

# Successful Conservative Management of Tracheal Injury After Forceful Coughing During Extubation: A Case Report

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## Abstract

A 56-year-old woman underwent carpal tunnel release surgery under general anesthesia. Thirty minutes after extubation, the patient complained of chest discomfort with dyspnea. Swelling of the neck and upper anterior chest was observed. Computed tomography of the chest showed tracheal rupture at the brachiocephalic trunk level, and bronchoscopy demonstrated a 5 cm linear tracheal defect in the posterior membranous wall, 6 cm proximal to the carina. Surgical repair of the tracheal injury was impossible due to its location. The patient was managed with intubation, mechanical ventilator care, and antibiotics. She made a full and uncomplicated recovery and was discharged 18 days after the original injury. When suspicious symptoms appear in patients receiving mechanical ventilation support, an immediate and accurate diagnostic process should be undertaken to rule out endotracheal tube-related tracheal injuries and to avoid potentially lethal complications.

**Keywords:** Complication, Endotracheal Tube, Intubation, Tracheal

## 1. Introduction

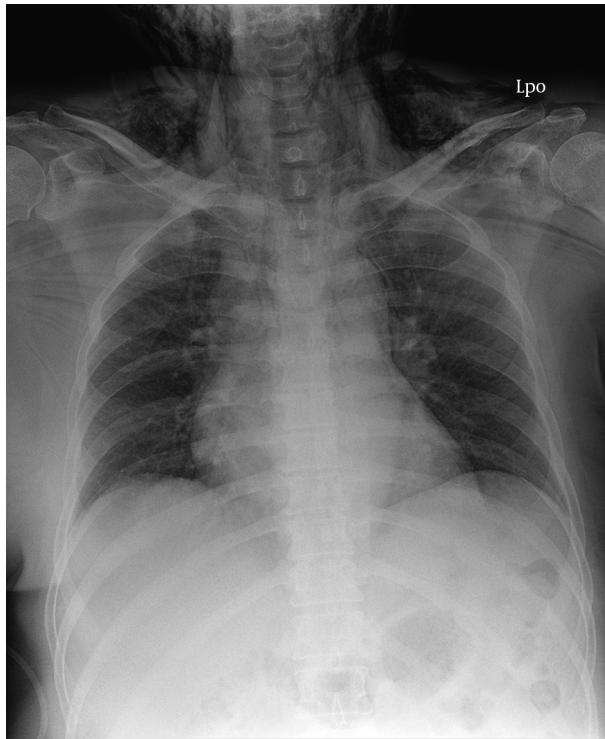
Tracheal injury is a rare and serious complication of endotracheal intubation. Tracheal perforation resulting from tracheal intubation causes pneumothorax and pneumomediastinum through high-volume air leakage, and may lead to mediastinitis and sepsis. As acute mediastinitis is a life-threatening condition if not diagnosed early and treated adequately, early diagnosis and treatment are critical. We report a case of pneumomediastinum occurring due to tracheal injury during general anesthesia with endotracheal intubation.

## 2. Case Presentation

A 56-year-old woman (height 146 cm, weight 74 kg) was scheduled to undergo carpal tunnel release surgery under general anesthesia. No other medical history or specific abnormal laboratory results were recorded except for the presence of arterial hypertension treated with valsartan 80 mg/day and hydrochlorothiazide 12.5 mg/day for approximately 3 months. Following induction of anesthesia with propofol 120 mg, a continuous infusion of remifentanyl 10  $\mu$ l/h, and fentanyl rocuronium 50 mg, the oral intubation was performed without difficulty using a 6.5 mm internal diameter (ID) high-volume/low-pressure cuffed endotracheal tube (MALLINCKRODT®, Covidien, USA) without a

stylet. The cuff was inflated with 4 ml of air, but its pressure was not checked. Anesthesia was maintained with desflurane in air/O<sub>2</sub> (FiO<sub>2</sub> = 0.5) and remifentanyl. The entire surgery lasted approximately 25 minutes. At the end of surgery, anesthesia was discontinued and the endotracheal tube was suctioned. While awakening, the patient coughed vigorously and made a violent neck movement. However, the extubated endotracheal tube was not tinged with blood. She was transferred to the post-anesthesia care unit (PACU). Thirty minutes after the extubation, the patient complained of chest discomfort with dyspnea. The anesthesiologist checked for swelling of the neck and upper anterior chest. The results of the arterial blood gases were as follows: pH = 7.32, PCO<sub>2</sub> = 51 mmHg, PO<sub>2</sub> = 78 mmHg, HCO<sub>3</sub> = 26.8 mmol/L, and SpO<sub>2</sub> = 93%. The chest X-ray showed pneumomediastinum and subcutaneous emphysema (Figure 1), and a subsequent computed tomography (CT) scan showed a tracheal laceration at the brachiocephalic trunk level (Figure 2). The bronchoscopy demonstrated a 5 cm linear tracheal defect in the posterior membranous wall, 6 cm proximal to the carina (Figure 3). The thoracic surgeon's opinion was that thoracic surgical repair of the tracheal tear was impossible due to its location. In the intensive care unit, a 7.5 mm ID cuffed endotracheal tube was placed and a surgical repair of the tracheal tear was attempted as possible near the carina.

under bronchoscopy. Low-tidal-volume lung ventilation was applied to allow the lesion to recover without deteriorating the pneumomediastinum. A pressure-controlled mode was applied as follows: tidal volume of 250 - 350 ml/kg, frequency of 20 - 25/min, and pressure-limited ventilation (mean airway pressure < 25 cm H<sub>2</sub>O) with permissive hypercapnia. A course of broad-spectrum intravenous antibiotics was administered. The patient improved, and three days later, chest CT showed markedly reduced mediastinal and subcutaneous emphysema. After eight days, bronchoscopy showed that the lesion was healing. Endotracheal tube extubation was performed 13 days after the initial injury, and the patient was discharged in good condition 5 days later.



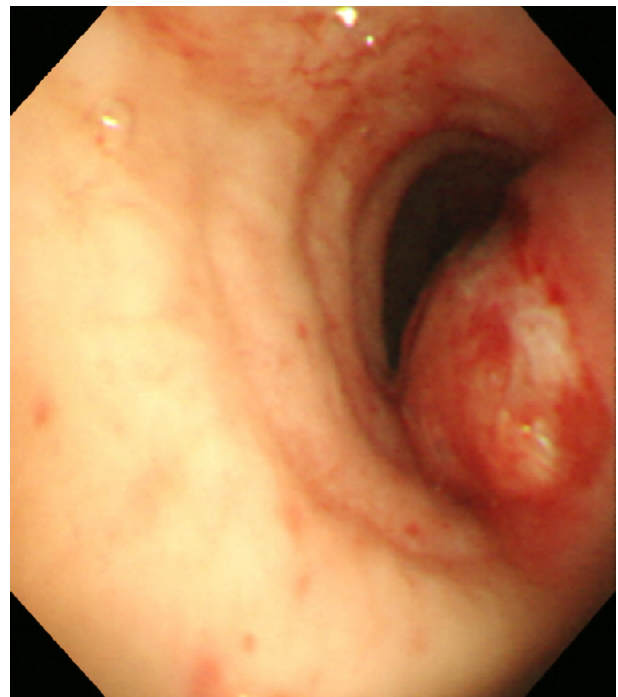
**Figure 1.** Chest X-ray PA View Showing Pneumomediastinum and Subcutaneous Emphysema in the Neck and Chest Wall

### 3. Discussion

Iatrogenic tracheal injury following intubation is extremely rare. For intubation with a patient was disendotracheal tube, the incidence ranges between 1:20,000 and 1:75,000, and the lesions are typically longitudinal lacerations of the posterior tracheal wall (pars membranosa) (1, 2). Tracheal injury occurs mainly in women, as their airways have a narrower diameter, their tracheas are shorter,



**Figure 2.** Chest CT Showing Linear Tracheal Rupture in Posterior Wall (Arrow), Pneumomediastinum, and Subcutaneous Emphysema



**Figure 3.** Diagnostic Bronchoscopy Revealing a 5 cm Linear Laceration on the Posterior Membranous Wall

and their pars membranosa is weaker than in men (3, 4). In addition, short stature and advanced age can be predisposing factors to tracheal injury (4, 5). In this case, the patient had sufficient predisposing factors, but we did not monitor the pressure of the endotracheal cuff.

The precise cause of post-intubation tracheal tears is



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