From Soup to Nuts: Pediatric Urology in the Primary Care Office

Liza Aguiar, MD
Assistant Professor of Surgery (Urology) and Pediatrics
The Warren Alpert Medical School of Brown University

Disclosure

• I have no financial interest in or affiliation with any commercial supporter to disclose.

Learning Objectives

1. Describe the management of prenatally diagnosed hydronephrosis
2. Summarize the work-up of febrile UTIs
3. Describe treatments of nocturnal enuresis
4. List common causes of recurrent UTIs
Topics

- Prenatal hydronephrosis
- Renal anomalies
- Febrile urinary tract infections
- Recurrent urinary tract infections and bladder bowel dysfunction
- Nocturnal enuresis
- Scrotal swelling

Hydronephrosis: Scope of the Problem

- 1-2% of all pregnancies
- Increased detection with improved high resolution ultrasound
- Wide spectrum of urologic conditions

Prenatal Hydronephrosis: What is Significant?

<table>
<thead>
<tr>
<th>Degree</th>
<th>2nd Trimester</th>
<th>3rd Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>4 to &lt;7 mm</td>
<td>7 to &lt;9 mm</td>
</tr>
<tr>
<td>Moderate</td>
<td>7 to &lt;10 mm</td>
<td>9 to &lt;15 mm</td>
</tr>
<tr>
<td>Severe</td>
<td>≥10 mm</td>
<td>≥15 mm</td>
</tr>
</tbody>
</table>
HYDRONEPHROSIS: Etiologies

Obstruction
[Renal or bladder]

Vesicoureteral reflux

Nonobstructive and non-refluxing
(Physiologic or transient)

Hydronephrosis Grading

Vesicoureteral Reflux Grading

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reflux into ureter only</td>
</tr>
<tr>
<td>2</td>
<td>Reflux into non-obstructed renal pelvis</td>
</tr>
<tr>
<td>3</td>
<td>Reflux into mildly obstructed renal pelvis</td>
</tr>
<tr>
<td>4</td>
<td>Reflux into moderately obstructed renal pelvis</td>
</tr>
<tr>
<td>5</td>
<td>Reflux into severely obstructive renal pelvis with hydronephrosis</td>
</tr>
</tbody>
</table>
Early detection of obstruction and reflux

Prevent UTIs, calculi, renal insufficiency or failure

The Society for Fetal Urology consensus statement on the evaluation and management of antenatal hydrourephrosis

PRENATAL ULTRASOUND

Does prenatal US improve outcomes?

- Renal function?
- Ability to predict outcomes?
The Society for Fetal Urology consensus statement on the evaluation and management of antenatal hydronephrosis

- Renal function: No studies concluding outcomes benefit

POSTNATAL PARAMETERS:

Need for Intervention

- < 10mm AP diameter in 3rd trimester
  - None required intervention

- Those who required intervention
  - > 12mm AP diameter

- HOWEVER...
  - >12mm 34% required intervention

• Hydronephrosis outcomes
  - Prenatal hydronephrosis resolves in majority
    - Mild (AP<12mm): 12% UT pathology
    - Severe (AP>20mm): 88% UT pathology
    - <5% require surgery

Ransley, Masoud DPU 1985

J Ped Urol 2010

BROWN Alpert Medical School
PRENATAL ULTRASOUND

Does prenatal US improve outcomes?

- Renal function? NO
- Ability to predict outcomes? YES

WORK-UP NEEDED TO EVALUATE PRENATALLY DETECTED HYDRO?

Prenatal Hydronephrosis Management
Renal Anomalies

Multicystic dysplastic kidney

Renal agenesis

Renal duplication

Horseshoe kidney

Cross-fused ectopia

Solitary Functioning Kidney: MCDK & URA

• Clinical significance
  • Problems with Contralateral kidney
    • Obstruction
    • Reflux
  • Risk of co-existing genital anomalies
    • 30% of patients with unilateral renal agenesis have an associated Mullerian or Wolffian anomaly
    • Thompson & Lynn, 1966
  • Trauma

Management

• VCUG
  • Up to 30% risk of contralateral vesicoureteral reflux
  • Assessing pyelonephritis risk
• GU exam with pelvic ultrasound in females
  • Palpation of normal ipsilateral vas deferens and epididymis
  • Vaginal bulge or lower abdominal mass, indicating mucocleps
  • Girls should undergo imaging with pelvic US and/or MRI at the time of pubertal onset and prior to menarche to prevent complications
Long-term Follow-up

- Renal ultrasounds until compensatory renal growth is demonstrated in the contralateral kidney
- Counseling
  - Sports
  - Medication
  - Trauma

Other Renal Anomalies:
Duplicated Systems, Horseshoe kidney, Cross-fused Ectopia

- No further work-up necessary unless symptomatic
  - Febrile UTI
  - Gross hematuria
  - Pain

Febrile UTIs (ages 2-24mo)

- Ascending bacterial infection
- Most commonly e. Coli
- Presentation
  - Unexplained fever
  - Gross hematuria
- Collection of urine
- Catheterized urine specimen
  - Suprapubic aspiration
- Ultrasound
- Roll of VCUG
- Roll of antibiotic prophylaxis
Renal/Bladder Ultrasound

- Screen for congenital/anatomic abnormality
  - Hydronephrosis
  - Hydroureter
  - Ureterocele
- May demonstrate renal scarring

VCUG

- Up to 40% of children with history of febrile UTI
- Invasive test
- AAP vs. AUA recommendations

Antibiotic Prophylaxis in VUR: UTI Outcome
8 RCTs 2006-2014

- Garin et al Peds 2006
- Montini et al Peds 2008
- Pennesi et al Peds 2008
- Hari et al Ped Nephrol 2014
- Roussey-Kessler JUrol 2008
- Branstrom JUrol 2010
- Craig NEJM 2009
- Hoberman NEJM 2014
ANTIBIOTIC PROPHYLAXIS AND VUR: UTI Outcome
8 RCTs 2006 - 2014

• 4/8 → Antibiotics not helpful

Antibiotics not helpful

Garin et al Peds 2006
Montini et al Peds 2008
Pennesi et al Peds 2008
Hart et al Ped Nephrol 2014

8 RCTs 2006 - 2014

• 4/8 → Antibiotics protective

Antibiotics protective

Roussey-Kessler J Urol 2008
Branstrom J Urol 2010
Craig NEJM 2009
Hoberman NEJM 2014

Why such different results and recommendations?

• The study populations all have VUR, but that is where the similarities end

• Differences:
  • Inclusion and exclusion criteria
  • Definitions of pyelonephritis
  • Grades of VUR
  • Length of follow-up
  • Some consider BBD, some don’t
Consider Antibiotic Prophylaxis....

- History of febrile UTI
- High grade reflux + hydronephrosis
- Presence of renal scarring

Recurrent UTIs and Bladder Bowel Dysfunction

- BBD: A spectrum of lower urinary tract symptoms associated with bowel complaints
- Dysfunctional voiding: Failure of the pelvic floor muscles to relax during voiding
  - Incomplete bladder emptying
  - Suprapubic discomfort
  - Hematuria
  - Incontinence
  - UTIs

UTIs/BBD History

- Voiding frequency
- Urinary incontinence
- Holding
- Retentive posturing
- Urgency, hesitation, dysuria
- Abdominal pain and cramping
- Frequency of bowel movements, consistency, shape and size
- Encopresis
UTIs/BBD Physical Exam

• Abdominal exam
• GU exam
  • Underwear – leakage, smell, streaking
  • Urine pooling in vaginal vault – vaginal voiding or ectopic ureter
  • Signs of abuse – 6% of pts with voiding dysfunction have history of abuse
    (Ellsworth et al. 2002)
• Neuro exam
  • Back: presacral abnormality
  • LE strength

UTIs/BBD Work-up

• Urinalysis and urine culture
• RBUS for recurrent UTI or febrile UTI
• MRI of spine for concern of neurogenic bladder
• Bladder scan post-void residual
• Uroflow/EMG
• Urodynamics

UTIs/BBD Treatment

• Educating patient and family
• Behavioral
  • Timed voiding
  • Adequate hydration (48-64 oz/day)
  • Comfort and relaxation during voiding
  • Bowel management
  • Pelvic floor physical therapy
“Don’t forget that inside most people you read about in history books is a child who fiercely resisted toilet training.”

- Richard Holbrooke

Nocturnal Enuresis

• Primary
  • Never been dry at night

• Secondary
  • Prior history of 6 months of dryness
  • May requires neurologic evaluation
  • Often due to stressful event

Epidemiology and Natural History

5 years – 16 percent
6 years – 13 percent
7 years – 10 percent
8 years – 7 percent
10 years – 5 percent
12 to 14 years – 2 to 3 percent
≥15 years – 1 to 2 percent
Potential Causes

- Smaller functional bladder capacity
- Delayed maturation of bladder control
- Genetics
- ADH
  - Blunted response to ADH vs. decreased ADH production
- Likely multifactorial

Evaluation

- History & physical
  - Number of wet nights/week
  - Primary vs. secondary
  - What have they tried (stopping fluids prior to bedtime, timed waking)
  - Abdominal exam: palpable stool balls, palpable bladder
  - Back: presacral abnormalities
  - Neuro: LE strength
- Family History
  - Anyone in family who was a bedwetter
- Social History
  - Stressors

- Urinalysis
  - Screen for diabetic ketoacidosis, diabetes insipidus, water intoxication, and/or occult UTI
- Renal/bladder ultrasound
  - Significant daytime complaints
  - History of UTIs
- MRI
  - Secondary nocturnal enuresis with no psychosocial stressor
  - Presacral abnormality or abnormal neuro exam
Treatment

• Education and reassurance
• Perfecting daytime habits
• Motivational therapy
• Medication
• Enuresis alarms

Education and Reassurance

• High rate of spontaneous resolution
• Most parents do not know incidence
• Emphasize it is not the child’s fault
  • Up to 1/3 of parents punish their child for wetting the bed (Skelov et al 1981)
• Define the expectations of the parent and child
  • Dryness for sleepovers or overnight camps vs. long-term dryness

Perfecting Daytime Habits

• Timed voiding
• Strict constipation control
• Front loading water intake
• Stopping fluid intake 2 hrs prior to bed time
• Voiding before bed
Motivational Therapy

- For patients who do not wet the bed every night
- Sticker chart
- Estimated to be successful for 25% of patients

Medication

- Desmopressin (DDAVP)
  - 50% of children are responders
  - Risk of hyponatremia with increased fluid intake
- Anticholinergic (oxybutinin)
  - Often used in combination with DDAVP
- Imipramine
  - Relaxes detrusor muscle and may lighten sleep
  - 10-50% success rate

Bedwetting Alarm

- Requires motivated patient and family
- Labor intensive
- Conditions the brain to wake up
  - Sound, vibration, or both
- Major cause of failure = compliance
- Up to 80% effective
- At least 4 months of use

It is essential that the parent fully wakes the child up when the alarm goes off!
Questions?

Thank you!