Traumatic rupture of the thoracic aorta diagnosed by transoesophageal echocardiography

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Abstract
Transoesophageal echocardiography is a safe and rapid means of obtaining anatomical and dynamic information about the descending aorta. It was used to confirm a suspected diagnosis of ruptured descending aorta.

Traumatic rupture of the thoracic aorta is a common cause of death in vehicle deceleration injuries. A high index of suspicion, prompt diagnosis, and early surgical repair is crucial for a successful outcome. The method of choice for diagnosis is aortography. The use of transoesophageal echocardiography (TOE) is a safe, non-invasive, and rapidly performed investigation for imaging of the thoracic aorta, highlighting detail of anatomy and physiology.

We describe a case of traumatic rupture of the descending thoracic aorta diagnosed by TOE and confirmed by aortography, that was successfully repaired by surgery.

Case report
A 23 year old woman sustained a deceleration injury, while wearing a seatbelt, in the back seat of a car that collided head on with a bus. On arrival in the casualty department, she was disorientated and aggressive. Her pulse was 88 beats/min, blood pressure 120/80 mm Hg, and there were no abnormalities on cardiac examination. She was tender over the right lateral thorax, with dullness to percussion and reduced air entry over the right base. There was generalised abdominal tenderness but no guarding and bowel sounds were present. Apart from slight disorientation, there was no neurological abnormality. A 12 lead electrocardiogram showed widespread T wave inversion. A chest x ray film showed a right haemopneumothorax and a suggestion of widening of the mediastinum. Because of the clinical suspicion of aortic rupture and the potential of colour flow Doppler to provide dynamic information regarding aortic flow at the site of trauma, TOE was performed. This was done with a Hewlett-Packard 77020 phased array scanner with a 5 MHz transducer. Figure 1 shows the TOE images. There was intimal disruption at the level of the aortic isthmus with deformity of the anteromedial aortic wall and colour flow Doppler indicated flow into an abnormal echo free space site, highly suggestive of traumatic aortic dissection. As these appearances were so unusual and previously undescribed, and because the patient's condition remained stable, she underwent aortography, which confirmed the findings of the TOE (fig 2).

The patient was taken to theatre where she underwent surgical repair. A high left lateral thoracotomy was performed. The aorta was clamped between the left common carotid and left subclavian arteries and again in the mid-descending aorta. The left subclavian
Figure 2  Digital subtraction angiogram of the arch and descending aorta showing the localised rupture of the anteromedial wall of the descending aorta at the level of the isthmus.

artery was separately clamped. A 7 mm heparin coated Gott shunt was inserted from the ascending aorta to the descending aorta below the distal clamp. The adventitia overlying the isthmus of the aorta was raised and a rupture confirmed just below the ligamentum arteriosum on the anteromedial aspect of the aorta. The aortic ends were mobilised and trimmed, and an end to end anastomosis was performed. She made an uncomplicated recovery.

Discussion
Injury of the thoracic aorta causes 10–20% deaths attributed to car accidents.9 It is thought that about 10-15% of patients who have aortic injury survive the initial insult but most die within 24 hours. In a previously reported series of traumatic aortic ruptures, of the patients that reached hospital, 39% of patients died either because the diagnosis was unsuspected or because complete rupture occurred before surgical intervention could be undertaken.1 That paper highlighted the need for a high degree of suspicion of aortic trauma in seatbelt injuries, and stated that delay in diagnosis seriously affected outcome. Clues to the diagnosis are a reduction of femoral pulses in comparison with the upper limbs, widening of the mediastinum, depression of the left main bronchus on chest x ray film, and deviation of the oesophagus as shown by a radio-opaque nasogastric tube.6 Aortic injury can still be present, however, in the absence of these signs. Therefore, the need for a non-invasive and rapid means of assessment is of importance.

Most of these injuries occur at the aortic isthmus distal to the origin of the left subclavian artery but they can occasionally occur at the aortic arch or distal thoracic aorta. All of these areas are readily examined by TOE. Magnetic resonance imaging also provides excellent images of the arch and descending aorta, but immediate availability and time delay limits its usefulness under these clinical circumstances.7

Though aortography is regarded as the best investigation, it can be associated with a significant organisational delay and is not without risk. TOE can quickly establish the diagnosis and extent of aortic injury in the accident department, and our case confirms that it is a safe means for high quality imaging of the thoracic aorta. Because few patients survive these sorts of injuries a meaningful trial of the various modes of imaging is unlikely to be practical. We suggest, however, that suspicion of aortic injury after road traffic accidents can be readily confirmed by TOE, and that, with increasing experience, the use of this imaging mode will reduce delay in making the diagnosis and eliminate the need for aortography.

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