OAB and LUT dysfunction: Comorbidity of constipation, UTI & VUR

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Lower urinary tract dysfunction (UTI)

- Predictive of bladder storage issue
- Urinary stasis = “Holder”
- Incomplete emptying
- Irritative voiding symptoms
  - Urgency
  - Frequency
  - Dysuria
  - Incontinence
  - Posturing/Holding maneuvers
- OAB
Detrusor Overactivity

Small OAB

Incomplete Emptying
Detrusor Overactivity

Small OAB

No UTI

Incomplete Emptying

+ UTI
Lower urinary tract dysfunction
VUR

• Strong association of VUR with LUT dysfunction
• Emptying issue
  • Voiding dyssynergy
• Storage issue
  • Altered bladder wall compliance
  • ↑ bladder pressures
• Frequently accompanied by constipation
• Secondary VUR
Primary reflux
Critical anatomy

- Intravesical ureter length relative to diameter
  - 5:1
- Proper muscular attachments
  - Fixation
- Posterior Support
  - Compression
Primary reflux
Critical anatomy

- Intravesical ureter length relative to diameter
  - 5:1
- Proper muscular attachments
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- Posterior Support
- Compression
Primary reflux
Embryology

- Abnormal ureteral bud
- Renal dysplasia
  - Displaced ureteral bud
  - Faulty induction of metanephros

[Diagram showing embryonic development of the kidneys with labels for Metanephric bud, Ureteral bud, and Common excretory duct]
Secondary reflux

Bladder outlet obstruction

↑ Pressure

Anatomic
- PUV
- Ureterocele
- Atresia / Stricture

Functional
- Neuropathic bladder
- Voiding Dysfunction
Non-neurogenic, neurogenic bladder
Hinman Syndrome
Non-neurogenic, neurogenic bladder
Hinman Syndrome
Non-neurogenic, neurogenic bladder
Hinman Syndrome
Bladder outlet obstruction
Smooth muscle response

- Tension / Stretch

- Hypertrophy

- Hyperplasia

Bladder outlet obstruction
Smooth muscle response

• Hyperplasia

• $\Delta$ Bladder Compliance

• Niederhoff et al, J Urol, 184: 1686-1691, 2010
Bladder outlet obstruction
Smooth muscle response

- △ Bladder compliance

- Hydronephrosis
- Vesicoureteral reflux
- Renal damage
- Renal failure
OAB / LUT dysfunction
Associated comorbidity

• Recurrent UTI’s
• Vesicoureteral reflux: 33-50%
  • Addressing overactive bladder or dysfunctional elimination problems
    • ↑ reflux resolution 3x compared to controls
• Constipation

• Koff et al, J Urol,122:373-376, 1979
• Koff & Murtagh , J Urol,130:1138-41, 1983
• Homsy et al, J Urol, 134:1168-71, 1985
• Schulman et al, Pediatrics 103:E31,1999
• Uragh et al, J Urol, 179: 1564-1567, 2008
Secondary VUR

- Vital to inquire & determine elimination patterns of children with VUR
- Treat bladder dysfunction
  - Resolution or downgrading VUR with Oxybutynin
    - 62% of ureters in 37 children

Constipation and LUT dysfunction
Constipation and LUT dysfunction
Constipation and LUT dysfunction
### Dysfunctional elimination syndrome (DES)

- Association of fecal elimination disturbances with dysfunctional voiding syndromes

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**143 patients – “1º VUR”**

<table>
<thead>
<tr>
<th></th>
<th>Pts (%)</th>
<th>Breakthrough UTIs</th>
<th>VUR Resolution (Yrs)</th>
<th>Mean Reflux Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>DES</td>
<td>66 (46)</td>
<td>54 (82)</td>
<td>6.8</td>
<td>3.2</td>
</tr>
<tr>
<td>No DES</td>
<td>77 (54)</td>
<td>16 (23)</td>
<td>5.2</td>
<td>2.3</td>
</tr>
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</table>

- Reduction of 1.6 years in VUR resolution
- 1 Grade less severe in VUR resolution

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Transient urodynamic dysfunction in infancy

- Voiding abnormalities during infancy
- Predisposed to UTI & VUR with spontaneous improvement
- Urodynamic study of infants with UTI &/or VUR

<table>
<thead>
<tr>
<th></th>
<th>Males (39 pts)</th>
<th>Females (22 pts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal Voiding</td>
<td>97%</td>
<td>77%</td>
</tr>
<tr>
<td>High Voiding Pressures (&gt;40 cm H₂O)</td>
<td>92%</td>
<td>66%</td>
</tr>
</tbody>
</table>

- Chandra et al, *J Urol*, 1996;155(2) 673-677
Urodynamic dysfunction infancy
High grade VUR

- Bladder dysfunction
- High filling & voiding pressures
- Two year follow-up
  - Gradual decrease of initial hypercontractility
  - ↑ Bladder capacity
  - ↓ voiding pressures
- ↑ Resolution with ↓ bladder dysfunction

- Sillén et al, *Br J Urol*, 1999; 83 (3) abstr 3: 69-70
Summary of the AUA Guideline on Management of Primary Vescoureteral Reflux in Children

• Abnormal bladder and bowel function, and VUR are recognized to be associated and linked with each other and UTI
• VUR outcomes are affected by the presence or absence of bladder and bowel dysfunction (BBD)

• Standard:
• Symptoms indicative of BBD should be sought in the initial evaluation (including urinary frequency and urgency, prolonged voiding intervals, daytime wetting, perineal/penile pain, holding maneuvers [posturing to prevent wetting] and constipation/encopresis).

J Urol 184: 1134-1144, September 2010
Influence of BBD in VUR management

- Risk of febrile UTI in children with VUR on antibiotic prophylaxis is greater in those with (44%) than without (13%) BBD

- Forest plots of febrile UTI incidence in children (medical management of BBD vs Non-BBD). Concurrent/prior use of *bladder training, †anticholinergics, ‡stool softeners
Influence of BBD in VUR management

• Rate of reflux resolution 24 months after diagnosis is less for children with (31%) than without (61%) BBD

• Forest plots of reflux resolution rate among children receiving antibiotic prophylaxis
Influence of BBD in VUR management

- Rate of cure following endoscopic therapy is less in children with than without BBD but there is no difference for open surgery

- Forest plots of reflux resolution in children undergoing intervention with curative intent (open or endoscopic surgery)
Influence of BBD in VUR management

• Rate of postoperative UTI is greater in children with (22%) than without (5%) BBD

• Forest plots of UTI incidence in children following open or endoscopic surgery (BBD vs Non-BBD)
Summary of the AUA Guideline on Management of Primary Vesicoureteral Reflux in Children

**Recommendation:**
- If clinical evidence of BBD is present, treatment of BBD is indicated, preferably before any surgical intervention for VUR is undertaken.
- There are insufficient data to recommend a specific treatment regimen for BBD, but possible treatment options include behavioral therapy, biofeedback (appropriate for children > age five), anticholinergic medications, alpha blockers and treatment of constipation.
- Monitoring the response to BBD treatment is recommended to determine whether treatment should be maintained or modified.

**Recommendation:**
- Continued antibiotic prophylaxis is recommended for the child with BBD and VUR due to the increased risk of UTI while BBD is present and being treated.

J Urol 184: 1134-1144, September 2010
Summary

- VUR and UTI are closely associated with bladder and bowel dysfunction

- Treatment of bladder and bowel dysfunction
  - Facilitate & improves the prognosis of VUR & UTIs
  - Improves response rates and interventions toward VUR and UTIs