

## Tracheal Diverticulum Simulating Pneumomediastinum in an Elderly Patient with Traumatic Injuries: A Radiological Pitfall

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## Abstract

## Case Report

Paratracheal air collections identified in trauma patients often raise suspicion for pneumomediastinum, a potentially serious condition associated with aerodigestive tract injury. However, benign entities such as tracheal diverticula may mimic this appearance, leading to misdiagnosis. In this paper, we report the case of an 80-year-old woman found to have tracheal diverticulum mimicking pneumomediastinum following a road traffic accident. This case report aims to provide a comprehensive overview and highlights the importance of accurate radiological interpretation, to guide decision making regarding advanced imaging or procedures.

**Keywords:** Tracheal diverticulum, Pneumomediastinum, Trauma, CT imaging.

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### INTRODUCTION

Pneumomediastinum refers to the presence of extraluminal gas within the mediastinum, often associated with conditions such as blunt or penetrating traumatic injury, surgical procedures, or spontaneous alveolar rupture due to increased intrathoracic pressure [1]. However, not all paratracheal air collections represent true pneumomediastinum. Several entities, including tracheal diverticula and paratracheal air cysts, may mimic this appearance and lead to diagnostic confusion, especially in acute trauma setting [2-3].

These lesions are benign and incidentally findings, that present as air-filled collections in typical right-sided paratracheal locations [2-4]. They are mostly acquired and associated with conditions that weaken the tracheal wall [5].

Herein, we report the case of an elderly trauma patient found to have tracheal diverticulum on computed tomography (CT) imaging, mimicking pneumomediastinum. Differentiating these two entities is critical in chest imaging evaluation, in order to avoid misdiagnosis and unnecessary investigations.

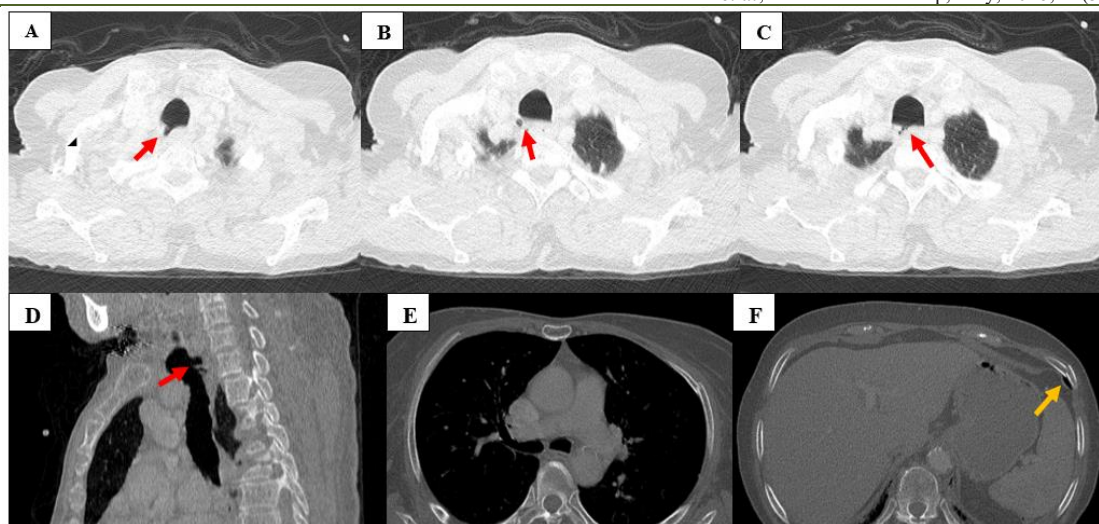
### CASE REPORT

An 80-year-old female with no significant prior respiratory history was admitted to the emergency

department following a road traffic accident. She presented with left chest pain and thoracic discomfort but no respiratory distress, dysphagia, or hemoptysis. On physical exam, the patient was alert and stable, but presented with pain in the left chest wall upon palpation.

A whole-body CT scan was performed as part of trauma assessment and revealed left-sided rib fractures without evidence of hemothorax or pneumothorax, associated with multiple small and well-defined air-filled structures adjacent to the right posterolateral wall of the upper trachea. These findings initially raised suspicion for post-traumatic pneumomediastinum. However, closer and detailed evaluation of the CT revealed thin-walled air collections with rounded margins in the classic location of tracheal diverticula, clearly communicating with the tracheal lumen. No surrounding inflammatory changes were noted. No evidence of obvious tracheal or bronchial rupture was noted. No esophageal injury was detected. (Figure 1).

The patient remained hemodynamically stable and was treated conservatively. The diagnosis of tracheal diverticulum was made.



**Figure 1:** Non-contrast CT images in parenchymal window (A, B, C, D) revealing multiple thin-walled air collections adjacent to the right posterolateral wall of the upper trachea (red arrows), clearly communicating with the tracheal lumen. Non-contrast CT images in bone window showing left-sided rib fractures (yellow arrow) without evidence of hemothorax or pneumothorax (E, F).

## DISCUSSION

Tracheal diverticula also known as a tracheocele or tracheal air cyst are outpouchings lined by ciliated columnar epithelium arising from the tracheal wall that have direct communication with the lumen of the trachea [1].

Although previously considered rare, their prevalence has increased with the widespread use of high-resolution CT, with reported rates ranging from 1% to 4% [2-3].

They are classified either congenital or acquired [2-6]. Congenital diverticula, considered true diverticula, are the result of altered embryonic development of the lung buds, and contain all three layers of the tracheal wall [2-5]. They are smaller, with a narrower neck than the acquired type, and may coexist with other abnormalities [7-8]. Whereas acquired forms, more common in adults, are usually larger and caused by increased intraluminal pressure that weakened the tracheal wall such as obstructive lung disease, chronic cough, recurrent bronchitis, chronic smoking, or chest trauma. They consist only of respiratory epithelium and thus are considered pseudodiverticula [4-5].

They are predominantly found on the right posterolateral aspect of the upper trachea, likely due to the relative lack of anatomic protection compared to the left side that is supported by the aortic arch and esophagus [9-11].

The clinical manifestations of tracheal diverticulum can vary depending on factors such as its size, location, and whether it is congenital or acquired (posterior). While often incidental and rarely symptomatic, they may serve as a reservoir of

infected mucus and may be the underlying cause of recurrent respiratory tract infections or streaky hemoptysis [1-2].

The current diagnostic approach to tracheal diverticulum involves a thorough clinical evaluation, imaging studies, and in some cases, bronchoscopy [9-12-13].

Multidetector CT imaging is the most effective imaging method to detect diverticula of both the trachea and bronchi. It allows the radiologist to evaluate the location, size, contour, and wall thickness [1-7-14].

The characteristic features include a thin-walled unilocular or multilocular air-filled structures, mostly located in the right posterolateral trachea, with direct visualization of a communication stalk with tracheal lumen in up to 35% of cases [5]. Multiplanar CT reconstructions can effectively improve detection of this communication [1-4]. Otherwise, the study of Tsiouma *et al*. showed that performing the Valsalva maneuver during Ct scan result in an elevation of the intrathoracic pressure which in turn lead to the increase of the size of the tracheal diverticulum and allow the observation of a narrow connection to the tracheal wall [7].

CT may also aid whether the diverticula are congenital or acquired depending on the presence or absence of cartilage and the size of the neck of the diverticula [14]. Acquired diverticula are typically larger and have a wider communication with the lumen [1]. Furthermore, CT can be useful for detecting complications such as diverticular wall inflammation, perforation, or abscess formation [1].

In trauma setting, the presence of extraluminal paratracheal air raises the concern for

pneumomediastinum, making diagnosis of tracheocele difficult, particularly when multiple or large [1-5]. Pneumomediastinum occurs when gas is present in the interstitial spaces of the mediastinum [2]. It presents as diffuse linear air throughout mediastinum, that doesn't show any communication with the trachea.

On the other hand, there are few reported cases in the literature of pneumomediastinum and subcutaneous emphysema caused by tracheal diverticulum's rupture, mainly after interventions such as tracheal intubation and administration of positive pressure ventilation [7-9].

Misinterpretation of tracheal diverticula as pneumomediastinum may lead to unnecessary bronchoscopy, esophagography and prolonged hospitalization. Conversely, failure to recognize true pneumomediastinum may delay diagnosis of life-threatening injuries.

Therefore, radiologists must consider this benign entity when assessing post-traumatic mediastinal air collections, use multiplanar CT and actively search for tracheal communication [1].

## CONCLUSION

Tracheal diverticula are an important and relatively common cause of paratracheal air that may mimic pneumomediastinum, particularly in trauma patients.

Accurate diagnosis relies on CT imaging and identification of key features, especially communication with the tracheal lumen. Awareness of this entity is essential to avoid misdiagnosis and unwarranted surgical treatment.

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