Neuropathic Bladder

Magda Kujawa
Consultant Urologist
Stockport NHS Foundation Trust
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Plan

• Physiology- bladder and sphincter behaviour in neurological disease
• Clinical consequences of Symptoms
• Bladder management techniques
• Managing Incontinence
  • MS/ Parkinsons/ CVA/ Congenital disorders
Neuropathic Bladder

• To understand pathophysiology must understand normal physiology
• Storage
• Voiding
• Co-ordination of these phases
• Impact on upper tracts
Function

• Can be split into 2 main phases
  1. Storage/ Filling (99%)
  2. Voiding (1%)
Storage

• Bladder filling occurs without rise in pressure
• Compliance
  • Passive elastic properties of bladder wall
  • Ability of smooth muscle to maintain constant tension while stretching
  • Spinal reflexes controlling tension while bladder filling
• Urethra and sphincteric mechanism closed
Voiding

• Urethral Relaxation precedes detrusor contraction
• Simultaneous relaxation of pelvic floor
• Funnelling of bladder neck to facilitate flow into proximal urethra
• Detrusor contraction to forcefully expel urine
Neuronal Control

• Complex series of peripheral and central neuronal pathways
• Co-ordinate the activities of the bladder and the urethra/sphincter mechanisms
• Control compliance (receptive relaxation)
• Sense bladder fullness
• Maintain continence
• Initiate voluntary voiding
Neuronal Control
Involuntary Storage Reflexes

- Lumbo-sacral spinal cord
- Increasing bladder fullness increases activity
  - Sympathetic nerves bladder relaxation urethral contraction
  - Pudendal nerve pelvic floor contraction
  - Inhibits parasympathetic (bladder contraction)
- Guarding reflex
Desire to void

• Conscious act co-ordinated in mid brain and pons (pontine micturition centre)

• Causes switch from storage to voiding phase when bladder full and appropriate to void

• Many other areas in brain impact upon the pontine micturition centre

• Involved with delaying micturition, inhibiting premature contraction, appropriate voiding
  • NB Dementia!
The control of the urethral sphincter

- Superior Hypogastric plexus (sympathetic)
- Spinal Cord
- Pelvic nerve (parasympathetic)
- Pudendal nerve (somatic)
- Detrusor
- External urethral sphincter
- Internal urethral sphincter
Micturition Cycle

• Mediated by complex coordination

• Sacral micturition centre
  • Receptive relaxation
  • Reflex bladder contraction

• Pontine micturition centre
  • Co-ordination
  • Filling/voiding
Bladder and sphincter behaviour in neurological disease

• Bladder control is complex
• There are many sites where disease or injury can have impact
• Not always predictable
• Complete vs Incomplete
Bladder and sphincter behaviour in neurological disease

• Abnormal or neuropathic behaviour may affect bladder +/- sphincter
• Activity of bladder and sphincter
• Overactive bladder is one that intermittently contracts during bladder filling
• Neurogenic detrusor overactivity in context of neurological disease
  • Previously detrusor hyperreflexia
• Bladder where pressure rises progressively during filling = poorly compliant
  • Bladder unable to store urine at low pressure
Detrusor Overactivity on Urodynamics
Detrusor Overactivity on Urodynamics
Poor Compliance
Bladder and sphincter behaviour in neurological disease

- Other end of spectrum is underactive bladder or areflexia
- Low pressure during filling and voiding
Detrusor Areflexia
Bladder and sphincter behaviour in neurological disease

• Overactive sphincter generates high pressure while filling but also voiding when it should be relaxed
• Detrusor sphincter dyssynergia
• Can be seen during electromyographical recording of sphincter
• Activity seen in sphincter during voiding when it should be relaxed and inactive
DSD and EMG activity during void
Bladder and sphincter behaviour in neurological disease

• Over time neurogenic detrusor overactivity can lead to
  • Trabeculated bladder
• If sphincter is also dyssynergic
  • Incomplete bladder emptying
  • Raised intravesical pressure
    • Hydronephrosis
  • Chronic urinary tract infection
    • Vesico ureteric reflux
    • Pyelonephritis
    • Stone formation
    • Ultimately renal failure
Bladder and sphincter behaviour in neurological disease

• “The bladder is an unreliable witness”
• Many different pathological entities that translate to same symptoms
• Frequency, nocturia, urgency, urge incontinence and stress incontinence and UTI
Bladder and sphincter behaviour in neurological disease

- Better understanding of these conditions
- Continued assessment
- Advances in management
- Reduction in incidence of death from consequences for those particularly with
  - Congenital neuropathic bladder
  - Spinal cord injury
Assessment

- Presence and Severity of symptoms
- Assessment of bladder emptying
- MSSU
- Check electrolytes
- May require flexible cystoscopy
- Urodynamic assessment is cornerstone
Urodynamic assessment in neuropaths -
Indications

• New onset of incontinence or change in incontinence patterns or voiding pattern
• Recurrent UTI ? New onset
• Development of upper tract dilatation (loss of renal function)
• Prior to reconstructive surgery
Urodynamics
Urodynamic assessment in neuropaths

- Video or standard?
- Allow time? Hoist required
- Staffing
- Presence of urine infection
- Fill on top of residual
- Avoid rapid filling- ideally 10-30mls per min
Urodynamic assessment in neuropaths

Key questions

• In storage/filling phase
  • Normal sensation
  • Evidence of phasic detrusor overactivity
  • Evidence of continued increase in pressure with filling (poor compliance)
  • When does leakage occur
  • Is there reflux (video or ultrasound)

• In voiding phase
  • Any dyssynergia
  • Emptying
General principles of Management

• Protect upper tracts and preserve renal function
• Improve symptoms
• Tailor management to patient’s medical, functional status and expectations
• Conservative
• Individualize
Medical management

• Behavioural measures
• Control UTI
• Anticholinergics
• B-3 agonists
• CISC
• Sheath
• Indwelling catheter
  • Urethral
  • Suprapubic
Surgical Management

• Intravesical botox injections
  • 200-300u
  • Temporary benefit duration often dose dependent
  • Can be performed under local anaesthetic
  • Effectively paralyses muscle to reduce compliance and detrusor overactivity
  • Protects upper tracts
Technique for 200 units

- 20 injection sites – 4 lines of 5 around lateral and posterior wall bladder
Surgical management

• Bladder reconstruction
  • Need commitment to ISC
• Clam cystoplasty
• Mitrofanoff
• Urinary Diversion
Clam Cystoplasty
Mitrofanoff Principle

Figure 1 – Isolating a 2 to 2.5 cm segment of ileum (A) and opening it from its anti-mesenteric border (B) and finally reter- bu hilarious along its longitudinal axis (C).
Urinary Diversion

- Still a very useful procedure
- MS patients
- High spinal injury
Multiple Sclerosis

• De-myelination of nerves of brain and spinal cord
• Plaques or sclerosis in different areas at different times
• Nerve transmission affected
• 4 main types
  • Benign
  • Relapsing remitting
  • Primary progressive
  • Secondary progressive
• 20-40 years 2:3 male to female
Typical symptoms of MS

• 75% of MS patients have spinal cord involvement
• Frequency, Nocturia, Urgency and Urge incontinence due to neurogenic detrusor overactivity
• Incomplete bladder emptying due to dyssynergic sphincter
• UTI secondary to incomplete bladder emptying
• Rarely have upper tract problems
• Mobility problems and poor hand function have big impact on management
Investigation

• History/ Type of their MS
• MSSU
• Post void scan
• Flexible cystoscopy if haematuria/ recurrent UTI
• Upper tract imaging
Management

• If incomplete bladder emptying and hand function allows teach intermittent self catheterisation ? Home best
• Use anticholinergics to treat detrusor overactivity
• If using variable dose preparation such as oxybutynin, darifenacin, solifenacin or fesoterodine often the higher dose will be required
• Reassessment
• If no benefit then urodynamics
Next step

• Overactivity not controlled?
• Intravesical botox injections 200u/300u
• Not able to manage ISC
• Carer to perform
• Indwelling catheter
  • Better is supra-pubic catheter
  • Easier to change
  • Avoids patulous urethra/ acquired hypospadias
• Urinary diversion
Cerebrovascular accident

• 3 mechanisms
• Reduced cortical inhibitory control of the micturition reflex leads to detrusor overactivity commonly causes symptoms of frequency urgency urge incontinence and nocturia
• Cognitive, functional and language deficits, normal bladder function but still incontinent
• Detrusor areflexia (underactive bladder) because of concomitant neuropathy or medication
• Upper tract problems are unusual as Pons intact
Cerebrovascular accident

• Assessment
• Management of detrusor overactivity
• Compromised by other neurological deficit and co-morbidities
• Use of other continence aids
Parkinson’s Disease

- Progressive loss of Dopa producing cells of the substantia nigra of the basal ganglia
- Located near and has effect upon Pons of brainstem
- Frequency, nocturia, urgency and urge incontinence exacerbated by the movement disorder of Parkinsons
- Often have concomittant bladder outflow obstruction which may be prostatic or may be sphincter related (bradykinesia)
- Treat overactivity with anticholinergic in first instance
- Trospium Chloride (Regurin) does not cross blood brain barrier
Parkinson’s Disease

• Treat obstructive symptoms with α blocker +/- 5ARI
• Urodynamics can be helpful in establishing contribution of overactivity and obstruction to symptoms
• Video urodynamics can help establish if obstruction at bladder neck or external sphincter
• However poorer outcome with TURP well established
• Often end up with indwelling catheter
Urodynamic example
Multiple System Atrophy

• Formerly known as Shy-Drager Syndrome
• Parkinsons plus autonomic neuropathy
• Younger males affected
• Incontinent because of deficient sphincter
• Surgery should be avoided
Congenital cord lesions
Congenital cord lesions

- Normal
- Spina Bifida Occulta
- Meninigocele
- Myelomeningocele
Spina Bifida
Congenital cord lesions

• Pattern of dysfunction depends on level of abnormality and whether complete or incomplete lesions
• Eg Thoracolumbar and lumbar myelomeningocele tend to be complete
• Lumbar and lumbosacral can be incomplete
• At or below L3 can be ambulant
Congenital cord lesions

• Clinical effects then
  • Neurogenic detrusor overactivity +/- sphincter weakness
  • Acontractile bladder +/- sphincter weakness

• Main concern is loss of upper tract function and so investigation and management geared to surveillance for this

• Combination of poor compliance, detrusor sphincter dyssynergia and lack of sphincter weakness and elevated leak point pressures are strong risk for upper tract deterioration

• Sphincter weakness can help preserve upper tracts in this situation.
Congenital cord lesions

• Symptoms are frequency, nocturia, urgency, urge incontinence and leakage without obvious preceeding urgency or increased intra-abdominal pressure

• Urodynamics essential with upper tract imaging

• Measurement of detrusor leak point pressure
Conclusions

• Clear idea of pathophysiology
• Understand patterns of symptoms and potential consequences of various conditions
• Not everyone has read the textbook
• Aware of red flag symptoms