Ice cream cone sign: reversible ballooning of the trachea due to tracheostomy tube cuff overinflation

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DESCRIPTION

A woman in her 80s with ventilator-dependent respiratory failure due to severe cardiomyopathy and critical illness myopathy was transferred to our hospital after experiencing recurrent episodes of ventricular fibrillation cardiac arrest requiring cardiopulmonary resuscitation. On arrival, there was a significant air leak despite tracheostomy tube (TT) cuff pressures of 50 cm H₂O (normal <25 cm H₂O). Chest radiography revealed what

we term the 'ice cream cone sign' (figure 1 and video 1), consistent with proximal trachea dilation from cuff overinflation. Bronchoscopy demonstrated tracheomegaly (figure 2) at the cuff site, with a normal calibre distal trachea. TT distal end was not coaxial with the tracheal lumen and pointed posteriorly. The TT was exchanged for a longer cuffed TT with the distal end bypassing the ballooned segment and coaxial to the tracheal lumen. The air leak resolved with this intervention

Figure 1 Ice cream cone sign with ballooning of proximal trachea.

Video 1 Ice cream cone sign with ballooning of proximal trachea.

Figure 2 Tracheostomy tube positioned improperly posteriorly. Arrows indicate area of malacia and dilated tracheal segment.

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Figure 3 Resolution of tracheal dilation 2 days after tracheostomy exchange.

and chest radiography (figure 3) obtained 2 days later revealed a normal tracheal appearance.

Our case is informative in that the ‘ballooning’ was reversible with decrease in cuff volume and pressures. Others^{1 2} have described this to be non-reversible, but cuff pressures were not reported. In our patient, acute decompensation likely necessitated higher levels of ventilator support and resulted in cuff-leak. Subsequently, the cuff balloon was inadvertently hyperinflated to counter air leak. Cuff pressures should be closely monitored, as overinflation could result in ischaemic complications³ including tracheomalacia, tracheal stenosis and

tracheo-oesophageal fistula. Flexible bronchoscopy provides reliable information about the condition of the trachea and selection of the optimal tracheostomy tube.

Learning points

- ▶ Tracheostomy or endotracheal tube cuff pressures should be kept below 25 H₂O (range 20–30 H₂O) to prevent ischaemic injury and subsequent airway and airway-oesophageal complications.³
- ▶ Improperly (non-coaxial) positioning can result in air leaking around an appropriately inflated cuff.
- ▶ Bronchoscopy provides reliable information on coaxial positioning of the tracheostomy tube in relation to the trachea.

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