

# Silent Threat: Post-Traumatic Aortic Pseudoaneurysm Causing Airway Compression and Respiratory Failure

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## ABSTRACT

**Background:** Post-traumatic aortic pseudoaneurysm is a rare but life-threatening complication of blunt chest trauma. When large, it can exert significant mass effect on adjacent structures, leading to critical complications such as airway compression and pulmonary artery obstruction. Early recognition and intervention are crucial to prevent fatal outcomes.

**Case Presentation:** We report a case of a 17-year-old male who developed progressive dyspnea and hypoxemia over 1.5 months following a motor vehicle accident. Initial injuries included lung contusion and hemothorax, requiring mechanical ventilation and chest tube insertion. Contrast-enhanced CT revealed a large aortic arch pseudoaneurysm with a mediastinal hematoma, causing severe compression of the left main bronchus and pulmonary arteries. The resultant left lung collapse and vascular compromise led to refractory respiratory failure. Despite maximum ventilatory support, the patient remained hypoxemic, necessitating extracorporeal membrane oxygenation (ECMO) and subsequent endovascular stent graft repair. The intervention successfully relieved airway compression, leading to improved oxygenation and clinical stabilization.

**Conclusion:** This case highlights the potential for post-traumatic aortic pseudoaneurysms to cause airway and vascular compression, mimicking pulmonary embolism and leading to respiratory failure. Prompt imaging and endovascular intervention are critical in preventing fatal outcomes. Contrast-enhanced CT with multiplanar reconstruction is invaluable in diagnosis and management planning.

**KEYWORDS:** Silent Threat, Post-Traumatic Aortic Pseudoaneurysm, Airway Compression, Respiratory Failure, ECMO.

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## INTRODUCTION

Post-traumatic aortic pseudoaneurysm is a rare but life-threatening complication of blunt chest trauma, accounting for approximately 15–20% of traumatic aortic injuries and carrying a high risk of rupture if left untreated<sup>(1)</sup>. While acute presentations often involve hemodynamic instability due to impending rupture, delayed complications may arise from progressive pseudoaneurysm enlargement and compression of adjacent mediastinal structures, leading to respiratory and cardiovascular compromise<sup>(2)</sup>.

Among the potential sequelae, airway compression due to mediastinal hematoma and pseudoaneurysm expansion is an uncommon but critical cause of post-traumatic respiratory failure. Extrinsic compression of the left main bronchus may result in complete ipsilateral lung collapse, while involvement of the pulmonary artery branches can mimic pulmonary thromboembolism, complicating diagnosis and delaying appropriate management<sup>(3)</sup>. Contrast-enhanced computed tomography (CT) with multiplanar reconstruction plays a pivotal role in identifying pseudoaneurysms, assessing their impact on adjacent structures, and guiding therapeutic interventions.

Here, we present a case of a young male who developed progressive respiratory failure secondary to an enlarging post-traumatic aortic arch pseudoaneurysm with severe left main bronchus and pulmonary artery compression. This case highlights the importance of early imaging, multidisciplinary management, and the role of endovascular stent grafting as a minimally invasive approach to treating complex aortic injuries.

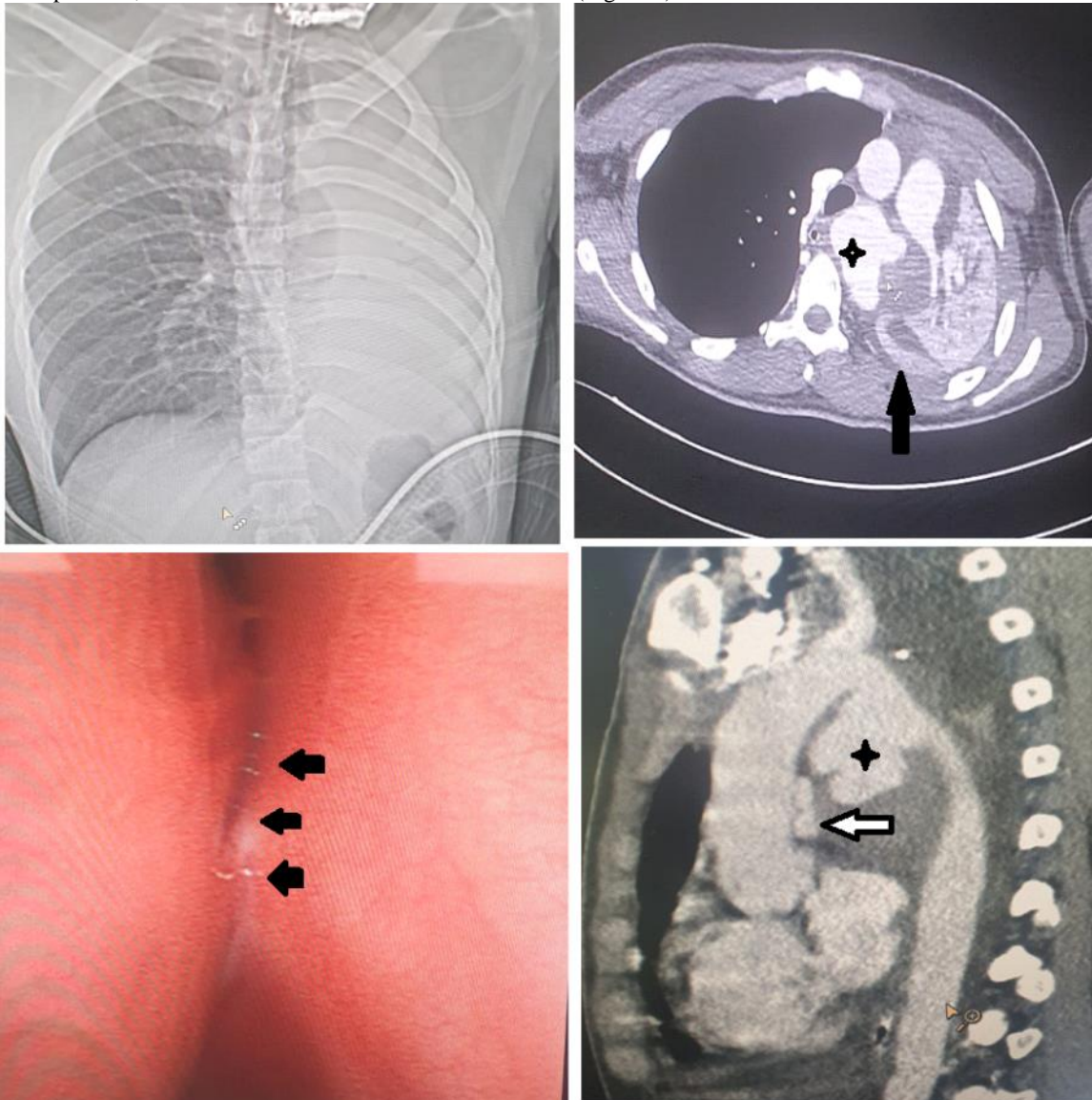
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## CASE PRESENTATION

A 17-year-old previously healthy male presented with progressive dyspnea and epigastric discomfort over six weeks following blunt chest trauma sustained in a high-impact motor vehicle accident. At the time of the injury, he was diagnosed with bilateral lung contusions and left-sided hemothorax, requiring mechanical ventilation for five days and the placement of an intercostal chest tube. He was discharged in stable condition but later developed worsening breathlessness and hypoxemia.

On presentation, the patient was tachypneic with a respiratory rate of 32 breaths/min, oxygen saturation of 84% on high-flow nasal cannula, and decreased breath sounds over the left hemithorax. There was no evidence of external chest deformity or palpable thrill. Laboratory tests, including inflammatory markers and coagulation parameters, were within normal limits.

A chest radiograph demonstrated an opaque left hemithorax with contralateral mediastinal shift. Contrast-enhanced computed tomography (CT) of the chest revealed a large, irregular aortic arch pseudoaneurysm distal to the left subclavian artery, measuring  $6.2 \times 4.8$  cm. A mediastinal hematoma was present, causing severe extrinsic compression of the left main bronchus, leading to complete collapse of the left lung. Additionally, the pseudoaneurysm displaced and compressed the left pulmonary artery, mimicking pulmonary embolism. Flexible bronchoscopy confirmed near-total obstruction of the left main bronchus due to external compression, with an otherwise normal bronchial mucosa (Figure 1).



**Figure (1): (A) chest PA radiograph with complete left hemithorax opacification and mediastinal shift, (B) Axial MSCT chest mediastinal scan with complete left lung collapse (black arrow) due to aortic aneurysm (Asterisk) compressing the left main bronchus with mediastinal shift. (C) Bronchoscope picture with obliterated left main bronchus lumen (arrows) due to external compression and (D) Sagittal MSCT chest scan shows aortic aneurysmal dilatation compressing the pulmonary artery (white arrow).**

The patient was placed on mechanical ventilation with maximal support; however, persistent hypoxemia necessitated ECMO. Given the high risk of rupture, an urgent endovascular intervention was performed. A thoracic endovascular aortic repair (TEVAR) was successfully deployed across the pseudoaneurysm, restoring airway patency and vascular integrity. Post-procedure imaging confirmed resolution of bronchial compression and improved left lung aeration. The patient was successfully weaned

from ECMO and extubated within 72 hours. He remained hemodynamically stable and was discharged with a structured follow-up plan, including serial imaging to monitor for endograft complications.

## DISCUSSION

Post-traumatic aortic pseudoaneurysm is a rare but potentially fatal complication of blunt chest trauma, accounting for approximately 15–20% of traumatic aortic injuries<sup>(1)</sup>. These injuries often result from high-impact mechanisms, such as motor vehicle accidents, and carry a significant risk of rupture if not promptly recognized and managed. While acute cases present with hemodynamic instability, delayed presentations can occur due to progressive aneurysm expansion and mass effect on adjacent structures<sup>(2)</sup>. This case highlights the potential for an enlarging aortic pseudoaneurysm to cause respiratory failure due to extrinsic bronchial and vascular compression, mimicking pulmonary embolism and complicating diagnosis.

Aortic pseudoaneurysms result from partial-thickness aortic wall injury, with containment of blood by adventitia or periaortic tissue. Unlike true aneurysms, pseudoaneurysms have a high propensity for rupture, particularly in the setting of trauma<sup>(3)</sup>. In this case, the pseudoaneurysm's expansion led to compression of the left main bronchus, resulting in ipsilateral lung collapse, and displacement of the left pulmonary artery, contributing to hypoxemia. The patient's worsening respiratory status despite supportive measures necessitated advanced imaging and emergent intervention.

The differential diagnosis for progressive dyspnea in post-trauma patients includes pulmonary embolism, lung contusion, hemothorax, diaphragmatic injury, and post-traumatic fibrothorax. However, the presence of a hilar mass effect on chest radiography and contralateral mediastinal shift prompted further evaluation, leading to the diagnosis of aortic pseudoaneurysm with mediastinal hematoma<sup>(4)</sup>. The role of contrast-enhanced CT in such cases is critical, as it allows for detailed anatomical assessment of vascular injury and associated complications, guiding timely intervention.

Historically, open surgical repair was the standard treatment for traumatic aortic injuries but carried high perioperative morbidity and mortality, particularly in hemodynamically unstable patients<sup>(5)</sup>. In recent years, TEVAR has emerged as a preferred alternative, offering a minimally invasive approach with reduced risk of hemorrhage and neurological complications<sup>(6)</sup>. In our patient, TEVAR successfully excluded the pseudoaneurysm, relieving bronchial and pulmonary artery compression, and leading to rapid clinical improvement.

Extracorporeal membrane oxygenation (ECMO) played a crucial role in stabilizing our patient before definitive intervention. The use of ECMO in patients with severe respiratory failure due to central airway obstruction is well-documented and can provide a bridge to definitive therapy<sup>(7)</sup>. Our case underscores the importance of a multidisciplinary approach, integrating vascular surgery, critical care, and interventional radiology for optimal outcomes.

This case highlights the need for early recognition of post-traumatic vascular complications in patients with delayed respiratory decline. Clinicians should maintain a high index of suspicion for pseudoaneurysm-related mass effect when evaluating post-trauma patients with unexplained dyspnea, especially in the presence of mediastinal abnormalities on imaging.

Long-term follow-up after TEVAR is essential, as complications such as endoleaks, graft migration, and aneurysm expansion can occur. Serial imaging with CT angiography is recommended to ensure graft patency and detect late complications<sup>(8)</sup>. Further studies are needed to evaluate the long-term outcomes of TEVAR in young trauma patients, particularly regarding graft durability and the risk of reintervention.

## CONCLUSION

Post-traumatic aortic pseudoaneurysm can present insidiously with respiratory failure due to mass effect on the airway and pulmonary vasculature. This case underscores the importance of early imaging, multidisciplinary decision-making, and the role of TEVAR as a life-saving intervention. Clinicians should be aware of this rare but critical entity, as timely diagnosis and intervention are essential to prevent fatal outcomes.

**Ethics approval:** *Written informed consent was obtained from the patient and legal guardian for publication of this case report and any accompanying images.*

**Conflict of interest:** None.

**Financial disclosures:** None.

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