Deep Dive into Urodynamics Part I

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When the bladder is full, it sends signals to the brainstem. The brainstem then sends signals to the sacral spinal cord, which innervates the bladder and the urethra. The bladder empties, and the urethral sphincter relaxes, allowing urine to flow out of the bladder.

PeriAqueductalGray
Involuntary
PreMotorCortex
Voluntary

The cerebral cortex can also override the brainstem and voluntarily control urination. This is what allows us to hold our urine until we find a convenient place to urinate.

The PMC (premotor cortex) and PAG (periaqueductal gray) are two brain regions that are involved in the control of micturition (urination). The PMC is responsible for the voluntary control of urination, while the PAG is responsible for the involuntary control of urination.
Examining this is not enough. Examine this instead.

Store Empty

Does everyone need Urodynamics?
• U/A
• 3 day voiding diary
• Comprehensive history
• Flow rate
• Post-Void Residual

Who needs Urodynamics?

The American Urological Association (AUA) in collaboration with the Society for Urodynamics, Female Pelvic Medicine, and Urogenital Reconstruction (SUFU) summarises the main indications for performing urodynamic studies into 5 categories:

• Identifying LUT dysfunction
• Predicting the consequences of LUT dysfunction on the upper urinary tract
• Predicting outcomes of management
• Assessing the outcomes of an intervention
• Assessing treatment failure
**Urodynamics**

**Time to fill**

Normal: 2 - 4 hrs

**Time to fill**

Urodynamics: 10-20 minutes
READ THE CHART

- diabetes mellitus
- alcoholism
- injury or disease affecting lower spinal segments
- complete spinal cord injuries
- denervating diseases (MS, transverse myelitis, etc.)

Signs & Symptoms
- Flushing and sweating above the injury level
- Nasal stuffiness
- Goose bumps and paleness below injury level
- Sudden high blood pressure (hypertension)
- Pounding headache
- Slow heart rate (bradycardia)
- Blurred vision or spots in vision
- Irregular heartbeat
- Anxiety or apprehension
- May have no symptoms (this is known as silent autonomic dysreflexia)
Treatment
- Recognize the signs and symptoms of AD
- Check blood pressure and monitor frequently (Neuropathic Bladder Patients with SCI above T6 have low systolic blood pressure of 90-110mmHg)
- Sit the person up, lower the legs
- Loosen any clothing or constrictive devices
- Keep an eye on the person and look for the underlying cause and correct if found.

Andrea Strong, DNP

- Confirm DOB
- Confirm ALLERGIES
- Who and What you are
- Explain test
Uroflow

Qmax Flow \( \geq 12 \text{ ml/s} \)

Urinalysis

High-level disinfection (HLD)

Uses chemicals to kill most microorganisms on a surface or object, it is effective against a wide range of pathogens, including bacteria, viruses, and fungi.

Use:
- Spray Zeta 3 Foam over all the surfaces and medical devices to be disinfected. Leave the foam for at least 1 minute, then clean the surfaces/devices with a tissue and dry them off.
Filling CMG

- Capacity
- Compliance
- Competence (of the sphincter)
- Sensations
- Detrusor response (formerly “Stability”)

Filling

Usual
20-30 mL/minute
Filling

BUT
Start slow <10cc/min

U or not?

Cough test
Compliance:
Normal compliance is nearly flat pressure during filling
Change in volume divided by change in Pdet:
Normal: >/= 20 ml/cm H2O
Low: </= 10 ml/cm H2O
5/2/23

100cc fill /10cm rise in Pdet=10

Compliance Danger

Volume Specific Pressures: volume when Pdet reaches capacity (0-19cm H2O normal)
Compliance Danger

20-30 cm H2O very slight risk of upper tract distress

Compliance Danger

30-40 cm H2O moderate risk of upper tract distress

Compliance Danger

>40cm H2O imminent risk of upper tract distress
Sensory

1st sensation

90-100

37

Strong Urge to void

200-400

38

Got to go NOW!

200-400

39
**Sensory urgency**

- Increased bladder sensations
- Early first sensation
- Early strong desire to void
- Desire persists throughout filling

**W/O leakage**

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**Reduced bladder sensations**

- Delayed & diminished sensations of bladder filling

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**Absent bladder sensations**

- Self explanatory term
How far should we fill?

500cc?
750cc?
1000cc?
More?

Significance Early sensations

associated with overactive bladder & detrusor overactivity

DETRUSOR RESPONSE

Significance Delayed sensations

- diabetes mellitus
- alcoholism
- injury or disease affecting lower spinal segments
- complete spinal cord injuries
- denervating diseases (MS, transverse myelitis, etc.)
Detrusor overactivity (DO): involuntary contractions of the bladder detrusor muscle during bladder filling, which may be provoked or unprovoked.

1. **Phasic**: which occurs during filling, does not necessarily cause incontinence.
2. **Terminal**: occurring near maximum bladder capacity, usually results in incontinence.
3. **Compound**: with an increase in detrusor and baseline detrusor pressure with each contraction during filling; it occurs relative to underlying neurological disease.
4. **High and sustained**: increased continuous detrusor contractions, with detrusor pressure still returning to baseline.
5. **Post micturition**: occurs after voiding, usually in the presence of detrusor and/or urethral instability.
Stress
Cough
Sneeze

Competence (of the sphincter)

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Stress
Moderate volume:
150-200ml

50

Stress
Valsalva leak point pressure (VLPP):
• <60 cm H2O: ISD
• 60 to 90 cm H2O: equivocal
• >90 cm H2O: urethral hypermobility

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*The normal voiding pressure is between 10 and 40 cm H2O.
**Empty**

Abrams-Griffiths nomogram

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**Sphincter EMG**

Filling CMG: presence of bulbocavernosus reflex; recruitment of motor units with bladder filling

Pressure/Flow study: sphincter relaxation (abnormal finding → vesicosphincter dyssynergia)

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**Sphincter EMG**

Filling CMG: presence of bulbocavernosus reflex; recruitment of motor units with bladder filling
Sphincter EMG

Pressure/Flow study:
sphincter relaxation
(abnormal finding ➔
vesicosphincter dysyne)