TRAUMA SERVICE GUIDELINES

Title:	**Blunt Aortic Injury**
Developed By:	**K. Gumm P. Antippa, J. Miller, M. Van Den Driesen, P. Page, R. Judson**
Created:	**Version 1.0 April 2005**
Revised By:	**Version 4.0 December 2019 , V3.0 April 2013, V2.0 December 2007**
Revised:	**K. Gumm, B. Thomson, D. Pascoe, A. Cocco, G. Plunkett , T. Wagner, K. Liersch**

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]

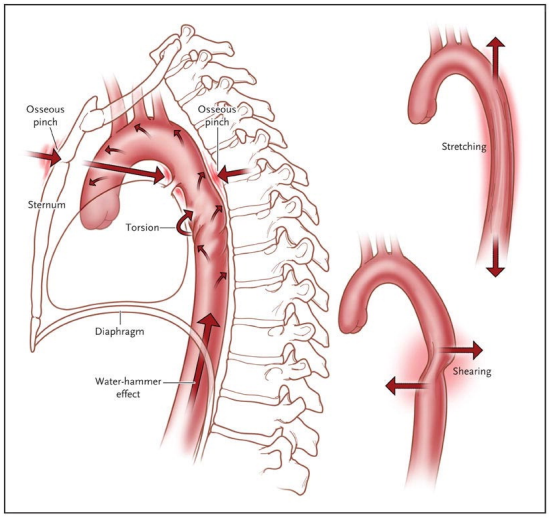
Mechanism of Injury

It is widely accepted that BAI's are most commonly associated with high energy mechanisms with rapid deceleration of the thorax causing sheering and compression forces on the transition zone between the fixed and more mobile aorta, most commonly at the artic 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]



Source: www.nejm.org/doi/full/10.1056/NEJMr0706159

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

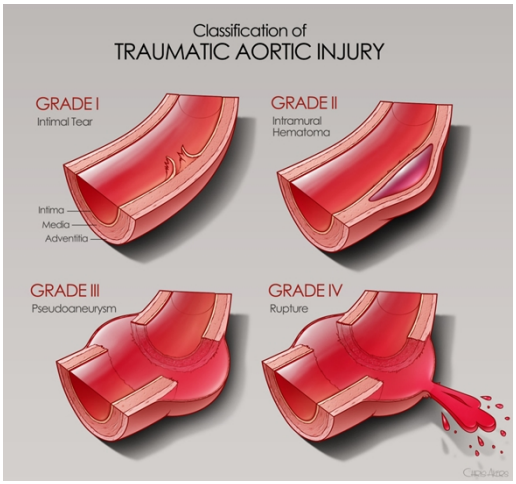
CT angiography of the chest with intravenous contrast is the initial investigation of choice for BAI. It is readily available, minimally invasive, and rapid and has the ability to identify other injuries. For the diagnosis of BAI it is 100% sensitive, 99.7% specific and has a negative predictive value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



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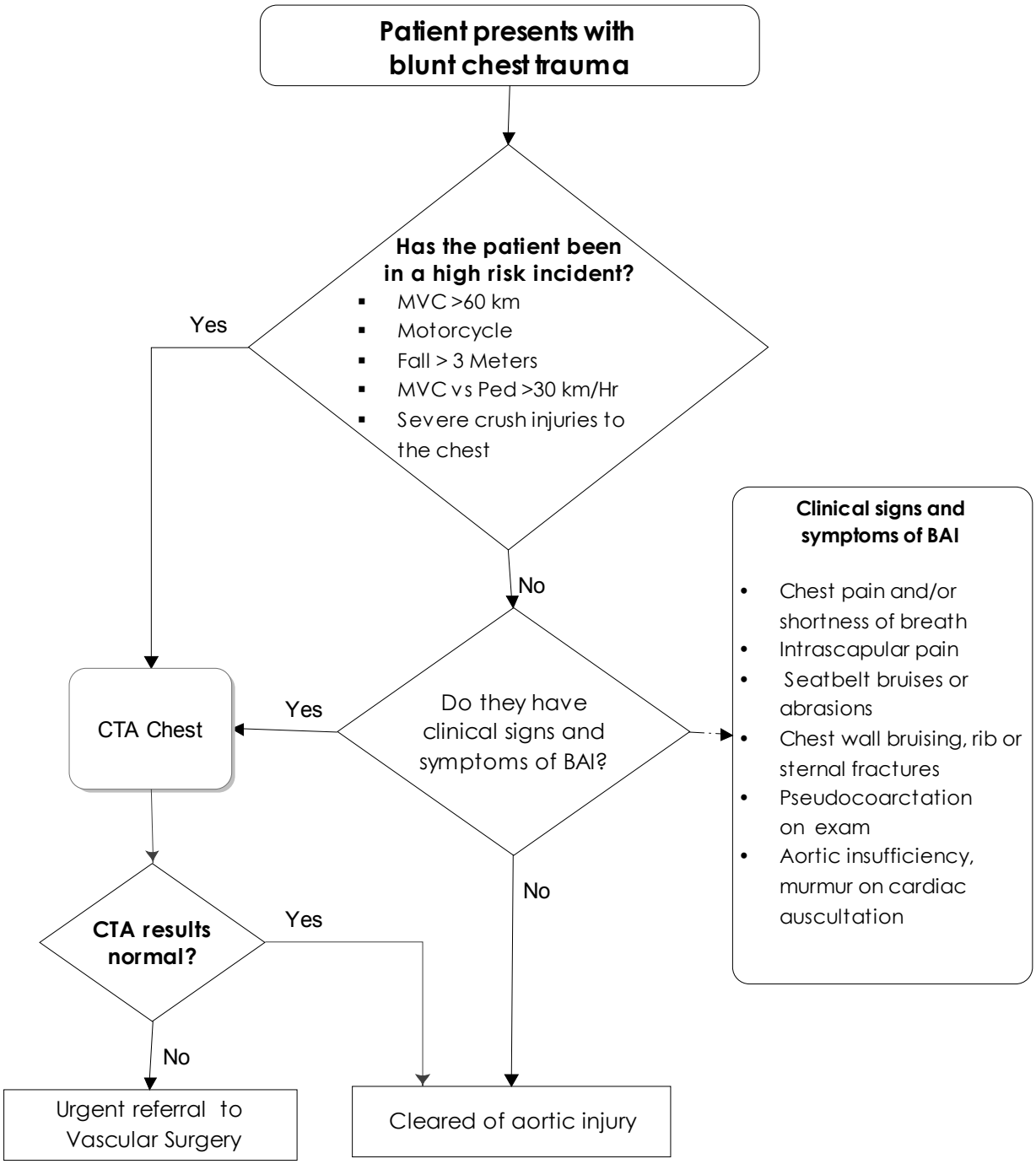
References

1. Fox N, Schwartz D, Salazar J, et al. Evaluation and Management of Blunt Traumatic Aortic Injury: A Practice Management Guideline from the Eastern Association for the Surgery of Trauma. *Journal of Acute Care Surgery.* 2015;74(1):136-146.
2. Rodriguez R, Hendey G, Mower W. Selective chest imaging for blunt trauma patients: The national emergency x-ray utilization studies (NEXUS-chest algorithm). *American Journal of Emergency Medicine.* 2017;35(1):164-170.
3. Santos R. *Trauma Registry Data Report Aortic Injuries at The Royal Melbourne Hospital 2010-2018.* Melbourne: The Royal Melbourne Hospital; October 2019.
4. Rodrigues R, Anglin D, Langdorf M, et al. NEXUS Chest Validation of a Decicion Instrumentt for Selective Chest Imaging in Blunt Trauma *Journal of American Association of Surgery.* 7th August 2013;148(10):940-946.
5. O'Connor J. Blunt Aortic Injury. *Trauma.* 24th June 2015;17(4):1-4.
6. Eghbalzadeh K, Sabashnikov A, Zeriouh M, et al. Blunt chest trauma: a clinical chameleon. *Heart.* 2018;104(9):719-724.
7. Starnes BWL, R; Gunn, M; Quade, S, Hatsukami, T; Tran, N; Nahush, M, Aldea, G. A new classfication scheme for treating blunt aortic injury. *Journal Vascular Surgery.* 2012;55:47-54.
8. Mokrane F, Revel-Mouroz P, Saint Lebes B, Rousseau H. Traumatic injuries of the thoracic aorta: The role of imaging in diagnosis and treatment. *Diagnostic and Interventional Imaging.* June 2015(96):693-706.


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
Yes
No
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
Do they have clinical signs and symptoms of BAI?
Yes
CTA Chest
CTA results normal?
Yes
No
No
Urgent referral to Vascular Surgery
Cleared of aortic injury