Investigations and Management
Daytime urinary incontinence

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Objectives

• Definitions
• Bladder Function
• Presenting Symptoms
• History and Examination
• Bladder diary, Uroflowometry + USS
• Drug approaches
• Neuromodulation
• Advanced Investigations (VUD)
• Enuresis – night wetting
• MSE – monosymptomatic 2/3
• NMSE – non monosymptomatic enuresis 1/3
• Daytime Urinary incontinence – DUI

• Involuntary loss of urine in socially inconvenient situations beyond 5 years of age, at least once a week and where there are organic causes.
Daytime urinary incontinence

- Overactive Bladder (OAB)
- Dysfunctional voiding
- Underactive Bladder
- Others
How does the bladder work?

1. **Storage of urine**
   - Void when socially convenient
   - 99%

2. **Voiding phase**
   - Complete bladder emptying
   - 1%
Voiding

-Detrusor contracts
-Urethral and sphincteric mechanisms must open

- Underactive detrusor
- Obstruction:
  - **Anatomical:**
    - PUV, epispadias, strictures, stones, tumours
  - **Neurological** – spina bifida, lipoma, tethered cord
  - **Functional:**
    - dysfunctional voiding
    - Primary bladder neck dysfunction
<table>
<thead>
<tr>
<th>Storage</th>
<th>Voiding</th>
<th>Post- micturition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urgency</td>
<td>Hesitancy</td>
<td>Feeling of incomplete emptying</td>
</tr>
<tr>
<td>Increased daytime frequency</td>
<td>Intermittency</td>
<td>Post micturition dribble</td>
</tr>
<tr>
<td>Nocturia</td>
<td>Slow stream</td>
<td></td>
</tr>
<tr>
<td>DUI</td>
<td>Splitting or spraying</td>
<td></td>
</tr>
<tr>
<td>Altered bladder sensation</td>
<td>Straining</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terminal dribbling</td>
<td></td>
</tr>
</tbody>
</table>
Definition - OAB

- Syndrome of Lower Urinary tract dysfunction (Bladder, ureters, outflow tract) characterised by:
  - Frequency
  - Urgency
  - Urge/Stress Incontinence
  - Stream abnormalities
  - Mostly complete bladder emptying
  - Post Void residuals if associated dysfunction voiding
History - General

- Age of onset primary Vs secondary
- Thorough antenatal/perinatal history
- Fetal distress/hypoxia/oligo-polyhydramnios
- Maternal illness
- Neurodevelopment – ADHD/ASD
- Potty training – failure to establish
- Toileting behaviours/aversions/retention
- OSA/Hypermobility
- Family History of Nephro-urological disorders
- Previous responses to interventions
History - Specific

- Urine Frequency
- Voiding position
- Urgency (each void?) Posturing/Reactions
- Voided volumes
- Incontinence
- Stress Incontinence
- Stream
- Straining/hesitancy/dribbling/vaginal reflux
- Enuresis?
- UTI history
- Fluid Intake
- Bowels
Examination

• Abdomen – masses/faecoma
• Lumbo-sacral spine
• Lower Limb neurology
• Cutaneous stigmata
• Gait
• Tonsils – Adenoids
• External genitalia
• General examination
ICCS Rome Criteria Constipation

- Straining > 25%
- Lumpy/Hard stool > 25%
- Sensation incomplete emptying > 25%
- < 3 stools per week
- Loose stools rare without laxatives
- Stool retentive posturing
- Large calibre stools that block toilet
- Faecal mass in rectum /abdo exam
- Rectal Bulb USS > 30mm with lack of desire
Urodynamic studies

• Any functional test of the Lower urinary Tract
• Simple – Bladder diary, Uroflowometry and Post Void Residuals.
• Complex – Invasive urodynamics (+/-Video)
• Urethral or suprapubic.
# Bladder and Bowel diary

On the next page, you will find a bladder diary. Keeping a bladder diary helps us to make an assessment of how your child's bladder is working and gives us an idea of the amount your child drinks, the amount of urine your child's bladder can hold and how often your child passes urine.

**How to complete the bladder diary**

Fill in the bladder diary as carefully as possible for two convenient days (preferably not school days).

- For each day record what and how much your child drinks (in mls or cups) and when they drink it.
- Use a jug to measure the amount of urine your child passes. Record the amount on the chart and the approximate time.
- If your child leaves urine, tick the column marked “wet”.
- Record any day and night-time wetting on the seven-day Bowel diary on page 3.

If possible every time your child passes urine please put a letter on the chart from the list below that describes how urgently your child had to get to the toilet:

- **A.** My child felt no need to empty their bladder but did so for other reasons
- **B.** My child could have postponed voiding (emptying their bladder) as long as necessary without fear of wetting themselves
- **C.** My child could have postponed voiding for a short while, without fear of wetting themselves
- **D.** My child could not postpone voiding, but had to rush to the toilet in order not to wet themselves
- **E.** My child leaked before arriving at the toilet

Below is an example of how to complete the bladder diary:

<table>
<thead>
<tr>
<th>Time</th>
<th>DAY 1</th>
<th></th>
<th></th>
<th>DAY 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IN (drink)</td>
<td>OUT (urine)</td>
<td>Wet</td>
<td>Urgency</td>
<td>IN (drink)</td>
<td>OUT (urine)</td>
</tr>
<tr>
<td>07:00</td>
<td>1 cup milk</td>
<td>120 mls</td>
<td></td>
<td></td>
<td>1 cup water</td>
<td></td>
</tr>
<tr>
<td>08:00</td>
<td>1 cup water</td>
<td></td>
<td></td>
<td></td>
<td>1 cup water</td>
<td></td>
</tr>
<tr>
<td>09:00</td>
<td>90 mls 10 mls</td>
<td></td>
<td></td>
<td></td>
<td>90 mls 10 mls</td>
<td></td>
</tr>
<tr>
<td>10:00</td>
<td></td>
<td>90 mls 10 mls</td>
<td></td>
<td></td>
<td></td>
<td>90 mls 10 mls</td>
</tr>
<tr>
<td>11:00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Uroflowometry

Expected Bladder capacity for age

• Koff Formula
  - $EBC \text{ (ml)} = (\text{Age in yrs} + 2) \times 30$
• Butler/Hjalmas Formula (>5 years)
  - $EBC \text{ (ml)} = (\text{Age in yrs} \times 30) + 30$
• Small capacity bladder <65% EBC
• Large bladder capacity >150% EBC
• Nocturnal polyuria >130% EBC
• Normal voiding frequency 4-7x/day
  - Frequency >7
  - Infrequent <4
Uroflowometry

- Non-Invasive
- Inexpensive
- Measures volume of urine passed/unit time (mls/sec)
- Flow curve clue to detrusor action/obstruction
- PVR scan after
Uroflowometry continued

- At least two representative curves
- > 50% EBC void
- Info (level of need)
- Sitting/standing
- Normal pattern for them?
- Wet?
- Fluid intake

![Uroflowmetry Diagram]
Interpretation

- Flow dependent on detrusor contraction and outflow tract patency (sphincter relaxation/urethra/meatus/bladder neck)
- Children can compensate for outlet obstruction with intense detrusor contraction
- Uroflowometry tell us NOTHING of intravesical pressures
Post Void Residual Scan

- Immediate < 1min
- Rpt thrice
- Document range
- < 10% older kids
- < 20mls generally
- Refill phenomenon
Patient: Amy Calverhouse
Hospital: 
Visit No.: 
Date (dd-mm-yyyy): 2-18-2011
Time (hh:mm:ss): 19:11:15 (24 hr clock)

Flow
Full Scale
40 ml/s

Uroflow Summary

Peak Flow: 42 ml/s
Mean Flow: 38 ml/s
Voluntary Time: 12 sec
Flow Time: 12 sec
Time To Peak Flow: 6 sec
Volume: 349 ml

Comments: 644 ml
Reports normal voiding pattern
Management and Investigation ladder for OAB

- Mirabegron
- S3 Agonist
- Intravesical BOTOX
- Biofeedback?

Further treatments

Video-urodynamics

Bladder diary and non-invasive urodynamics
- Anticholinergic +/- Neuromodulation

1. Oxybutinin
2. Tolterodine
3. Solifenacin
4. Trospium

Urotherapy and management of bowels
Urotherapy

Fixed fluid target spread across 6-8 drinks
Restrict fluids 1-2 hrs prior to bed
Regular timed voiding plan 2-3h (Wobble watch) May include ‘lifting’ for enuresis.
(Double and triple voiding)
Treatment of constipation
Pelvic floor exercises-relaxation techniques
Biofeedback (for dysfunctional voiding)
Drug Therapy - Anticholinergics

1. Oxybutinin (XL) – Lyrinel
2. Tolterodine Tartate (XL) Detrusitol
3. Solifenacin (Vesicare)
4. Trospium Chloride
   BBB (s/e – ADHD – ASC)

- Side effects: dry mouth, blurred vision, constipation, poor bladder emptying, neuropsychiatric Sx.
- 60% Response rate
Transcutaneous Electronerve Stimulation TENS

- Setting p05
- 1h/night 3 months
- S2/3 nerve roots
- Max mAmps tolerated
- Long interest
- Limited evidence children
- ELCH cohort -54% improvement in urgency/wetting

Parasacral transcutaneous electrical stimulation for overactive bladder in children: An assessment per session
Maria Luiza Veiga, Ana Paula Queiroz, Maria Clara Carvalho, Ana Aparecida Nascimento Martineli Brag, Ariane Sampaio Sousa, Ubirajara Barroso. JUrol 2016; 03:011
Dysfunctional voiding

Risk of UTI is 7 times greater than normal

Risk of VUR is 15 times greater than normal

Fig. 11-1. Schematic of normal coordinating voiding (A) and dysfunctional voiding (B). (Courtesy of the National Kidney Foundation of Texas. A Parent’s Primer to Normal and Abnormal Voiding in Children, Dallas, TX)
Management of dysfunctional voiding

STAGE 1

- Management of UTI

STAGE 4

- CIC
- Urodynamic investigation and assessment of kidney status
- Biofeedback (+/- anticholinergic)
- General measures
  - Positioning
  - Constipation management
  - Management of UTI
Formal Videourodyamics

• What is it?
  • Pressure-flow study with indwelling catheter, pressure probe and rectal probe +/- EMG.
  • Allows us to characterise
  • STORAGE
    • Capacity, compliance, pressures, sensation
  • VOIDING
    • Flow rates, pressures during voiding, PVR
  • VIDEO
    • Bladder shape/neck/urethra/VUR/VR/level of obstruction/bladder neck level

• ELCH c2,000 studies 85% identified OAB 15% other diagnosis
Catheter: Small 8Fr SELF - GA - ENTONOX

Site: Urethral - Suprapubic - Mitrofanoff
Ensuring a Technically Good Trace

\[ p_{\text{ves}} \text{ and } p_{\text{abd}} \text{ are same amplitude so that } p_{\text{det}} \text{ is zero on subtraction.} \]
What’s left?

• **Mirabegron** (NICE guideline) S3 agonist
• Mirabegron + Solifenacin/Tolterodine
• S3 Agonist s/e HR, BP, nasal congestion

• **Intravesical Botox** (Dysport)
• GA
• 6-monthly
• Risks – Pain/PVR/UTI/retention

• **CIC?** - large residuals, chronic wetting/dribble
Resources

• ERIC   www.eric.org.uk
• Education and Resources for improving childhood continence 08453708008
• NICE enuresis guideline 111 www.nice.org.uk/guidance/CG111
• NICE constipation guideline 99
•  www.nice.org.uk/guidance/CG99
• The Standardization of Terminology of Lower Urinary Tract Function
• in Children and Adolescents: Update Report from the Standardization
• Committee of the International Children’s Continence Society  J Urol 2014
• Paul F. Austin,* Stuart B. Bauer, Wendy Bower, Janet Chase, Israel Franco, Piet HoebekeSøren Rittig, Johan Vande Walle, Alexander von Gontard, Anne Wright, Stephen S. Yang and Tryggve Neveus
“Whenever somebody tells me ‘You go girl’ I generally have to.”
Any questions?