Case 15109

Traumatic adrenal haemorrhage
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Section: Interventional radiology
Area of Interest: Adrenals Trauma Vascular
Procedure: Diagnostic procedure
Procedure: Embolisation
Imaging Technique: CT
Imaging Technique: Catheter arteriography
Special Focus: Trauma Case Type: Clinical Cases
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Patient: 21 years, male

Clinical History:
A 21-year-old male presenting as a level-1 trauma after being ejected from a motor vehicle during a collision. Physical exam performed in the emergency department revealed tenderness of the right lateral chest wall, pain with inspiration, and thoracolumbar spine tenderness. FAST exam was negative.

Imaging Findings:
Contrast-enhanced CT demonstrates a moderate to large right adrenal haematoma with evidence of active bleeding (Fig 1). A complex laceration of the liver was also identified, but did not show evidence of active bleeding (Fig 2). Patient was transferred to the interventional radiology suite for emergent embolisation for his acute adrenal haemorrhage. Aortography and selective arteriograms revealed contrast extravasation in the superior adrenal arteries originating from the inferior phrenic artery (Fig 3). Intravascular coils were deployed and postintervention arteriogram demonstrated resolution of haemorrhage (Fig 4). The middle and inferior adrenal arteries which originate from the aorta and renal arteries did not demonstrate active contrast extravasation (Figs 5 and 6).

Discussion:
Background:
Adrenal haemorrhage following blunt abdominal trauma is relatively rare, occurring in only 0.15 – 4% of cases [1]. An estimated 75-90% of cases are unilateral and most commonly affect the right adrenal gland [1]. Three theories of the mechanism of haemorrhage predominate: (1) IVC compression leading to a rapid increase in venous pressure, (2) adrenal crushing between the spine and the liver or spleen, and (3) shearing forces on the microvasculature within the adrenal during deceleration [2]. The first theory best correlates the incidental preference for the right adrenal over the left.

The blood supply to the adrenal glands originates from the inferior phrenic artery, the abdominal aorta and the renal artery; these provide the superior, middle and inferior adrenal arteries, respectively [1]. The right adrenal vein drains
directly into the the inferior vena cava whereas the left adrenal vein drains into the left renal vein [1].

Clinical Perspective:
The initial presentation of adrenal haemorrhage is generally non-specific abdominal pain but may include hypotension, hypertension, altered mental status, fever, and nausea among other symptoms [3]. Associated injuries are very common and frequently involve the liver, ribs, spleen and kidneys [3].

Imaging Perspective:
While ultrasound may detect some adrenal haemorrhages, CT is the preferred modality. On CT, haemorrhage frequently presents with a round or oval haematoma but may also reveal unilateral enlargement of an adrenal gland with hazy margins or fat stranding [2].

Outcome:
Therapy is dictated by haemorrhage severity and associated injuries. For minor haemorrhages with associated injuries not requiring operative intervention, pain control and avoidance of increased intra-abdominal pressure may be adequate [3]. If haemorrhage is more severe, transarterial embolisation may be attempted [4]. Infarction resulting from embolisation is unlikely given the triple arterial supply of the gland [4]. Open repair remains the final option, particularly if associated injuries indicate surgical intervention. Mortality from adrenal haemorrhage ranges from 10–33% [2]. While bilateral adrenal haemorrhage does present a risk of adrenal insufficiency, unilateral haemorrhage does not appear to confer the same risk. Our patient underwent transarterial embolisation of multiple superior pole branches originating from the right inferior phrenic artery using detachable microcoils and was discharged three days later.

Differential Diagnosis List: Traumatic adrenal haemorrhage, Haemorrhage secondary to adrenal myelolipoma, Adrenal neoplasm, Adrenal incidentaloma

Final Diagnosis: Traumatic adrenal haemorrhage

References:
Description: Axial CT image demonstrates a moderate to large right adrenal haematoma with areas of active arterial bleeding. Origin: Department of Radiology and Imaging, Augusta University Medical Center, Augusta, GA
Figure 2

**Description:** Coronal CT image demonstrates traumatic right adrenal haematoma and complex laceration of the liver. The liver did not show evidence of active arterial bleeding. **Origin:** Department of Radiology and Imaging, Augusta University Medical Center, Augusta, GA
Figure 3

Description: Selective arteriogram of the right inferior phrenic artery revealed active haemorrhage of the right superior adrenal arteries. Origin: Department of Radiology and Imaging, Augusta University Medical Center, Augusta, GA
Description: Intravascular embolisation coils were deployed in the right inferior phrenic artery. Postembolisation arteriogram demonstrates complete resolution of the haemorrhage of the right superior adrenal arteries. 

Origin: Department of Radiology and Imaging, Augusta University Medical Center, Augusta, GA
Description: The middle adrenal artery typically originates from the lateral aspect of the aorta but is too small in caliber to be seen on this aortogram. Origin: Department of Radiology and Imaging, Augusta University Medical Center, Augusta, GA
Description: The inferior adrenal arteries are seen arising from the adjacent renal artery and do not demonstrate active haemorrhage. Origin: Department of Radiology and Imaging, Augusta University Medical Center, Augusta, GA