

Early Radiographic Signs of Iatrogenic Tracheal Rupture: The Shape and Size of the Endotracheal Cuff

İyatrojenik Trakeal Rüptürün Erken Radyografik Bulguları: Endotrakeal Kafın Şekli ve Boyutu

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Tracheal rupture is a rare event; however, it is one of the most severe complications of endotracheal intubation.¹ Suspicion of this type of rupture depends on the early clinical symptoms like subcutaneous emphysema and respiratory distress. But also orientation of the distal portion of the endotracheal tube to the right with an overdistended spherical endotracheal balloon cuff in the chest radiography might be helpful for the assessment of iatrogenic tracheal injuries.

An 82-year-old woman was found unconscious at home, respiratory arrest was suspected and she was immediately intubated by an emergency doctor on duty. She had a medical history of diabetes, hypertension, atrial fibrillation and chronic obstructive pulmonary disease. When the patient arrived to our intensive care unit, the chest radiography showed that the overinflation of the intubation tube cuff was 27.7 cm² and the cuff shape was spherical in the right apex (Figure 1). Endotracheal cuff pressure was measured 50 cmH₂O by the aneroid manometer (VBM, Sulz, Germany). At this point, a rapid 30 mL of deflation of the cuff was

observed, and suddenly the patient developed subcutaneous emphysema of the facial, bilateral cervical lateral and upper anterior chest. Peritracheal fascia was urgently opened at the bedside by a suprajugular incision and a foley catheter was inserted to provide drainage of air. Skin emphysema had not regressed, and emergency tracheobronchial fiberoptic bronchoscopy showed a posterior tracheal transmural rupture 6 cm long and located 2 cm above the carina. The contrast computed tomography of the thorax showed disintegration in the posterolateral wall of the trachea from the vertebral body dorsal 1 to dorsal 4 (Figure 2, Figure 3). The patient underwent emergency surgical repair of lesion. However she died from post-hypoxic cardiac arrest on the second postoperative day.

Iatrogenic tracheal rupture may occur in the absence of difficult intubation, use of a stylet, or cuff overinflation. The most common symptom that leads to a diagnosis of tracheal rupture is subcutaneous emphysema.² In our patient, stylet protruding from the endotracheal tube was not used and subcutaneous emphysema was not initially present.

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FIGURE 1: The supine posteroanterior chest X-ray showing air-filled (27.7 cm²) tracheal tube cuff in the upper zone of the right hemithorax.

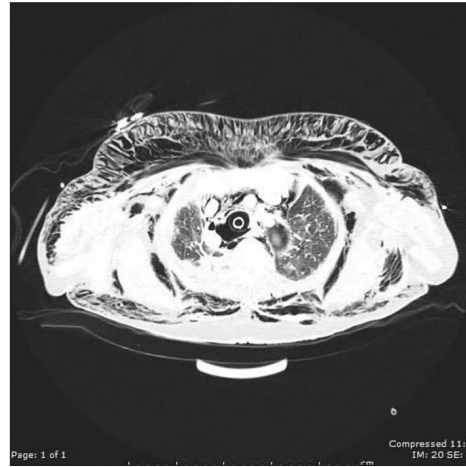


FIGURE 2: Axial thorax computed tomography sections demonstrating irregularity and defects in the right posterolateral wall of the trachea.

The over-distended cuff may temporarily seal the lesion. So, chest radiography after physical examination was not on first interpreted as tracheal rupture. Probably, if it had been interpreted as a rupture at that point, the patient could have been left to spontaneous breathing on veno-venous extracorporeal membrane oxygenation to save time for a treatment algorithm according to the rupture size.

Chest radiography was more helpful for the assessment of iatrogenic tracheal rupture. The overdistended spherical intubation tube cuff was 27.7 cm² in the right apex, which might be the first warning indicator for tracheal rupture.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, shareholding and similar situations in any firm.

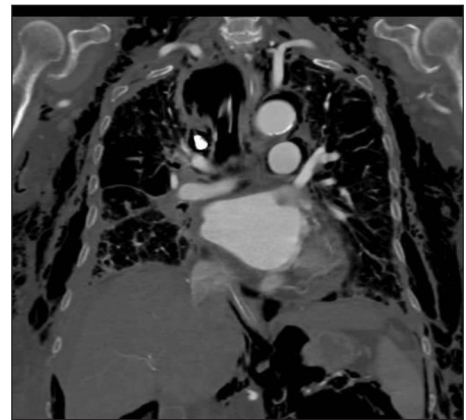


FIGURE 3: Coronal thorax computed tomography sections demonstrating irregularity and defects in the right posterolateral wall of the trachea.

Authorship Contributions

Idea/Concept: Deniz Kara, Direnç Özlem Aksoy, Osman Cemil Akdemir, Ayda Türköz; **Design:** Deniz Kara, Direnç Özlem Aksoy, Osman Cemil Akdemir, Ayda Türköz; **Control/Supervision:** Deniz Kara, Ayda Türköz; **Data Collection and/or Processing:** Deniz Kara, Direnç Özlem Aksoy, Osman Cemil Akdemir, Ayda Türköz; **Analysis and/or Interpretation:** Deniz Kara, Direnç Özlem Aksoy, Osman Cemil Akdemir, Ayda Türköz; **Literature Review:** Deniz Kara, Ayda Türköz; **Writing the Article:** Deniz Kara, Ayda Türköz; **Critical Review:** Deniz Kara, Ayda Türköz.

REFERENCES

1. Paraschiv M. Iatrogenic tracheobronchial rupture. J Med Life. 2014;7(3):343-8. [PubMed] [PMC]
2. Mi-ambres E, Burón J, Ballesteros MA, Llorca J, Mu-oz P, González-Castro A. Tracheal rupture after endotracheal intubation: a literature systematic review. Eur J Cardiothorac Surg. 2009;35(6):1056-62. [Crossref] [PubMed]