AMSER Case of the Month
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64 year-old male who presents with gross hematuria

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Patient Presentation

• 64 year old man who presents with 2 weeks of hematuria. Denies fever, dysuria, increased urinary frequency, or costovertebral angle tenderness.

• Past Medical History: Hypertension, GERD

• Past Surgical History: None

• Past Social History: Current smoker with a 40 pack-year smoking history. Denies alcohol and illicit drug use.
Pertinent Labs

- BMP: Na 142 / K 5.4 / Cl 109 / Co2 25 / Cr 1.51 / BUN 25

Urinalysis:
- Glucose - Negative
- Bilirubin - Negative
- Ketones - Negative
- Specific gravity - Normal
- Blood - Moderate*
- Protein - Negative
- Leukocyte esterase - Trace
- Nitrate - Negative

What Imaging Should We Order?
ACR Appropriateness Criteria for Hematuria

<table>
<thead>
<tr>
<th>Clinical Condition:</th>
<th>Hematuria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variant 3:</td>
<td>All patients except those described in variant 1 or 2.</td>
</tr>
</tbody>
</table>

<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 and with IV contrast</td>
<td>9</td>
<td>CT urography. Must include high-resolution imaging during excretory phase.</td>
<td>*****</td>
</tr>
<tr>
<td>CT abdomen and pelvis without IV contrast</td>
<td>6</td>
<td>For patient with contraindication to iodinated contrast or strong suspicion of urothelial lesion, to clarify abnormality suspected on CT or IVU.</td>
<td>****</td>
</tr>
<tr>
<td>X-ray retrograde pyelography</td>
<td>6</td>
<td>This procedure may be appropriate but there was disagreement among panel members on the appropriateness rating as defined by the panel’s median rating.</td>
<td>****</td>
</tr>
<tr>
<td>CT abdomen and pelvis with IV contrast</td>
<td>5</td>
<td></td>
<td>****</td>
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<tr>
<td>US kidneys and bladder retroperitoneal</td>
<td>5</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>MRI abdomen and pelvis without and with IV contrast</td>
<td>5</td>
<td>MR urography. For patients with contraindication to iodinated contrast.</td>
<td>O</td>
</tr>
<tr>
<td>MRI abdomen and pelvis without IV contrast</td>
<td>4</td>
<td></td>
<td>O</td>
</tr>
<tr>
<td>Arteriography kidney</td>
<td>2</td>
<td></td>
<td>***</td>
</tr>
<tr>
<td>X-ray abdomen and pelvis (KUB)</td>
<td>2</td>
<td></td>
<td>**</td>
</tr>
<tr>
<td>X-ray intravenous urography</td>
<td>1</td>
<td></td>
<td>***</td>
</tr>
</tbody>
</table>

Rating Scale: 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate
CT Abdomen and Pelvis with IV Contrast (Unlabeled)
• Hyperdense mass within a posterolateral right bladder diverticulum (red arrow) which projects into the bladder lumen.
• Encasement of the right ureter by the mass at the ureterovesicular junction.
• Minimal nonspecific fat stranding adjacent to the bladder mass (blue arrow).
Final Diagnosis:

Muscle Invasive High Grade Urothelial Carcinoma of the Bladder
# Urothelial Carcinoma – Epidemiology and Signs and Symptoms

## Epidemiology

**Incidence:**
- ~80,000 new cases per year in the US
- Male to female ratio of 2:1

**Risk Factors:**
- Advanced age
- Smoking
- Occupational exposures
  - Paint components
  - Polycyclic aromatic hydrocarbons
  - Diesel exhausts

## Signs/Symptoms

- Hematuria
- Dysuria
- Weight loss
- Fatigue
- Persistent back pain
Treatment of Urothelial Carcinoma of Bladder

**Non-Muscle Invasive**: Transurethral resection of bladder tumor (TURBT) with or without adjuvant intravesical therapy depending on tumor grade

**Muscle Invasive**: Radical cystectomy with urinary diversion

- Urinary diversion - Surgical technique to redirect the stream of urine
- Two major surgical approaches for urinary diversions performed after radical cystectomy: continent and incontinent diversions:
  - Incontinent urinary diversions - a cutaneous ostomy is used for continuous urine drainage (for example, an ileal conduit)
  - Continent diversion procedure - the patient may void through the native urethra or self-catheterize through a surgically created stoma
Case Continued - Post Operative Surveillance Imaging of Neobladder Urinary Diversion

- Patient underwent **radical cystoprostatectomy with bilateral pelvic lymphadenectomy** and **neobladder urinary diversion**

- Goals of Post Operative Imaging:
  - Assess postoperative anatomy
  - Detect postoperative complications
  - Evaluate for residual or recurrent tumor and metastatic disease
  - Monitor for upper tract distention and/or deterioration

**What Imaging Should We Order to Assess Post Operative Status?**
## ACR Appropriateness Criteria for Post Operative Surveillance of Muscle Invasive Bladder Cancer

### Variant 3:
Muscle-invasive bladder cancer (MIBC) 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>
</tr>
<tr>
<td>CT abdomen and pelvis without and with IV contrast</td>
<td>Usually Appropriate</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>Fluoroscopy abdomen loopogram</td>
<td>Usually Appropriate</td>
<td>⭐⭐⭐⭐</td>
</tr>
<tr>
<td>CT abdomen and pelvis with IV contrast</td>
<td>Usually Appropriate</td>
<td>⭐⭐⭐⭐</td>
</tr>
<tr>
<td>MRI abdomen and pelvis without and with IV contrast</td>
<td>Usually Appropriate</td>
<td>⭐⭐⭐</td>
</tr>
<tr>
<td>CT chest with IV contrast</td>
<td>May Be Appropriate</td>
<td>⭐⭐⭐⭐</td>
</tr>
<tr>
<td>CT chest without IV contrast</td>
<td>May Be Appropriate</td>
<td>⭐⭐⭐⭐</td>
</tr>
<tr>
<td>FDG-PET/CT skull base to mid-thigh</td>
<td>May Be Appropriate</td>
<td>⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>MRI abdomen and pelvis without IV contrast</td>
<td>May Be 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>Radiography intravenous urography</td>
<td>Usually Not Appropriate</td>
<td>⭐⭐⭐⭐⭐⭐</td>
</tr>
<tr>
<td>US pelvis (bladder)</td>
<td>Usually Not Appropriate</td>
<td>⭐⭐⭐</td>
</tr>
<tr>
<td>CT chest without and with IV contrast</td>
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<td>⭐⭐⭐⭐⭐⭐</td>
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Post-Op Complications

Fig. 1 - CT abdomen with IV contrast 1 week post neobladder formation. Loculated fluid in the RLQ peritoneal cavity with fluid-debris level indicating a hemorrhagic seroma (blue arrow).

Fig. 2 - Fluoroscopic Loopogram 1 month post neobladder formation. Water-soluble contrast is injected, demonstrating a leak (red arrow) from the right lateral wall of the neobladder forming a small urine collection.
Post-Op Complications - Anastomotic Stricture

Figure 1. (Axial) Hydroureteronephrosis (arrow)

Figure 2. (Coronal) Ureto-neobladder anastomoses (arrows)

Figure 3. (Axial) Increased moderate left hydroureteronephrosis to the level of the ureteral anastomosis with the afferent limb of the neobladder suspicious for *anastomotic stricture* (red arrow) at the ureto-neobladder anastomoses.
Complications of Neobladders

Early:
- **Urine leak**
- Leakage of bowel contents
- Fluid collections (urinoma, abscess, lymphocele, seroma, hematoma)

Late:
- **Fistula:**
  - Most common site: from the anterior neobladder to the ileal-ileal small bowel anastomosis
  - Symptoms: fecaluria, pneumaturia, or recurrent urinary tract infection
  - Radiographic findings: air in the neobladder or upper urinary tract (however, air could also be due to instrumentation)

- **Ureteral stricture:**
  - The rate of ureteroenteric anastomotic stricture is as high as 11% after orthotopic neobladder
  - A significantly lower rate of stricture is seen when a refluxing surgical technique is used to create the anastomosis

- Subneovesical obstruction:
  - Rare complication after neobladder formation that occurs in approximately 1% of patients
  - Possible causes include local tumor recurrence along the pelvic floor involving the neobladder neck, stricture of the neovesicourethral anastomosis, and urethral stricture

- **Neobladder Rupture:**
  - Occurs after trauma, radiation therapy, or overdistention (High index of suspicion needed for acute abdominal pain in ER)
References:


