomy a small tumour (diameter 1·5 cm) was detected originating from the apex of the right lower lobe and also affecting the middle lobe. A right lower and middle lobectomy was performed. The postoperative course was uneventful and the patient was discharged nine days after surgery.

The histological examination of the resected specimen confirmed that there was a squamous cell carcinoma with metastases at one hilar node but without mediastinal node

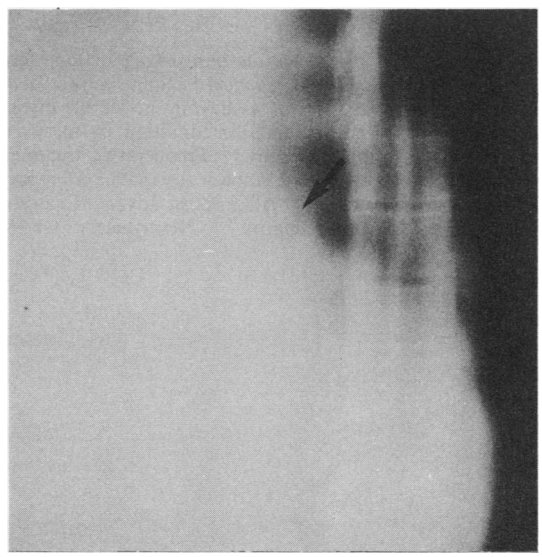

Fig 1 *Anteroposterior mediastinal tomogram: the tumour is obstructing the right main bronchus and bulging into the trachea (arrow).*

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Fig 2 *Anteroposterior mediastinal tomogram showing the reopened right mainstem bronchus (arrow) and upper lobe bronchus after YAG laser phototherapy.*

metastases. No residual tumour was detected on the bronchial stump.

Twelve months after his first YAG laser phototherapy the patient is alive and doing well, showing no evidence of any recurrence.

Discussion

Surgical resection still offers the best chance of long term survival in patients with lung cancer.[1 2] Some workers have shown that patients assessed as having inoperable disease can be converted to an operable condition by means of radiotherapy or chemotherapy.[3 4] Preoperative treatment with the argon Dy laser has also been described.[5] All reports agree that the role of the YAG laser in advanced cases of lung cancer is only palliative.[6 7] Nevertheless, George recently described the case of a patient with tracheal cancer in whom YAG laser therapy facilitated elective surgery.[8]

To our knowledge, no case has been reported in which a patient originally considered inoperable because of the extension of the tumour to the mainstem bronchus has undergone surgery after the reopening of the bronchus. Cases like the one described here are rare but serve as a reminder that tumours originating from the lobar bronchus may show a polypoid cranial development along the mainstem bronchus.

In these cases, in which pneumonectomy appears necessary, the use of laser treatment may sometimes allow the surgeon to carry out a more limited resection. A prerequisite for success is the polypoid development of the tumour without invasion of the bronchial mucosa. For this reason, numerous biopsy samples and brushings have to be obtained to ascertain that the bronchial stump has not been invaded by tumour.

We conclude that YAG laser phototherapy not only has a palliative role but may occasionally be of value in the preoperative treatment of carcinoma of the bronchus.

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