

## Trauma Reports

### RENAL TRAUMA AFTER BLUNT ABDOMINAL INJURY

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**Abstract—Background:** The kidney is the third most common solid organ injury in blunt abdominal trauma. The preferred treatment of blunt kidney injury varies according to grade of severity, with a preference for non-operative management in most instances. **Discussion:** We examine an unusual case of blunt renal trauma. In this case, our patient presented with severe flank pain and hematuria after a game of softball. Our focused abdominal sonography for trauma revealed fluid in the splenorenal recess concerning for intra-abdominal injury, and subsequent abdominal computed tomography confirmed a grade IV kidney laceration. **Conclusion:** Our patient was managed medically despite his high grade of injury. This article reviews the diagnosis and management of blunt renal trauma and highlights the fact that despite significant injury, a patient can go on to do well with conservative management alone. © 2013 Elsevier Inc.

**Keywords—**abdominal computed tomography; interventional radiology; renal trauma; trauma surgery

#### CASE PRESENTATION

A 25-year-old healthy man presented via private automobile complaining of severe suprapubic pain radiating to the left flank and gross hematuria. The onset was shortly after he fell while running toward third base, having landed on his left side while playing softball approximately 45 min before arrival. He denied loss of consciousness, shortness of breath, nausea, or vomiting.

On arrival, his vitals were normal, with a blood pressure of 120/72 mm Hg, heart rate of 81 beats/min, respira-

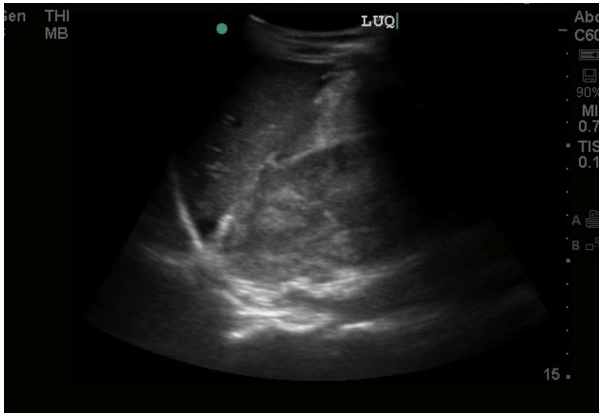
tory rate of 14 breaths/min, and a room air pulse oximetry of 99%.

The primary survey revealed a patent airway with the patient breathing spontaneously and speaking in complete sentences. His breath sounds were clear and equal. A cervical collar was placed due to mechanism of injury in the setting of a possible distracting injury. The patient was awake and alert, following commands, with spontaneous movement of all extremities. No gross deformities or lacerations were noted, however, the patient appeared to be in distress, writhing and complaining of left flank pain.

Two large-bore peripheral intravenous lines were inserted as the secondary survey began. The secondary survey was significant for a firm abdomen with involuntary guarding, and marked tenderness to palpation in the suprapubic, left abdomen, and left flank regions. There was no visible penile trauma, no blood at the urethral meatus, and no scrotal hematoma. Urine mixed with gross blood was evacuated upon placement of a Foley catheter. A focused abdominal sonography for trauma (FAST) examination was performed, revealing a thin, subtle anechoic black stripe in the splenorenal recess (Figures 1, 2).

#### METHODS

Given the degree of tenderness and the positive FAST examination, serious blunt abdominal trauma was suspected. Had the patient been unstable, he would have



**Figure 1.** Our patient's focused abdominal sonography for trauma (FAST) examination of the left upper quadrant with fluid in the splenorenal recess.

likely been taken emergently to the operating room for exploration. However, as non-operative management is the preferred method of treatment for most stable blunt abdominal traumatic injuries, the initial plan was to better delineate the injuries by performing a computed tomography (CT) scan of the abdomen and pelvis.

The majority of blunt abdominal injuries are solid organ injuries (spleen, liver, and kidney), followed by hollow viscous injuries, and finally vascular injuries. The history and pattern of injury can aid in delineation of potential organ involvement. A positive seatbelt sign



**Figure 2.** Computed tomography scan showing extensive left-sided pararenal hemorrhage with extension into the pararenal space and the retroperitoneum along the left abdomen and pelvis.

suggests duodenal or small bowel injury (1). Left lower rib fractures are associated with splenic injury, and right lower rib fractures are associated with liver injury (2). In lumbosacral compression fractures there can be up to a 20% chance of significant renal parenchymal injury (3). Shearing from rapid deceleration most often effects fixed or tethered structures such as the kidney, duodenum, and mesentery.

Our patient had an unusual mechanism of blunt trauma, having sustained a substantial impact to the left flank from a fall while sprinting toward third base. Given the presentation of hematuria and abdominal pain, the initial concerns of the trauma team were possible kidney injury, splenic injury, or bladder rupture (with fluid in the splenorenal recess possibly representing urine). Recognizing that an intraperitoneal bladder rupture would necessitate surgical exploration, it was a primary goal to delineate whether the patient had in fact suffered a bladder injury. Therefore, a standard CT scan of the abdomen/pelvis with intravenous contrast was performed to evaluate for intra-abdominal injury. Delayed images were obtained to evaluate for vascular extravasation and the collecting system of the kidneys. This was immediately followed by a CT cystography to evaluate for extravasation from the bladder, which would implicate the bladder as a source of injury.

## DISCUSSION

### *Imaging Studies*

The FAST examination evaluates for fluid in the perihepatic fossa, perisplenic fossa, pelvis, and pericardium. It is the gold standard for evaluating intra-abdominal bleeding in the unstable blunt trauma patient (4,5). A positive FAST with free fluid suggestive of hemorrhage can be useful in determining who may benefit from exploratory laparotomy. Ultrasound can reliably detect as little as 250 mL of free fluid in Morison's pouch (6). However, a negative study does not exclude significant injury with 100% sensitivity. The test is examiner dependent, and overall it is a poor study for hollow viscous injury and retroperitoneal bleeds (7). Figure 1 is an image of our patient's left upper quadrant on FAST examination notable for fluid in the splenorenal recess.

CT has become the standard of care in diagnosing organ injury after trauma because it provides detailed images of abdominal and retroperitoneal structures, and can be used to stage injury (8,9). It has near 100% sensitivity/specificity for solid organ injury. CT is more sensitive and specific than intravenous pyelogram, ultrasonography, or angiography (10). CT with intravenous contrast can also detect active extravasation of blood (seen as a "blush"). Early and delayed imaging is recommended

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