



## TEST YOUR KNOWLEDGE: Radiology quiz

# Flank pain and haematuria

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A 19 year old male presented with right flank pain and macroscopic haematuria after blunt trauma while playing Australian Rules football.

### Question 1

**What is the most appropriate form of imaging?**

- A. intravenous urogram (IVU)
- B. ultrasound (US)
- C. computerised tomography (CT)
- D. retrograde pyelogram.

### Question 2

**What category renal injury is demonstrated here (Table 1)?**

- A. category I
- B. category II
- C. category III
- D. category IV.

### Question 3

**Imaging is usually NOT required in the setting of trauma when there is:**

- A. blunt trauma and gross haematuria
- B. microscopic haematuria and hypotension
- C. child with microscopic haematuria
- D. adult with microscopic haematuria and normal blood pressure.

### Table 1. Radiological classification of renal injuries<sup>1</sup>

#### Category I

Minor injury (renal contusion, intrarenal and subcapsular haematoma, minor laceration with limited perinephric haematoma and without extension to the collecting system or medulla, small subsegmental cortical infarct). These constitute 75–85% of all renal injuries and are generally managed conservatively.

#### Category II

Major injury (major renal laceration through the cortex extending to the medulla or collecting system with or without urine extravasation, segmental renal infarct). Approximately 10% of renal injuries lie in this category and management varies from conservative to surgical exploration.

#### Category III

Catastrophic injury (multiple renal lacerations, vascular injury involving the renal pedicle). Generally require surgical exploration and often nephrectomy and account for about 5% of renal trauma.

#### Category IV

Ureteropelvic junction injury (avulsion [complete transection], laceration [incomplete tear]). Rare injury and often a result of rapid deceleration. Absence of haematuria in 30% of patients. May be treated by surgical repair, stenting or conservative measures.

## Answers

### 1. Answer C

CT has proven more sensitive and specific than IVU for the evaluation of renal trauma and has become the modality of choice for assessing renal injuries. IVU is used only for gross assessment of renal function in unstable patients and is rarely applied today. US can be used to assess for haemoperitoneum or urinary extravasation but is less useful in defining renal injuries. Retrograde pyelogram may be useful in assessing for pelvic or ureteric rupture but is more invasive and the same information may be available from CT. Renal angiography and venography may give information on vascular rupture or injury but is also more invasive with similar information sometimes provided by CT.

CT can provide accurate delineation of parenchymal damage and fragmentation as well as demonstrating collecting

system rupture and vascular anatomy and any devascularised segments. It readily demonstrates presence, size and location of haematoma as well as urinary extravasation. Most importantly CT helps to differentiate trivial injuries which can be treated conservatively from those which need intervention.

### 2. Answer A

Pre- and post-intravenous contrast enhanced CT scans (Figure 1, 2) demonstrate a small parenchymal laceration at the lower pole of the right kidney. There is a small amount of perinephric haematoma as evident by the relatively increased density material adjacent to the renal substance precontrast. No contrast extravasation from the collecting system or vessels is present in the postcontrast scans. The parenchyma is otherwise enhancing symmetrically without devascularised fragments.

Answers

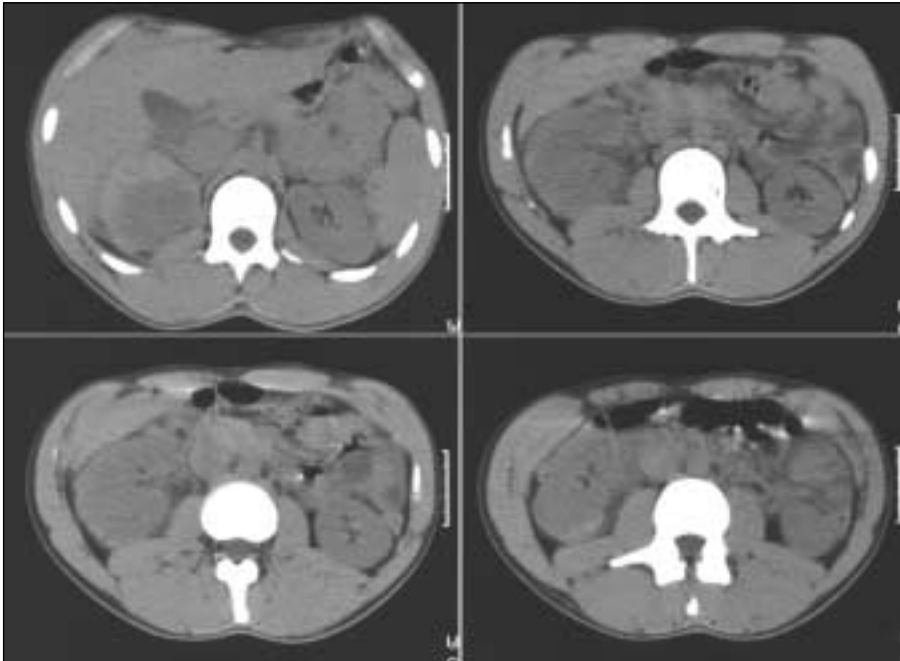


Figure 1. Pre-intravenous contrast enhanced CT scans.

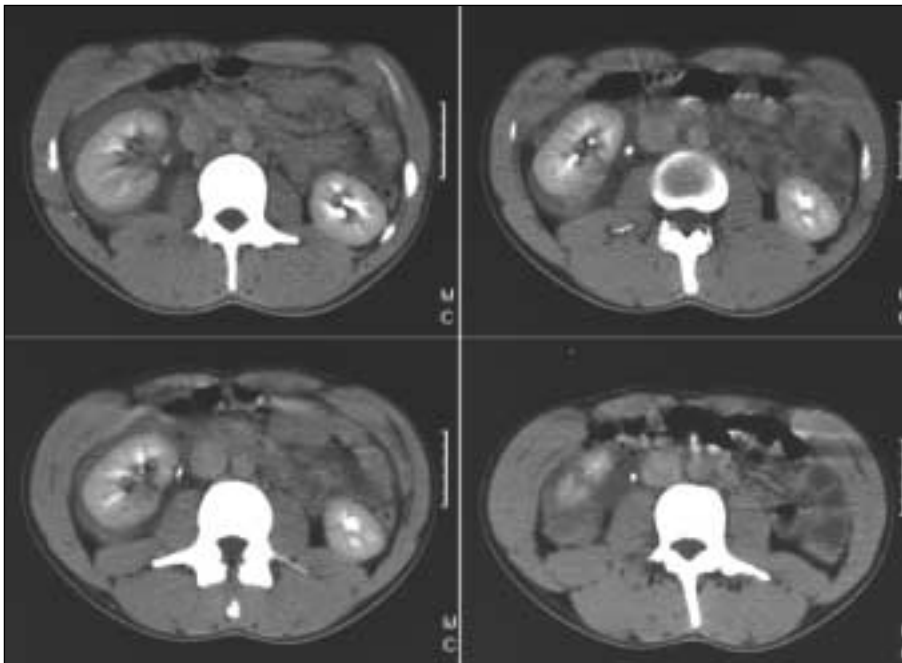


Figure 2. Postintravenous contrast enhanced CT scans.

3. Answer D

Haematuria generally occurs in 95% of individuals who sustain renal trauma but the absence of haematuria does not exclude significant trauma. Many series have sought to define the place for imaging in renal trauma.<sup>1</sup> Although practices vary from centre to centre, it is generally accepted the indications for imaging include:

- penetrating injury and haematuria
- blunt trauma when combined with gross haematuria
- microscopic haematuria and hypotension (blood pressure <90 mmHg)
- microscopic haematuria and significant associated injuries
- children with blunt trauma and haematuria, regardless of blood pressure and amount of haematuria.

In some centres, blunt trauma without haematuria but with injuries known to be associated with renal trauma, eg. flank haematoma, lower rib fractures, fracture of lumbar transverse process, can be indication for imaging.

Reference

1. Kawashima A, Sandler C M, Corl F M, et al. Imaging of renal trauma: A comprehensive review. *Radiographics* 2001; 21(3): 557–574.

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