RADY 417: Body Imaging
Case Presentation

Ashley Cairns, MS4
July 2018
51 year old male with one day history of left flank pain and fever
Mr. PKD is a 51 year old with HTN, Gout, chronic CMV and ADPKD s/p renal transplant on 12/16/11 c/b delayed graft function on dialysis post-op who presents with one day history of left flank pain and fever.
Differential Diagnosis

- Left flank pain:
  - Colon: colitis, diverticulitis, IBD, IBS, mesenteric ischemia
  - Pelvis: testicular torsion (male)
  - Renal: nephrolithiasis, pyelonephritis
  - Abdominal wall: herpes zoster

(Cartwright and Knudson, 2015)
List of imaging studies

- CT scan without contrast
- CXR
- Transplant renal US
# ACR Appropriateness Criteria for Acute Onset Flank Pain

**Clinical Condition:** Acute Onset Flank Pain—Suspicion of Stone Disease (Urolithiasis)

**Variant 1:** Suspicion of stone disease.

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>8</td>
<td>Reduced-dose techniques are preferred.</td>
<td>⭐⭐⭐⭐</td>
</tr>
<tr>
<td>CT abdomen and pelvis without and with IV contrast</td>
<td>6</td>
<td>This procedure is indicated if CT without contrast does not explain pain or reveals an abnormality that should be further assessed with contrast (e.g., stone versus phleboliths).</td>
<td>⭐⭐⭐⭐</td>
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<tr>
<td>US color Doppler kidneys and bladder retroperitoneal</td>
<td>6</td>
<td></td>
<td>0</td>
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<tr>
<td>X-ray intravenous urography</td>
<td>4</td>
<td></td>
<td>⭐⭐⭐⭐</td>
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<tr>
<td>MRI abdomen and pelvis without IV contrast</td>
<td>4</td>
<td>MR urography.</td>
<td>0</td>
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<tr>
<td>MRI abdomen and pelvis without and with IV contrast</td>
<td>4</td>
<td>MR urography.</td>
<td>0</td>
</tr>
<tr>
<td>X-ray abdomen and pelvis (KUB)</td>
<td>3</td>
<td>This procedure can be performed with US as an alternative to NCCT.</td>
<td>⭐⭐</td>
</tr>
<tr>
<td>CT abdomen and pelvis with IV contrast</td>
<td>2</td>
<td></td>
<td>⭐⭐⭐⭐</td>
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*All radiologic reports must include a 1000-gram plain view (KUB) film, complete.

(Moreno et al., 2015)
**Variant 3:** Younger than age 40, negative physical examination, and no other signs, symptoms, or risk factors.

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<tr>
<td>X-ray chest</td>
<td>4</td>
<td></td>
<td></td>
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<tr>
<td>CT chest without IV contrast</td>
<td>1</td>
<td></td>
<td>⭐⭐⭐⭐</td>
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<tr>
<td>CT chest with IV contrast</td>
<td>1</td>
<td></td>
<td>⭐⭐⭐⭐</td>
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<tr>
<td>CT chest without and with IV contrast</td>
<td>1</td>
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*Relative Radiation Level

(Kirsch et al., 2013)
Imaging studies from PACS: CT

Rt Colon
Spleen
Imaging studies from PACS: CT
Imaging studies from PACS: CT
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**CT Findings**

- **Kidneys/ureters:** many cysts within horseshoe pelvic kidney, some hyperdense cysts with perhaps hemorrhage, LLQ transplant kidney, no surrounding fluid collection
- **Bowel:** non-obstructed bowel gas pattern
- **Soft tissue:** soft tissue edema
CT scan is the most appropriate scan per ACR criteria in evaluation of acute left flank pain
Calcifications are best detected in CT without contrast
US is not needed for further evaluation

(Moreno et al., 2015)
Imaging studies from PACS: CXR

- RLL subsegmental atelectasis
- Enlargement of pulmonary vasculature
- No new nodularity, effusions, or pneumothorax when compared to previous CXR
- CXR is an appropriate imaging modality in fever
- Atelectasis is very common and should be correlated with clinical symptoms and picture
- Normal left donor kidney parenchyma with adjacent renal parenchyma with cysts, calcifications
- Largely to evaluated flow in donor kidney (LLQ)
- Donor kidney 11.3 cm x 5.1 cm x 5.7 cm
- Main renal artery resistive index: 0.72-0.84
- Main renal vein patent
Renal US to evaluate flow of transplant kidney
Useful for evaluation of chronic renal rejection, progression, or assessment of renal stenosis
Renal resistive index calculated as (peak systolic velocity - end diastolic velocity) / peak systolic velocity, 0.6 +/- 0.01 normal
- Upper limit of normal 0.7

(Moreno et al., 2015), (Viazza et al., 2013).
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No new findings on CXR, CT, US
Fever workup was a negative, considered potentially 2/2 gout as patient reports knee pain as well and resolved
Plans for antibiotic 14 day course of levaquin as differential included renal cyst vs. pyelonephritis
Patient was discharged
ADPKD (Autosomal Dominant Polycystic Kidney Disease), late-onset multisystem disorder with:

- Bilateral renal cysts (primarily kidney diagnosis), determined by age, 50% ESRD by 60 years
- Liver cyst
- Increased risk of intracranial aneurysms
- Additional: pancreatic cysts, dilation of aorta, mitral valve prolapse, abdominal wall hernias (95% of affected have an affected parent, but 10% de novo variant)

Diagnosis: renal imaging (US, CT, MRI) and heterozygous variant in PKD1, PKD2, and DNAJB11

Prevalence: 1 in every 400-1000 live births; ½ of these cases are diagnosed in lifetime, ½ are clinically silent (Harris and Torres, 2018)
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(Harris and Torres, 2018)
Commonly referred to as ‘horseshoe kidney’
Common congenital malformations of renal tissue during embryologic migration, resulting in fusion at renal poles
Incidence: 0.4-1.6 per 10,000 registered but estimated to be 1/400-1/600 when screened infants less than 6 months
Most are asymptomatic but has increased risk of renal calculi (20%), metabolic abnormalities, and infection
Diagnosis: Abdominal CT, Renal US, Excretory urography

(Rosenblum, 2017)
Renal fusion abnormality

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- Diagnosis: Abdominal CT, Renal US, Excretory urography.

(Rosenblum, 2017)
Polycystic horseshoe kidney

- Rare combination of hereditary autosomal dominant and common renal fusion anomaly during embryogenesis
- Incidence: 1 in 134,000-800,000 live births
- Horseshoe kidney is largely asymptomatic, and the development of renal failure with PKD is not higher with presence of horseshoe abnormality
- Indication for nephrectomy in these cases include:
  - Pyelonephritis, persistent
  - HTN, persistent
  - Renal transplantation

(Chikkannaiah et al., 2018)
Take-Away Points from Case

- ADPKD presents with many cysts in the kidney
- Horseshoe kidney is the most common renal fusion abnormality and has increased risk of renal calculi
- CT without contrast is the best study to evaluate for renal calculi and calcifications (sensitivity 97%, specificity 95%) [ACR criteria]
- US provides valuable information about flow in transplant kidney
- CXR can be helpful in the workup of fever


