

Renal trauma during a rugby tackle

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Abstract

Rugby-related renal trauma is rare and identification of a young patient with renal trauma secondary to sports who requires observation versus further radiological evaluation in the emergency department (ED) poses a diagnostic challenge. We report a case of a 16-year-old girl who presented to the ED with abdominal pain after being tackled during a game of rugby. Examination revealed tenderness over the right lateral lower ribs and right flank. Blood tests were

normal and bedside ultrasound did not show any free intraperitoneal fluid. Urinalysis showed gross hematuria. She was pain-free after analgesia but had a syncopal episode in the ED. A computed tomography (CT) scan of the abdomen and pelvis showed a complex right lower pole renal laceration and she was admitted to the Intensive Care Unit. She remained stable and was discharged. Assessment with urinalysis, hematocrit, and creatinine is required during the evaluation of a patient with suspected renal trauma. CT scan is the imaging modality for the diagnosis and grading of renal injury. Conservative treatment is the mainstay of therapy, but some patients require angioembolization of surgical intervention. Patients must discuss with their physician regarding the optimal timing of return to rugby. Rugby-related renal trauma is rare and poses a challenge for emergency physicians regarding their evaluation and management in the ED. AAST-OIS grading of renal trauma on CT imaging helps guide appropriate management decisions.

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Introduction

Patients with renal trauma account for 10% of cases with abdominal trauma,¹ with kidneys being the third most injured solid organ after liver and spleen. The majority of cases of renal trauma are secondary to road traffic crash, fall from height, and assault. There is an increasing incidence (16-30%) of renal trauma secondary to contact sports.² We report a case of a traumatic kidney injury in a 16-year-old girl after being tackled during a game of rugby.

Case Report

A 16-year-old female patient was tackled on her right side by another player during a rugby game. After going home, she complained of right flank pain and nausea. On arrival in ED, she was alert and her vital signs showed a heart rate of 72 beats/min, respiratory rate of 17 breaths/min, blood pressure of 111/63 mm Hg, and oxygen saturation of 100%. On examination, there was tenderness over the right lateral lower ribs and right flank, but there were no signs of peritonism.

Her blood investigations were normal, with a hemoglobin of 111×10^9 g/L, creatinine of 68 $\mu\text{mol/L}$, and lactate of 1.5 mmol/L. Plain radiographs of the chest and pelvis were normal. Extended focused assessment by sonography in trauma (E-FAST) showed a sliver of free fluid within the right renal capsule (Figure 1A) and hyperdensity noted within the urinary bladder suggestive of a blood clot (Figure 1B). Urinalysis showed gross hematuria. She was given analgesia with a resolution of pain. She attempted to mobilize and had a syncopal episode. Repeat hemoglobin was 94 g/L. Given hematuria, hemoglobin drop, and syncopal episode, a computed tomography (CT) scan of the abdomen and pelvis was done which showed a complex right lower pole renal laceration (AAST Grade III) with associated retroperitoneal fluid/blood (Figure 2), but no active hemorrhage. She was admitted to the

Intensive Care Unit for observation, and serial hemoglobin measurements did not show any further drop. The patient remained stable and was discharged after 4 days. She was advised to avoid sports for 6 weeks, and given an outpatient follow-up with urology. She was stable during her follow-up assessments.

Discussion

Contact sports like rugby, boxing, football/soccer, hockey, gymnastics, and horse riding can lead to renal trauma. Children are at higher risk for renal injury than adults,³ and the majority of kidney injuries from rugby/football have been noted in patients in the 16–18-year age group.⁴

Most patients with kidney injury have relatively minor injuries. A significant indicator of renal trauma is a direct blow to the abdomen, flank, or mid/lower back, as seen during a tackle in rugby. Vital signs documentation during the evaluation of the patient helps assess for hemodynamic stability. Physical examination may reveal abdominal tenderness, distention, guarding, bruising around the flank, or other associated injuries. Traumatic kidney injury is more likely in patients with pre-existing kidney abnormalities.⁵

Urinalysis must be done in all patients suspected to have renal trauma, along with measurement of hematocrit and creatinine. Hematuria (gross or microscopic) is a good indicator of renal

injury but does not correlate with the degree of injury. Counterintuitively, patients with major kidney injuries such as renal pedicle injury, disruption of the urethra-pelvic junction, renal artery laceration or avulsion, and/or arterial thrombosis may not have hematuria.^{6,7} Moreover, false negative urinalysis is found in 3–10% of the patients.⁵

Bedside FAST is used to identify hemoperitoneum, but can also identify kidney laceration or perinephric hematoma. Although challenging to determine the extent of renal injury on ultrasound, it is useful to identify patients who may benefit from further radiological evaluation. Hemodynamically stable patients with gross hematuria must undergo further evaluation with a CT scan with contrast to look for kidney injury, grade the renal injury, detect active extravasation of blood, and identify injuries to other organs.^{1,8} The American Association for the Surgery of Trauma Organ Injury Scale (AAST-OIS)⁹ is the most widely used CT correlated grading system for renal trauma (Table 1).

The indications for radiologic evaluation of renal injury in blunt trauma include: i) clinical signs suggestive of renal trauma e.g., abdominal tenderness, distension, flank pain, ipsilateral lower rib fractures; ii) gross hematuria; iii) microscopic hematuria and one episode of hypotension (pre-hospital or initial ED systolic BP <90mm Hg); iv) presence of other major injuries

Hemodynamically stable patients with microscopic hematuria, those with low-grade renal injuries (I–III), and even those with high-grade renal injuries (IV–V) can be managed conservatively.

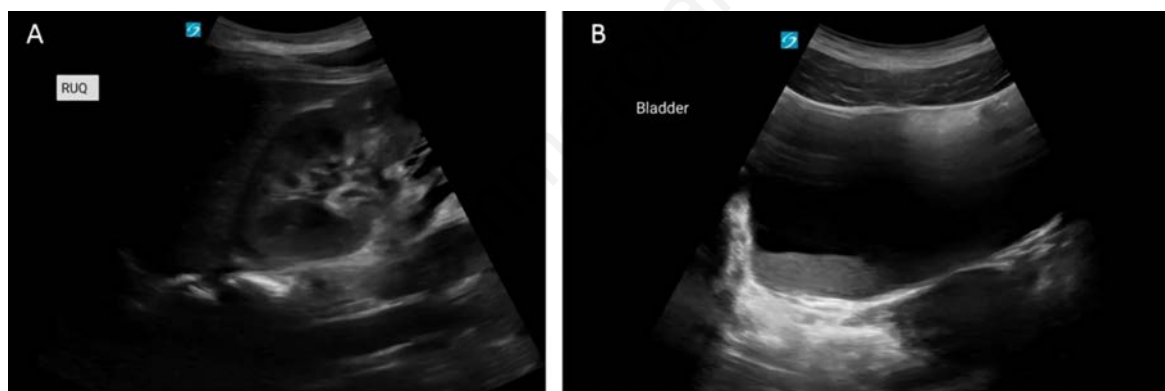


Figure 1. E-FAST showing a sliver of free fluid within the right renal capsule (A) and hyperdensity within the urinary bladder suggestive of a blood clot (B).

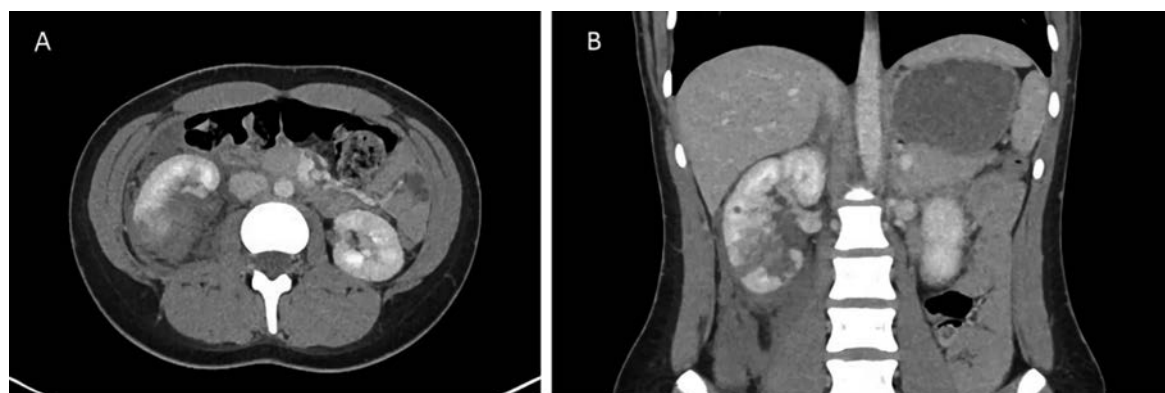


Figure 2. Computed tomography (CT) scan of abdomen and pelvis showing a complex right lower pole renal laceration (AAST Grade III).

Table 1. AAST-OIS for renal trauma.

Grade	Type	Description
I	Contusion	Microscopic or gross hematuria. Normal urological studies
	Haematoma	Subcapsular, non-expanding without parenchymal laceration
II	Haematoma	Non-expanding perirenal haematoma confined to renal retroperitoneum
	Laceration	<1 cm parenchymal depth of renal cortex without urinary extravasation
III	Laceration	>1 cm parenchymal depth of renal cortex without collecting system rupture or urinary extravasation
IV	Laceration	Parenchymal laceration extending through the renal cortex, medulla, collecting system
	Vascular	Main renal artery or vein injury with contained hemorrhage
V	Laceration	Completely shattered kidney
	Vascular	Avulsion of renal hilum that vascularized kidney

Conservative management includes observation, bed rest, serial abdominal examination, and assessment of hemoglobin/hematocrit till hematuria resolves. Monitoring hemoglobin trends is useful for decision-making, either to continue conservative management or transition to further intervention. Primary non-operative management is not associated with any increase in immediate or long-term morbidity and is associated with a reduced rate of renal loss and blood transfusion compared to operative management.^{2, 3} As our patient had a Grade III laceration of the lower pole of the right kidney with intact vascular structures and no active hemorrhage, she was admitted and managed conservatively. The urologist review suggested no need for any intervention. Her serial abdominal examinations were normal and her hematocrit remained stable, and she was discharged upon resolution of hematuria.

Angiography and selective embolization have shown a high success rate in the management of patients with high-grade (Grade IV and V) renal injuries with ongoing bleeding or vascular complications.^{3,10} Patients with significant extravasation of urine on CT scan should be treated with retrograde ureteral stents to prevent development of a urinoma.² Surgical intervention is required in less than 5% of patients, especially for hemodynamically unstable patients, or those with complete avulsion of the ureteropelvic junction, or an expanding/pulsatile retroperitoneal hematoma suggestive of renal pedicle injury, to control hemorrhage and salvage the kidney.¹

3-10% of patients with renal trauma develop complications like urinoma, delayed bleeding, hypertension, hydronephrosis, pyelonephritis, perinephric abscess, arteriovenous fistula, urinary fistula, and pseudoaneurysm.¹¹ As the risk of complications is higher in patients with high-grade injuries, these patients should be discharged with appropriate follow-up with trauma/general surgery and/or urologist. Physicians must discuss the risk of potential complications and long-term sequelae with the patient. Patients who are managed conservatively should avoid sports for at least 6 weeks, while those with high-grade renal injury may take longer time to heal and should avoid returning to sports for 6 to 12 months. However, the decision regarding the appropriate time to resume contact sports must be decided on a case-by-case basis, depending on the severity of the injury.

Conclusions

Rugby-related renal trauma is rare and poses a challenge for emergency physicians regarding their evaluation and management

in the ED. AAST-OIS grading of renal trauma on CT imaging helps guide appropriate management decisions. Conservative treatment is the mainstay of therapy, but some patients may require angioembolization or surgical intervention. Physicians must advise the patient regarding the long-term sequelae, and the optimal time to resume rugby.

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