

ED QUICK QUIZ

WHAT IS THE DIAGNOSIS?

BACKGROUND

A 30yo male is brought to the ED by the SAS after a high-speed RTA. He was the restrained driver of a car that skidded out of control and hit a tree head-on at approximately 60 mph. He was conscious at the scene but required extrication from his vehicle.

In the ED he is complaining of severe chest pain that radiates to his back and shortness of breath.

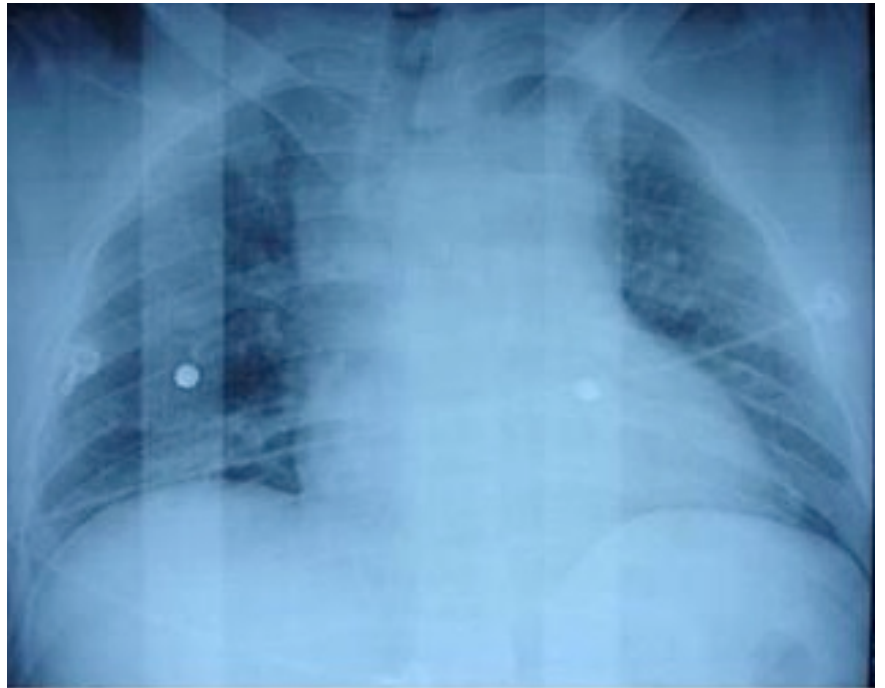
On examination: he is in moderate distress secondary to the chest pain with abrasions and bruising over the sternum, which is tender to palpation.

HR 84 bpm, BP 124/67, RR 16 breaths per minute.

He has superficial abrasions on his face and scalp (GCS15, PEARL, intact dentition).

Chest, abdomen and limbs otherwise NAD.

This CXR was obtained in Resus.



QUESTIONS

1. What features of the story give rise to concern?
2. What is the abnormality on the CXR, and gives rise to what possible diagnosis.
3. What further investigation should be obtained?

ANSWERS & DISCUSSION

1. Concerning Features

The speed, frontal impact and the extrication/entrapment are concerning. In real life such a mechanism would have triggered an ED standby call allowing trauma team activation. Other worrying features in a RTA are rollover, ejection from vehicle and death of an occupant.

2. Diagnosis

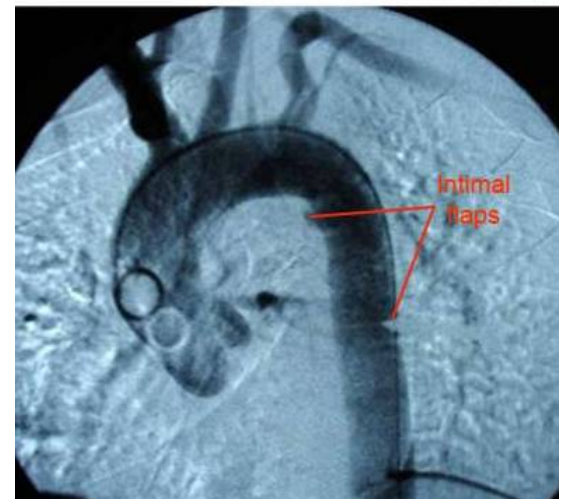
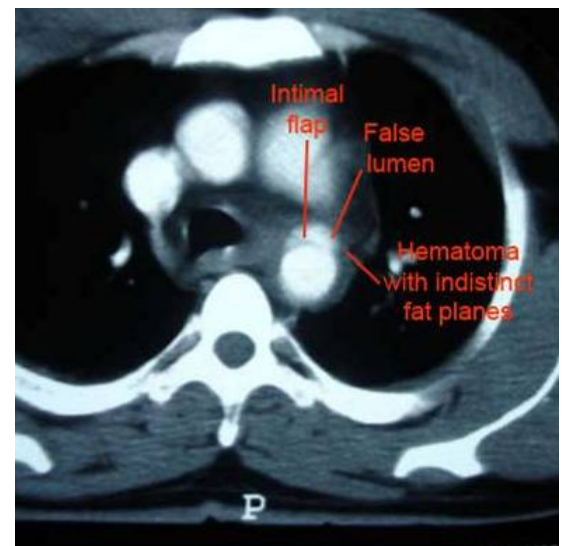
The portable chest radiograph demonstrates a widened mediastinum with an irregular aortic contour. This raises the suspicion of **Acute Traumatic Aortic Injury (ATAI)**. Other CXR findings suggestive of an ATAI may include

- mediastinal widening
- an indistinct aortic knob
- abnormal aortic contour
- rightward displacement of trachea or NG tube
- inferior displacement of the left mainstem bronchus
- a left apical pleural cap (deathcap)
- fractures of the first or second rib
- pneumothorax
- pulmonary contusion.

However, many of the CXR findings result from associated mediastinal haemorrhage and haematoma formation and are not from the aortic injury itself.

3. Further Investigations

In this case a CT Scan of the chest was obtained. However, given the mechanism of injury nowadays a pan CT would (should) have been obtained. Because of the CT findings, an aortogram was obtained. The chest CT and arteriographic results established the diagnosis of ATAI with pseudoaneurysm formation.



ATAI most commonly results from a clinically significant deceleration injury, such as a fall from extreme height or high-speed motor vehicle collision. The mechanism of injury involves a combination of shearing and torsional forces, which occur where the course of the aorta is fixed. The most common site of injury (85%) is the aortic isthmus, where the ligamentum arteriosum (remnant of the fetal ductus arteriosus) attaches the left pulmonary artery to the inferior surface of the aortic arch. Other sites of injury include the ascending aorta and aortic root (where it is fixed at the valve plane) and at the diaphragmatic hiatus.

By some estimates, as many as 15% of deaths from motor vehicle accidents are due to injury to the thoracic aorta, and only 10-20% of patients with ATAI survive the initial trauma because of a high rate of exsanguination due to hemodynamically unstable injuries and aortic transection. Among survivors, the untreated mortality rate is high: approximately 80% in 1 hour, 85% in 24 hours, and 98% within 3 months. In addition, patients with untreated ATAI who survive may develop chronic pseudoaneurysm.

Aortography can be useful when the chest CT results are nondiagnostic though the index of suspicion is high or when the CT scans fail to completely demonstrate or help in characterizing the injury. However, with new-generation multidetector-row helical CT scanners, aortography is performed less frequently. The aortic angiogram may show subtle intimal tears, complete transection, traumatic aneurysms, dissection, and coarctation. As many as 20% of patients have multiple injuries, and the arch vessels should be evaluated carefully because they are commonly injured. A ductus diverticulum, likely the remnant of the ductus arteriosus, is found in approximately 10% of the population and is characterized as a smooth anteromedial bulge at the aortic isthmus that lacks intimal irregularity and that has a normal washout of contrast material. This normal anatomic variant should not be confused with an aortic injury.

Treatment for ATAI depends on severity of injury and the stability of the patient's condition. Most contained injuries can be managed on a semi-elective basis. Other life-threatening injuries (eg, severe head injury, haemorrhage from other organs [eg, liver spleen], extensive

burns, coagulopathy, acidosis, hypothermia) should be treated as a priority. The aim of ATAI management in patients with these conditions is often reduce the risk of rupture by aggressively controlling their systolic blood pressure.

Surgical repair is indicated when patients are haemodynamically unstable, when they have evidence of penetrating aortic injury, or when images show extravasation of contrast material or a rapidly expanding hematoma. Endovascular repair with stent placement may be used in patients who are haemodynamically stable, in those with other co-morbidities that exclude them as candidates for operative repair, or in those with multiple injuries.