Use of a fenestrated silicone drain to stent a malignant tracheobronchial stenosis

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Abstract

An innovative use of a fenestrated silicone drainage tube as an endobronchial stent is reported. The patient had respiratory obstruction due to a carinal tumour and laser photoresection had failed to restore airway patency.

The treatment of major airway obstruction by placement of an endotracheal stent was first reported in 1952 by Harkins, who used metal tubes for benign tracheal stenosis resulting from trauma.¹ Since then tubes constructed from various materials, including stainless steel wire² and silicone,³ have been tried and the indications for the use of such stents have been extended to include malignant strictures of the trachea or main bronchi.⁴ This paper describes the use of a fenestrated silicone tube, marketed as a chest drain, to palliate a malignant tracheobronchial stricture.

Case report

A 53 year old chef presented as an emergency with a five week history of increasing dyspnoea and stridor. On admission he was cyan-

osed and breathless at rest with a low arterial oxygen tension (8.1 kPa) and an arterial oxygen saturation (Sao₂) of 90%. He had a persistent weak cough productive of purulent sputum and was too dyspnoeic to perform pulmonary function tests satisfactorily. A chest radiograph showed bilateral basal and lingular consolidation and a widened upper mediastinum.

A diagnosis of small cell bronchial carcinoma with affected mediastinal nodes had been confirmed by biopsy. He had had palliative mediastinal radiotherapy and combination chemotherapy at another hospital eight months earlier. This consisted of four 10 day cycles of chlorambucil 10 mg daily, procarbazine 50 mg eight hourly, and prednisolone 10 mg twice daily, plus etoposide 300 mg daily on the first three days.

On the evening of his admission with respiratory distress a rigid bronchoscopy was carried out. The left main bronchus and trachea at the carina were found to be slit like and the right main bronchus appeared to be completely blocked by tumour tissue. An attempt was made to recanalise the airway with a carbon dioxide laser but this was successful only in partially reopening the right main bronchus. Unfortunately, the patient could not recover spontaneous respiration because of the persisting obstruction and we had to introduce a stent.

The distal, fenestrated portion of a 36 F silicone drainage tube (Portex Ltd, Hythe; fig 1) was placed via the bronchoscope across the tracheobronchial stenosis. The tube was positioned in the left main bronchus (fig 2) and we hoped that the right lung would be aerated via one of the fenestrations, thus allowing ventilation of both lungs. These silicone tubes are used routinely as pleural or mediastinal drains in our unit.

Breathing and sputum clearance were immediately much improved and the patient was comfortable breathing room air. Arterial oxygen tension increased to 10.4 kPa and Sao₂ to 96%. The forced expiratory volume in one second (FEV₁) five days after operation was 1.50 litres with a vital capacity of 3.10 l, both being 50% of the predicted volumes. Radiography confirmed resolution of the consolidation (fig 2).

A further course of radiotherapy to the mediastinum has been completed. Improvement had been maintained when the patient was seen nine months after insertion of the stent and he has returned to work. Chest radiographs show that the position of the stent had not changed over this period.

Discussion

Obstruction of major airways is extremely disabling and alarming to the patient. Urgent relief by restoration of airway patency is required and recently laser photoresection has become accepted as the method of choice.⁵⁻⁸ Indeed, for some patients it is the only form of treatment required and may be repeated as often as necessary.⁹

There remains a small group of patients for

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Figure 1 A silicone drainage tube and the fenestrated distal portion used as an endobronchial stent.

Figure 2 Chest radiograph showing the silicone drainage tube in position in the trachea and left main bronchus, full expansion of both lungs, and the presence of mediastinal widening.

whom laser phototherapy or conventional treatment by radiotherapy or surgery is inappropriate.^{9 10} Radiotherapy does not produce sufficiently rapid relief in an emergency and may worsen dyspnoea because of radiation induced oedema.⁷ Laser phototherapy may not alleviate airway compression by extraluminal tumour. Multiple admissions for treatment sessions may be unacceptable to the patient¹⁰ and, occasionally, haemorrhage or airway perforation may be a problem.

In these patients placing an endotracheal stent may relieve the symptoms of airway obstruction and obviate the problems associated with the alternative modes of treat-

ment. Silicone tubes have emerged as the material of choice and may produce prolonged palliation,⁴ though meticulous aftercare is required.³

In this patient the attempt to restore patency of the left main bronchus by carbon dioxide laser photoresection was unsuccessful and no standard endotracheal stent for a lesion at this site was available at the time.

The use of the fenestrated silicone drainage tube proved satisfactory in terms both of ease of placing the endoscope and of improvement in lung function. Re-expansion and aeration of both lungs was evident from the post-operative chest radiograph and pulmonary function. The patient's improvement allowed time for further treatment by radiotherapy and effective palliation has continued for nine months so far.

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