CHOC Children’s Business Development
Virtual Pediatric Lecture Series

Bladder Function and Dysfunction: Woes for Primary Care Clinicians

Friday, November 13, 2020 from 12:30 – 1:30 PM (PST)

WELCOME
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Pediatric Virtual Lecture Series:
Bladder Function + Dysfunction; Woes for Primary Care Clinicians

Planning Committee Disclosures – The following Planning Committee members have had no relevant financial relationships in the last 12 months with any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients:

• Leslie Castelo
• Mary Hickcox
• James D. Korb, MD
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Faculty Disclosures - The following planner(s)/speaker(s) have had no relevant financial relationships in the last 12 months with any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients:
  • Tony Khoury, MD

CME Planning Committee Disclosure - This live activity was approved outside of the CME Committee. The following CME Committee members have had no relevant financial relationships in the last 12 months with any entity producing, marketing, re-selling, or distributing health care goods or services consumed by, or used on, patients:
  • Mary E. Hickcox
  • James D. Korb, MD
Bladder and Bowel Dysfunction: Frustrating for the Family and Doctor

Tony Khoury MD FRCSC FAAP
Walter R. Schmid Professor of Pediatric Urology
Professor, Department of Urology
University of California, Irvine
Head of Pediatric Urology
Children's Hospital of Orange County

CHOC Children's Urology Center
LEARNING OBJECTIVES

• The basics of normal bladder function
• Understand the relationship between bladder and bowel dysfunction
• Diagnose the different causes of urinary incontinence
• Manage the different therapeutic modalities to correct bladder and bowel dysfunction
The Poor Bladder
Matt won't hold it in any longer, flushes away bladder woes in time for Opener

YA
GOTTA
RELIEVE!

Matt Harvey, who gave Mets a scare with 'mysterious' medical problem Monday, is OK after passing painful blood clot in bladder. Pages 40-41
Courage
Kindness
Generosity

Intelligence
Wisdom
Creativity
I hope I'm next. My bladder is about to...to burst.
Urinary Bladder

- Unique organ
- Dual functions of storage and emptying of urine
- Complex innervation of voluntary and involuntary control of function
Normal Bladder Function

- Low pressure filling
- Low pressure storage
- Perfect continence
- Periodic voluntary expulsion (at low pressure)
- Resist infection
Detrusor Muscle Properties

Contractile properties well suited for either urine storage or release

Smooth Muscle

Connective Tissue
Normal Reflex

Cortical Inhibition

(+)
Stretch Receptors

Low Pressure Storage

Detrusor Overactivity
Bladder Filling

Cortical Inhibition

(+) Stretch Receptors

Low Pressure Storage

Neurogenic Detrusor Overactivity

Department of Urology
School of Medicine
University of California - Irvine

CHOC Children's
Children's Hospital of Orange County
Evolution from Infantile to Adult Bladder

1. Progressive increase in functional bladder capacity

2. Maturation of voluntary control over the urethral striated muscle sphincter

3. Development of direct volitional control over the bladder-sphincteric unit so that the child can voluntarily initiate or inhibit the micturition reflex.

Urethral Control Mechanism

Smooth muscle maintains tone with relatively little expenditure of energy

Striated muscle for emergencies

Holding Reflex

Voiding Dysfunction
Detrusor-Sphincter Dyssynergia

Sphincter Contraction in response to Bladder contraction

Increased Outlet Resistance

Hinman Syndrome

Storage pressure
Detrusor- Sphincter Dyssynergia

Sphincter Contraction in response to Detrusor contraction in NB (OA or voiding contraction)

Voiding Dysfunction

Learned behavior in a neurologically intact person. Failure of relaxation of urethra during voiding
Clinical Significance

• BBD predisposes children to Recurrent UTIs and VUR

• Incontinence impacts behavioral, emotional, and social aspects of a child’s daily life.

• “Wetting pants in class” rated as the third most stressful life event in school children

Epidemiology

- BBD accounts for up to 40% of pediatric urology clinic visits annually
- Daytime incontinence is estimated to affect up to 7 million children in the United States 6 years of age or older
- Daytime urinary incontinence is more common in girls (6.7%) than in boys (3.8%)
Childhood constipation: Finally some hard data about hard stools!

It is estimated that 55 million adults in the United States, approximately 28% of the population, are constipated.¹

Similar large-scale epidemiologic data are not available in pediatrics, although it has been reported that 34% of toddlers in the United Kingdom and 37% of Brazilian children younger than 12 years of age were considered by their parents to be constipated.²

A disorder of defecation is the chief complaint in 3% to 5% of visits to pediatricians. At Children’s Hospital of Pittsburgh, a review of visits to the gastroenterology clinic during the past year reveals the prevalence of children

See related articles, p. 35 and p. 41.
Urinary Incontinence

the bladder and the bowel

– partners in crime

Often an association between constipation & bladder problems
Constipation

- Relief of constipation resulted in resolution of:
  - daytime urinary incontinence in 89%
  - enuresis in 63% of patients

Loening-Baucke, 1997
Understanding The Cause of Incontinence
Wein’s Functional Classification

- **Failure to Store**
  - Because of Bladder (CCC)
  - Because of Urethra
  - Combined

- **Failure to Empty**
  - Because of Bladder
  - Because of Urethra
  - Combined
Effect of incomplete emptying on storage

Bladder Capacity (in ounces) = Age (yrs) + 2
# Intake and Voiding Diary

**Instructions:** Begin recording as soon as you wake in the morning and continue for 24 hours. Choose 2 full days to complete this record—note that they DO NOT need to be consecutive, but just days that you can be sure to record EVERY void. Please measure voided volumes in the hat provided in ‘cc’ and fluid intake in ‘oz.’ Please record approximate times for all events, and try to note the severity of urinary leakage and if there is any associated urgency.

| TIME | Voiced volume (cc) | Leakage  
1 = damp  
2 = soaked | Urgency  
1 = yes  
2 = no | Fluid intake (oz) |
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<td>Type</td>
<td>Description</td>
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<tr>
<td>-------</td>
<td>--------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Separate hard lumps, like nuts (hard to pass)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Sausage-shaped but lumpy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Like a sausage but with cracks on the surface</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Like a sausage or snake, smooth and soft</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Soft blobs with clear-cut edges</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Fluffy pieces with ragged edges, a mushy stool</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Watery, no solid pieces. Entirely Liquid</td>
<td></td>
<td></td>
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The Dysfunctional Voiding Symptom Score
The Dysfunctional Voiding Symptom Score

• To quantify pediatric DV symptoms.

• Does bladder retraining make a difference?
Materials and Methods

- **Group A**: (n=104, aged 3 to 10 years, M: F 1:4) presenting to the Pediatric Urology Clinic with history of:
  - diurnal urinary incontinence.
  - urinary tract infections.
  - or abnormal voiding habits

- **Group B**: (n=54), M: F 1.3:1] consisting of children without suspected voiding dysfunction or fluid imbalances from a non-urolology clinic
DVSS

Ten questions reflecting unique BBD parameters were assigned scores of 0 to 3 according to prevalence (maximum score 30).
<table>
<thead>
<tr>
<th>Over the last month</th>
<th>Almost never</th>
<th>Less than half the time</th>
<th>About half the time</th>
<th>Almost every time</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have had wet clothes or wet underwear during the day</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>2. When I wet myself, my underwear is soaked</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>3. I do not have a bowel movement every day</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>4. I have to push for my bowel movements to come out</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>5. I only go to the bathroom one or two times each day</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>6. I can hold onto my pee by crossing my legs, squatting or doing the “pee dance”</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>7. When I have to pee, I can not wait</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>8. I have to push to pee</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>9. When I pee it hurts</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>NA</td>
</tr>
<tr>
<td>10. Parents to answer: Has your child experienced something stressful like the example below? TOTAL</td>
<td>No (0)</td>
<td></td>
<td></td>
<td>Yes (3)</td>
<td></td>
</tr>
</tbody>
</table>

New baby  
New home  
New school  
School problems (tests/ friends)  
Abuse (sexual/physical)  
Home problems (divorce, death)  
Special events (birthday)
Distribution of DVSS between Groups A and B

Maximum score 30
DVSS an Objective Measure

Before After
Compliant Non-compliant

p < 0.05
Physical Exam

- Abdomen: Tenderness over colon → constipation
- Spine
- Genitals: Meatal stenosis or Labial adhesions
- Check Underwear for urine and stool stains
Investigations

- UA and UC
- UroFlow and
- PVR by US
Beware The Bag Specimen

Bag → Always Positive
(USELESS for Culture OK for UA)

Midstream → Helpful if done properly
Always Check for Pyuria

Catheter → Gold Standard
Conservative Management

- Behavioral modification of voiding (i.e., timed voiding schedules)
- Lifestyle modifications
- Treatment of constipation
- 70% Reduction in symptoms
Bowel Management

- Increased fluid intake: 18 oz cup/yr of age up to 8 cups
- High fiber: age in years + 15-20 gms of Fiber
  - Pears, Prunes, Papaya
  - Flax/Chia seeds
- PEG
Behavioral Modification

• Timed voiding
  – Watch
  – Diary → rewards for voiding

• Motivation improves with age
  – Peer pressure
  – Maturation of bladder
Pharmacotherapy

Based on findings on diary and FR/PVR

• Storage
  – Anticholinergics: follow up FR PVR

• Voiding dysfunction
  – BN: Alpha Blocker
  – Pelvic Floor: Biofeedback
BBD and VUR

The Journal of Urology
Volume 184, Issue 3, Pages 1134-1144, September 2010

Summary of the AUA Guideline on Management of Primary Vesicoureteral Reflux in Children

BBD is associated with more UTIs on CAP

AUA GUIDELINES

Overall

UTI incidence (per 100 children)

BBD

No BBD

44%

13%

UTI incidence (per 100 children)
BBD is associated with less VUR resolution at 2y

AUA GUIDELINES

BBD

Overall

Reflux resolution (per 100 infants)

No BBD

Overall

Reflux resolution (per 100 infants)

31%

61%
BBD is associated with reduced success for endoscopic VUR Correction

AUA GUIDELINES

BBD

No BBD

Reflux resolution (per 100 children)

DES, Endoscopy

Non-DES, Endoscopy

57%
BBD is associated with increased incidence of UTI after surgery

**AUA GUIDELINES**

**BBD**

Overall

- 2360
- 3560
- 2360
- 3690

**No BBD**

Overall

- 2360
- 3560
- 2360
- 3690

23%

5%
SPECIFIC CONDITIONS
Specific Conditions

- Overactive bladder (OAB),
- Voiding postponement
- Underactive bladder
- Giggle incontinence
- Vaginal reflux
- Pollakiuria (Sensory Urgency and Frequency)
- Enuresis
Overactive Bladder (OAB)

- **Symptoms:**
  - Frequency
  - Urgency
  - Urge incontinence

- **Management:**
  - Constipation
  - Water
  - Anticholinergic
Underactive Bladder
(Lazy Bladder, Holders)

- Large Bladder / decompensated detrusor
- Void with straining
- High PVR
- Encourage timed voiding and double voiding
- Alpha Blocker
- CIC
Voiding Postponement

- Holder - Infrequent voider
- Bladder diary
- FR PVR
- Timed Voiding
Giggle Incontinence (Enuresis Risoria)

- CNS inactivation (cataplexy) in association with laughter

- RX:
  - Behavioral modification
  - Methylphenidate
  - Anticholinergics
Sensory Urgency and Frequency (Pollakiuria)

- Extreme Urgency and Frequency
- Small daytime volumes
- WITHOUT INCONTINENCE
- No Nocturia
- Large volume in the morning
- Usually self limiting
- Rx: Increase water intake, Anticholinergics
Vaginal Entrapment / Voiding

- Typically wet after voiding
  - History important here !!
- Prepubertal girls
- Check for Labial adhesions
- Rx. Postural change and stand up to wipe
Take Home Messages

- Common Problem
- A good H&P Diary and Qnaires very telling
- Behavioral modifications resolve the majority
- Remember the Rectum
- Non-invasive studies
- Short term meds and follow-up Diary and Qnaires
- Most get better with time
PRACTICE INFORMATION

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Fax: 855-246-2329

Office Line: 714-509-3919

ADDITIONAL LOCATIONS
Mission Viejo and Huntington Beach

Specialty Care Physician Concierge Service: 714-509-4013
Physicians available via Telehealth and pingmd®
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CHOC Business Development at
714-509-4363, or BDINFO@choc.org
UPCOMING VIRTUAL PEDIATRIC LECTURES

Neurosurgery: Minimally Invasive Surgery for Craniosynostosis
January 14, 2021, 12:30 p.m. - 1:30 p.m.

Orthopaedic Oncology
February 25, 2021, 12:30 p.m. - 1:30 p.m.

Free registration at: choc.org/VirtualLectureSeries

Contact CHOC Business Development: (714) 509-4291
THANK YOU.