**Aims of course/workshop**

The workshop provides comprehensive review of the latest evidence in assessment and management of LUTS in patients with chronic medical conditions. This includes management of LUTS in the elderly, in patients with multiple sclerosis, Parkinson’s disease, and following stroke. The workshop covers all aspects of management including conservative, medical and surgical management. The issues surrounding catheter care and its complications will be discussed along with a new session on reconstructive surgery. This will cover neuromodulation, cystoscopic botulinium injections, and advanced reconstructive surgery including cystoplasty and urinary diversion.

**Educational Objectives**

The workshop covers all aspect of LUTS management in chronic medical conditions. The comprehensive role of assessment and management including conservative, medical and surgical management will be covered by experts in the field. Often LUTS are ignored in patients with chronic medical conditions. The speakers will cover the multidisciplinary approach to the management of these patients. The assessment and role of special investigations will be covered. In addition, this year we added the important topic of catheter management, and the role of Botulinium injuections and reconstructive surgery in the long term management of these patients. The management of LUTS in the elderly with multiple chronic illnesses and polypharmacy, which is often challenging to clinicians will be comprehensively overviewed. This workshop has been running for two years with very good feedback.
Catheter Use in Patients with Chronic Disease and LUTS

Howard B Goldman MD

Center for Female Pelvic Medicine and Reconstructive Surgery
Glickman Urologic and Kidney Institute
Cleveland Clinic
Lerner College of Medicine

History of Urinary Catheters

• First described in 300 AD
• 1779 - precursor of modern catheter introduced - made of gum elastic
• 1880s – started using Latex catheters
• 1853 - Jean Reybard developed first indwelling catheter – with balloon made of animal cecum
• 1932 – Frederic Foley redesigned catheter to have rubber balloon near tip

15-25% of patients have indwelling catheter placed during hospitalization
7.5-10% of population of long-term care facilities catheterized
Inappropriate use of catheters – 21-50%


CDC Guidelines for Indications for Indwelling Urethral Catheter Use

• Patient has acute urinary retention or bladder outlet obstruction
• Need for accurate urine output measurements
• Use for selected surgical procedures
• To assist in healing of open sacral or perineal wounds
• Patient requires prolonged immobilization
• To improve comfort for end of life care

Additional Catheter Indications

Often found in those with chronic disease

• Patient unable to void and unable to perform clean intermittent catheterization
• Patient with incontinence that is not amenable to other treatments but desires dryness
• Patients with complex LUTS who do not want reconstructive surgery

Types of Catheterization

• Clean Intermittent Catheterization
• Condom catheter
• Indwelling urethral catheter
• Suprapubic catheter
Clean Intermittent Catheterization (CIC)

- Patients who cannot empty bladder
  - Areflexic bladder
  - Detrusor sphincter dyssynergia
  - Anatomic obstruction - prostate
- Must have adequate dexterity, mobility and vision
- Clean catheter passed every few hours to drain bladder
- Lower rate of UTI than indwelling catheter
- Lower rate of malignancy than indwelling catheter

Condom Catheter

- Males
- Condom placed over penis to drainage tube
- Needs to be able to stay on penis
- Need either reflexive voiding or free flow of urine per urethra
- May have difficulty staying on

Indwelling Urethral Catheter

- Catheter with balloon at tip to maintain placement

Types of Indwelling Catheters

- Traditional Latex Foley
- Non-latex foley
- Hydrophilic coating
- Silver coated
- Coudee – curved tip to bypass enlarged prostate

Urethral Indwelling Catheter

- Quick fix
- Efficacious
- Low maintenance
- Effective?
- Hygiene issues?
- Sexual function?
- UTI's
Risks of Indwelling Urethral Catheter

- Trauma or introduction of bacteria into the urinary system, resulting in infection and, consequently, possible septicemia or death
- Trauma to the urethra or bladder from incorrect insertion or attempts to remove the catheter without deflating the balloon
- Pain
- Accidental catheter dislodgement
- Urine bypassing the bladder
- Urethral perforation
- Blockage of the catheter
- Encrustment
- Urinary stones
- Profound effects on a patient’s social, work, and psychological well-being
- Risk of malignancy after long-term use?

Acquired Hypospadius

Urethral Destruction after Long Term Foley

Suprapubic Tube

- Placed directly through abdominal wall into bladder
- Outpatient procedure
- Relatively low risk
- No risk of urethral damage
- May be easier to manage in women with mobility issues or men with anatomic obstruction
- Reduced UTIs?

Suprapubic Catheter

Indwelling Catheters

- Generally changed every 4-6 weeks
  - Prevent encrustation
  - Decrease incidence of blockage
- In some can be clamped between drainage
UTI

- Important to distinguish UTI from asymptomatic bacteriuria
  - Many patients will have colonization
- Signs of infection
  - Fever
  - Suprapubic pain
  - Increased bladder spasms
  - Mental status changes
- Try to avoid treating asymptomatic bacteriuria

Complications of Foley Catheters—Is Infection the Greatest Risk?

Table 2. Gynecological events among inpatient veterans with an indwelling FC

<table>
<thead>
<tr>
<th>Event</th>
<th>No. Without Intervention</th>
<th>No. With Intervention</th>
<th>%55/2</th>
<th>%553/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower genital tract infection</td>
<td>11</td>
<td>0</td>
<td>8.7</td>
<td>8.7</td>
</tr>
<tr>
<td>Ovarian torsion</td>
<td>14</td>
<td>13</td>
<td>9.7</td>
<td>9.7</td>
</tr>
<tr>
<td>Tube insertion</td>
<td>2</td>
<td>5</td>
<td>7.6</td>
<td>7.6</td>
</tr>
<tr>
<td>suprapubic pain</td>
<td>3</td>
<td>5</td>
<td>8.1</td>
<td>8.1</td>
</tr>
<tr>
<td>External trauma, eg. gangrene of penis, proctitis or urethral stenosis</td>
<td>3</td>
<td>4</td>
<td>7.6</td>
<td>7.6</td>
</tr>
<tr>
<td>Placement of FC, ranging from preoperative to intraoperative placement</td>
<td>0</td>
<td>4</td>
<td>6.1</td>
<td>6.1</td>
</tr>
<tr>
<td>Catheter inserted with balloon inflated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Other</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>28</td>
<td>100.5</td>
<td>100.5</td>
</tr>
</tbody>
</table>

Proper Maintenance of Indwelling Catheters

- Insert using sterile technique
- Maintain closed drainage
- Maintain unobstructed flow
  - Keep catheter bag lower than bladder
  - Avoid tube kinking
- Some clean out collection bag regularly with dilute bleach or vinegar

Catheter Use

- CIC in the patient who cannot void is generally accepted as a first-line treatment
- In patients with significant LUTS, unable to be treated with typical treatments, urinary drainage may be necessary – and reasonable
- When appropriate - condom catheter
- In other cases indwelling catheter
- If planned for long-term, consider suprapubic tube
Surgical Management of the Bladder in Chronic Medical Conditions

Howard B Goldman MD
Center for Female Pelvic Medicine and Reconstructive Surgery
Glickman Urologic and Kidney Institute
The Cleveland Clinic
Lerner College of Medicine
Cleveland, OH

Types of LUTS

- Failure to Store
  - Bladder
    - Detrusor Overactivity
    - Poor Compliance
  - Outlet
    - Stress Incontinence

- Failure to Empty
  - Bladder
  - Outlet
    - DSD
    - Anatomic abnormality

Special Considerations

- Neurologic Disease
- Mobility
- Hand Dexterity
- Mentation

- Failure to Store
  - Bladder
    - Detrusor Overactivity
      - Behavioral tx, Meds, Neuromodulation, Botox, Augment, Diversion
    - Poor Compliance
      - Meds, Botox, Augment
  - Outlet
    - Stress Incontinence
      - Bulking agent, Burch, Sling, Artificial Sphincter

- Failure to Empty
  - Bladder
    - Catheterization, Neuromodulation, Diversion
  - Outlet
    - DSD
      - Catheter, Botox, Sphincterotomy
    - Anatomic abnormality
      - Treat abnormality

Neuromodulation

- Modulation of spinal cord reflexes and brain networks with electrical energy via peripheral afferents

- Has been demonstrated to work effectively in patients with OAB and idiopathic non-obstructive retention via multiple different routes
• What about neuromodulation for LUTS of neurogenic origin?

• May work for incontinence or idiopathic retention (and sometimes DSD)

Options

• On the market:
  – Sacral Nerve Modulation – Interstim®
  – Posterior Tibial Nerve Stimulation – Urgent PC®

• Experimental
  – Dorsal Genital Nerve Stimulation
  – Pudendal Nerve Stimulation
  – Other

Interstim (SNM)

• Indications: “...for the treatment of urinary retention and the symptoms of OAB.... In patients who have failed or could not tolerate more conservative treatments”

• Precautions: “Safety and effectiveness have not been established for.....patients with neurological disease origins such as multiple sclerosis....”

Medtronic Interstim Therapy Fact Sheet 2003

SNM Concerns

• Not approved for neurogenic LUTS

• ? of indications/studies

• ? of financial reimbursement if done

• ? about MRI safety

Urgent PC (PTNS)

• Indications: “The Urgent PC Neuromodulation System is intended to treat patients suffering from urinary urgency, urinary frequency, and urge incontinence.”

FDA letter to Uroplasty, 2007

Acute UDS effect of PTNS in Patients with Multiple Sclerosis

• N = 29 patients with MS

• Average age 47 years

• Average duration of LUTS 4.3 years

• UDS before and during PTNS

• Outcomes
  – Volume at first DO
  – Cystometric capacity

Gabay et al, Urology, 2008
3 month clinical outcomes of PTNS in MS patients

- N = 19 patients with MS
- Treated with PTNS weekly for 12 weeks
- Outcomes
  - UDS variables
  - Bladder diaries

Kabay, et al, Neurourol Urod, 2009

PTNS to Treat Refractory OAB in MS

- N = 21 patients with MS
  - Refractory to conservative treatment
- Prospective multicenter open label trial
- Treated with 12 sessions of Urgent PC
- Outcomes
  - 3 day freq/vol chart
  - PPBC, KHQ, urgency bother, VAS

Sacral Nerve Modulation

- Sacral Nerve Modulation (SNM) is stimulation of the sacral nerves to modulate the reflexes that influence the bladder, sphincter, and pelvic floor.
- SNM utilizes mild electrical pulses to improve or restore normal voiding function.

Sacral Neuromodulation - Interstim

- Direct Stimulation of the S3 sacral nerve
- Trial phase with external IPG and temporary or permanent lead
- Permanent lead and IPG placed if trial successful

Interstim for Neurogenic LUTS

- Review of neurogenic patients tested with SNS
- 33 patients tested, 28 implanted

Waller et al, ADOG, 2007

SNM for Neurogenic LUTS

Meta-analysis

- 26 studies (357 patients) as of April 15, 2010
- Pooled success rates
  - 68% for test phase
  - 92% for permanent SNS
- Mean follow-up of 26 months

Kessler et al, Eur Urol, 2010
Interstim for Neurogenic LUTS

- N = 62 trialed
  - DO = 34
  - Retention = 28
- 41/62 had > 50% improvement, 37 implanted
- Follow up avg 4.3 years
- 76% of those implanted maintained outcomes
- 8% results partially altered
- 16% loss of efficacy

Chaabane, et al, Neurourol Urod, 2011

Patients with Retention

<table>
<thead>
<tr>
<th>Neurological pathology</th>
<th>n = 62</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple sclerosis</td>
<td>13</td>
</tr>
<tr>
<td>Incomplete spinal cord injury</td>
<td>13</td>
</tr>
<tr>
<td>Peripheral neuropathy</td>
<td>8</td>
</tr>
<tr>
<td>Parkinson’s disease</td>
<td>4</td>
</tr>
<tr>
<td>Myelitis/encephalitis</td>
<td>4</td>
</tr>
<tr>
<td>Stroke</td>
<td>3</td>
</tr>
<tr>
<td>Acquired brain injuries</td>
<td>3</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>2</td>
</tr>
<tr>
<td>Central nervous system tumor</td>
<td>2</td>
</tr>
<tr>
<td>Friedrich ataxia</td>
<td>1</td>
</tr>
<tr>
<td>Subarachnoid hemorrhage</td>
<td>1</td>
</tr>
<tr>
<td>Primary dyssynergia</td>
<td>1</td>
</tr>
<tr>
<td>Williams-Beuren syndrome</td>
<td>1</td>
</tr>
<tr>
<td>Adrenoleukodystrophy</td>
<td>1</td>
</tr>
<tr>
<td>Multiple system atrophy</td>
<td>1</td>
</tr>
<tr>
<td>Spinocerebellar atrophy</td>
<td>1</td>
</tr>
<tr>
<td>Operated cerebral aneurysma</td>
<td>1</td>
</tr>
<tr>
<td>Familial hereditary degeneration</td>
<td>1</td>
</tr>
</tbody>
</table>
Patients with DO

<table>
<thead>
<tr>
<th></th>
<th>Before the test</th>
<th>During the test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak voiding Q (ml/s)</td>
<td>13.46 ± 5.12</td>
<td>9.87 ± 3.19</td>
</tr>
<tr>
<td>Mean number of urinations</td>
<td>2.64 ± 0.59</td>
<td>3.4 ± 1.05</td>
</tr>
<tr>
<td>Mean percent of urinary episodes</td>
<td>7.07 ± 0.48</td>
<td>3.9 ± 0.69</td>
</tr>
<tr>
<td>Mean number of voids</td>
<td>3.66 ± 1.46</td>
<td>3.9 ± 0.69</td>
</tr>
<tr>
<td>Mean voided volume(mL)</td>
<td>38.4 ± 93</td>
<td>18.4 ± 93</td>
</tr>
<tr>
<td>Mean post void residual volume (mL)</td>
<td>29.4 ± 93</td>
<td>13 ± 102</td>
</tr>
<tr>
<td>Mean frequency of the updated index value (cpr)</td>
<td>11.8 ± 13.7</td>
<td>32.8 ± 153</td>
</tr>
<tr>
<td>Mean maximum (cpr)</td>
<td>3.6 ± 1.13</td>
<td>2.8 ± 0.36</td>
</tr>
<tr>
<td>Immediate post voiding urethra pressure (cm H2O)</td>
<td>467 ± 254</td>
<td>333 ± 194</td>
</tr>
</tbody>
</table>

Issues with SNM for Neurogenic LUTS

- Potential loss of efficacy in patients with progressive disease
- MRI issues: “MRI is not recommended for a patient who has any implanted component of a neurostimulation system. Exposing a patient with an implanted neurostimulation system or component to MRI may potentially injure the patient or damage the neurostimulator…”
  
  Medtronic website, 2006

MRI following Interstim – Single Institution Experience

- 9 patients with 15 MRI exams
  - Lumbar = 8
  - Pelvis = 1
  - Head/Neck = 6
- No interference with imaging
- As long as IPG magnetic switch turned off – no malfunction of device
- No patient adverse event

Chermansky, Krlin, et al, Neurourol Urod, 2011

Medtronic May 2012

- Head MRI can be safely performed in patients with Interstim

Bottom Line

- Patients with Interstim can be imaged safely with no apparent adverse effect to the patient or the device
- Can’t always find a radiologist to perform MRI
- Both PTNS and SNS can be utilized safely and effectively in patients with neurogenic LUTS
- For “OAB” as well as “idiopathic retention”
- Much more data on SNS
Detrusor Overactivity or Poor Compliance

- Botox
  - Decreases episodes of DO
  - Decreases intravesical pressure

- 20% risk of new onset urinary retention
- Patients must be willing to perform clean intermittent catheterization
  - PATIENT MUST BE ABLE TO HAVE CIC DONE

BOTOX® Mechanism of Action

**Efferent Pathways** (Motor Effects)
- BOTOX® inhibits acetylcholine release

**Afferent Pathways** (Sensory Effects)
- BOTOX® is believed to inhibit afferent neuro-transmission and urinary pathways

Botulinum Toxin

- Most potent neurotoxin known to man
- Works by inhibiting acetylcholine release from presynaptic cholinergic junction leading to chemodenervation and reduced muscle contractility
- Reversible in 5-8 months

Inhibition of Acetylcholine Exocytosis by BOTOX®

Release of Acetylcholine at the Neuromuscular Junction

Prior to Procedure

<table>
<thead>
<tr>
<th>Patients not on self-catheterization</th>
<th>Always antiseptic and sterile to catheterize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinal*</td>
<td>Not sterile - infections urinary tract (UTI) if left present, do not inject</td>
</tr>
<tr>
<td>Pre-procedure antibiotic**</td>
<td>Consider institution of appropriate prophylactic antibiotic program</td>
</tr>
<tr>
<td>Antiplatelets/anticoagulants**</td>
<td>Discontinue antiplatelet therapy 2 days before procedure</td>
</tr>
</tbody>
</table>

1. Data on file, Allergan, Inc.
**Botox Injection Technique**

**Results (NDO): UI Episodes**

*\( p < 0.05 \) for differences between BoNT group and placebo

†\( p < 0.05 \) for difference within-group changes from baseline

- Reduction in number of UI episodes compared to baseline (%)

**Results: Quality of Life**

*\( p < 0.05 \) for pairwise contrasts between BoNT groups and placebo

†\( p < 0.002 \) for within-group differences from baseline

- Increase in Total IQoL Score from baseline (%)

**Decreases in Urge Urinary Incontinence With BoNT-A**

- Mean UI Frequency (% Change from Baseline)

*\( p < 0.05 \) in among-group comparison

† BoNT-A vs placebo \( P = 0.0347 \)

‡ BoNT-A vs placebo \( P = 0.0878 \)

**Mean Reduction in Weekly Urinary Incontinence Episodes**

*\( p < 0.001, ** p < 0.05 \) in pairwise comparison versus placebo

**Responder Analysis of Proportion of Patients With ≥50% Reduction in Incontinence Episodes at Week 6**

*\( p < 0.001 \) in among-group comparison
1. Data on file, Allergan, Inc.

**BOTOX®**

Mean change from baseline in MDP at Week 6:

- **IDC** = involuntary detrusor contraction
- **MDP** = maximum detrusor pressure

Mean change from baseline:

- Placebo: 57.4 ± 25 mL
- BOTOX® 200 U: 62.9 ± 28.3 mL

**Week 6:**

- **Placebo:** 200 mL
- **BOTOX® 200 U:** 253.8 mL

**Adverse Events: First 12 Weeks**

Adverse reactions reported by ≥ 1% of BOTOX® treated patients and more frequent than in placebo-treated patients within first 12 weeks in double-blind, placebo-controlled trials:

<table>
<thead>
<tr>
<th>Adverse Event</th>
<th>BOTOX® 200 U (N=262)</th>
<th>Placebo (N=272)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary tract infection†</td>
<td>84 (34%)</td>
<td>47 (17%)</td>
</tr>
<tr>
<td>Urinary retention‡</td>
<td>45 (17%)</td>
<td>9 (3%)</td>
</tr>
<tr>
<td>Infection†</td>
<td>70 (4%)</td>
<td>8 (3%)</td>
</tr>
<tr>
<td>Fatigue</td>
<td>10 (4%)</td>
<td>3 (1%)</td>
</tr>
<tr>
<td>Nausea</td>
<td>4 (2%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

**Median Duration of Response**

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Median Duration of Response in Pivotal Trials (Based on Patient Qualification for Retreatment)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOTOX® 200 U</td>
<td>295-337 days (42-48 weeks)</td>
</tr>
<tr>
<td>Placebo</td>
<td>96-127 days (13-18 weeks)</td>
</tr>
</tbody>
</table>

Retreatment qualification criteria:

- ≥ 50% reduction in MDP at Week 6
- ≥ 70% reduction in MVC at Week 6
- ≥ 20% increase in PVR at Week 2
- ≥ 30% increase in PVR at Week 2

- PVR ≥ 40 mL at first treatment
- PVR ≥ 50 mL at second treatment
- PVR ≥ 60 mL at third treatment
- PVR ≥ 70 mL at fourth treatment

- ≥ 105 CFU/mL conjoint with a leukocyturia > 5/hpf or a positive urine culture
Idiopathic OAB
Currently an Off Label use

• Results similar to DO
• Likely dose will be either 100 or 150 units
• Injected about 2-4 mm deep at 20-30 sites

• Adverse Events
  – Retention
  – UTI

Botox for DSD

• Injection of the external sphincter may treat DSD
• 100u/10cc saline
• Injected 2.5 cc in 4 quadrants of sphincter

Detrusor Overactivity or Poor Compliance not responding to other Treatments

• Bladder Augmentation
  If poor urethra – add catheterizable stoma
• Urinary Diversion
  – ileovesicostomy
  – ileal conduit

Enterocystoplasty

Increase in bladder capacity
Interruption of coordinated detrusor contractions
Low pressure system

Enterocystoplasty

• Enterocystoplasty
  – 70% satisfactory results achieved.
• Long-term favorable urodynamic changes in neuropathic bladders.
• Favorable outcomes in MS patients.
• Present and future dexterity an issue.

Augmentation Cystoplasty

Multiple potential bowel segments can be used

Augmentation Cystoplasty

- Patient must be prepared to catheterize
- In 2012 do not perform as often as did 10 years ago
Augment with Catheterizable Stoma

- Increase capacity and reduces DO
- Ability to catheterize via abdominal stoma
- Good for those with difficulty getting to urethra or destroyed urethra
- Needs reasonable manual dexterity

Ileovesicostomy

- Sew bowel to bladder and bring to skin
- No ureteroileal anastamoses
- Simple
- Problems with poor flow out
  - UTIs, bladder stones

Ileal Conduit

- Straightforward
- Drains directly to bag
- ?? What to do about bladder

Suprapubic Tube

- Simple
- Not (usually) a “major” procedure
- Catheter is not ideal
- But in special populations may not have options
- Issues with UTI, catheter obstruction, bladder remodeling

Ileovesicostomy

- Sew bowel to bladder and bring to skin
- No ureteroileal anastamoses
- Simple
- Problems with poor flow out
  - UTIs, bladder stones
Suprapubic Tube

- Effective for Urinary Retention

- Less effective for “OAB”
  - Leakage around the catheter
    - Sometimes utilize Botox in such a case

Bladder Neck Closure

Urethral Destruction after Long Term Foley
Incontinence in neurological disorders:

Stroke

Jalesh N. Panicker
Consultant Neurologist
Department of Uro-Neurology
National Hospital for Neurology and Neurosurgery
and UCL Institute of Neurology
Queen Square, London

Stroke (CVA)

Acute neurological manifestations of a cerebrovascular disease resulting from interruption of blood flow to brain

Thrombotic

Embolic

Haemorrhagic

Bladder dysfunction

• Incidence: 11%-53%
• Storage symptoms> voiding symptoms
• Nocturia 36%
• Urge incontinence 29%
• Voiding difficulty 25%
• Urinary retention (acute stage): 6%

Sakakibara et al. 1996

Urodynamic findings and stroke (n=22)

• Detrusor overactivity (68%)
• Detrusor-sphincter dyssynergia (14%)
• Retention: detrusor areflexia and unrelaxing sphincter

Sakakibara et al., 1996

Is the time interval after stroke relevant?

< 6 hours

3 days
Acute stroke

- Urinary retention may occur
- Stage of neuronal shock
- Catheterisation
- Fever: worse outcome
- Predictors for UTI: age, catheterisation, female gender, stroke severity
- Prevalence: 54% → 24% over 1 year

(Kolominsky-Rabas et al. 2003)

Incontinent patients fare poorly

- Incontinence at 7 days predicts poor survival, disability and institutionalization (Wade and Hewer 1985)
- Incontinence during first 12 months: 4x higher mortality (Anderson et al. 1994)
- Depression and suicide (Brittain and Castleden 1998)

Is the type of stroke relevant?

Is the site of stroke relevant?

Arterial territories
**A neuroanatomical correlation?**

*Sakakibara et al., 1996*

**Site of lesion and incontinence**

- More anterior the stroke, more likely are bladder symptoms
- Size of the lesion
- Basal ganglia lesions have been associated with Detruso sphincter dyssynergia
- Cerebellar lesions - retention
- Laterality - right hemispheric lesions
- Deficits associated with incontinence: hemiplegia, aphasia, visual neglect, loss of proprioception

---

**The white matter**

*Wakana et al. 2004*

**White matter disease: leukoaraiosis**

- Disease of the small vessels
- Affects memory, mobility, continence

---

**Leukoaraiosis and incontinence**

*Sakakibara et al., 1999*

**White matter disease: a cause for incontinence in the elderly?**

- Brain regions activated by bladder filling become more prominent with increased burden of white matter hyperintensities

*Tadic et al., 2010*
Any particular white matter tracts?

Superior longitudinal fasciculus

Anterior thalamic radiation

Wakana et al. 2004

Incontinence and the patient with stroke

Functional incontinence
• Reduced mobility
• General debilitation

Neurogenic bladder dysfunction

Memory loss
• Amotivation
• Apraxia
• Agnosia
• Visuospatial disorientation
• Language dysfunction

Incontinence and the patient with stroke

Management

Acute Stroke
• Exclude UTI
• Bladder scan
• Catheterisation?
• Containing continence: penile sheath, pads
• Antimuscarinics?

Chronic Stroke
• Exclude UTI
• Bladder scan
• Urodynamics?
• Antimuscarinics
• CISC
• Second line treatments?

Points to consider

• Memory, attention: more frequent follow ups, timed voiding, memory aids
• Manual dexterity, hemianopia, speech disturbance: easy access to bed pan/urinal
• Dressing apraxia: simple clothing, fastening velcro
• Language disturbance: symbols
• Visuospatial disorientation: lighting, minimise obstacles to the toilet
• Hemineglect

Which patients continue to be incontinent?

• Age > 75 years
• Gender: females
• Stroke risk factors: diabetes, hypertension
• Level of consciousness
• Site of stroke: anterior circulation, cortical strokes
• Size
• Side of stroke: right hemispheric?
• Deficits: hemiparesis, aphasia
Incontinence in neurological disorders: Multiple Sclerosis and Parkinson’s Disease

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No competing interests to be declared

MS - a demyelinating disorder

Expanded Disability Status Scale (EDSS)

Course of MS

Involuntary bladder contractions
• Small capacity
• Incomplete emptying

S2-4 in cauda equina
pelvic & pudendal ns
MS & LUTS: Facts and Figures

- Prevalence 32%-96%
- 90% if duration > 10 years
- First symptoms occur average 6 years into the illness
- LUTS in 10% at first diagnosis
- Related to duration of MS and severity of neurological deficits (pyramidal weakness)

Urinary symptoms (%) of 170 patients (mean 12 years duration MS)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urgency</td>
<td>85</td>
</tr>
<tr>
<td>Frequency</td>
<td>82</td>
</tr>
<tr>
<td>Urge incontinence</td>
<td>63</td>
</tr>
<tr>
<td>Hesitancy</td>
<td>49</td>
</tr>
<tr>
<td>Interrupted stream</td>
<td>43</td>
</tr>
<tr>
<td>Incomplete emptying</td>
<td>34</td>
</tr>
</tbody>
</table>

Botts et al., 1993

Urodynamics in MS

- 65% Detrusor Overactivity
- 25% Hypocontractile Detrusor
- 35% DSD

May be normal in 10% of symptomatics

de Seze et al., 2007

Not all neurogenic bladders are the same!

Upper tract dilatation
- Neural tube defects: 68%
- Traumatic paraplegia: 23%
- MS: 8%

Risk for renal failure
- Neural tube defects: 8x
- Traumatic paraplegia: 5x
- MS: 0x

de Seze et al., 2007
Lawrenson et al., 2001

Upper urinary tract damage in patients with MS

- Not very common
- Risk factors:
  - Long standing MS
  - long term indwelling catheter
  - DO
  - DSD

de Seze et al., 2007

A UK consensus on the management of the bladder in multiple sclerosis

C J Fowler, J N Panicker, M Drake, C Harris, S C W Harrison, M Kilby, M Lucas, N Madewell, A Mangnall, A North, B Porter, S Reid, N Russell, K Watkiss and M Wells

J. Neurol Neurosurg Psychiatry 2005; 70;470-477
doi:10.1136/jnnp.2005.159178

Email: j.panicker@ion.ucl.ac.uk for PDF copy
Urodynamics for all?

- Patients refractory to conservative treatment
- Bothered by their symptoms and wish to undergo further interventions

(Grade D)

Fowler, Panicker, et al., JNNP, 2009

Bladder scan evaluating voiding dysfunction: measuring the post void residual urine

- Initial evaluation
- For any patient prior to treatment
- Suspicion of incomplete emptying
- New bladder symptoms

Voiding Dysfunction: other alternatives?

- Suprapubic vibration
- Level 1b evidence in patients with DSD
- Effect is limited

<table>
<thead>
<tr>
<th>Table 2: Results of key outcome measures at two weeks following add-on (antimuscarinic) treatment vs. SBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome</td>
</tr>
<tr>
<td>Mean frequency of incontinence events/week</td>
</tr>
<tr>
<td>Mean number of incontinence episodes/week</td>
</tr>
<tr>
<td>Mean bladder activity scores (0-6)</td>
</tr>
<tr>
<td>Mean voiding symptoms (0-10)</td>
</tr>
</tbody>
</table>

*Compared with no treatment.

Prasad, et al., Clin Rehabil, 2003

Effect of raised post micturition residual volume and antimuscarinics on bladder dysfunction

Fowler, Panicker et al. JNNP 2009
Desmopressin (DDAVP)

- Level Ia evidence in MS
- Situational
- once/24 hours
- extreme care in >60 years old
- not indicated with ankle swelling

Change in number of nocturia episodes related to severity of baseline episodes

<table>
<thead>
<tr>
<th>Baseline severity (# Nocturia episodes)</th>
<th>Change in # Nocturia episodes</th>
<th>All</th>
<th>&gt;=0.5</th>
<th>&gt;=1</th>
<th>&gt;=1.5</th>
<th>&gt;=2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>p=0.01</td>
<td>p=0.004</td>
<td>p=0.008</td>
<td>p=0.003</td>
<td>p=0.023</td>
</tr>
<tr>
<td></td>
<td>Sativex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Placebo</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Fowler, Panicker et al. JNNP 2009
"Dasgupta Method" at Queen Square

- Flexible cystoscopy
- Ultra-fine flexible needle
- 300 units Botox® in 30 sites
- Duration < 15 minutes
- Discomfort score 3.4 (0.5 – 9)
- Effect lasts 9-13 months

Harper et al., BJU Int 2003

Single injection improves bladder symptoms and QoL in MS

Catheterisation after botulinum toxin

Number of patients not requiring catheterization

Khan et al. Poster BAUS, 2009

Repeat injections

Repeat injections in 99 (mean 2.9)

Kalsi et al., 2007

QoL: Urogenital symptoms in MS

UDI 6 Scores NDO/MS

Median 13 months (IQR 11-17 months)
QoL: Incontinence

Fowler, Panicker et al. JNNP 2009

Urinary tract infections

- Urinary tract infections, may lead to exacerbation of neurological symptoms
- Avoid routine testing of urine if doing CISC, unless symptoms suggest infection (Grade D)
- Cranberry preparations may reduce likelihood of infections (Grade B)
- Prophylactic antibiotics?

Fowler, Panicker, et al., JNNP, 2009

Parkinson’s Disease

NHS
- 68, male
- Progressive slowness in walking, tremor right hand
- Bradykinesia, rigidity, rest tremor
- Urgency, frequency, nocturia
- Incontinence- daily
- Erectile dysfunction

### Table 3: International Non-Motor Symptoms Questionnaire (NMS-Quest) study: prevalence of major non-motor symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nocturia</td>
<td>59.50%</td>
</tr>
<tr>
<td>Urinary urgency</td>
<td>53.60%</td>
</tr>
<tr>
<td>Constipation</td>
<td>50.20%</td>
</tr>
<tr>
<td>Blues</td>
<td>48.20%</td>
</tr>
<tr>
<td>Insomnia</td>
<td>44.30%</td>
</tr>
<tr>
<td>Concentration</td>
<td>44.00%</td>
</tr>
<tr>
<td>Anxiety</td>
<td>43.40%</td>
</tr>
<tr>
<td>Memory</td>
<td>43.10%</td>
</tr>
<tr>
<td>Restless legs syndrome</td>
<td>40.30%</td>
</tr>
<tr>
<td>Dribbling</td>
<td>40.10%</td>
</tr>
</tbody>
</table>


### Voiding symptoms in Parkinson’s Disease

- Bladder outlet obstruction: prostate enlargement
- Bradykinesia of pelvic floor muscles
  - “pseudo-dysynergia”
- ?Weak detrusor
- ?Raised urethral pressure from levodopa metabolites

Araki and Kuno, 2000
L-dopa on/off

- Off L-Dopa
  - Urgency
  - Urge incontinence
  - Voiding difficulty

- On L-Dopa
  - Urgency worse in most but better in some
  - Less voiding difficulty in all

Sakakibara et al., 2002

Is it Multiple System Atrophy (MSA)?

What happens in MSA?

- **Brain stem**: detrusor overactivity

- **Spinal cord intermediolateral column**:
  - **Sacral segments**: parasympathetic failure
  - Impaired detrusor contraction
  - **Dorsolumbar segments**: sympathetic failure
  - Open bladder neck

- **Onuf’s nucleus**: sphincter weakness

Beck et al., 1994

<table>
<thead>
<tr>
<th></th>
<th>MSA</th>
<th>PD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onset of urogenital dysfunction</strong></td>
<td>May precede other neurological deficits</td>
<td>Usually follows</td>
</tr>
<tr>
<td><strong>Bladder dysfunction</strong></td>
<td>Early and severe incontinence. Overactive bladder symptoms initially, followed by stage of chronic urinary retention</td>
<td>Less severe incontinence. Overactive bladder symptoms, nocturnal polyuria</td>
</tr>
<tr>
<td><strong>Bladder scan</strong></td>
<td>Elevated postvoid residual</td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Videourodynamics</strong></td>
<td>Open bladder neck (in men)</td>
<td>Closed bladder neck</td>
</tr>
<tr>
<td><strong>Sexual dysfunction</strong></td>
<td>Erectile dysfunction (often first manifestation)</td>
<td>ED, sometimes hypersexuality</td>
</tr>
</tbody>
</table>

Open bladder neck in a man with MSA

Sakakibara et al., 2000
Benign Prostatic Obstruction and Parkinson’s Disease — Should Transurethral Resection of the Prostate be Avoided?

Beat Roth, Urs E. Studer, Clare J. Fowler* and Thomas M. Kessler1,4

2009

Botulinum toxin in Parkinson’s disease?

- One series of 6 patients
- 200 U Botox©
- Favourable response
- CISC for MSA patients (n=2)

Muscarinic receptor affinity

<table>
<thead>
<tr>
<th>Agent</th>
<th>Formulation</th>
<th>Dosing</th>
<th>Dose</th>
<th>Chemical Structure</th>
<th>Muscarinic M3, M4, M5, (K-Ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domperidone</td>
<td>Controlled release</td>
<td>Once daily</td>
<td>7.5, 15 mg</td>
<td>Tertiary amine</td>
<td>0.3</td>
</tr>
<tr>
<td>Glycopyrr</td>
<td>Immediate release</td>
<td>Two or three times daily</td>
<td>1 mg</td>
<td>Tertiary amine</td>
<td>1.5</td>
</tr>
<tr>
<td>Glycopyrr</td>
<td>Extended release</td>
<td>Once daily</td>
<td>5, 10, 20 mg</td>
<td>Tertiary amine</td>
<td></td>
</tr>
<tr>
<td>Oxybutynin</td>
<td>Immediate release</td>
<td>Once daily</td>
<td>3.9 mg</td>
<td>Tertiary amine</td>
<td></td>
</tr>
<tr>
<td>Skelaxin</td>
<td>Immediate release</td>
<td>3–4 days</td>
<td>1, 5 mg</td>
<td>Tertiary amine</td>
<td>2.5</td>
</tr>
<tr>
<td>Triflusal</td>
<td>Immediate release</td>
<td>Twice daily</td>
<td>1, 2 mg</td>
<td>Tertiary amine</td>
<td>0.6</td>
</tr>
<tr>
<td>Trospium</td>
<td>Immediate release</td>
<td>Once daily (at least 1 hour before food)</td>
<td>2, 4 mg</td>
<td>Quaternary amine</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Giannantoni et al. 2009

Acknowledgements

Department of Uro-Neurology

Urology referral

- Haematuria
- Renal impairment
- Pain from upper or lower urinary tract
- Suspicion of concomitant urological/urogynecological condition: prostate enlargement, stress incontinence, fistula
- Frequent urinary tract infections
- Symptoms refractory to treatment
- Consideration for intradetrusor injections of Botulinum toxin A
- Suprapubic catheterization
- Rare consideration of surgery eg. ileocystoplasty, ileal conduit
Bladder Diary - extension of history taking

<table>
<thead>
<tr>
<th>Time / Volume (mL)</th>
<th>Fluid Intake</th>
<th>Episodes of Urinary Tract Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td>10 AM</td>
<td>2 PM</td>
</tr>
<tr>
<td>Volume</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Time</td>
<td>3 PM</td>
<td>4 PM</td>
</tr>
<tr>
<td>Volume</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>Time</td>
<td>5 PM</td>
<td>7 PM</td>
</tr>
<tr>
<td>Volume</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Time</td>
<td>8 PM</td>
<td>9 PM</td>
</tr>
<tr>
<td>Volume</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Time</td>
<td>10 PM</td>
<td>11 PM</td>
</tr>
<tr>
<td>Volume</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Time</td>
<td>12 AM</td>
<td>1 PM</td>
</tr>
<tr>
<td>Volume</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

- Dipsticks
- Bladder scan
- Uroflowmetry
- Any uro/gynae causes?

- Urodynamics
- Renal functions
- Specialist referral
- Isotope renography
- Cystoscopy
- Antimuscarinics; CISC
- DDAVP; BoNT/A
- IDC; Antimuscarinics; BoNT/A
- Urosepsis
- Upper tract damage
- Renal impairment
- Calculi
- Cancer

- Bladder retraining; fluid regulation; exercises
- Incomplete emptying
- UTI

- IDC
- Antimuscarinics; CISC
- BoNT/A; CISC

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3 \( \Rightarrow \)

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Notes
Record your notes from the workshop here