Case Report

Acute traumatic injury of the thoracic aorta with pseudoaneurysm after blunt chest trauma: Report of two cases

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ABSTRACT

Acute injury to the thoracic aorta is a life-threatening and can lead to various types of aortic injury including the formation of false aneurysm or pseudoaneurysm. We report two cases of acute traumatic aortic injury after motor vehicle accidents. One case had a saccular pseudoaneurysm and another case had complex aortic injury with pseudoaneurysms. We review the chest radiograph and CT scan findings. (Rawal Med J 2012;37:211-213).

Keywords

Pseudoaneurysm, acute traumatic aortic injury, aortic isthmus.
INTRODUCTION

Penetrating and blunt trauma to the thoracic cage can cause injury to the thoracic aorta.\textsuperscript{1} Since the era of high-speed vehicles, motor vehicle accident accounts for most cases of acute traumatic aortic injury (ATAI). ATAI has high morbidity and mortality with approximately 80\% to 90\% cases being immediately fatal.\textsuperscript{2}

CASE 1

A 17 year-old motorcyclist allegedly hit his head with a car. He developed mild anterior chest and upper abdominal pain. There was no shortness of breath. On arrival at the Emergency Department, he was fully alert and conscious. The blood pressure and heart rate were 130/80mmHg and 85 beats per minute, respectively. There was mild tenderness at the sternum; however, there was no clinical evidence of rib and sternum fractures. The abdomen was soft, non-tender and had no bruises.

\textbf{Fig. 1a and 1b.} Chest radiograph (a) revealed widening of the mediastinum and obliteration of the aortic knuckle (arrow). Chest radiograph (b) was taken four hours later showed obliteration of the aortic knuckle (arrow) with thickened left paratracheal stripe (short arrow).
He had an ultrasound (US) examination of the abdomen and there was no haemoperitoneum and the solid organs were normal. Bilateral pleura effusions were observed. His chest radiograph showed widening of the left superior mediastinum, indistinctness of the aortic knuckle, thickened left paratracheal stripe and absence of a definable aortopulmonary window [Figure 1].

**Fig. 2a and 2b. Axial CT images indicated intimal tear at the (a) superior (arrow) and (b) inferior (arrow) aspects of the false aneurysm.**

The ribs and clavicles were intact. He was suspected to have ATAI and was subjected for contrast enhanced Computed Tomography (CT) scan of the thorax. The CT scan showed a saccular aneurysm arising from the anteromedial aspect of the proximal descending thoracic aorta immediately distal to the left subclavian artery [Figures 2, 3].
Fig. 3a and 3b. Oblique sagittal reformatted image (a) and sagittal volume rendered image (b) showed a saccular aneurysm of descending thoracic aorta (arrow) and its relation to the left subclavian artery (short arrow).

The aneurysm measured 2.52cm x 1.13cm. There was no active extravasation of contrast. There were also periaortic hematoma, bilateral hemothorax and segmental collapse of lower lobes of both lungs.

CASE 2

A 23 year-old car driver had his chest hit on the steering and developed shortness of breath and chest pain. On arrival at the Emergency Department, he was tachycardic and tachypneic. He had tenderness on both sides of the chest with clinical examination suggestive of right pneumothorax. The abdomen was soft and no clinical evidence of abdominal injury.
Fig 4. Chest radiograph showed indistinctness of the aortic knuckle (arrow) with left side haemothorax and generalised subcutaneous emphysema.

A chest radiograph was done after the insertion of right chest tube which showed pneumomediastinum, bilateral subcutaneous emphysema and right pneumothorax. The margin of the aortic knuckle was indistinct with evidence of left hemothorax and posterior 5\textsuperscript{th} rib fracture [Figure 4]. The CT scan of the thorax showed pneumomediastinum resulting from trachea perforation (not shown), residual right pneumothorax, subcutaneous emphysema and left hemothorax. There was a complex aortic injury with medial and lateral aneurysms distal to the left subclavian artery [Figure 5]. They measured 2.20cm x 1.59cm and 1.05cm x 0.51cm respectively.
Fig 5a and 5b. Axial CT image (a) showed complex aortic injury with large aneurysm on the right (arrow) and small aneurysm on the left (short arrow). (b) Oblique volume rendered images of the large (arrow) and small (short arrow) aneurysms and their relation to the left subclavian artery (dashed arrow).

Both patients were referred and managed by vascular and interventional unit in another hospital. They had endovascular stent grafting and recovered.

DISCUSSION

Among the survivors of ATAI, 2% to 5% developed pseudoaneurysm. The blood accumulates between the intima and two outer layers, media and adventitia, to form pseudoaneurysm. There are several suggested combination of mechanisms of ATAI such as shearing forces, hydrostatic forces and rapid acceleration and deceleration of the thoracic cage. In osseous pinch mechanism, the thoracic aorta receives direct or indirect compression from the bony structures of thoracic wall.
Parmley et al classified thoracic aorta injuries into intimal hemorrhage, intimal hemorrhage with laceration, medial laceration, complete laceration of the aorta, pseudoaneurysm, and periaortic hemorrhage. Most of the injuries involved the aortic isthmus at the region of ligamentum arteriosum within two cm from the origin of the left subclavian artery where the aorta is relatively immobile. The pseudoaneurysms are mostly situated at the medial side of the thoracic aorta with ventral extension.

Chest radiograph is the initial radiological investigation in chest trauma and 7% could be normal in thoracic injury. The abnormalities are related to the mediastinum, which includes obliteration of the aortopulmonary window, downward displacement of the left main stem bronchus, deviation of the trachea to the right of midline and presence of left apical pleura cap. Mediastinal width of more than 8 cm at the aortic arch is the most worrying finding and needs further imaging. The chest radiograph could help to identify emergency situations such as haemothorax and pneumothorax. However, it should not be used to exclude or confirm thoracic injury. Multidetector CT scan is a noninvasive procedure and able to diagnose aortic injury, is faster, able to produce multiplanar reformatted and volume rendered images for better assessment of the vessels and aneurysm. In summary, ATAI is a fatal condition of chest trauma and can lead to the formation of pseudoaneurysm. The chest radiograph should be scrutinized and CT scan of the thorax is performed for suspicious case of thoracic aortic injury.

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