

Traumatic thoracic aortic transection after a high-energy trauma

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Abstract

Deceleration trauma resulting in thoracic aortic contained rupture is uncommon and associated with a high prehospital mortality. By reporting this case, the authors aim to report a rare case of blunt thoracic aortic injury and share the correspondent unique imaging before and after it was successfully corrected. After a blunt trauma, an adolescent presented diminished breath sounds on the left hemithorax and gross hematuria. Imaging revealed visceral herniation through a ruptured diaphragm, fracture of four left ribs and a contained aortic rupture located at the aortic isthmus, associated with perivascular hematoma – type IV. The patient was submitted to open descending aorta replacement by a vascular prosthesis and diaphragm laceration was directly sutured. Post-operative radiological reevaluation revealed good resolution of both lesions. This clinical case highlights the importance of considering different types of internal hemorrhage in cases of trauma, particularly life-threatening lesions resulting from blunt trauma.

Keywords

thoracic trauma; aortic transection; hemidiaphragmatic rupture; rhabdomyolysis; acute renal insufficiency

Abbreviations

CT: Computerized tomography; FAST: Focused assessment with sonography in trauma

Introduction

Trauma is the leading cause of death worldwide among individuals aged one to 44 years. It is currently considered one of the main international public health problems, despite the gradual decrease of the mortality rate in developed countries. In 2020, trauma is expected to be the second or third principal cause of death for all age groups. Car accidents are the main cause of trauma and are associated with the high mortality rate in 70% of the 39 developed countries with available data [1].

Deceleration injury resulting in thoracic aortic transection is uncommon and associated with a high prehospital mortality. Less than 25% of patients with blunt thoracic aortic injury survive long enough to

reach a hospital. Of these, nearly half perish in the first 24 hours after admission. Patients with blunt thoracic aortic injury who survive long enough to be submitted to surgery in a cardio-thoracic center, usually have incomplete tears or a pseudoaneurysm [2].

Aortic dissection is the most common acute aortic syndrome, and frequently requires urgent surgery. Radiological evaluation plays an important role in diagnosis and the accurate classification of the type of dissection is important to plan the intervention and optimize the outcome [3].

Case Report

A previously healthy 17-year-old high energy accident victim arrives in the emergency room. He has several traumatic lesions but is hemodynamically stable, presenting with a Glasgow Coma Scale of 15/15. Physical examination reveals decreased vesicular breath sounds on the left hemithorax and gross hematuria. A FAST scan shows left pleural effusion as well as blood surrounding the left kidney, and chest radiography displays left hemidiaphragmatic rupture with stomach herniation and mediastinal enlargement (Figure 1a). To further characterize these findings, a thoracic CT scan is performed, confirming visceral herniation through the ruptured diaphragm and exposing fracture of four left ribs and a contained aortic rupture located at the aortic isthmus, associated with perivascular hematoma – type IV (Figure 1b). In addition, the abdominal CT scan, besides confirming the suspected left renal lesion, revealed subdural rupture of the spleen.

The patient is promptly taken into emergency cardio-thoracic surgery, as endovascular treatment is considered unsuitable due to unfavorable anatomical characteristics. Therefore, the patient is submitted to open descending aorta replacement by a vascular prosthesis. Distal aortic perfusion is maintained by a Gott shunt. Simultaneously, diaphragm laceration is directly sutured. During surgical procedures, inotropic support is required, and the patient is started on noradrenaline for the following 48 hours. Post-operative radiological evaluation confirms successful repair of both lesions (Figures 2a & 2b). He is continuously re-evaluated by echocardiogram, maintaining normal global function and stable stent placement.

In the hours that followed, urine output is rapidly decreasing, resulting in anuria and generalized edema, and increasing in the values of renal function parameters (maximum values of creatinine of 3,15 mg/dL and urea of 77 mg/dL). These findings add to creatinine kinase increase (maximum value of 71.125 U/L) and hyperkalemia (maximum value of 6,7 mEq/L), raising the hypothesis of acute renal insufficiency subsequent to severe rhabdomyolysis and associated with left renal trauma. Hence, the patient is started on continuous venovenous hemodiafiltration and anticoagulation with citrate the day after surgery, with is suspended after 25 days, as laboratorial tests improve and clinical progress is evident, with regression of edema and increased urine output.

Regarding outcome, the adolescent was discharged home after 44 days of hospital admission, without any severe sequelae



Figure 1: Radiology exams on admission



Figure 1a: Chest radiograph on hospital admission

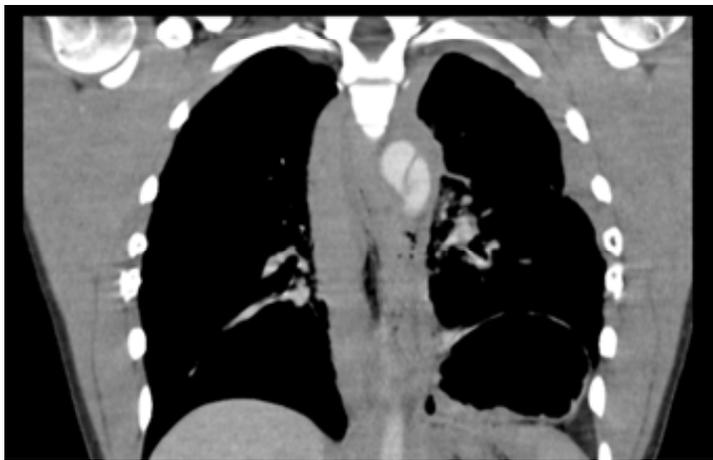


Figure 1b: CT scan images on hospital admission

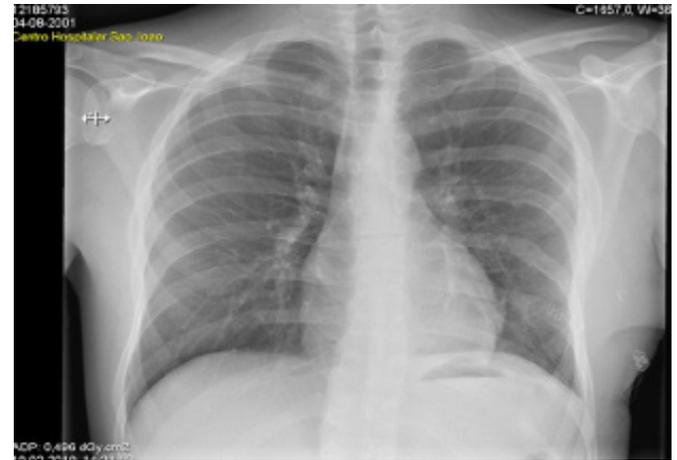


Figure 2: CT Radiology exams after surgery

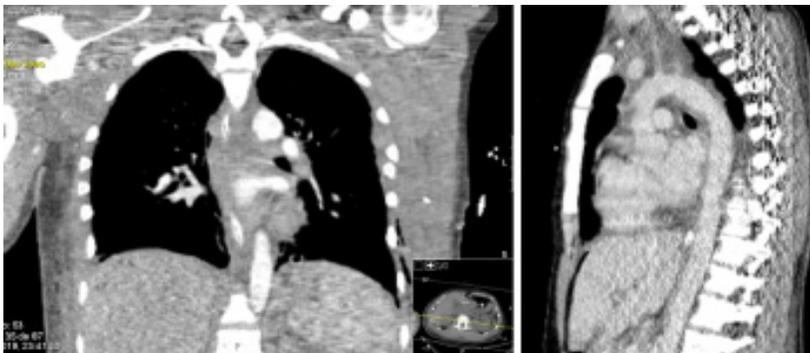


Figure 2a: Chest radiograph after surgical procedure



Figure 2b: CT scan images after surgical procedure

Conclusion

This clinical case highlights the importance of considering internal hemorrhage in cases of trauma, particularly life-threatening lesions resulting from blunt trauma. In this particular case, the patient was hemodynamically stable at all times, which was only possible due to the containment of the hemorrhage to the mediastinum. Furthermore, considering the evolution in this case, it reinforces the relevance of a multidisciplinary team working together to improve the patient's outcome.

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