Urodynamics

Andre a Strong, BSN, RN, CURN
Ambulatory RN 3, Rush University Medicine
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Uroflow Basics

- Electronic measurement of urine flow rates and urine volume (Chapple et al, 2009)
- Should have at least 150ml (Adams et al., 2005; Lajiness & Quaillich, 2016; Mikel Gray, 2012)

Uroflow Basics

- Flow rate/Q = volume of urine per second
- Maximum flow rate/Qmax = the maximum flow rate sustained for at least 1 second
- Average flow rate/Qave = voided volume divided by flow time
- Voiding time = total time to complete void, including periods when flow is interrupted

(Mikel Gray, 2012)
Uroflow Basics

- **Flow time** = total time which a measurable flow occurs, *excluding* periods when flow is interrupted.
- **Time to maximum flow** = the amount of time it takes to reach maximum flow for at least 1 second.
- **Voided volume/VV** = total amount in milliliters.

(Mikel Gray, 2012)

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**Normal Male Uroflow**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Minimum Flow Rate (ml/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 years old</td>
<td>&gt;22 ml/sec</td>
</tr>
<tr>
<td>40–60 years old</td>
<td>&gt;19 ml/sec</td>
</tr>
<tr>
<td>&gt;60 years old</td>
<td>&gt;13 ml/sec</td>
</tr>
</tbody>
</table>

(Mikel, 2005)

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**Normal Female Uroflow**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Minimum Flow Rate (ml/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 years old</td>
<td>&gt;25 ml/sec</td>
</tr>
<tr>
<td>&gt;50 years old</td>
<td>&gt;18 ml/sec</td>
</tr>
</tbody>
</table>

(Mikel, 2005)
Urodynamic Tracings

Normal UDS

- **Capacity** = 300ml-600ml
- **Compliance** = bladder fills to accommodate instillation while maintaining safe Pdet pressures (protects kidneys)
  - Safe <20cm H2O
  - Low risk 20 – 30 cm H2O
  - High risk 30 – 40 cm H2O or greater
- **Urethral sphincter competency** = no stress incontinence. no intrinsic sphincter deficiency

(Newman, Wyman & Welch, 2017, p. 279)
Normal UDS

- **Sensations** = first sensation (initial perception)
  first desire (90 – 200ml) strong desire (300-600ml) capacity (emergency)
- **Detrusor stability** = bladder remains relaxed while being filled
- **EMG** = relaxed during void, may have some guarding during study
- **PVR** = 0ml

Abdominal Events
Detrusor Events
Outlet Obstruction

(Mikel, 2005)
Acontractile Detrusor
Low Bladder Compliance

Figure 21-4.
Low Bladder wall compliance. Note the shape of the plot trending to an orange. Plot at end of relaxation. 2 cm H2O, Plot at symmetrical capacity is 15 cm H2O. Where
volume relates to 500 mL. Complied = (2 x Plot at 500 mL) + 1.25 mm Hg.
Dysfunctional Voiding
(no known neurologic disease)

or

Detrusor Sphincter Dysynergia
(known neurologic disease)

Case Study 1

- 29 year old female with Multiple Sclerosis
- Incontinence
- Treated at outside facility
- Interested in Botox
Case Study 1

- Given 100mg Botox
- Complete retention
- Performs CIC

Case Study 2

- 28 year old female presents with urinary retention
- Indwelling catheter since June 2016
- History metastatic chondroblastic osteosarcoma complicated by cauda equina
- Infiltrating lesion from L5-S2
- On multiple narcotics for cancer related pain
- Declined further treatment
Case Study 2

- Indwelling catheter removed increasing quality of life
- Patient educated on clean intermittent catheterization (CIC)

Tips for the Novice Urodynamicist

- Study should be repeated until a valid reproducible result is attained (Mikel, 2005, p. 6)
- Always check a dipstick (Mikel, 2005)
- Medication considerations
- Be aware of history...autonomic dysreflexia!
- Don’t forget emotional supports for your patients
Thank you!

- Questions?

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References


References