On-line Case Report

A rare case of fatal haemorrhage after tracheostomy

CV PRAVEEN¹, A MARTIN²

Departments of ¹ENT and ²Anaesthetics, Princess Royal University Hospital, Farnborough, Kent, UK

ABSTRACT

Tracheo-arterial fistula after tracheostomy causing massive haemorrhage is fortunately rare, but can be serious and often fatal. Brachiocephalic trunk is commonly at risk of erosion because of its close relation with the trachea. Factors responsible for fistula are pressure from tube rubbing on the trachea and adjacent vessel, infection, malignant neoplastic invasion of a vessel near the trachea and low tracheostomy. We present a rare case of massive arterial bleeding which happened on the second day and recurred on fifth day, because of slippage of the ligature from the thyroid artery, causing aspiration and death. A low tracheostomy below the third ring should be avoided. If there is bleeding, as a first-aid measure the cuff should be over inflated without removing the tracheostomy tube.

Keywords: Tracheostomy – Brachiocephalic trunk

The commonest surgical intervention performed by ENT surgeons on intensive care unit (ITU) patients would be surgical tracheostomy for long-term ventilation. Many of these ITU patients will have complex medical problems requiring long-term, high-dependency care. Tracheostomy for ITU patients is generally regarded as a minor surgical procedure but it is not without hazards. Several operative and postoperative complications have been reported after tracheostomy including fatal haemorrhage from erosion of the brachiocephalic trunk. Erosion of a major vessel after tracheostomy is usually caused by pressure necrosis and is invariably fatal. The effective first-aid measure to stop the bleeding is to over-inflate the cuff of the tracheostomy tube. We present here a rare case of massive haemorrhage after a surgical tracheostomy, which happened on the second day and recurred again on the fifth day, this time being fatal.

This case is being reported on account of its rarity. Though usually fatal,¹ some patients have survived bleeding.²⁻⁵ All concerned need to be aware of the

complication of tracheostomy. The tracheostomy tube should not be removed if there is bleeding from the tracheostomy site and the cuff of the tracheostomy tube should be over-inflated to prevent aspiration of blood before embarking on emergency surgical exploration to stop the offending vessel.

Case report

A 76-year-old man underwent surgical tracheostomy for long-term intubation for ventilation. The patient had various medical problems including septicaemia secondary to an orthopaedic procedure and a past history of myocardial infarction. The surgical tracheostomy was uneventful and complete haemostasis was secured after the tracheostomy. Two days after the tracheostomy, the patient had sudden onset of spontaneous bleeding from a vessel in the paratracheal region. The tracheostomy site was re-explored with the tube *in situ* and the bleeding

Correspondence to: Mr CV Praveen, Department of ENT, Princess Royal University Teaching Hospital, Farnborough, Kent BR6 8ND, UK
T: +44 (0)1689 863000; E: cvpraveen@doctors.org.uk

thyroid artery was ligated. The patient was doing well until 3 days later when he had another massive haemorrhage from the same vessel near the tracheostoma. This time a different on-site ITU anaesthetist extubated the tracheostomy tube to apply external pressure on the bleeding vessel as a result of which the patient aspirated blood and could not be 'ventilated' through the endotracheal tube. All efforts to save the patient including re-exploration of neck by the on-call ENT surgeon and ligating the bleeding vessel were futile and patient died of aspiration of blood.

A post-mortem examination confirmed 800 ml of blood in the tracheobronchial tree and failed to reveal any aneurysm or any evidence of local pathology such as erosion of major blood vessels.

Discussion

Haemorrhage is one of the feared complications after tracheostomy and fortunately is rare. It can happen not only during and after surgical tracheostomy but also during a percutaneous technique.⁶ In 1879, Korte⁷ reported the first patient in whom a tracheostomy was complicated by erosion of a major blood vessel. The brachiocephalic artery is the most commonly eroded vessel.^{3,8,9} Bleeding can also occur from the carotid artery, brachiocephalic vein¹⁰ and the aortic arch.¹¹ The incidence of tracheo-arterial fistula varies from 0.6%¹² to 0.79%.¹³ It usually happens if the tracheostomy is low and is invariably fatal.¹⁴

The brachiocephalic (innominate) artery is the largest branch of the arch of aorta. It runs posterior to the centre of the manubrium sterni, across the trachea from left to right, lying at first in front of the trachea and then on its right side. It divides at the level of the right sternoclavicular joint into the right common carotid and the right subclavian arteries.¹⁵

Erosion of a major blood vessel after tracheostomy is usually caused by pressure necrosis produced by a tracheostomy tube. Erosion is common if tracheostomy is below the fourth tracheal ring.⁷ The mechanism of erosion involves both direct pressure and indirect pressure exerted by the tracheostomy tube. Indirect pressure is exerted by the tip of the tube abutting against the anterior tracheal wall and direct pressure results when the tube rubs on an adjacent vessel.⁷ Additional factors responsible for the development of a tracheo-arterial fistula are the piston-like movement of a tracheostomy tube connected to a ventilator, the use of excessive and continuous cuff pressure, infection around the tracheostomy stoma, and malignant neoplastic invasion of a vessel near the trachea.⁷

Low tracheostomy may result in pounding of the vessel against the inferior edge of the tracheostomy tube

leading to erosion of a vessel;¹ hence, tracheostomy should not be performed lower than the third tracheal ring. Necrotic changes may develop in the intercartilagenous ligaments and may spread to involve tracheal cartilages. This may lead to perforation of the tracheal wall,^{16,17} thus, the tube can directly damage the arterial wall. If the tracheostomy is too low, the concave surface of the tracheostomy tube is in close proximity of the brachiocephalic artery causing direct pressure.³ Utley *et al.*¹⁸ described that, by reducing the curvature of tracheostomy tube from 90° to 60°, the incidence of erosion could be reduced.

The surgical treatment of tracheo-arterial fistula involves temporary control of severe haemorrhage while simultaneously maintaining an adequate airway.⁷ Many authors^{1,3,12,19} recommend over-inflation of the tracheostomy cuff to tamponade the bleeding vessel as an emergency measure before exploring the site. We feel over-inflation not only buys time for an emergency exploration, it also prevents aspiration of blood and can avoid the 'can't ventilate' situation. We feel that, in our case, the aspiration would not have happened if the tracheostomy tube had not been removed and replaced with an oral endotracheal tube.

Conclusions

Bleeding after tracheostomy is fortunately rare but can happen due to erosion of a vessel or slipping of a ligature. Over-inflation of the cuff is vital to exert pressure on the bleeding vessel and the tracheostomy tube should not be removed as it can cause aspiration and drowning in blood.

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