Video-Assisted Transcervical-Transtracheal Repair for Post-Intubation Tracheal Laceration: A Rare Case of Subcutaneous Emphysema

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Introduction

Post-intubation tracheal laceration(PITL) is rare but can be life-threatening. Patients may present with facial and upper trunk subcutaneous emphysema, dyspnea, or sometimes asymptomatic [2,3]. Early detection and management are essential to reduce complications and mortality rates. In this report, we present a case of significant subcutaneous emphysema after elective intubation, highlighting the importance of early recognition, and treatment options in such cases.

Case presentation

A 30-year-old female with class III obesity (BMI: 41.8; 168 cm, 118 kg) underwent orthopedic surgery under general anesthesia with endotracheal intubation. Postoperatively, she complained persistent chest tightness. Physical examination revealed significant swelling and crepitus of the face, neck, and anterior chest wall. Computed tomography (CT) demonstrated extensive air from the trachea to the lower neck and mediastinum, along with marked subcutaneous emphysema in the anterior chest wall (Figure 1 & 2). Endoscopic evaluation revealed a 3-cm laceration on the posterior tracheal wall, approximately 8 cm below the vocal cords, causing significant air leakage during respiration (Figure 3).

Because of rapid clinical deterioration, surgical intervention was arranged. First, we performed a cervical tracheostomy (Figure 4). A 6.0-mm endotracheal tube was then inserted through the tracheostomy site with the cuff positioned distal to the tracheal laceration to allow ventilation. Using a rigid endoscope, we accessed the trachea through the same tracheostomy site to repair the posterior wall laceration, which was located between the fifth and seventh tracheal rings. During the repair, the endotracheal tube was intermittently removed, placing the patient in a temporarily apneic state to facilitate suturing. When the oxygen saturation dropped below 85%, the tube was reinserted for ventilation. Once the saturation recovered to above 97%, we resumed the repair. The laceration was sutured with Tisseel covering (Figure 5).

Postoperatively, a tracheostomy tube was temporarily placed for respiration and bypass the wound. Follow-up showed gradual resolution of the subcutaneous emphysema in the neck and anterior chest, so we removed the tracheostomy tube subsequently. After one month, during outpatient endoscopic evaluations, we noticed good healing of the posterior tracheal wound (Figure 6).

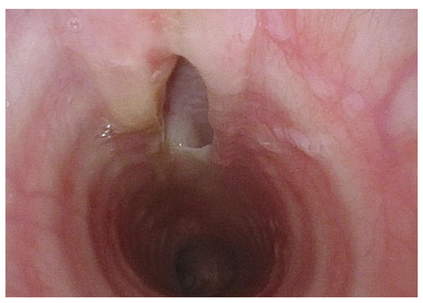
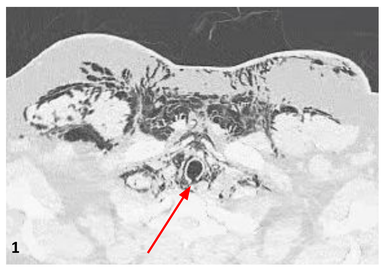


Figure 3. A 3 cm full-thickness laceration on the posterior tracheal wall, approximately 8 cm below the vocal cords



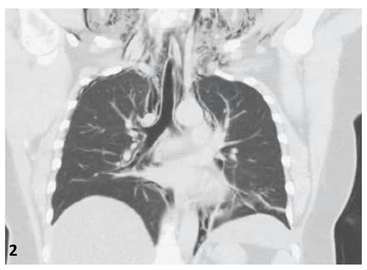


Figure 1. Chest CT axial view. A posterior tracheal laceration with extensive subcutaneous emphysema, without esophageal injury or herniation, consistent with Cardillo's classification type II.
Figure 2. Chest CT coronal view. Extensive air from the trachea to the lower neck and mediastinum

Discussion

PITL is very rare, and estimated to be around 0.005%, with approximately 15% in emergency intubations[1,2,3]. The most common injury site is the pars membranacea of the cervicothoracic trachea at the midline.[2,3]

Some risk factors have been reported, including multiple intubation attempts, clinician inexperience, and protrusion of endotracheal tube introducers. Patient-related risk factors include congenital tracheal abnormalities, advanced age, female gender, and bronchial inflammation.[4] Clinical manifestations may be subtle. Common symptoms include subcutaneous emphysema, dyspnea of varying severity, and possible pneumothorax or pneumomediastinum.[3]

Diagnosis is based on scope and image. Bronchoscopy should be performed to carefully assess the length and depth of the lesion. Chest X-ray is useful for ruling out pneumothorax and massive pneumomediastinum. Contrast-enhanced CT provides more detailed information, such as small subcutaneous emphysema and tracheal lacerations with adjacent tissue injuries.

The key factor in treatment selection is the depth of the tracheal injury rather than its length [2]. In our case, a full-thickness tracheal laceration with subcutaneous and mediastinal emphysema was identified, without esophageal injury or mediastinitis. According to Cardillo's revised morphologic classification (Table 1), this corresponded to a level II tracheal injury—the most common type [2]. Conservative treatment or Tisseel application under bronchoscopy may be considered for this type of patient [2,3].

However, in our case, surgical intervention became necessary because of clinical deterioration. Surgical choices include thoracotomy for injuries in the lower one-third of the trachea, cervicotomy for the upper two-thirds, or video-assisted techniques [2,3]. We opted for the video-assisted transcervical-transtracheal approach to repair the posterior tracheal wall laceration [3]. This is a relatively minimally invasive surgical approach, and our subsequent follow-up showed that her conditions recovered very well. The disadvantage of this method is that it is more time-consuming, primarily due to drops in the patient's blood oxygen levels during the procedure, which necessitate pauses until stabilization.

Classification	Morphology	Management
Level I	Mucosal/Submucosal partial thickness PITL without emphysema	Conservative treatment
Level II	Full-thickness tracheal lesion with emphysema, without esophageal injury	Conservative treatment or bronchoscopic treatment
Level IIIA	Full-thickness laceration of the trachea with esophageal or mediastinal soft-tissue herniation	Surgical treatment if disease progresses
Level IIIB	Full-thickness laceration of the trachea with esophageal injury or mediastinitis	Surgical treatment is indicated.
Level IV	Extensive Loss of substance/fracture of tracheal rings	

Table 1. Cardillo's revised morphologic classification type and management[2]

Conclusion

This case highlights the importance of early recognition and intervention for PITL. Video-assisted transcervical-transtracheal repair offers a minimally invasive yet effective surgical option for posterior tracheal wall lacerations, especially in cases with exacerbated subcutaneous and mediastinal emphysema. While the technique may be time-consuming due to intermittent hypoxemia, its advantages in preserving tracheal integrity and promoting rapid recovery make it a valuable approach.

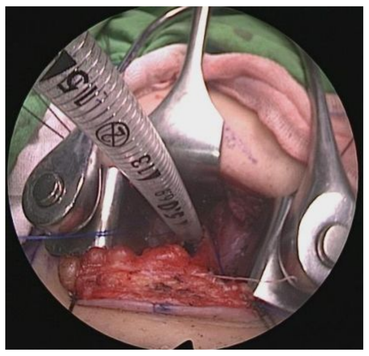


Figure 4. Cervical tracheostomy for transcervical- transtracheal approach

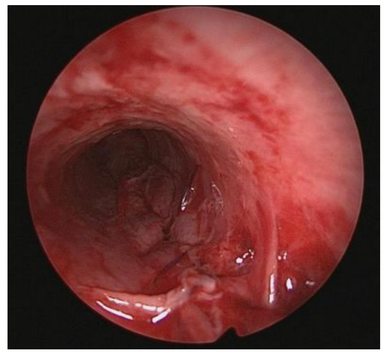


Figure 5. The laceration was sutured with Tissel covering.

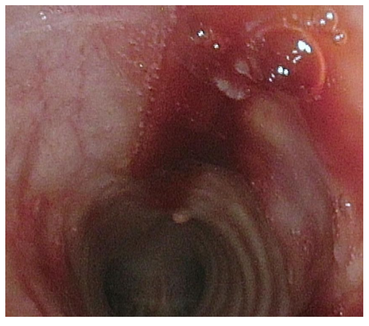


Figure 6. good healing of the posterior tracheal wound

Reference

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