Nocturnal Enuresis

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Case Study

11 y/o boy presenting with bedwetting >5 nights per week and episodes of daytime urgency.
Micturition

- Relaxation of the pelvic floor and external urethral sphincter
- Contraction of the detrusor muscle surrounding the bladder

Result = Forceful and continuous urine flow with complete bladder emptying
Micturition

- Controlled by four specific parts of the nervous system:
  - ganglion cells in the bladder wall and sympathetic chain (autonomic) and dorsal root chain (sensory)
  - motor neurons and sensory interneurons in the caudal spinal cord
  - the caudal brainstem
  - the cortical and subcortical areas
Micturition

- Cortical arousal is present during sleep in response to bladder distension
- Ages 1-2: Develop conscious sensation of bladder filling
- Ages 2-3: Develop ability to void or inhibit voiding voluntarily
- Ages 3-4: Develop adult pattern of urinary control and are dry during day and night
Micturition

- Normal frequency of voiding in children = 4-7 times per day
- Normal residual urine volume in children <10% of maximal bladder capacity
- Reduced urine production at night in response to the circadian rhythm of the antidiuretic hormone (ADH)
Nocturnal Enuresis

- Involuntary passage of urine during sleep
- Beyond 5 y of age
- Twice per week for 3 consecutive months
- Primary: lifelong
- Secondary: acquired after being dry for at least 6 months
- Monosymptomatic: associated with normal daytime urination
- Polysymptomatic: associated with other urinary symptoms i.e. daytime symptoms, urgency, frequency
Epidemiology

- Age 5: at least 20% of children wet the bed at least monthly
- Age 6: 10% of children
- Age 7 and beyond: 15% become dry each year
- M > F
Etiology

- Physiologic
  - Maturational delay
  - Small bladder
  - Deep sleepers
  - Genetic
- Psychologic
- Organic
- Association with sleep apnea
Nocturnal Enuresis and ADHD

- ADHD is the most specific comorbid disorder in children with nocturnal enuresis.
- Robson et al in 1997: 20.9% of studied individuals with ADHD demonstrated nocturnal enuresis.
- NE in setting of ADHD is more difficult to treat
Table 1.
Frequency of elimination disorders and attention deficit symptoms by gender

<table>
<thead>
<tr>
<th>Disorder</th>
<th>No. Girls (%)</th>
<th>No. Boys (%)</th>
<th>Total No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urinary incontinence:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>41 (6.4)</td>
<td>95 (12.9)</td>
<td>136 (9.9)</td>
</tr>
<tr>
<td>DI</td>
<td>19 (3.0)</td>
<td>30 (4.1)</td>
<td>50 (3.6)</td>
</tr>
<tr>
<td>Overall</td>
<td>60 (9.3)</td>
<td>125 (17.0)</td>
<td>185 (13.4)</td>
</tr>
<tr>
<td>FI (any/encopresis):</td>
<td>9 (1.4)</td>
<td>10 (1.4)</td>
<td>19 (1.4)</td>
</tr>
<tr>
<td>Isolated</td>
<td>1 (0.2)</td>
<td>1 (0.1)</td>
<td>2 (0.15)</td>
</tr>
<tr>
<td>With UI</td>
<td>8 (1.2)</td>
<td>9 (1.2)</td>
<td>17 (1.2)</td>
</tr>
<tr>
<td>Constipation</td>
<td>4 (0.6)</td>
<td>9 (1.2)</td>
<td>13 (0.9)</td>
</tr>
<tr>
<td>Constipation + FI</td>
<td>1 (0.2)</td>
<td>2 (0.3)</td>
<td>3 (0.2)</td>
</tr>
<tr>
<td><strong>ADHD symptoms (clinical/borderline range):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without UI</td>
<td>8 (1.2)</td>
<td>32 (4.4)</td>
<td>40 (2.9)</td>
</tr>
<tr>
<td><strong>With NE</strong></td>
<td><strong>6 (0.9)</strong></td>
<td>7 (1.0)</td>
<td><strong>13 (0.9)</strong></td>
</tr>
<tr>
<td>With DI</td>
<td>5 (0.8)</td>
<td>13 (1.8)</td>
<td>18 (1.3)</td>
</tr>
<tr>
<td>With UI + FI</td>
<td>4 (0.6)</td>
<td>5 (0.7)</td>
<td>9 (0.7)</td>
</tr>
<tr>
<td>Overall</td>
<td>19 (2.9)</td>
<td>52 (7.1)</td>
<td>71 (5.1)</td>
</tr>
<tr>
<td>Totals</td>
<td>1379 (100)</td>
<td>645 (100)</td>
<td>734 (100)</td>
</tr>
</tbody>
</table>
Table 4.
Risk factors for clinically relevant CBCL inattentive scale symptom scores

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Wald Chi-Square</th>
<th>p Value</th>
<th>OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE</td>
<td>3.1</td>
<td>0.08</td>
<td>2.0 (0.9-4.4)</td>
</tr>
<tr>
<td>DI</td>
<td>8.3</td>
<td>0.004</td>
<td>4.4 (1.6-12.0)</td>
</tr>
<tr>
<td>FI</td>
<td>0.2</td>
<td>0.688</td>
<td>1.3 (0.3-5.5)</td>
</tr>
<tr>
<td>Age</td>
<td>1.3</td>
<td>0.249</td>
<td>1.4 (0.8-2.6)</td>
</tr>
<tr>
<td>Gender</td>
<td>0</td>
<td>0.97</td>
<td>1.0 (0.5-2.0)</td>
</tr>
<tr>
<td>Developmental disorder</td>
<td>42.7</td>
<td>&lt;0.0001</td>
<td>9.6 (4.9-18.9)</td>
</tr>
<tr>
<td>Migration</td>
<td>0</td>
<td>0.858</td>
<td>0.9 (0.4-2.1)</td>
</tr>
<tr>
<td>Separation</td>
<td>11.9</td>
<td>0.0006</td>
<td>3.3 (1.7-6.7)</td>
</tr>
<tr>
<td>Expected problems in schools</td>
<td>9.9</td>
<td>0.002</td>
<td>4.1 (1.7-10.0)</td>
</tr>
</tbody>
</table>
General Assessment

- **History**
  - Inquire whether child views wetting as a problem
  - Pattern of wetting
  - Associated symptoms
  - Fluid intake
  - Developmental Hx
  - History of UTIs, constipation, airway obstruction, abuse, stress
  - Previous interventions
  - Family history of wetting
General Assessment

- Physical Exam
  - Abdominal, spinal, neurologic, and genital exam

- Labs
  - U/A (everyone)
  - Ucx only if sxfs concerning for infection
  - Further work-up directed by H&P: frequency/volume chart, uroflowmetry, urinary tract ultrasound, post-void ultrasound, spinal xray, abdominal xray

- Referral
  - Genitourinary pathology or treatment failure after 8-12 weeks → refer to urology
  - Child’s social functioning impaired or family punishing → psychological counseling
Uroflowmetry

Case Study

11 y/o boy presenting with bedwetting >5 nights per week and episodes of daytime urgency.

HPI: Mom has tried restricting fluids after 5pm and putting boy on toilet during the night. He has never been dry for 6 or more months. He is very embarrassed.

PMH: constipation, occasionally soils

FHX: Older sister had bedwetting
Case Study

- Physical Exam: vitals normal; neurological, spinal, abdominal and perineal examination normal
- Labs: Urinalysis normal
Case Study

- Plan: Ask mom to complete a 3 day frequency and volume chart
## Case Study

### Frequency and volume chart

<table>
<thead>
<tr>
<th>Day 1</th>
<th>Comments — urgency and leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Drink</td>
</tr>
<tr>
<td>08:00</td>
<td>eg. 8.00 am</td>
</tr>
<tr>
<td></td>
<td>eg. 200 mL</td>
</tr>
<tr>
<td></td>
<td>eg. 100 mL</td>
</tr>
<tr>
<td>08:10</td>
<td>50</td>
</tr>
<tr>
<td>12:00</td>
<td>100</td>
</tr>
<tr>
<td>16:00</td>
<td>100</td>
</tr>
<tr>
<td>16:30</td>
<td>200</td>
</tr>
<tr>
<td>17:00</td>
<td>100</td>
</tr>
<tr>
<td>18:00</td>
<td>200</td>
</tr>
<tr>
<td>18:50</td>
<td>90</td>
</tr>
<tr>
<td>20:00</td>
<td>250</td>
</tr>
<tr>
<td>21:00</td>
<td>80</td>
</tr>
</tbody>
</table>

Amount of first wee in the morning: 100 mL

<table>
<thead>
<tr>
<th>Day 2</th>
<th>Comments — urgency and leakage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Drink</td>
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<tr>
<td>09:00</td>
<td>100</td>
</tr>
<tr>
<td>10:00</td>
<td>200</td>
</tr>
<tr>
<td>15:00</td>
<td>250</td>
</tr>
<tr>
<td>15:15</td>
<td>100</td>
</tr>
<tr>
<td>17:00</td>
<td>100</td>
</tr>
<tr>
<td>18:00</td>
<td>100</td>
</tr>
<tr>
<td>20:00</td>
<td>100</td>
</tr>
<tr>
<td>21:00</td>
<td>90</td>
</tr>
</tbody>
</table>

Amount of first wee in the morning: 100 mL
Case study

Findings:

- Fluid intake is 650-800 ml/day (greater in the evening than during the day)

- Functional bladder capacity is 100mL (lower than expected for age)

- He withholds voids for hours then experiences urgency

Additional Studies

- Uroflowmetry: normal urine flow curve

- Bladder U/S: no residual urine after voiding
Case Study

Diagnosis: Primary non-monosymptomatic nocturnal enuresis
Management

- Child needs to be motivated for any intervention to be successful

- Goal #1: Resolve/alleviate problem and limit impact on child’s self esteem and relationships

- Goal #2 (equally important):
  - Allow family to understand enuresis is common and is usually a developmental problem, child has little to no control.
  - Punishments only LOWER self-esteem and does improve sxs
  - Effective treatments available, but will require their cooperation
Nocturnal Enuresis Management

- Alarms
  - Preferred method: high efficacy, low cost, low regression rate
  - Children >7 years old
  - Avg use at least 2-3 months, up to 6 months
  - Requires significant cooperation from parent, especially during 1st week when child may not awaken to alarm
  - 50% of children who achieved dryness with alarm, remain accident free after therapy discontinued
  - Video: [http://www.youtube.com/watch?v=S-hGcEjpcJ8](http://www.youtube.com/watch?v=S-hGcEjpcJ8)
Nocturnal Enuresis Management

- Medications
  - DDAVP
    - Effective in 60% of children with monosymptomatic nocturnal enuresis
    - Average of 1.3 dryer nights per week
    - High relapse rate after medication discontinued
    - Concerns for hyponatremia from excess water intake
  - Oxybutynin
    - Increase bladder capacity and decrease overactivity
    - Uncontrolled studies show improvement in sxss
    - Side effects: constipation, flushing, dizziness, increased temp, urinary retention after voiding
  - Combination therapy: DDAVP and anticholinergic agent requires very close monitoring
Nocturnal Enuresis Management

- Behavior therapy: studies are inconclusive
  - Bladder relaxation exercises
  - Rewards
  - Fluid restriction before bedtime
  - Scheduled waking
Daytime Incontinence

- If child presents with daytime and nighttime incontinence, treat daytime incontinence first.

- Treat any underlying pathology, if no organic cause identified then:
  - Timed voiding: voiding q2hr, easy access to restrooms
  - Medications for diurnal enuresis rarely used: anticholinergics and alpha blockers
Impact

- Self-esteem
- Interpersonal relationships
- Risk of physical abuse
- Impact on schooling
Education

• Discourage punishment

• Not a sign of emotional, psychological or medical dysfunction

• Encourage child to take responsibility for dryness
  • “double bubble technique”: plastic sheet over mattress followed by sheets/blankets, repeat X 2
  • Dry set of pajamas at bedside
  • Practice what to do after accident
    • Helps decrease family tension
Case Study
Diagnosis: Primary non-monosymptomatic nocturnal enuresis

Management

1. Remove blame/shame from child/family
2. Recommend collaborative approach between child, parents, teachers, doctor
3. Encourage voiding prior to bed
4. To reduce daytime urgency: aim for a daily fluid intake of 1.5 L (caffeine-free), drink at regular intervals throughout the whole day (slowing down in the evening), void at least 5–6 times per day instead of holding on.
5. Address constipation/soiling
6. Return in 3-4 weeks for f/u
Case Study

• 6 weeks later:
  • Patient had increased functional bladder capacity, resolved constipation, resolved urinary urgency, but continues to wet the bed on most nights
  • Diagnosis: Monosymptomatic nocturnal enuresis
  • Plan: Recommended alarm. Return in 8 weeks.
References


Thank you!