Background

Blunt aortic injuries (BAI) are a significant cause of mortality and morbidity in trauma patients. BAI is the second most common cause of pre-hospital death with up to 80% of patients dying.\(^1\),\(^2\) Almost half of patients with aortic disruption have no external signs of chest trauma and because of the variable presentation there needs to be a high index of suspicion when assessing patients based on mechanism of injury and imaging results.

The Royal Melbourne Hospital treated 37 patients with a diagnosis of a BAI from 2010-18. Of those 48% underwent angioembolisation +/- aortic stent graft with 1 patient having open procedure. The median length of stay was 12 days, average ISS 36 (range 17-75) and the mortality rate was 12%.\(^3\)

Mechanism of Injury

It is widely accepted that BAI’s are most commonly associated with high energy mechanisms with rapid deceleration of the thorax causing shearing and compression forces on the transition zone between the fixed and more mobile aorta, most commonly at the aortic isthmus.\(^1\),\(^4\)

These high energy mechanisms include:
- motor vehicle/ cycle crashes
- pedestrian versus motorised vehicle
- high falls
- thoracic crush injuries.

RMH’s major mechanisms of injury related to BAI from 2010-2018 MVC (45%), MBC (24%), pedestrians (12%) and high falls (9%).\(^3\)

Decision making in BAI

Clinical symptoms of BAI are rarely present and diagnosis must be based on a high index of suspicion from the mechanism of injury, associated injuries and imaging studies.\(^1\),\(^4\)

Clinical signs and symptoms may include:
- Chest pain and/or shortness of breath
- Intrascapular pain
- Seatbelt bruises or abrasions
- Chest wall bruising, rib or sternal fractures, however there is no correlation between skeletal injury and BAI
- Pseudocoarctation on exam (defined as elevated BP in upper extremities and low BP in lower extremities
- Aortic insufficiency, murmur on cardiac auscultation.

Chest X-ray

Plain chest XRay is neither highly specific nor highly sensitive for the diagnosis of blunt aortic injury. Patients with aortic injury are often found to have a normal CXR.

For this reason, any patient with suspicious findings on CXR or those injured by significant deceleration or acceleration mechanism should undergo further assessment.

Chest x-ray findings that may indicate a BAI include:
- Widened mediastinum > 8cm
- Obscured aortic knob
- Deviation of the left main stem bronchus or nasogastric tube
- Opacification of the aorta pulmonary window
- Large L) haemothorax
- Deviation of trachea rightward
CT scan

CT angiography of the chest with intravenous contrast is the initial investigation of choice for BAI. It is readily available, minimally invasive, and rapid and has the ability to identify other injuries. For the diagnosis of BAI it is 100% sensitive, 99.7% specific and has a negative predictive value of 99.7%. 1, 5, 6

Classification of Injury

The most common site of BAI is the peri-isthmic region and left subclavian artery. 1 This can result in a Grade 1-4 classification of injury. 7, 8

- Grade 1- Intimal tear or localized haematoma
- Grade 2- Intramural hematoma/large intimal flap
- Grade 3- Pseudo aneurysm

Grade 4- Rupture or complete section. If an aortic injury has been diagnosed, a referral to the Vascular surgery unit for a management plan is advised.

References

Patient presents with blunt chest trauma

Has the patient been in a high risk incident?
- MVC >60 km
- Motorcycle
- Fall > 3 Meters
- MVC vs Ped >30 km/Hr
- Severe crush injuries to the chest

Has the patient been in a high risk incident?

Clinical signs and symptoms of BAI
- Chest pain and/or shortness of breath
- Intrascapular pain
- Seatbelt bruises or abrasions
- Chest wall bruising, rib or sternal fractures
- Pseudocoarctation on exam
- Aortic insufficiency, murmur on cardiac auscultation

CTA Chest

Do they have clinical signs and symptoms of BAI?

CTA results normal?

Yes

Urgent referral to Vascular Surgery

No

CLINICAL SIGNS AND SYMPTOMS OF BAI

Yes

Cleared of aortic injury

No