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Case Report Open Access

Rare Vascular Injury in Blunt Trauma: Bilateral Internal Thoracic Artery Laceration

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Abstract

A rare case of bilateral internal thoracic artery (ITA) laceration after blunt chest trauma is presented. ITA laceration in and of itself is uncommon in the setting of blunt trauma, and bilateral disruption, is rarely seen. We report such a case, and in doing so, seek to bring awareness to the injury, its presentation, diagnosis and associated complications. Our patient presented after a motor vehicle collision, requiring emergent splenectomy as well as tube thoracostomy for a hemothorax. Only after initial surgery, and achievement of hemodynamic stability, did the patient experience rapid cardiovascular collapse, demonstrating cardiac tamponade physiology and large bilateral hemothoraces. Emergent sternotomy and thoracic exploration led to the discovery of bilateral ITA laceration with extravasation. This case emphasizes the occult presentation of internal thoracic artery injury and its associated high morbidity.

Introduction

Blunt thoracic injury is a leading cause of trauma-related mortality [1]. Bleeding and complications due to internal thoracic artery (ITA) laceration in these instances are seldom encountered and blunt *bilateral* ITA injury has rarely been reported [2-4]. Though an atypical injury, ITA rupture can lead to significant hemothoraces, cardiac compression and resultant hemodynamic compromise. We report a case of blunt thoracic trauma leading to bilateral lacerations of the internal thoracic arteries and ensuing hemothoraces and hemodynamic instability.

Case Report

A 22-year-old male skateboarder was transported to our Emergency Department after being struck on his left side by a motor vehicle travelling at high speeds. Upon presentation, the patient was alert and oriented with a Glasgow Coma Scale of 15 and was hemodynamically stable. Chest examination revealed a large left-sided thoracic abrasion, symmetric chest rise, bilateral breath sounds and a regular cardiac rhythm. However, due to the mechanism of injury and due to complaints of abdominal pain, the patient underwent contrast enhanced computed tomography (CT) of the thorax, abdomen and pelvis. The CT revealed a Grade IV Splenic injury with active extravasation and a moderate right pleural effusion. The patient was scheduled for emergent splenectomy. On route to the OR, the patient became hemodynamically unstable and ATLS resuscitation was utilized. In the operating room, a right sided chest tube was placed and quickly expressed 500cc of blood. After this initial production, the chest tube output significantly decreased, obviating the need for emergent thoracotomy. An uncomplicated open splenectomy was performed and the patient was admitted to the surgical intensive care unit (SICU). Within minutes of arrival to the SICU, the patient's pupils became dilated and non-reactive, chest tube output rapidly increased to 2000cc and the patient began exhibiting cardiac tamponade physiology. Transthoracic echocardiogram revealed a moderate pericardial effusion with depressed left ventricular function (ejection fraction 40-45%). Head and chest CT demonstrated no intracranial hemorrhage but a moderate pericardial effusion and significant bilateral pleural effusions (Figure 1). The patient's hemodynamic status continued to decline rapidly and he was taken back to the operating room for an exploratory sternotomy in order to evacuate the pericardial effusion and identify the hemorrhagic source(s).

Intra-operatively, a transverse sternal fracture was noted and upon sternotomy, dark clotted blood was found in the pericardium. The blood in the pericardial space was postulated to have entered through a disrupted anterior pericardium as well as from a contused right ventricle, the latter which was no longer bleeding at the time of exploration. After evacuation of the clot, the patient's hemodynamic status improved and attention was focused on continued hemorrhagic sources. Both internal thoracic arteries were identified and were actively bleeding; surgical clips were successfully applied to each artery. Tube thoracostomy was performed on the left side while the patient's sternum was closed with standard horizontal wire fixation and the fracture was fixated with two vertical figure of eight wires. Only upon post-operative attending review of the repeat CT scan was the ITA injury radiographically identified (Figure 2). The patient was re-admitted to the SICU and required post-operative pressor support

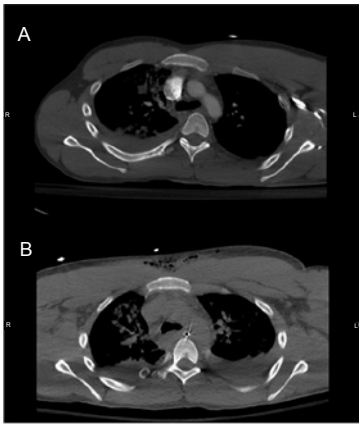

Figure 1: Comparison of the Initial and Repeat Thoracic CT Scans: (A) the initial Emergency Department CT demonstrates a right pleural effusion while (B) a repeat thoracic CT performed after mental status changes and cardiac tamponade physiology, demonstrates bilateral pleural effusions.

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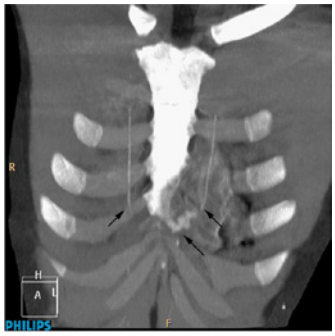

Figure 2: Coronal Reconstruction of the Repeat Thoracic CT Scan: This reconstructed, contrast-enhanced computed tomography of the thorax demonstrates bilateral internal thoracic artery injury with contrast pooling (arrows). (Philips 64 slice scanner 64 x 0.625 detector array, C filter, 3mm thickness by 1.5mm spacing or increment).

for four days. The patient slowly recovered and was discharged to rehabilitation services on post-operative day #34; he is currently without serious sequelae from his significant injuries.

Discussion

In cases of blunt chest trauma, major artery rupture is of critical concern. Aortic injury is generally of primary interest, but the possibility of internal thoracic artery laceration cannot be overlooked. Historically, high-energy blunt mechanisms of injury and the presence of rib and/or sternal fractures are associated with increased likelihood of significant thoracic vascular injury [5]. Even in these circumstances however, internal thoracic artery laceration may not present with immediate symptomology because of shock-induced vasospasm and hypotension [3]. As with our case, ITA injury and intrathoracic bleeding may present only after initial resuscitation and shock reversal. Because of the unpredictable presentation of ITA laceration, early recognition and treatment is challenging.

If clinical suspicion is high, contrast enhanced computed tomography and angiography may be used to successfully identify ITA injury in hemodynamically stable patients. Hemodynamically stable patients may also benefit from angiographic transcatheter embolization to effectively control hemorrhage [4]. However, when patients exhibit hemodynamic *instability*, as in our case, midline exploratory sternotomy is preferred. The goal of operative exploration is to quickly ligate bleeding vessels and restore stability. Additionally, exploration affords the opportunity to remove pericardial clot and further improve hemodynamic status. In conclusion, despite its uncommon nature, hemorrhage due to internal thoracic artery laceration must be considered after high impact blunt chest trauma due to the severe consequences of missing such an injury. If uncovered early, minimally invasive intervention may be utilized; however, delayed symptomatic presentation may prevent such recognition and therefore require definitive surgical ligation.

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Conflict of Interest

No conflicts of interest or financial/material support.

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