Urodynamics in women

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Aims of Urodynamics in women
- Confirmation of incontinence and its cause
- Definition of detrusor activity during filling
- Assessment of detrusor voiding function
- Assessment of degree of sphincter weakness
- Assessment of pelvic floor function
- Plan management
- Predict outcomes of intervention
- Predict consequences on upper urinary tract
- Explain the causes of failure of treatment

Why do Urodynamics?
- Value of Urodynamic Evaluation (ValUE)
- Value of Urodynamic Evaluation (VUSIS)
- Hilton, 2012 – UK
- NICE
Pad test

- Not routinely done at BUI
- > 1 g/h (Short-term pad test)
- > 8 g/24 h (Long-term pad test)
- Use the following in combination
  - Patient's history
  - Bladder diary
  - Pad test

Bladder diary

<table>
<thead>
<tr>
<th>Bladder diary</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daytime Frequency</td>
<td>6 - 7</td>
</tr>
<tr>
<td>Nocturia episodes</td>
<td>0 - 1</td>
</tr>
<tr>
<td>Mean Voided volume (ml)</td>
<td>200 - 250</td>
</tr>
<tr>
<td>Mean voided volume at night (ml)</td>
<td>300 - 400</td>
</tr>
<tr>
<td>Mean 24 h voided volume (ml)</td>
<td>1400 - 1800</td>
</tr>
</tbody>
</table>

► Helps to plan the Urodynamic test
Uroflowmetry
- Voided volume
- Flow rate
- Urine Flow pattern

<table>
<thead>
<tr>
<th>Uroflowmetry</th>
<th>Normal Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voided Volume (ml)</td>
<td>250 – 550 (150)</td>
</tr>
<tr>
<td>Post Void Residual Urine (ml)</td>
<td>&lt; 50</td>
</tr>
<tr>
<td>Maximum Flow rate $Q_{\text{max}}$ (ml/s)</td>
<td>23 – 33</td>
</tr>
<tr>
<td>Average Flow rate $Q_{\text{ave}}$ (ml/s)</td>
<td>17 - 24</td>
</tr>
</tbody>
</table>

Urine Dipstick
- Rule out infection
- ? Antibiotic cover

Urethral Function
- Functional Urethral Length
- MUCP
  - > 75 cm of H$_2$O is hypertonic
  - < 20 cm of H$_2$O is ISD
- Voluntary increment
- Intrinsic sphincter deficiency
  - MUCP <20 cm H$_2$O
  - ALPP <80 cm H$_2$O
Filling Cystometry

- Bladder Sensation
- Bladder Compliance
- Bladder Capacity
- Detrusor Function / Overactivity
- Incontinence – Cough / VLPP / DOI

<table>
<thead>
<tr>
<th>Urodynamic Parameter</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Sensation (ml) – 50%</td>
<td>100-250</td>
</tr>
<tr>
<td>First desire to void (ml) – 75%</td>
<td>200-330</td>
</tr>
<tr>
<td>Strong desire to void – 90%</td>
<td>350-550</td>
</tr>
<tr>
<td>Bladder compliance (ml/cm of water)</td>
<td>&lt; 50 (Compromised if &gt; 30)</td>
</tr>
<tr>
<td>Detrusor activity</td>
<td>Stable</td>
</tr>
<tr>
<td>Maximum Cystometric capacity (ml)</td>
<td>450-550</td>
</tr>
</tbody>
</table>

The bladder pressure should not reach more than 6-10 cm of H2O.
Detrusor Function – Filling CMG

- Normal - No Detrusor activity
- 10-18% normal volunteers show DO
- 40% of patients with Urgency incontinence do not show DO
- No ICS standard
- The Overactive Bladder
  - Detrusor Overactivity +/- Incontinence
- Bladder Hypersensitivity
- Painful Bladder syndrome

Urodynamic Stress Incontinence (USI)

- USI is the involuntary leakage of urine during increased abdominal pressure in the absence of a detrusor contraction during filling cystometry
- Observing urine leak - external meatus
- Videourodynamic
- Valsalva
- Maneuvers
- Ambulatory urodynamics (AUDS)
Voiding Cystometry / Pressure Flow Studies

- Voiding
- Pressures
- Detrusor function

<table>
<thead>
<tr>
<th>Pressure flow studies (Voiding CMG)</th>
<th>Normal range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Flow rate (Qmax - ml/s)</td>
<td>15 - 25</td>
</tr>
<tr>
<td>Maximum detrusor pressure (P_{detmax} - cm H2O)</td>
<td>12</td>
</tr>
<tr>
<td>Detrusor pressure at max flow (P_{detQmax} - cm H2O)</td>
<td>10-30</td>
</tr>
</tbody>
</table>
Leak Point Pressures

- Detrusor Leak Point Pressure
  - High DLPP – affects upper tract
    (> 40 cm of H₂O)
- Valsalva (VLPP) of abdominal Leak Point Pressure (ALPP)
  - < 60 cm of H₂O (Suggestive of ISD)
  - > 100 cm of H₂O (Urethral hypermobility)
  - 60 -100 cm of H₂O (Combined)

Co-existent POP and UI

- Pelvic organ prolapse and stress urinary incontinence coexists (80%)
  (Bai, 2002; Maher, 2011)
- Surgery for POP – de novo SUI / worsening SUI
  (Brubaker, 2006; Winters, 2008)
- Patient centred goals
  (Mahajan, 2011)
- MUCP could be falsely elevated in women with prolapse (Normalizes with reduction of prolapse)
- POP affects $Q_{\text{max}}$, $Q_{\text{ave}}$ and VV (Voiding dysfunction)

Why reduce prolapse?

- To reveal underlying incontinence
  (Occult SUI)
- To predict postoperative voiding problems
Reduction tests for occult SUI

- Pessary, speculum, forceps, swab, vaginal pack, manual.

<table>
<thead>
<tr>
<th>Reduction test</th>
<th>Detection rate (%)</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All methods</td>
<td>19</td>
<td>24</td>
<td>88</td>
<td>60</td>
<td>61</td>
</tr>
<tr>
<td>Pessary</td>
<td>6</td>
<td>5</td>
<td>96</td>
<td>50</td>
<td>59</td>
</tr>
<tr>
<td>Manual</td>
<td>16</td>
<td>18</td>
<td>90</td>
<td>50</td>
<td>66</td>
</tr>
<tr>
<td>Swab</td>
<td>20</td>
<td>33</td>
<td>93</td>
<td>79</td>
<td>65</td>
</tr>
<tr>
<td>Forceps</td>
<td>21</td>
<td>17</td>
<td>84</td>
<td>50</td>
<td>51</td>
</tr>
<tr>
<td>Speculum</td>
<td>30</td>
<td>39</td>
<td>74</td>
<td>55</td>
<td>60</td>
</tr>
</tbody>
</table>

[Visco 2008]

Surgery for prolapse and incontinence

- Case-Control study – Higher incidence of voiding problems (14%) when TVT combined with anterior repair
  [De Tayrac, 2004]
- Combined prolapse and incontinence surgery has higher incidence of DO (30%) than prolapse surgery (6%) alone
  [Kutka, 2000]
- RCT of Abdominal sacrocolpopexy with/without Burch Colposuspension - Higher incidence of voiding problems
  [Brubaker, 2006]

Patient Centered Care