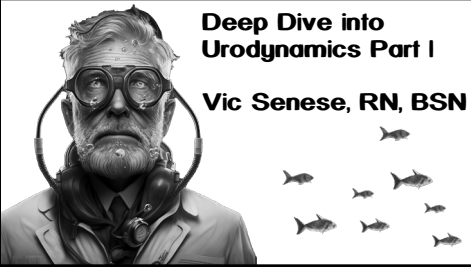


**Deep Dive into Urodynamics Part I**  
**Vic Senese, RN, BSN**



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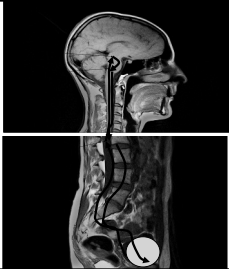
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When the bladder is full, it sends signals to the brainstem. The brainstem then sends signals to the sacral spinal cord, which innervates the bladder and the urethra. The bladder muscles contract, and the urethral sphincter relaxes, allowing urine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



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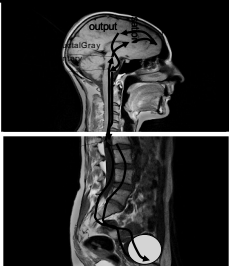
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The cerebral cortex can also override the brainstem and voluntarily control urination. This is what allows us to hold our urine in until we find a convenient place to urinate.

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.



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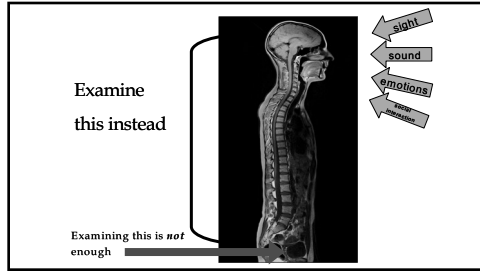
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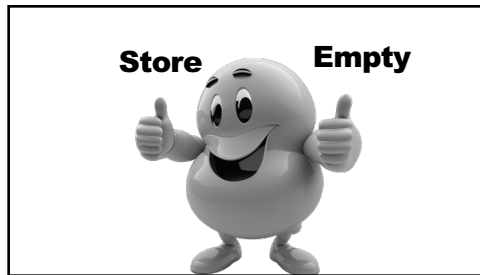
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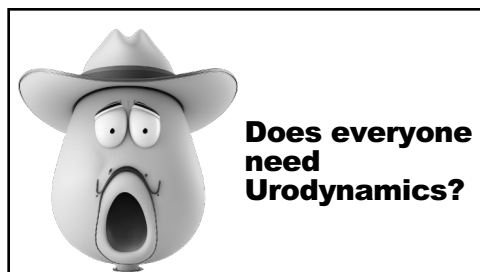
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- **U/A**
- **3 day voiding diary**
- **Comprehensive history**
- **Flow rate**
- **Post-Void Residual**

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**Who needs Urodynamics?**

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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

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**Urodynamics**

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**Time to fill**



**Normal: 2 - 4 hrs**

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**Time to fill**



**Urodynamics:  
10-20 minutes**

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**READ THE CHART**

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

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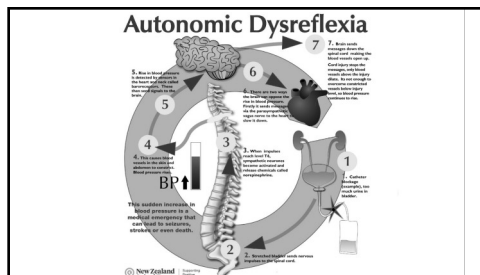
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**Signs & Symptoms**

- 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)

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**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.

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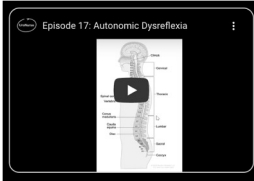
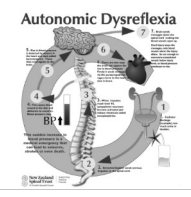
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**Autonomic Dysreflexia**



**Andrea Strong, DNP**

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

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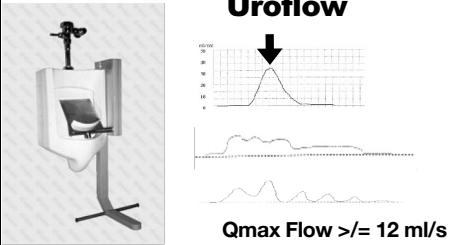
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**Uroflow**



Qmax Flow  $\geq 12$  ml/s

The image shows a uroflowmeter setup on the left. On the right, there are three graphs: the top one shows a bell-shaped curve with a peak and a downward arrow, the middle one shows a flat line, and the bottom one shows a jagged line.

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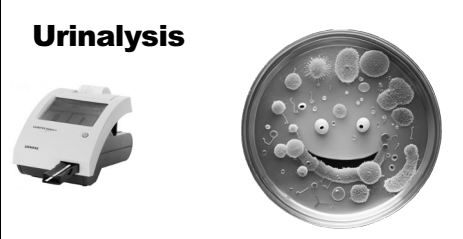
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**Urinalysis**



The image shows a urinalysis machine on the left and a petri dish with a smiley face and various bacterial colonies on the right.

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**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.

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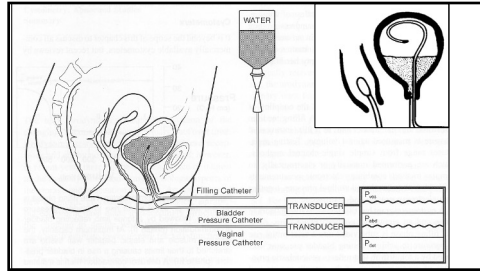
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**Filling CMG**



**Capacity**  
**Compliance**  
**Competence (of the sphincter)**  
**Sensations**  
**Detrusor response**  
**(formerly "Stability")**

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**Filling**



**Usual**  
**20-30 mL/minute**

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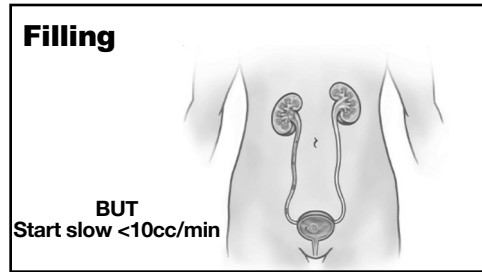
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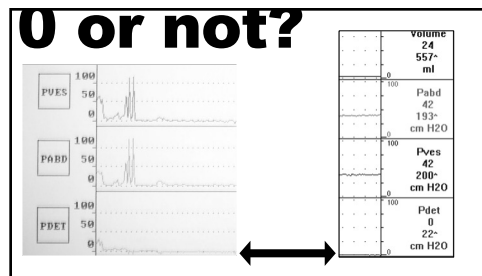
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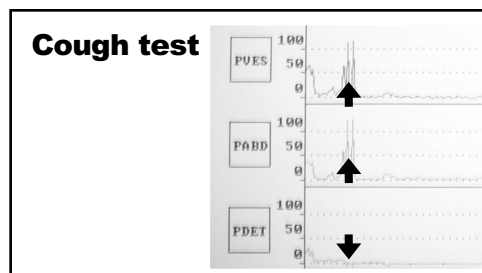
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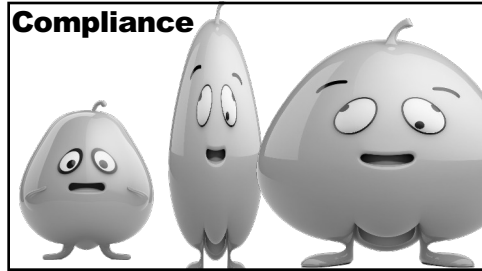
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**Compliance:**  
**Normal compliance is nearly flat pressure during filling**  
**Change in volume divided by change in Pdet:**  
**Normal:  $\geq 20$  ml/cm H<sub>2</sub>O**  
**Low:  $\leq 10$  ml/cm H<sub>2</sub>O**

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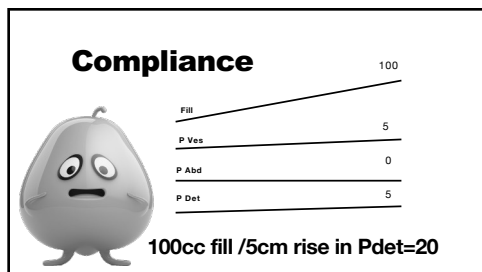
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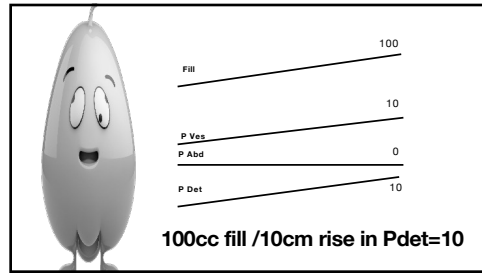
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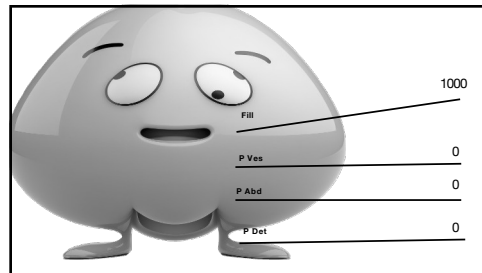
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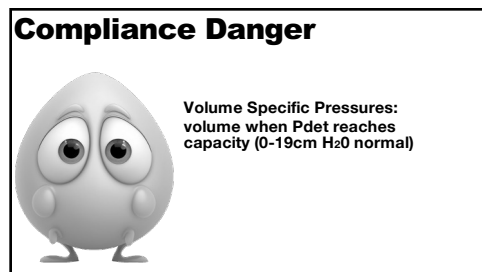
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**Compliance Danger**



20-30 cm H<sub>2</sub>O very slight risk of upper tract distress

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**Compliance Danger**



30-40 cm H<sub>2</sub>O moderate risk of upper tract distress

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**Compliance Danger**



>40cm H<sub>2</sub>O imminent risk of upper tract distress

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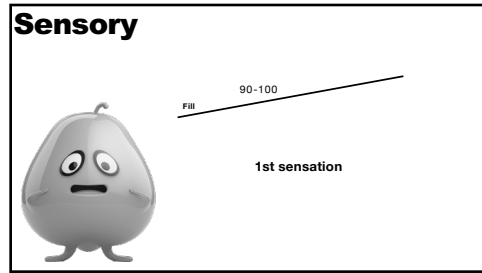
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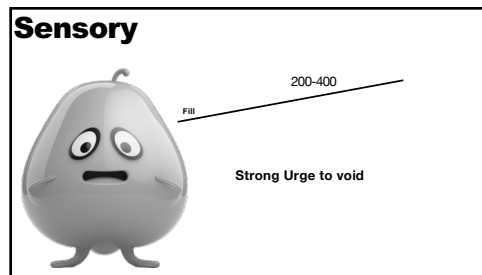
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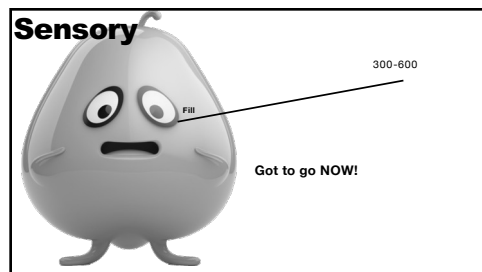
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**Sensory urgency**



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

**W/O leakage**

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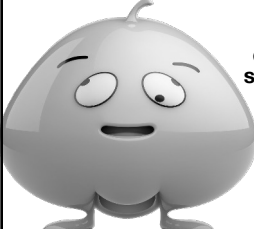
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**Reduced bladder sensations**



delayed & diminished sensations of bladder fill

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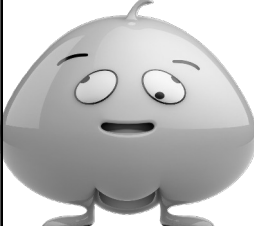
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**Absent bladder sensations**



self explanatory term

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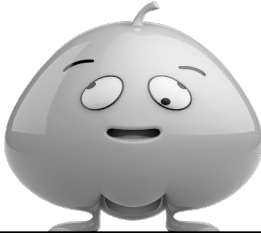
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**How far should we fill?**



**500cc?**  
**750cc?**  
**1000cc?**  
**More?**

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**Significance Early sensations**



associated with overactive bladder  
& detrusor overactivity

**DETRUSOR RESPONSE**

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**Significance Delayed sensations**



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

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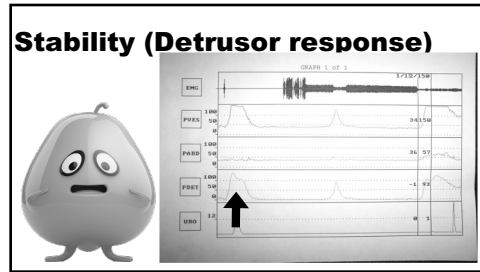
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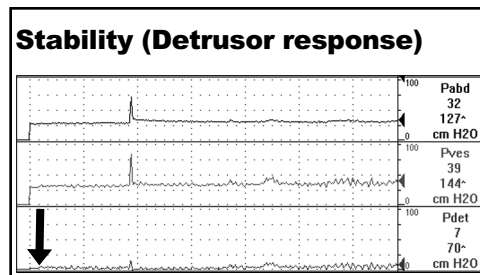
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**Detrusor overactivity (DO): involuntary contractions of the bladder detrusor muscle during bladder filling, which may be provoked or unprovoked.**

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

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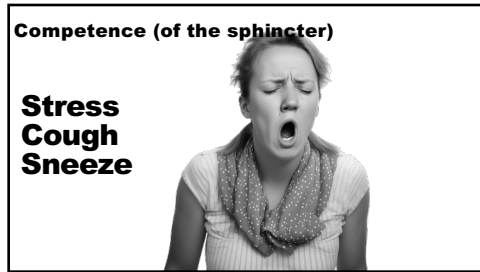
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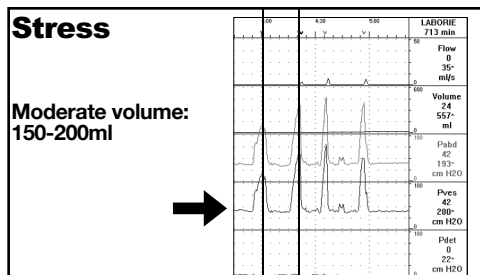
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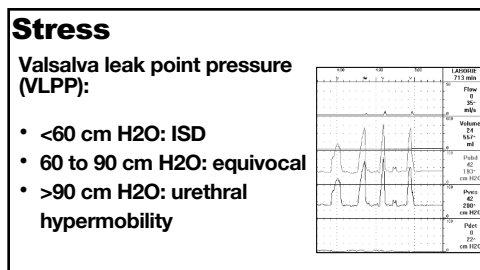
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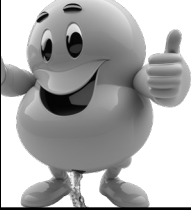
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**Empty**



**Voiding Pressure Flow Study**

\*The normal voiding pressure is between 10 and 40 cm H<sub>2</sub>O.

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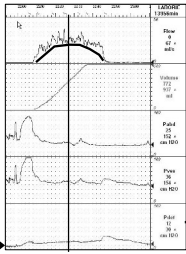
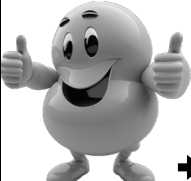
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**Empty**



40cc/sec

15cmH<sub>2</sub>O

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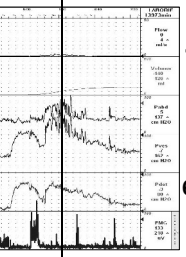
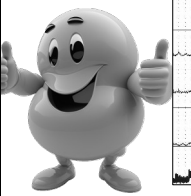
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**Empty**



4cc/sec

60cmH<sub>2</sub>O

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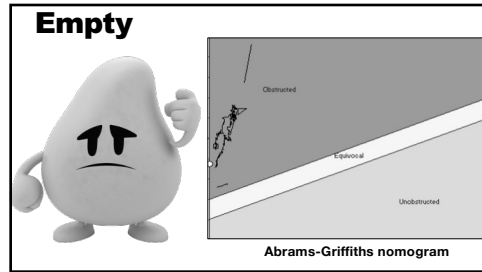
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**Sphincter EMG**

**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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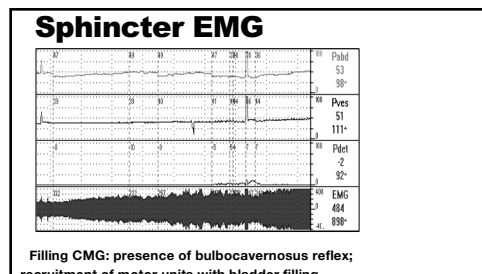
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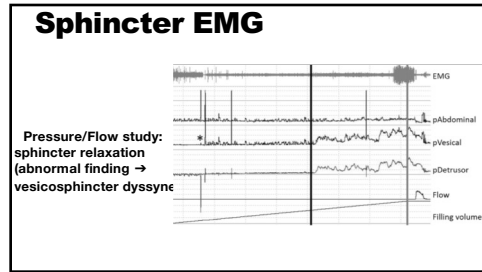
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