Vesicoureteral Reflux

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9/18/2019
DII RAD 4001 elective
Reviewed by: Dr. Manickam Kumaravel

UTHealth
The University of Texas Health Science Center at Houston
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Clinical History

- 2 year old female with UTI
- History of closed myelomeningocele s/p repair
- Past renal ultrasounds normal, asymptomatic at birth
- Prior consults indicated voiding cystourethrogram (VCUG) with new UTIs
Voiding Cystourethrogram (VCUG)

8/7/19

- Fluoroscopic examination of bladder and urinary tract
- Test of choice for VUR
- ~$1,000
But then...
bladder
urethra

Renal pelvis and central calyces

Ureteral reflux

bladder
urethra
Findings

• “On the final void, there is evidence of vesicoureteral reflux into a nondilated right ureter, pelvis and central calyces with preserved papillary impressions. Minimal post void residual.”
Differential Diagnosis: Pediatric UTI

- Vesicoureteral Reflux
- Urinary obstruction
  - ureteropelvic junction obstruction, neurologic conditions (myelomeningocele), posterior urethral valves (males)
- Bladder and bowel dysfunction
  - abnormal elimination pattern, incontinence, withholding maneuvers
Discussion: Vesicoureteral Reflux (VUR)

- Retrograde passage of urine from the bladder to the upper urinary tract
- Primary VUR 1% of newborns
- Most common in white girls <2yo
VUR Grades

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Into a nondilated ureter</td>
</tr>
<tr>
<td>II</td>
<td>Into the pelvis and calyces without dilation</td>
</tr>
<tr>
<td>III</td>
<td>Mild to moderate dilation of the ureter, renal pelvis, and calyces with minimal blunting of the fornices</td>
</tr>
<tr>
<td>IV</td>
<td>Moderate ureteral tortuosity and dilation of the pelvis and calyces</td>
</tr>
<tr>
<td>V</td>
<td>Gross dilation of the ureter, pelvis, and calyces; loss of papillary impressions; and ureteral tortuosity</td>
</tr>
</tbody>
</table>
Grade 3

- Mild dilation of ureter, renal pelvis, and calyces.
- Papillary impressions preserved.
Management

- Screening and treatment of bowel and bladder dysfunction
  - Urge incontinence, infrequent voiding, recurrent UTI, dysuria, abdominal pain, soiling
- Watchful waiting w/ prompt treatment of UTIs/pyelonephritis
  - All patients
- Antibiotic prophylaxis
  - All patients
- Surgical correction
  - Grades III to IV: breakthrough infection
  - Grade IV to V: beyond 2-3yo
Final diagnosis:

Grade 3 Vesicoureteral Reflux
## ACR Appropriateness Criteria

### Urinary Tract Infection—Child

#### Variant 1:

<table>
<thead>
<tr>
<th>Radiologic Procedure</th>
<th>Rating</th>
<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US kidneys and bladder</td>
<td>9</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Voiding cystourethrography</td>
<td>6</td>
<td>Consider this procedure in boys and in the presence of sonographic abnormality.</td>
<td>☀️☀️</td>
</tr>
<tr>
<td>Tc-99m pertechnetate radionuclide cystography</td>
<td>5</td>
<td>Consider this procedure in girls.</td>
<td>☀️☀️</td>
</tr>
<tr>
<td>Tc-99m DMSA renal cortical scintigraphy</td>
<td>3</td>
<td>This procedure is not a first-line test. It could be used 4 to 6 months after UTI to detect scarring.</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

*Relative Radiation Level*
### ACR Appropriateness Criteria

**Variant 2:** Age >2 months and ≤6 years, first febrile urinary tract infection with good response to treatment.

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<th>Comments</th>
<th>RRL*</th>
</tr>
</thead>
<tbody>
<tr>
<td>US kidneys and bladder</td>
<td>7</td>
<td>This procedure has a low yield, especially if US in the third trimester is normal.</td>
<td>0</td>
</tr>
<tr>
<td>Voiding cystourethrography</td>
<td>4</td>
<td></td>
<td>⭐⭐</td>
</tr>
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**Rating Scale:** 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level*
Take Home Points

- Vesicoureteral Reflux
- VCUG
- Be aware of what your order
References

1. https://www.youtube.com/watch?v=Obg9tqm20U8
6. https://acsearch.acr.org/docs/69444/Narrative/
Questions?