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FAST Exam to Diagnose Subcapsular Renal Hematoma

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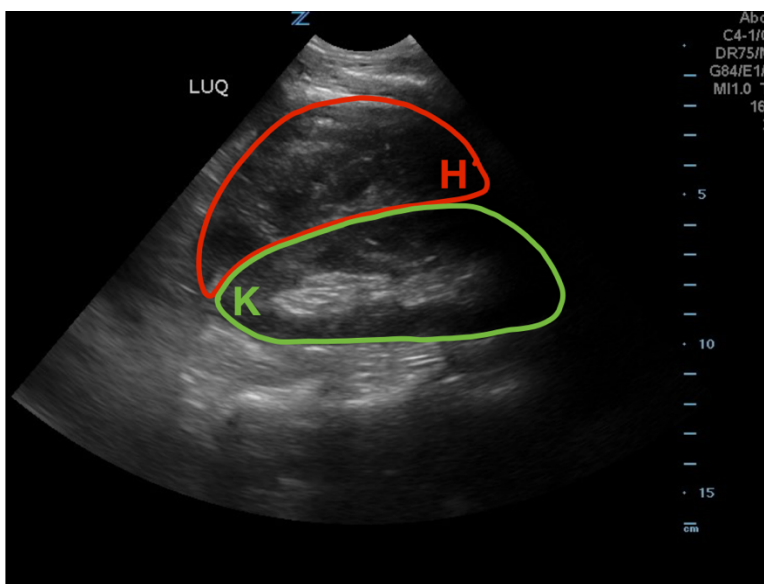
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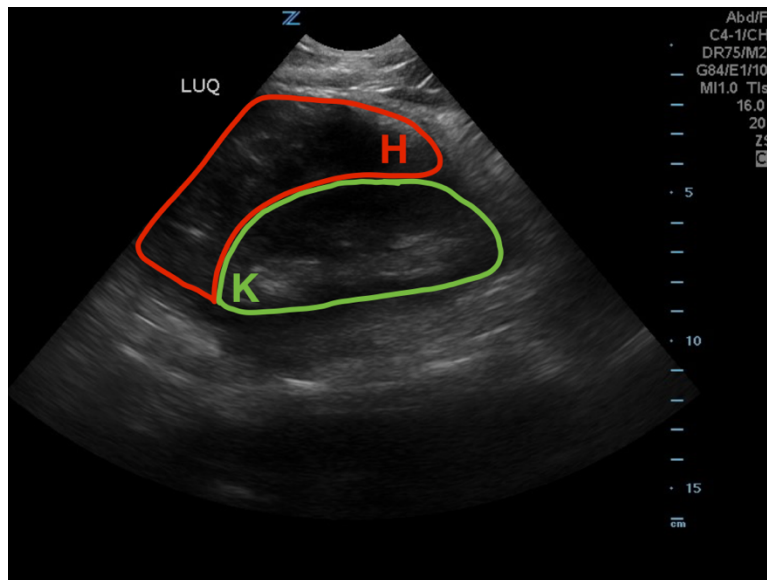
ABSTRACT:

A 49-year-old male presents for evaluation of hematuria and left flank pain after mechanical fall down stairs four days ago. Point-of-care ultrasound (POCUS) focused assessment with sonography in trauma (FAST) exam demonstrated subcapsular renal hematoma. Once a subcapsular hematoma is recognized the provider should keep in mind that this condition may be managed conservatively in patients with two normally functioning kidneys, but may require urgent intervention if the patient is at risk for significant renal disease, such as a single kidney. The use of bedside ultrasound can expedite diagnosis and care for these patients, and allow proper consultants to be contacted early. Some consultants that may need to be consulted include nephrology, urology, and/or internal medicine. This case report emphasizes the utility of the FAST exam for patients presenting for non-acute trauma. The FAST exam can be utilized not only to identify free fluid in the abdomen and pelvis but also to visualize organs and the surrounding tissues for abnormalities after a trauma.

Topics:

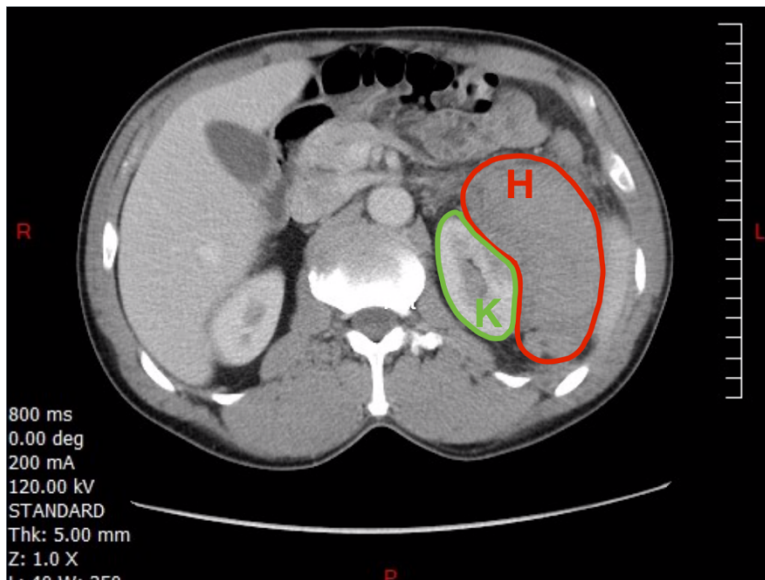
Renal, ultrasound, subcapsular hematoma, trauma, FAST, point-of-care ultrasound, focused assessment with sonography in trauma.





Video Link: <https://youtu.be/YaHjezVD>

Video Link: <https://youtu.be/mBMWTMnTvrk>



Introduction:

A 49-year-old male presents for evaluation of left sided flank pain and hematuria after sustaining a mechanical fall four days prior. A POCUS FAST exam visualized a left sided subcapsular renal hematoma.

Presenting concerns and clinical findings:

A previously healthy 49-year-old male presented to the emergency department after a mechanical fall while walking

upstairs four days prior to presentation. The patient complained of left flank pain and hematuria that persisted since the incident. The patient denied any other injuries, anticoagulant use, loss of consciousness, nausea or vomiting. The patient was previously evaluated by an urgent care facility and was provided with an antibiotic for a possible urinary tract infection without any improvement of his symptoms. Vital signs were within normal limits, including his blood pressure, and physical exam was significant only for left costovertebral angle tenderness.

Significant findings:

A bedside point of care ultrasound FAST exam was performed revealing a left subcapsular renal hematoma. The hematoma was a non-compressing hematoma, evidenced by preserved renal contour with the hematoma labeled with a red H and the normal renal contour labeled with a green K. Additionally, cortical necrosis and ischemia can be characterized by a dark, hypoechoic renal cortex on ultrasonography with a decrease in flow to the cortex on color doppler which was not seen on this patient, providing further evidence that the hematoma was non-compressing. The hematoma was concluded to be an acute process due to its hypoechoic appearance with some mixed ultrasonographic echoes caused by the early deposit of fibrin.

Patient course:

A POCUS FAST exam was performed to evaluate flank pain with hematuria after trauma. In general, the larger the number of red blood cells on urinalysis, the greater the risk of significant intra-abdominal injury. This includes traumatic injury to any structure, not just the urinary tract.¹ The initial FAST exam performed on this patient revealed questionable free fluid in the left upper quadrant and a left subcapsular renal hematoma without compression of the kidney. The diagnosis was confirmed on computed tomography (CT) which demonstrated a laceration of the mid to upper pole of the left kidney with adjacent 8.4 x 4.6 x 10 cm hematoma. Blood urea nitrogen (BUN) and creatinine levels were within normal limits and the patient was not anemic. Urology evaluated the patient and recommended discharge with conservative management. The patient was advised to limit strenuous physical activity, avoid non-steroidal anti-inflammatory drug use and to follow up with urology in one week. Additionally, the patient was instructed to follow up with his primary care physician for re-evaluation of his blood pressure to ensure that he would not become hypertensive.

Discussion:

Subcapsular renal hematomas develop due to a hemorrhage within the kidney that is contained in the fibrous capsule.² As the hematoma ages, a restrictive fibrous capsule forms. A capsule is best visualized on CT or MRI. The rigid renal capsule does not allow for significant expansion of a hematoma, which can lead to complications including compression of the renal parenchyma, ischemia, and impaired renal function. The clinical course is determined by the size of the collection and the potential for hematoma expansion. Symptoms may include flank pain, acute renal insufficiency or failure, decreased urine output, hypertension, hematuria or a decrease in hemoglobin.³ Patients with a renal transplant or single kidney are most

susceptible to these complications. This specialized population requires immediate identification and rapid intervention in order to maintain as much renal function as possible.⁴

A subcapsular hematoma may be caused by trauma, renal tumors, cystic diseases, hydronephrosis, systemic lupus erythematosus, polyarteritis nodosa, infections, anticoagulation therapy, or iatrogenic interventions such as hemodialysis, renal biopsy, surgical procedures and extra corporeal shock lithotripsy.² Ultrasound can be used as an adjunct imaging study to provide an accurate, non-invasive and cost-effective diagnosis of a subcapsular renal hematoma. Color doppler should be utilized to identify ischemia and compression of the renal parenchyma.⁵ The diagnosis of acute subcapsular renal hematoma is best confirmed by CT scan, but magnetic resonance imaging (MRI) is another potential diagnostic imaging modality. Angiography can identify the vascular abnormality associated with the hematoma; however, it is invasive, expensive, and potentially nephrotoxic.

Treatment of a subcapsular hematoma is aimed at improving or preventing hypertension, as well as preserving renal function. In a patient with normal renal function, conservative management with close follow up and oral antihypertensives is the traditional course of treatment.³ However, if the patient is unable to compensate with a normally functioning contralateral kidney or has declining renal function in follow up lab work, more aggressive measures may be taken such as stripping the capsule, partial or total nephrectomy, percutaneous drainage, or surgical drainage.²

Focused assessment with sonography for trauma is a part of the trauma resuscitation recommended by an international panel consensus in 1997.⁶ Both physicians and other health care providers are routinely trained to perform this specific ultrasound test, where the right and left abdominal upper quadrants, suprapubic, and subxiphoid views are visualized. The purpose of the FAST exam is to identify hypoechoic free fluid, which in the setting of trauma, could indicate hemoperitoneum. However, for the detection of solid organ injuries, FAST is neither sensitive nor specific. Reported sensitivity varies from 38% to 95.4%.⁶ Similar to many other diagnostic imaging modalities, the FAST exam has technical pitfalls, interpretive pitfalls and limitations. In one study, ultrasonography detected solid organ injury to the liver in one of seven cases, to the kidney in one of four cases, and to the bowel in zero of three cases. However, this study also demonstrated that patients presenting later following a trauma had increased sensitivity of the FAST exam.⁷

Although ultrasound may not be the modality of choice for solid organ injury while performing FAST exams, it is important for providers to not only look for free fluid but to visualize the solid organs for injuries. This case provides an example of the utility of a FAST exam in patients that do not present as an acute trauma. Traumatic injuries can result in hematomas or hemoperitoneum, which can develop over time. Performing a FAST exam even days following a traumatic event can demonstrate trauma-related intra-abdominal pathologies.⁸

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