CASE REPORT

Cardiorespiratory arrest secondary to tracheostomy cuff herniation

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SUMMARY

This report details the case of a 67-year-old man who required intubation following a fall and multiple rib fractures and underwent surgical tracheostomy. Postoperatively, he deteriorated on the intensive care unit with airway obstruction. Bronchoscopy demonstrated tracheostomy cuff herniation obstructing airflow necessitating conventional orotracheal reintubation. On inspection of the tracheostomy an unusual cuff deformation was noted.

BACKGROUND

While little controversy now exists on the use of tracheostomy's in intensive care, concerns have been raised with regard to tracheostomy care, training and emergency management. Tracheostomies commonly are used in intensive care to aid mechanical weaning, protect and maintain the airway, as well as functioning as a bronchial toilet in those with excess secretions or an inadequate cough. Both helping improve patient outcomes at the same time relieving some of the pressure in a resource limited environment. This case report outlines our management of an unusual tracheostomy cuff deformity which leads towards a potentially disastrous situation.

CASE PRESENTATION

We report the case of a 67-year-old man, who sustained multiple left-sided rib fractures following a fall from standing hitting the curb. His medical background consisted of a severe chronic obstructive pulmonary disease (FEV₁ 21% predicted and forced vital capacity 0.7 L) for which he received multiple inhalers (Seretide, salbutamol and tiotropium), arterial hypertension, type 2 diabetes mellitus and atrial fibrillation. He was initially admitted to the medical high-dependency unit for non-invasive ventilation support and analgesia. Over the next few days the patient developed a radiological confirmed chest infection and despite empiric antibiotic treatment deteriorated into severe sepsis requiring orotracheal intubation. He was transferred to the intensive care unit. As the patient struggled with weaning off mechanical ventilation, a surgical tracheostomy was performed on day 10 to facilitate respiratory wean (Tracoe twist, TRACOE medical GmbH, Germany); the surgical procedure was uneventful.

Soon after the patient's return to intensive care a drop in the patient's tidal volumes to 150–200 mL was noted as well as high airway pressures. Capnography trace was normal, a suction catheter

passed easily down the tracheostomy tube and a pneumothorax was excluded by urgent chest X-ray. On auscultation bilateral wheeze was heard so the provisional diagnosis of bronchospasm was made and treated with nebulised salbutamol, Atrovent and intravenous ketamine, magnesium and intravenous theophyllines. Despite all therapeutic efforts, end-tidal carbon dioxide continued to rise. Repeat arterial blood gas showed worsening respiratory acidosis (maximum carbon dioxide 17.6 kPa) without hypoxia and direct bronchoscopy was performed. On direct bronchoscopic visualisation the cuff was seen to herniate into the inner tracheostomy lumen leading to an almost complete obstruction of the tracheostomy tube. Immediate cuff deflation leads to instant increase of the tidal volume and reduction of airway pressures. The patient was then reintubated with an oral size 7 endotracheal tube past the tracheostomy tube and the tracheostomy tube was removed (figure 1). Despite normalisation of the respiratory acidosis, the patient became hypotensive and suffered a cardiac arrest (non-shockable). Spontaneous circulation returned after one cycle of cardiopulmonary resuscitation with chest compression and administration of 1 mg epinephrine. An echocardiography after the event showed good right and left ventricular function.

OUTCOME AND FOLLOW-UP

During his further intensive care stay he developed severe sepsis and hypoxia with multiorgan failure and died on day 20.

DISCUSSION

This case demonstrates again the high-risk nature of tracheostomy tubes on intensive care as

Figure 1 The tracheostomy tube where the unusual cuff deformity can be seen.

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highlighted in the National Audit Project 4 report.¹ A plethora of new tracheostomy tubes are available on the market manufactured by different companies and considering many junior doctors are lacking expertise with tracheostomy tubes it is not surprising that tracheostomies on intensive care are a common source of concern. Despite a rigorous and thorough root-cause analysis we may never know with certainty whether the cuff deformity was a manufacturing defect or due to traumatic insertion.

Learning points

- ▶ While cuff herniation is rare its consequences can be potentially catastrophic.
- ▶ A trail of cuff herniation is part of the Difficult Airway Society guidance but this case demonstrates that cuff herniation does not always present as full airway obstruction.
- ▶ This case also highlights the importance to have a working bronchoscope available wherever endotracheal or tracheostomy tubes are used.

The management of this case was conducted in accordance with the Difficult Airway Society guidelines² as a suction catheter could be passed and a normal capnography trace present; however, this did not exclude airway obstruction. If a bronchoscope was not immediately available the diagnosis may not have been made correctly and this could have led to fatal consequences. We therefore propose to consider incorporating a trial of cuff deflation for the management of complications to exclude tracheostomy blockage.

Contributors IRB and MS were involved in writing the manuscript of this case report.

Competing interests None.

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REFERENCES

- 1 Cook TM, Woodall N, Harper J, *et al.* Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. *Br J Anaesth* 2011;106:632–42.
- 2 McGrath BA, Bates L, Atkinson D, *et al.* National Tracheostomy Safety Project: multidisciplinary guidelines for the management of tracheostomy and laryngectomy airway emergencies. *Anaesthesia* 2012;67:1025–41.

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