Vessel Tearing Car Accidents

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Introduction

Blunt aortic trauma typically occurs in the setting of aggressive deceleration forces, often in relation to a motor vehicle collision. The mechanism of injury is related to mechanical stress at the junction between the mobile and fixed portion of the aorta near the isthmus. This type of injury is relatively rare in the pediatric population as compared to the adult population with the incidence of 16% vs 1% respectively. Swift diagnosis and management is necessary to avoid devastating consequences.

Case Report

7 year old otherwise health boy presented to the ED after a motor vehicle accident. The patient was an unrestrained passenger, and was ejected from the vehicle during the collision. On arrival he had a glasgow coma scale of 9, and showed signs of respiratory distress. His respiratory status quickly decline and a rapid sequence induction and intubation was performed. Initial lab work was significant for hemoglobin of 9.9, hematocrit 28.8, pH of 7.199, PCO2 of 41.4, PO2 of 35, and HCO3- of 16.2.

Chest x-ray showed left pleural effusion, rightward shift of the mediastinum and mild widening of the superior mediastinum. CTA confirmed the x-ray findings and also demonstrated an aortic arch injury with evidence of pseudoaneurysm at the level of the isthmus consistent with aortic transection. Multiple other thoracic injuries including bilateral pulmonary contusions, left rib fractures, and sternal manubrial buckle fracture. No cervical spine, lumbar spine, or abdominal injuries were found.

The patient was emergently brought to the OR for further management. Central intravenous access was established and a radial arterial line was placed. Anesthesia was induced with sevoflurane. An 18Fr left sided chest tube was placed and 450cc of frank blood was drained. After which the patient became acutely hypotensive and massive transfusion protocol was started. At this time, the patient was placed in the right decubitus position and a left sided thoracotomy was created. A 3mm defect was found in the proximal aorta and the surgical staff gained

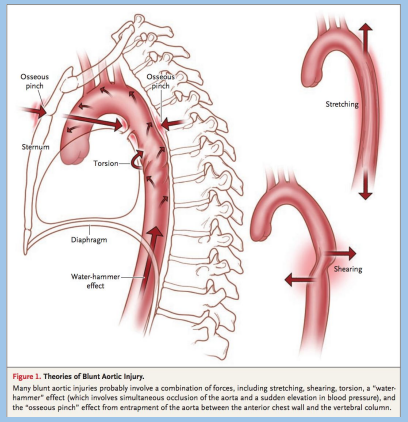

Figure 1. Theories of Blunt Aortic Injury.
Many blunt aortic injuries probably involve a combination of forces, including stretching, shearing, torsion, a "water-hammer" effect (which involves simultaneous occlusion of the aorta and a sudden elevation in blood pressure), and the "osseous pinch" effect from entrapment of the aorta between the anterior chest wall and the vertebral column.

Case Report Continued

control of the bleeding with an external clamp. The patient was then transferred to a hybrid surgical suit for planned thoracic endovascular repair. The patient was positioned supine and right femoral access was obtained. Graft was successfully placed via iliac stent. No extravasation was seen on aortogram.

The patient was transferred intubated to the PICU. He was extubated on POD 2. He was transferred to the floor on POD 4 and discharged home on POD 9.

Discussion

- Gold standard of diagnosis is CTA. However, transesophageal echocardiography (TEE) is increasingly being utilized.
- Recent studies and EAST guidelines recommend endovascular repair of aortic trauma in adults.
- Only case reports of endovascular repairs of blunt aortic exist in pediatric populations.
- Anesthetic consideration include:
  - Adequate analgesia
  - Hemodynamic goals:
    - BP of 90-100 mmHg (ideally measured in both upper extremity)
    - HR <100 bpm
  - Availability of a large volume of blood products is critical.
  - Consideration of other comorbid injury and their implications:
    - Pulmonary contusions and resultant hypoxia
    - Ribs fractures, pneumothorax, hemothorax
    - Intracranial injury and risk of significant intracranial bleeding with systemic anticoagulation need during the procedure.
    - Abdominal injury and risk of further exacerbation secondary to increased bleed, and significant contrast load.

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