Massive subcutaneous emphysema from a complicated intubation

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A 58-year-old woman with morbid obesity, diabetes and rheumatoid arthritis was admitted to the intensive care unit with septic shock due to an infected knee that required surgical irrigation and drainage. Postoperatively, she developed hypercarbic respiratory failure necessitating emergent reintubation. Three hours later, a tense swelling with crepitus was noticed on her neck and chest. A computed tomography scan of her chest revealed massive subcutaneous emphysema, pneumomediastinum and pneumothorax due to a tracheal laceration (Figures 1 to 3). She was emergently taken to the operative room. Flexible bronchoscopy showed a posterior tracheal perforation just above the carina. Right thoracotomy revealed a 2 cm tear in the membranous trachea extending toward the right main stem bronchus, which was repaired. After a prolonged stay in the intensive care unit, the patient died due to multiorgan failure and gastrointestinal bleeding.

Figure 1) Computed tomography scan showing massive subcutaneous emphysema and pneumomediastinum caused by a complicated endotracheal intubation. The tracheal injury (arrow) is apparent posteriorly near the level of carina proximal to the right main stem bronchus

Figure 2) A magnified image of the chest computed tomography scan is shown to demonstrate the site of tracheal injury (arrow)

Figure 3) A sagittal section of the chest computed tomography scan shows focal irregularity and discontinuity of the posterior tracheal wall (arrow) near the level of the carina at site of tracheal injury. The distal end of the endotracheal tube is apparent in close proximity to the site of the injury. Pneumomediastinum and extensive subcutaneous emphysema are visible

KEY LEARNING POINTS

- Tracheal laceration after endotracheal intubation is a rare but life-threatening complication, with a mortality rate as high as 22% (1). The incidence is <1%, with a higher prevalence among women of shorter stature and patients >50 years of age (1,2). Older age and male sex are associated with increased mortality (1).
- Emergent intubation increases the risk of death from tracheal injury by threefold compared with elective intubation (1).
- Subcutaneous emphysema is the most common finding in tracheal lacerations. It serves as a sentinel sign that stimulates further confirmatory studies to establish the diagnosis. Other signs include mediastinal emphysema, pneumothorax, dyspnea, dysphonia, cough, hemoptysis and pneumoperitoneum (1).
- During emergent intubation, caution should be taken in choosing the correct endotracheal tube size, depth and force of insertion, the use of long introducers and overdistention of the cuff (1,3).
- Management of tracheal laceration may be conservative or surgical based on the location and extent of the injury and patient comorbidities (1,3).

REFERENCES

1. Miñambres E, Burón J, Ballesteros MA, Llorca J, Muñoz P, González-Castro A. Tracheal rupture after endotracheal intubation: A literature systematic review. *Eur J Cardiothorac Surg* 2009;35:1056-62.
2. Borasio P, Ardisson E, Chiampo G. Post-intubation tracheal rupture. A report on ten cases. *Eur J Cardiothorac Surg* 1997;12:98-100.
3. Carbognani P, Bobbio A, Cattelani L, Internullo E, Caporale D, Rusca M. Management of postintubation membranous tracheal rupture. *Ann Thorac Surg* 2004;77:406-9.

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