Urodynamics in Neurological Lower Urinary Tract Dysfunction

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Learning Objectives

• Review functional neurology relevant to lower urinary tract
• Special practical considerations for the neurologically impaired patient
• Identify abnormalities on cystometry and relate to site of neurological lesion
• Guidance on structured reporting of complex urodynamic problems
Lower Urinary Tract Function

**KEEP IT SIMPLE**

- **Storage** of urine at low pressure with an adequate capacity

- Efficient social **voiding** to completion
Normal Function
Lower Urinary Tract Structure

- Bladder
- Urethra
- Sphincter
- Nerve Supply
Nerve Supply: Overview

Higher centres

Pontine micturition centres

Ascending/descending spinobulbar pathways

Sacral micturition centre

Pelvic plexus

Storage / Voiding Response

+ve -ve
-ve +ve
+ve -ve

Fig. 2. Neuronal innervation of the lower urinary tract.
Technique (1)

• THINK! – Before you start.
  – What do I need to know
  – What can the patient do
  – What help have I got
  – What abnormalities are most likely
Technique (2)

• **Filling**
  - Standard fill/slow fill
  - Repeat with slower fill if action too quick
  - Screen during filling with cough/valsalva

• **Voiding**
  - lying, sitting, standing
  - Screen – upper tracts for reflux
  - Simultaneous screen/pressure/EMG for DSD

• **Ambulatory Natural Filling**
Location, location, location

Pontine Micturition Centre

Supra Pontine

Supra Sacral

Sacral Micturition Centre

Infra Sacral
Supra Pontine

- Loss of Inhibition
  - Detrusor Overactivity
  - Reduced cystometric capacity
  - Detrusor overactivity incontinence

- Co-ordinated Voiding
  - Normal sphincteric action (NO dyssynergia)
  - Complete bladder emptying

- No Risk to Upper Tracts
Brain Injury
Supra Sacral

• Loss of Inhibition
  – Detrusor overactivity
  – Reduced cystometric capacity
  – Detrusor overactivity incontinence

• Loss of Co-ordinated voiding
  – Detrusor - sphincter dyssynergia
  – Residual urine

• Loss of Sensation
  – Unaware of leak
  – Unaware of distension

• Risk of Upper Tract Dilatation
Spinal Multiple Sclerosis
Cervical Cord MS
Detrusor-Sphincter Dyssynergia (DSD)
Infra Sacral

• **Loss of Sensation**
  – Increased cystometric capacity

• **Loss of Motor Function**
  – No detrusor contraction (acontractile)
  – Fixed sphincter

• **Abnormal Voiding**
  – Straining pattern
  – Incomplete emptying

• **Later Changes**
  – Low compliance
  – **Risk to upper tracts**
Central Disc Prolapse (Cauda Equina Syndrome)
L5/S1 Disc Prolapse
Mixed Picture

• Disease at Multiple Sites: MS

• Disease at Sacral or Pontine Centres: Meningomyelocele

• Partial Lesions: Sacral Fracture

• Secondary Smooth Muscle Changes
MS: Mixed picture
Meningomyelocele: Mixed picture
Summary

• History & Examination (adequate referral request)
• Rough idea of site and completeness of lesion
• Careful technique
• Repeat cycles until happy (don’t accept poor recording)
• Comment on what you see (avoid overinterpretation)
• Sensation
  – Reduced
  – Absent

• Storage
  – Phasic activity (neurogenic detrusor overactivity)
  – Low compliance – Detrusor Leak Point Pressure

• Incontinence
  – With detrusor contraction (detrusor overactivity incontinence)
  – Urodynamic stress (beware low opening pressure, Leak Point Pressures – Abdominal, Valsalva, Detrusor...
Report (2)

• Voiding
  – No voluntary void
  – Straining
  – Involuntary
  – Incomplete (detrusor underactivity)
  – Absent (acontractile)
  – Detrusor-Sphincter Dyssynergia
Report Summary

• Abnormalities of Storage

• Abnormalities of Voiding

• Radiographic (structural) abnormalities
Imaging - Video
Summary

• Know a functional classification of urodynamic consequences of neurological lesions

• Be prepared
  – What is likely
  – What does the clinician need to know
  – What can the patient cope with

• Strive to get full information in one go

• Give a structured methodical report
QUESTIONS?