# *Successful Conservative Management of Penetrating Cervical Tracheal Injury: A Case Report*

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## Abstract

Penetrating tracheal injuries are rare but potentially life-threatening, often associated with significant morbidity and mortality. This case report presents the successful conservative management of a 21-year-old male who sustained a penetrating cervical injury involving the trachea. The patient was admitted to the emergency department following an assault with a sharp object (screwdriver). Initial clinical examination revealed severe tachypnea, subcutaneous emphysema, and bilateral pneumothorax, confirmed by a computed tomography (CT) scan. The scan further revealed a small tracheal wound (less than 1 cm) and associated pneumomediastinum and pneumopericardium.

This case underscores the importance of early diagnosis and highlights that conservative management, in select cases of tracheal injuries, can lead to favorable outcomes without surgery.

**Keywords:** Tracheal trauma; Emergency; Management; Conservative management.

## INTRODUCTION

Penetrating neck injuries account for 5 to 10% of all traumatic injuries. They can be life-threatening injuries, due to the dense concentration of vascular and neural structures, as well as the presence of the upper aerodigestive tract [1]. The incidence of tracheal injuries in cases of penetrating neck wounds ranges from 3 to 6% [2]. Most of the cervical injuries are associated with mainly assaults, and suicide attempts in fewer cases, involving sharp objects or firearms. Given the severity of injuries in the cervical region, any penetrating neck wound requires urgent medical and surgical management to assess for signs of critical presentation and to conduct surgical management, if necessary.

Initial management must prioritize identifying life-threatening injuries, particularly acute respiratory distress due to upper airway (UA) injury or massive bleeding caused by vascular damage. Recognizing subtle signs of upper airway injury secondary to cervical trauma is crucial for ensuring early diagnosis and prompt intervention, which can improve survival rates and minimize long-term complications. Early detection of tracheal injuries significantly reduces morbidity and mortality [3].

According to the literature, one in three cases of penetrating cervical injuries results in bleeding, and one in ten results in direct injury to the UA, sometimes accompanied by esophageal involvement [4]. It is important to rule out esophageal injury when the UA is affected, as these injuries are commonly overlooked initially and can later manifest as severe septic complications.

The UAs (pharynx, larynx, trachea) are exposed throughout the neck and may be directly injured or compressed by a hematoma [4,5]. The clinical presentation of tracheal trauma varies depending on adjacent structures. Subcutaneous emphysema, pneumomediastinum, and pneumothorax, with or without respiratory failure, are the most observed acute clinical features [6,7]. Pneumomediastinum can further complicate the condition with cardiac tamponade or airway compression [8].

## CASE REPORT

A 21-year-old male with no notable medical history was the victim of an assault involving a sharp object (screwdriver) in the anterior cervical region in June 2024 (Figure 1).

Upon initial clinical examination, his Glasgow Coma Scale score was 15/15, blood pressure 120/80 mmHg, and SpO2 92% on room air. He presented with severe tachypnea, a respiratory rate of 40 breaths per minute, with a clear upper airway.

Physical examination found subcutaneous emphysema in the thoracic and cervical regions. Due to respiratory distress, the patient was sedated, intubated, and ventilated.

***Figure 1:*** *On-admission presentation of the patient*

A CT scan of the cervical, thoracic, abdominal, and pelvic regions revealed extensive subcutaneous emphysema in the cervical soft tissues, extending into the deep soft tissues of the face. A millimeter-sized ascending anterior cervical wound dissecting the sternohyoid muscle and reaching the anterior aspect of the subglottic larynx was observed, with associated fat densification and a tracheal wound less than 1 cm in size, which was not initially identified during the first review of the scan. In the thoracic region (Figures 2 and 3), a large right anterior pneumothorax caused a collapse of the lung parenchyma and mediastinal shift to the contralateral side. A moderate left anterior pneumothorax, an extensive pneumomediastinum, a large pneumopericardium, and significant subcutaneous emphysema dissecting the deep thoracic soft tissues were also observed.

The patient underwent chest drainage on the right side, and an otolaryngology examination was performed, indicating the need for an urgent surgical repair.

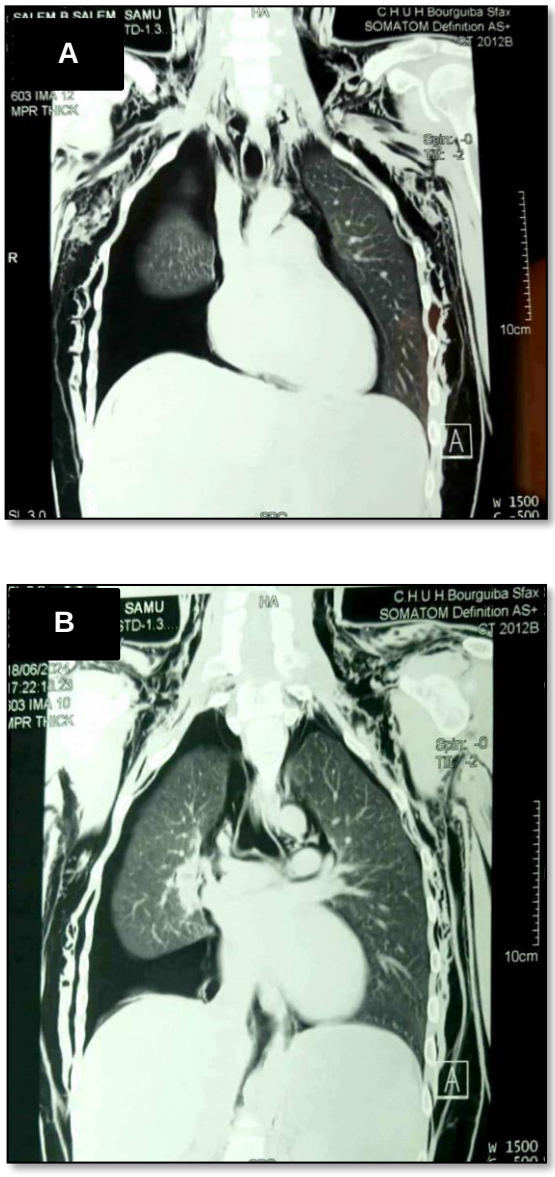


***Figure 2:*** *The CT scan showing an anterior pneumothorax on the right side (A) with a collapsed lung and a deviation of the mediastinum to the left side (B)*

The multidisciplinary decision was to keep the patient intubated for 24 to 48 hours. The decided management plan for the small tracheal wound was close monitoring alongside chest drainage.

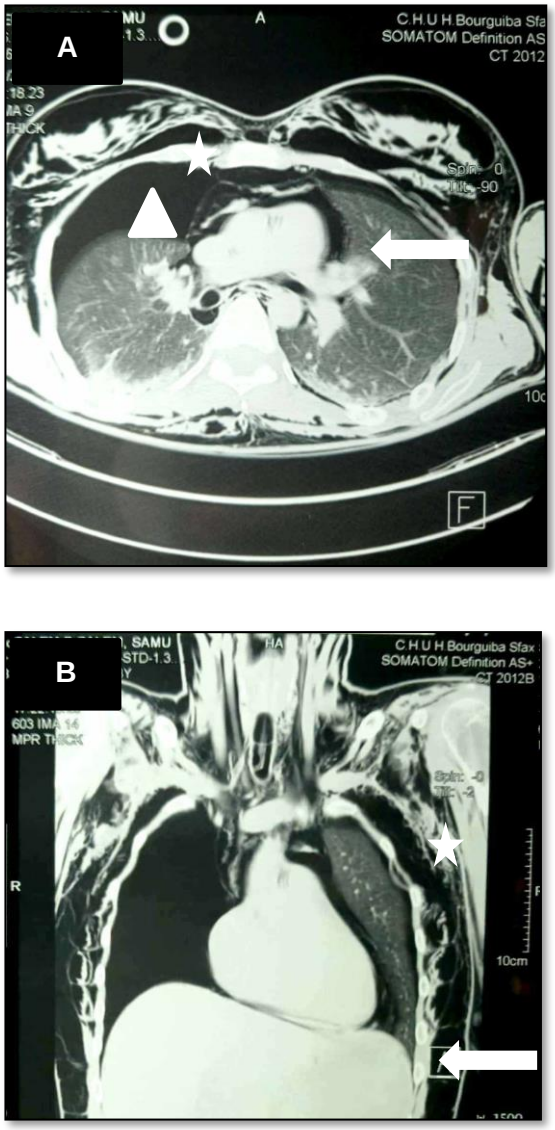


***Figure 3:*** *The CT scan showing a pneumomediastinum (Triangle) with a pneumopericardium (arrow) with an important emphysema (star) in axial (A) and sagittal (B) plans*

The patient was then transferred to the intensive care unit. He sustained hemodynamically stable without the need for catecholamines but with extensive subcutaneous emphysema extending from the chest to the lumbar region and palpebral edema. The therapeutic protocol continued to be conservative including monitoring, proton pump inhibitors, corticosteroids, antibiotics, and

preventive anticoagulation. The outcome was favorable, with a transfer to the thoracic surgery department, and then home discharge.

## DISCUSSION

The anatomy of the cervical region is complex with vital structures (vascular, neurological, respiratory, and digestive) within a limited space, surrounded by rigid fascia. This makes cervical wounds, particularly those involving the airway, highly challenging to assess and manage [9].

In the case of cervical injuries, it is crucial to look for expanding hematomas, airway deviation, or subcutaneous emphysema. Physical examination should include carotid pulse palpation, auscultation for bruits or thrills, and a thorough neurological assessment to distinguish between central (e.g., hemiplegia) and spinal cord injuries (e.g., tetraplegia, priapism, anal hypotonia). Clinical signs of tracheal injury, such as subcutaneous emphysema, pneumomediastinum, and pneumothorax, are common [5-7]. However, many patients may present with minimal symptoms, making early diagnosis critical.

Chest radiography is essential for evaluating pneumothorax, pneumomediastinum, or tracheal deviation, which could indicate tracheal damage. A CT scan of the cervical and thoracic regions confirms the diagnosis and provides a complete assessment of associated injuries (e.g., esophageal, pulmonary, or vascular). Bronchoscopy remains the gold standard for diagnosing tracheobronchial injuries but is sometimes avoidable with high-quality CT imaging [10-14].

Management depends on the clinical stability of the patient. Conservative treatment with corticosteroids, proton pump inhibitors, and humidified oxygen is effective for small tracheal lacerations (<2 cm). Larger or unstable injuries require surgical intervention, such as tracheal repair or anastomosis [15-21]. In cases of hemodynamic instability, extracorporeal membrane oxygenation (ECMO) may be considered a bridge to surgery [11, 22]. Postoperatively, patients should be monitored for complications such as tracheal stenosis or dysphonia [23].

In patients with respiratory and hemodynamic stability and moderate tracheal lesions less than 2 cm, conservative treatment with systemic corticosteroids, proton pump inhibitors, and possibly antibiotic prophylaxis, with humidified air, can be initiated. Conservative management may be superior to surgical treatment in well-selected patients with moderate injuries. Small tracheal wounds may close spontaneously within 48 hours [13].

Rehabilitation, including speech therapy, is important to optimize functional outcomes. The risk of high morbidity and mortality associated with tracheal injuries—due to complications like pneumomediastinum or pneumothorax—requires prompt and accurate intervention [24, 25].

## CONCLUSION

Penetrating neck wounds are notoriously challenging to assess due to the complexity of the anatomical region. The incidence of tracheal

injuries in the context of penetrating neck trauma is between 3% and 6%.

The clinical presentation of tracheal trauma can vary depending on the involvement of adjacent structures. Subcutaneous emphysema, pneumomediastinum, and pneumothorax are the most commonly observed acute clinical features with or without respiratory distress.

Accurate interpretation of chest X-rays is crucial for the early diagnosis of occult upper airway injuries in stable patients. Cervical-thoracic CT scans confirm the diagnosis and provide a listing of tracheal injuries and surrounding lesions, namely esophageal, pulmonary, or aortic involvement.

This case underscores the importance of early diagnosis and highlights that conservative management, in select cases of tracheal injuries, can lead to favorable outcomes without surgery.

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