

## Spontaneous Tracheal Injury Post Singing: An Extremely Rare Case Report

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### Abstract

**Introduction:** Spontaneous tracheal injury is a rare and serious condition characterized by a non-traumatic rupture of the trachea, requiring prompt medical attention.

**Case Presentation:** A 25-year-old male singer presented with acute dyspnea and neck crepitus post a prolonged singing session. CT revealed subcutaneous emphysema and pneumomediastinum, indicative of spontaneous tracheal injury. Managed conservatively with rest and monitoring, he recovered well and was discharged with vocal rest instructions.

**Discussion:** The incidence is extremely low, with risk factors including chronic respiratory diseases, severe coughing, connective tissue disorders, chronic inflammation, and long-term corticosteroid use. Diagnosis involves clinical assessment, imaging studies, and bronchoscopy. Treatment depends on the injury's severity, ranging from conservative management to surgical repair. Complications can include respiratory distress, infections, subcutaneous emphysema, pneumothorax, and tracheal stenosis.

**Conclusion:** Awareness and timely intervention are crucial for improving outcomes in spontaneous tracheal injury. Advances in diagnostic and therapeutic techniques play a vital role in managing this potentially life-threatening condition effectively.

**Keywords:** Spontaneous tracheal injury; Tracheal rupture; Non-traumatic; Case report; Subcutaneous emphysema

### Introduction

Spontaneous Tracheal Injury (STI) is an uncommon but significant clinical condition characterized by the abrupt rupture or tear of the trachea without any preceding trauma or surgical intervention [1]. This condition often presents as an emergency due to the potential for airway compromise and associated complications, such as pneumomediastinum, subcutaneous emphysema, and respiratory distress. The rarity and non-specific nature of symptoms make diagnosis challenging, often leading to delayed recognition and treatment. Understanding the pathophysiology, risk factors, and management strategies is crucial for healthcare providers to ensure prompt and effective treatment, thereby reducing morbidity and mortality associated with STI.

### Case Presentation

A 25-year-old gentleman with no significant past medical history presented to the emergency department with acute onset dyspnea and a sensation of crackling in his neck after an ex-

tended singing session lasting over 90 minutes. The patient reported that the symptoms began suddenly during a high-pitched note, accompanied by a sharp pain in his chest and neck. He denied any history of recent trauma, upper respiratory infections, or previous similar episodes. There was no history of smoking, drug use, or chronic respiratory conditions. He works as a professional singer and had been practicing intensively for an upcoming performance.

On physical examination, the patient was in mild respiratory distress, with a respiratory rate of 24 breaths per minute, oxygen saturation of 96% on room air, and a heart rate of 98 beats per minute. His blood pressure was 120/78 mmHg, and he was afebrile. Inspection of the neck revealed subtle swelling, and palpation elicited crepitus extending from the suprasternal notch to the angle of the mandible bilaterally, indicative of subcutaneous emphysema. Auscultation of the lungs revealed clear breath sounds bilaterally, without wheezes, rales, or rhonchi. Heart sounds were normal, with no murmurs or pericardial rubs. No tracheal deviation was noted.

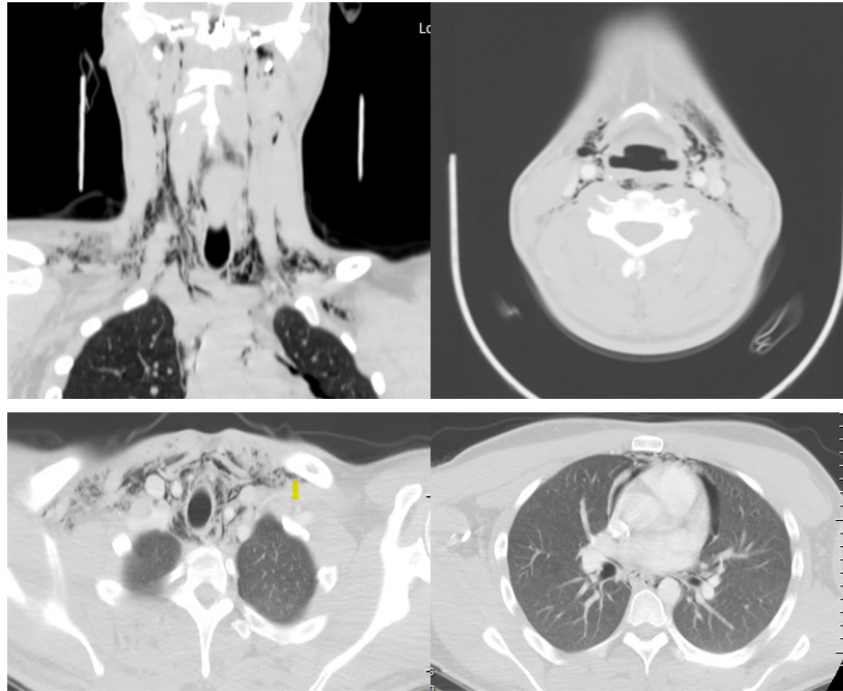


Figure 1: CT scan of the neck showed severe and massive soft tissue-subcutaneous emphysema with minimal pneumomediastinum.

A CT scan of the neck and chest was performed, revealing extensive subcutaneous emphysema and pneumomediastinum, with air tracking along the fascial planes into the anterior mediastinum (**Figure 1**). There was no evidence of pneumothorax, pleural effusion, or esophageal rupture. Based on these findings, the patient was diagnosed with a spontaneous tracheal injury, likely resulting from high intrathoracic pressures generated during the prolonged singing session.

The patient was admitted for conservative management, including bed rest, oxygen supplementation to maintain adequate oxygenation, analgesia for pain control, and close monitoring for any signs of respiratory distress or infection. Over the course of his hospital stay, his symptoms gradually improved, and repeat imaging showed no progression of the pneumomediastinum or subcutaneous emphysema. He was discharged home in stable condition with instructions to avoid strenuous vocal activities and follow-up appointments for reassessment and to ensure complete recovery.

## Discussion

Spontaneous tracheal injury is defined as a non-traumatic rupture or tear of the tracheal wall that occurs without any external force, surgical intervention, or apparent cause. It leads to air leakage into surrounding tissues, potentially causing severe respiratory complications [2].

The incidence of STI is not well-documented due to its rarity. It predominantly affects middle-aged to elderly adults, though it can occur in younger individuals as well. There is a slight male predominance observed in reported cases.

Several factors can predispose individuals to spontaneous tracheal injury such as chronic respiratory conditions, connective tissue disorders like Ehlers-Danlos syndrome or Marfan syndrome that weaken connective tissues, smoking that can lead to weakening of the tracheal walls, Previous tracheal procedures (endotracheal intubation or tracheostomy) and increased intrathoracic pressure like strong activities or conditions that cause

a sudden rise in intrathoracic pressure, such as severe coughing, vomiting, or Valsalva maneuvers [3].

The exact etiology of STI is unclear, but it is believed to result from a combination of mechanical stress and inherent weakness of the tracheal wall. Possible mechanisms include sudden, forceful coughing or sneezing, severe vomiting, excessive strain during physical activity like our case above and iatrogenic factors such as endotracheal intubation or tracheostomy, although these are technically non-spontaneous causes [4].

Diagnosing STI involves a combination of clinical assessment and imaging studies. Patients may present with sudden onset of neck pain, chest pain, dyspnea, hoarseness, or subcutaneous emphysema. Chest X-ray and Computed Tomography (CT) scan are crucial in identifying pneumomediastinum, subcutaneous emphysema, and tracheal rupture. CT scan is more sensitive and can provide detailed images of the tracheal wall. Bronchoscopy remains the gold standard where direct visualization of the trachea through bronchoscopy can confirm the presence and extent of the injury [5].

The management of STI depends on the severity and extent of the injury: Mild cases may be managed conservatively with close monitoring, oxygen therapy, and antibiotics to prevent secondary infections. Severe cases with significant tracheal damage or persistent air leakage may require surgical repair. Procedures may include primary closure of the tear, tracheal resection, or reconstruction. Pain management, respiratory support, and nutritional support are essential components of care [6].

The prognosis of STI varies depending on the severity of the injury and the promptness of treatment. Early diagnosis and appropriate management are crucial for favorable outcomes. Most patients recover well with timely intervention, although complications such as infection, tracheal stenosis, and respiratory failure can occur.

## Conclusion

To our knowledge, it is the first reported cases about a young man presenting with spontaneous tracheal injury secondary to singing. Spontaneous tracheal injury is a rare but serious condition that requires high clinical suspicion for timely diagnosis and management. Understanding the risk factors, clinical presentation, and appropriate treatment strategies is essential for optimizing patient outcomes. Further research is needed to better understand the underlying mechanisms and to develop standardized treatment protocols.

**Consent for publication:** Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review upon request by the Editor-in-Chief of this journal.

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