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View from Within: Radiology in Focus

Ballooned trachea as a consequence of intubation

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Abstract
A case of iatrogenic tracheal dilatation is presented. This potentially fatal complication of endotracheal intubation may escape early detection. It is well demonstrated by CT scanning.

Case report

A 44-year-old man was transferred to an intensive care unit for mechanical ventilation. A diagnosis of a generalized myopathy affecting in particular the muscles of respiration had been made three days previously following an emergency admission for breathing difficulties and increasing weakness.

Intermittent positive pressure ventilation was maintained via an orotracheal tube. A tracheostomy was performed 10 days later using a cuffed 7.5 Portex tube; 6 ml of air was used to inflate the cuff.

The condition of the patient stabilized. The aetiology of the myopathy remained unknown. The patient was treated with corticosteroids and cyclophosphamide but there was no evidence of improvement. The patient was transferred back to a general ward where he continued to be ventilated. He was taught to care for his own tracheostomy. In view of a leak of air and an element of aspiration around the tube ever greater volumes were used by the patient and his attendants to inflate the cuff. At six months it was found that over 50 ml of air was required in the cuff to create a seal for ventilation.

Fibreoptic tracheoscopy at this time revealed gross dilatation of the trachea at the site of the cuff with evidence of pressure necrosis of the mucosa. A CT scan of the trachea demonstrated this dilatation to a maximum diameter of 5 cm (Fig. 1). A scan of a normal trachea is shown for comparison (Fig. 2).

Discussion

Cuffed endotracheal tubes are used to create a seal to facilitate mechanical ventilation and also to try to prevent aspiration of secretions in patients who have an incompetent larynx. Excessive cuff pressure is known to cause damage to the tracheal wall which may progress either to stricture formation or to tracheal dilatation at the site of the cuff (Andrews and Pearson, 1971). A tracheo-oesophageal fistula may sometimes result (Stemmer *et al.*, 1976). This patient must in addition be at risk of tracheal rupture which would probably be fatal.

The case demonstrates how insidious such tracheal damage may be. In order to create the necessary seal for mechanical ventilation the patient himself filled the balloon with ever increasing volumes of air. Patients such as this who are essentially self-caring with respect to a cuffed tube are unusual. The tracheal dilatation is likely to have been caused by the pressure in the balloon being rather higher than that necessary to just create a seal. Perhaps the situation may have been prevented by closer supervision with periodic measurement of the cuff pressure and recording of the volumes of air which were being used. The absolute cuff pressure which might be regarded as excessive is unclear and studies such as that of Stauffer *et al.* (1981) admit to defining it arbitrarily as being a minimal occluding pressure of greater than 25 torr (mmHg). One strategy might have been to use tubes of various different lengths alternately so as to rest



Fig. 1

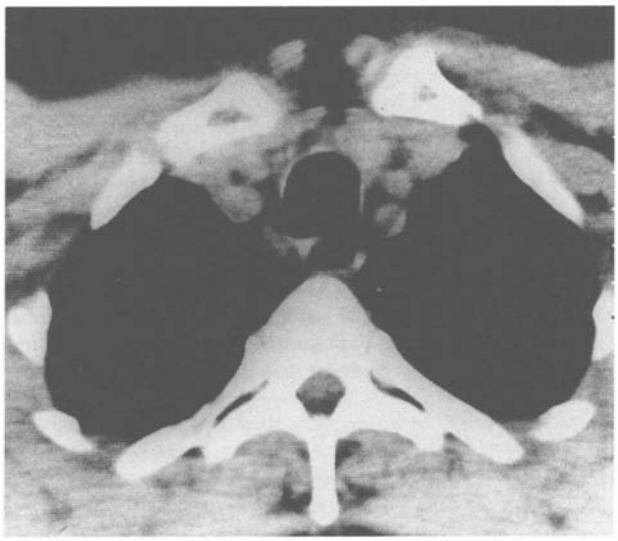


Fig. 2

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areas of the tracheal wall intermittently or to use a tracheostomy tube of an analagous design to that of Hatcher *et al.* (1968) which has two balloons at different positions alternately inflated.

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