Radiographic Investigation of an Ileal Conduit
Cooper University Hospital | Diagnostic Radiology

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Patient Presentation: a 66 y/o male with...

Pertinent PMHx

- Urothelial cell bladder carcinoma
  - TURBT, multiple tumors. 70% of bladder and prostatic urethra. HG T-1
- Prostatic adenocarcinoma
- COPD, HTN, HLD, Spinal Stenosis

SurgHx

- Cystoprostatectomy, 2016
  - Pelvic lymph node dissection
  - Ileal conduit c/b SBO and urine leak of proximal conduit
- Incisional Hernia Repair, Parastomal 2016

SocialHx

- 45 pack-years; last 2018
Hospital Admission; OSH Transfer

• P/w Intermittent, "intense" b/l flank pain
  • +ve: Nausea/ Vomiting
  • -ve: Fever, changes in vision, angina, dyspnea, falls

• From OSH transfer notes
  • Hypotensive
  • Leukocytosis 22.5
  • AKI  Cr 2.8
  • UTI
  • CT showing concern for obstruction at left ureteroenteric anastomosis
Pertinent Labs

- Cr 2.48 mg/dL
- WBC 22.5
- UA
  - +3 LE, +3 Blood, +1 Protein
- Urine Microanalysis
  - >180 WBC/hpf
  - 38 RBC/hpf
What Imaging Should We Order?

- s/p radical cystectomy
- CT from OSH showed hydroureteronephrosis
- Concern for stricture or obstructing calculus

→ Retrograde flow imaging (loopogram), ideal modality to identify possible anastomotic stricture s/p urinary diversion
ACR Appropriateness Criteria

**Variant 3:** Muscle-invasive bladder cancer with or without cystectomy. Post-treatment surveillance.

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Appropriateness Category</th>
<th>Relative Radiation Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiography chest</td>
<td>Usually Appropriate</td>
<td></td>
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<tr>
<td>Fluoroscopy abdomen loopogram</td>
<td>Usually Appropriate</td>
<td></td>
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<tr>
<td>MRI abdomen and pelvis without and with IV contrast</td>
<td>Usually Appropriate</td>
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<tr>
<td>MRU without and with IV contrast</td>
<td>Usually Appropriate</td>
<td></td>
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<tr>
<td>CT abdomen and pelvis with IV contrast</td>
<td>Usually Appropriate</td>
<td></td>
</tr>
<tr>
<td>CTU without and with IV contrast</td>
<td>Usually Appropriate</td>
<td></td>
</tr>
<tr>
<td>MRI abdomen and pelvis without IV contrast</td>
<td>May Be Appropriate (Disagreement)</td>
<td></td>
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<tr>
<td>CT chest with IV contrast</td>
<td>May Be Appropriate</td>
<td></td>
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<tr>
<td>CT chest without IV contrast</td>
<td>May Be Appropriate</td>
<td></td>
</tr>
<tr>
<td>CT abdomen and pelvis without and with IV contrast</td>
<td>May Be Appropriate (Disagreement)</td>
<td></td>
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<tr>
<td>FDG-PET/CT skull base to mid-thigh</td>
<td>May Be Appropriate</td>
<td></td>
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<tr>
<td>US pelvis (bladder)</td>
<td>Usually Not Appropriate</td>
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</tr>
<tr>
<td>Radiography intravenous urography</td>
<td>Usually Not Appropriate</td>
<td></td>
</tr>
<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>Usually Not Appropriate</td>
<td></td>
</tr>
<tr>
<td>CT chest without and with IV contrast</td>
<td>Usually Not Appropriate</td>
<td></td>
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</tbody>
</table>

This imaging modality was ordered by attending urologist.
Prior CT Findings (unlabeled)
Findings: (labeled)

Pelviectasis, greater on left

Hyperattenuating rim in the pelvicalyceal system

Parastomal herniation of small bowel

Perinephric fat stranding
Prior CT Findings continued (unlabeled)
Findings continued (labeled)

Right ureter; with ureteroenteric anastomosis.

Left ureter; with ureteroenteric anastomosis.

Mild to moderate ureterectasis.

Calcification within ileal conduit and possible calculus within distal left ureter.
The previous CT findings were from an OSH; concerning for stricture at the anastomosis.

Loopography was performed to assess for stricture/outflow obstruction.
Loopography Findings continued (unlabeled)
Loopogram Findings continued (labeled)

Ileal conduit, opacifying well

Renal collecting systems mildly opacified, mildly dilated with blunting of calyces

Bilateral ureteral contrast opacification after retrograde flow
Final Diagnosis:

- Retrograde flow from conduit to renal collecting systems excludes stricture at ureteroenteric anastomosis
- Non-obstructing calcifications within ileal conduit, likely post-operative calcific changes
- Small calcification at left distal ureter, likely dystrophic calcification versus non-obstructive calculus, unchanged from previous study
- Urothelial thickening in the renal pelvicalyceal system, nonspecific for inflammatory process
- AKI etiology is likely not post-renal or obstructive
Ileal Conduits

*For the purpose of urinary diversion*

- **Indications**
  - s/p cystectomy
  - Neurogenic bladder with threatening renal impairment
  - Radiation injury to bladder
  - Intractable incontinence
- **Many short- and long-term complications**
  - Bowel leak/obstruction most common (60%)
  - Renal impairment/AKI (20%)
CT Urogram vs. Loopogram

**CT Urogram enhanced and unenhanced images**
- Scout images & split bolus IV contrast
  - Split bolus protocol to reduce radiation exposure
- Capture of nephrographic and urographic phases in a single image acquisition
- Excretory phase visualizes renal collecting system and ureters
- Identification of *pathology* or *disease recurrence*

**Fluoroscopic Loopogram**
- Visualization of collecting systems and ureters (renal-independent study)
- Used to identify *post-operative leaks* and exclude *stricture* at the ureteroileal anastomosis
# Complications of Ileal Conduits

<table>
<thead>
<tr>
<th>Complication</th>
<th>Total (%)</th>
<th>Median time to occurrence, years</th>
<th>Probability of experiencing complication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(range)</td>
<td>5 years</td>
</tr>
<tr>
<td>Any complication</td>
<td>643 (60.8%)</td>
<td>1.1 (0.1-25.7)</td>
<td>58.9%</td>
</tr>
<tr>
<td>Bowel</td>
<td>215 (20.3%)</td>
<td>1.5 (0.1-17.3)</td>
<td>18.0%</td>
</tr>
<tr>
<td>Bowel Obstruction</td>
<td>169 (16.0%)</td>
<td>1.7 (0.1-17.3)</td>
<td>14.3%</td>
</tr>
<tr>
<td>Abscess</td>
<td>38 (3.6%)</td>
<td>0.9 (0.1-21.6)</td>
<td>3.3%</td>
</tr>
<tr>
<td>Fistula</td>
<td>29 (2.7%)</td>
<td>1.9 (0.1-21.1)</td>
<td>2.5%</td>
</tr>
<tr>
<td>Renal</td>
<td>213 (20.2%)</td>
<td>2.2 (0.1-29.6)</td>
<td>17.9%</td>
</tr>
<tr>
<td>Renal failure (Cr&gt;2.0 mg/dL)*</td>
<td>201 (19.0%)</td>
<td>2.3 (0.1-29.6)</td>
<td>16.7%</td>
</tr>
<tr>
<td>Loss of functional renal unit</td>
<td>22 (2.1%)</td>
<td>2.4 (0.2-23.5)</td>
<td>1.8%</td>
</tr>
<tr>
<td>Dialysis-dependence</td>
<td>26 (2.5%)</td>
<td>8.4 (0.9-23.5)</td>
<td>1.5%</td>
</tr>
<tr>
<td>Infectious</td>
<td>174 (16.5%)</td>
<td>1.8 (0.1-25.7)</td>
<td>15.2%</td>
</tr>
<tr>
<td>Pyelonephritis</td>
<td>127 (12.0%)</td>
<td>2.3 (0.1-25.7)</td>
<td>10.3%</td>
</tr>
<tr>
<td>Recurrent urinary tract infections</td>
<td>73 (6.9%)</td>
<td>2.1 (0.1-21.6)</td>
<td>6.7%</td>
</tr>
<tr>
<td>Stomal</td>
<td>163 (15.4%)</td>
<td>2.3 (0.2-23.4)</td>
<td>14.9%</td>
</tr>
<tr>
<td>Peristomal hernia</td>
<td>147 (13.9%)</td>
<td>2.4 (0.2-18.3)</td>
<td>13.8%</td>
</tr>
<tr>
<td>Stomal stenosis</td>
<td>22 (2.1%)</td>
<td>9.2 (0.2-23.4)</td>
<td>1.1%</td>
</tr>
<tr>
<td>Urolithiasis</td>
<td>162 (15.3%)</td>
<td>2.5 (0.1-24.9)</td>
<td>14.6%</td>
</tr>
<tr>
<td>Upper tract urolithiasis</td>
<td>141 (13.3%)</td>
<td>2.5 (0.1-24.9)</td>
<td>12.2%</td>
</tr>
<tr>
<td>Conduit stones</td>
<td>48 (4.5%)</td>
<td>3.0 (0.2-22.9)</td>
<td>4.8%</td>
</tr>
<tr>
<td>Metabolic</td>
<td>135 (12.8%)</td>
<td>1.9 (0.1-25.9)</td>
<td>11.0%</td>
</tr>
<tr>
<td>Metabolic acidosis</td>
<td>108 (10.2%)</td>
<td>1.0 (0.1-24.2)</td>
<td>9.8%</td>
</tr>
<tr>
<td>Vitamin B12 Deficiency</td>
<td>32 (3.0%)</td>
<td>9.1 (0.4-25.8)</td>
<td>1.3%</td>
</tr>
<tr>
<td>Structural</td>
<td>122 (11.5%)</td>
<td>1.5 (0.1-25.0)</td>
<td>10.6%</td>
</tr>
<tr>
<td>Anastomotic stricture</td>
<td>106 (10.0%)</td>
<td>1.1 (0.1-25.0)</td>
<td>10.1%</td>
</tr>
<tr>
<td>Conduit stricture</td>
<td>25 (2.4%)</td>
<td>9.4 (0.2-24.1)</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
Loopogram

- Foley catheter inserted into the stoma
  - Balloon is inflated with 5 to 8 mL of contrast material
- Instill contrast through catheter via hand injection
- Under fluoroscopy, observe for retrograde flow
- Contrast opacification of ureters and pelvicalyceal system

- Mild ureterectasis, pelvicaliectasis, with mild hydronephrosis may be normal in a patient with urinary diversion. This dilation occurs because there is no surgical construct to prevent reflux at the time the conduit is created.
References:


