



## Chronic medical conditions and the bladder, conservative, medical and surgical management

W29, 16 October 2012 09:00 - 12:00

Start	End	Topic	Speakers
09:00	09:15	Introduction, diabetes and the bladder	<ul style="list-style-type: none"> <li>Abdalla Fayyad</li> </ul>
09:15	09:45	LUTS in the elderly, can we do better?	<ul style="list-style-type: none"> <li>Adrian Wagg</li> </ul>
09:45	10:15	Catheter management, indications and management of complications	<ul style="list-style-type: none"> <li>Howard Goldman</li> </ul>
10:15	10:30	Discussion	All
10:30	11:00	Break	None
11:00	11:30	LUTS in Stroke, MS and Parkinson's disease	<ul style="list-style-type: none"> <li>Jalesh Panicker</li> </ul>
11:30	12:00	Surgical management of LUTS in Chronic medical conditions	<ul style="list-style-type: none"> <li>Howard Goldman</li> </ul>

### **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 botulinum 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 Botulinum injections 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%

Warren 2001, Saint et al 2000, Hazelett et al 2006

## 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

CDC Guideline for Prevention of Catheter-Associated Urinary Tract Infections 2009. [www.cdc.gov](http://www.cdc.gov)

## 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

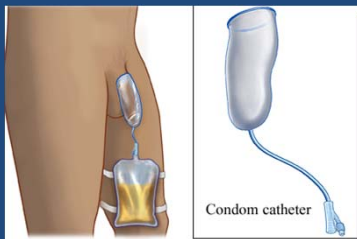
### Clean Intermittent Catheterization (CIC)

- 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 cath?

### 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

### Condom Catheter



### Indwelling Urethral Catheter

- Catheter with balloon at tip to maintain placement

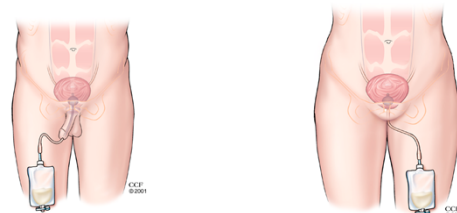


### Types of Indwelling Catheters

- 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



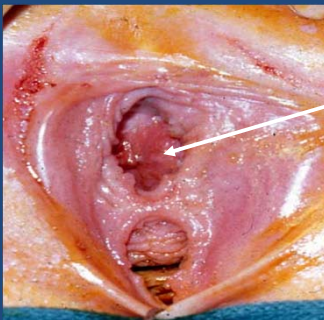
## Risks of Indwelling Urethral Catheter

- 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 Hypospadias



## Urethral Destruction after Long Term Foley



Bladder neck

## 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 Tube

- Outpatient procedure
- Efficacious and effective
- Lower maintenance
- Restore sexual fx
- Lower UTI rates
- Improved hygiene

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?

Anne-Marie Leuck,<sup>\*,†</sup> Deborah Wright,<sup>†</sup> LeAnn Ellingson,<sup>†</sup> Linda Kraemer,<sup>†</sup> Michael A. Kuskowski<sup>†</sup> and James R. Johnson<sup>\*,‡</sup>

From the VA Medical Center (AML, DW, LE, LK, MAK, JRJ), Department of Medicine (AML, JRJ) and Department of Psychiatry (MAK), University of Minnesota, Minneapolis, Minnesota

**Table 2. Genitourinary trauma events among inpatient veterans with an indwelling FC**

	No. With Intervention	No. Without Intervention	Total No. Events	% 6,513 FC Days
False passage	11	0	11	0.2
Gross hematuria	14	19	33	0.5
Ridging, usually causing pain and/or difficult FC removal	0	36	36	0.6
External trauma, eg gangrene of penis, paraphimosis or meatal erosion	2	5	7	0.1
Misplacement of FC ranging from prostatic to intraperitoneal placement	3	4	7	0.1
Catheter removal with balloon inflated	0	4	4	0.1
Other	2	0	2	0.03
Totals	32	68	100	1.5

AM Lueck et al, JU, 2012

**Table 1. Rates of bacteriuria/funguria and UTI among inpatient veterans with an indwelling FC**

	No. Events	% of 6,513 FC Days	% of 407 UA/UC Days	No. Events Treated With Antimicrobials (row %)
Any pos UC or UTI diagnosis	116	1.8	28.5	56 (48.2)
Symptomatic:	21	0.3	5.2	17 (81)
CDC S-UTI	13	0.2	3.2	12 (92)
Other: symptomatic	5	0.1	1.2	4 (80)
Other: complex	3	0.0	0.7	1 (34)
Asymptomatic:	95	1.5	23.3	39 (41)
CDC ABU	44	0.7	10.8	25 (57)
Other: asymptomatic	51	0.8	12.5	14 (27)

## 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  
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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)

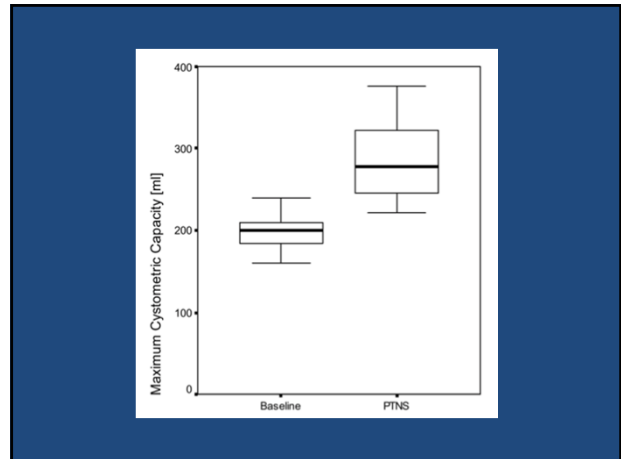
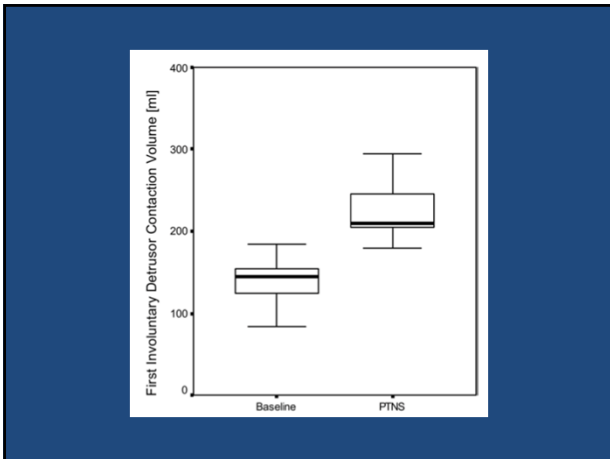
- Indications: “The Urgent PC Neuromodulation System is intended to treat patients suffering from urinary urgency, urinary frequency, and urge incontinence.”

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

Kabay 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

TABLE 1. Bladder Diary Variables (24/hr episodes) for the Comparison of Baseline and After PTNS Data in MS Patients

Patient	Urgency		Urge urinary incontinence		Daytime frequency		Nocturia		Pad test (g)		Voiding volume (ml)	
	Baseline	PTNS	Baseline	PTNS	Baseline	PTNS	Baseline	PTNS	Baseline	PTNS	Baseline	PTNS
1	12	8	8	5	15	8	8	2	5	1	26	35
2	11	4			10	6	5	1			226	238
3			8	6	10	4			75	15	175	207
4	17	9	9	5	12	5	6	3	2	1	288	275
5	15	4	12	5	13	6			32	9	198	212
6	16	9	9	6	8	4	3	0	16	7	75	134
7					9	9					140	155
8	5	0			18	6					168	173
9	5	2	6	3	6	2	4	1	17	3	167	193
10	10	6	5	2	11	3			64	6	178	201
11					19	7	3	0			143	295
12	13	11	3	0	10	8			10	0	138	202
13	17	13	12	4	17	8	4	2	23	2	149	195
14	14	7	7	5	5	2			3	0	160	386
15					15	6	5	2			67	245
16					7	4					35	210
17	15	8			13	7					43	234
18	14	7			8	6					56	248
19	16	9			12	5					110	393

### 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

Gobbi, et al, Mult Sclerosis J, 2011

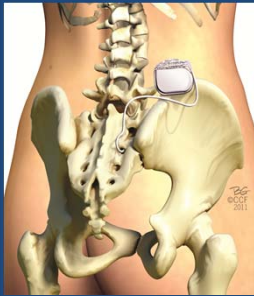
Table 2. Study outcomes

Assessment	Pre-PTNS	Post-PTNS	p-value
Daytime frequency*	9 (6-11)	6 (5-10)	0.04
Nocturia*	3 (2-4)	1 (0-3)	0.002
Voided volume**	182 ml (±50)	225 ml (±50)	0.003
Post-micturition residual**	98 ml (±124)	43 ml (±45)	0.02
PPBC*	5 (5,6)	2 (2,3)	0.003
PPIUS*	4 (3,4)	2 (1,3)	0.005
UB-VAS (cm)*	10 (8,10)	6 (4,8)	0.005

PTNS = Percutaneous tibial nerve stimulation; PPBC = patient perception of bladder condition; PPIUS = patient perception of intensity of urgency scale patient assessment (visual analogue scale [VAS]) of urgency bother (UB).  
\*Value expressed as median (and 25th, 75th percentiles); \*\*value expressed as mean (SD).



## 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

Wallace et al, AJOG, 2007

TABLE 1  
Baseline demographics and distribution of neurologic diseases

	n = 33	Mean age	Mean BMI	Detrusor overactivity	Retention	ISC
Multiple sclerosis	16/33	52	22	10/16 (63%)	9/16 (56%)	5/8 (63%)
Parkinson disease	6/33	61	26	4/6 (67%)	1/16 (6%)	1/8 (13%)
Spina bifida	2/33	33	33	1/2 (50%)	1/16 (6%)	1/8 (13%)
Cerebrovascular accident	2/33	64	22	2/2 (100%)	2/16 (13%)	
Cerebral palsy	1/33	31	36	1/1 (100%)		
Other (autoimmune polyneuropathy, spinal stenosis, neurofibromatosis)	6/33	62	34	5/6 (83%)	3/16 (19%)	1/8 (13%)

BMI, body mass index; ISC, intermittent self-catheterization.

TABLE 2  
Preoperative and postoperative InterStim trial 4-day voiding diary events

	Mean frequency*	Mean nocturia	Mean number of incontinence episodes per 24 h	Mean number of pads per 24 h	Mean number of ISC per 24 h
Preoperative	10.5	2.6	4.0	3.5	3.8
Postoperative	6.0	0.8	1.3	1.0	1.6
Reduction, %	43	69	68	72	58
SD, P value	1.4 <.0001	1.7 <.0001	2.4 <.0001	1.9 <.002	1.9 <.02

ISC, intermittent self-catheterization.  
\* Number of daytime voids.

## 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

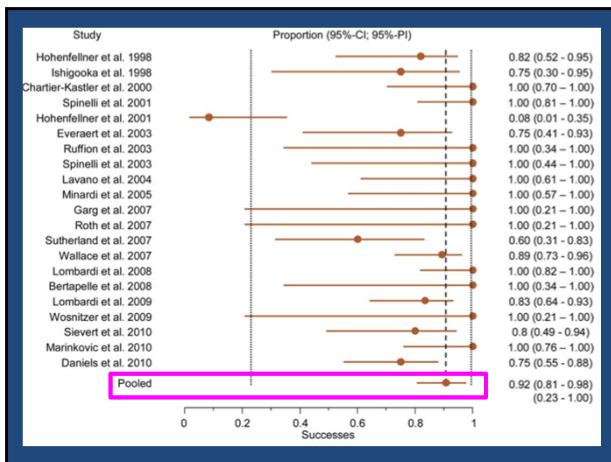
Kessler, et al, Eur Urol, 2010

Reference	Year of publication	Level of evidence	Study type	No. of patients	No. of women (N)	Mean age, yr	Study includes data on
Hohenfellner et al [15]	1998	4	RCS	11	9 (82)	43	P
Ishigooka et al [16]	1998	4	RCS	4	1 (25)	44	P
Chartier-Kastler et al [7]	2000	2b	PCS	9	9 (100)	43	T + P
Spinelli et al [19]	2001	4	RCS	18	11 (61)	NR	P
Retrospective registry		2b	PCS	16	9 (56)	59	P
Prospective registry		4	RCS	27	19 (70)	45	T + P
Hohenfellner et al [20]	2001	4	RCS	24	18 (75)	45	T
Scheepens et al [21]	2002	4	RCS	41	26 (63)	48	T
Braun et al [23]	2003	4	RCS	24	21 (88)	46	T
Bross et al [24]	2003	2b	PCS	8	8 (100)	44	T + P
Everaert et al [25]	2003	4	CR	2	2 (100)	45	T + P
Ruffion et al [26]	2003	4	RCS	3	2 (67)	31	T
Schurck et al [27]	2003	2b	PCS	5	NR	NR	T + P
Spinelli et al [28]	2003	4	RCS	6	4 (67)	48	T + P
Lavano et al [29]	2004	4	RCS	5	3 (60)	49	P
Minardi et al [30]	2005	4	CR	1	1 (100)	58	T + P
Garg et al [32]	2007	4	CR	1	1 (100)	45	T + P
Roth et al [33]	2007	4	RCS	10	9 (90)	60	P
Sutherland et al [34]	2007	4	RCS	33	31 (94)	54	T + P
Wallace et al [8]	2007	2b	PCS	17	17 (100)	37	P
Lombardi et al [35]	2008	4	RCS	11	3 (27)	55	T + P
Bertapelle et al [36]	2008	4	RCS	24	10 (42)	46	P
Lombardi et al [39]	2009	4	CR	1	1 (100)	20	T + P
Wosnitzer et al [40]	2009	4	PCS	10	0 (0)	31	P
Sievert et al [41]	2010	4	RCS	14	14 (100)	46	T + P
Marinkovic et al [42]	2010	4	RCS	32	26 (81)	62	T + P
Daniels et al [43]	2010	4	RCS	32	26 (81)	62	T + P

RCS = retrospective case series; P = permanent sacral neuromodulation; T = test phase; PCS = prospective cohort study; NR = not reported; CR = case report. Absolute value, not mean.

	No. of patients with success/total no. of permanently implanted patients	Success rate, %
LUTD resulting from: <sup>†</sup>		
MS	46/50	92
Parkinson's disease	6/6	100
Myelomeningocele	1/2	50
CVA	6/10	60
CP	2/2	100
Pelvic surgery	14/23	61
Disk disease	10/18	56
Spinal cord injury:	47/61	77
Complete	10/12	83
Incomplete	30/37	81
Unknown	7/12	58
Other neurologic disease or injury	38/52	73
Type of LUTD: <sup>‡</sup>		
Chronic urinary retention	65/89	73
Urgency-frequency syndrome	12/14	86
Urgency incontinence	62/84	74
Combination <sup>§</sup>	31/37	84

LUTD = lower urinary tract dysfunction; MS = multiple sclerosis; CVA = cerebrovascular accident; CP = cerebral palsy.



## Interstim for Neurogenic LUTS

- N = 62 trialed
  - DO = 34
  - Retention = 28
  - DSD = 9
- 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

Neurological pathology	n = 62
Multiple sclerosis	13
Incomplete spinal cord injury	13
Peripheral neuropathy	8
Parkinson's disease	4
Myelitis/encephalitis	4
Stroke	4
Acquired brain injuries	3
Cerebral palsy	2
Central nervous system tumor	2
Friedreich ataxia	1
Subarachnoid hemorrhage	1
Primitive dysautonomia	1
Williams-Beuren syndrome	1
Adrenoleukodystrophy	1
Multiple system atrophy	1
Spinocerebellar atrophy	1
Operated cerebral angioma	1
Familial hereditary degeneration	1

## Patients with Retention

TABLE III. Comparison of the Urodynamic Results Before and During the Sacral Neuromodulation Test Stimulation in Patients With Chronic Urinary Retention

	Before the test	During the test	P
Mean maximum flow rate (ml/sec)	7.6 ± 3.3	14.6 ± 4.9	0.03
Mean post-void residual volume (ml)	550.0 ± 124.5	34.0 ± 16.3	<0.0001
Mean maximum cystometric capacity (ml)	341.4 ± 224.3	331.5 ± 221.1	n.s.
Mean compliance	44.9 ± 43.5	39.3 ± 23.2	n.s.
Mean maximum urethral closure pressure (cm H <sub>2</sub> O)	68.8 ± 42.7	57.0 ± 18.1	n.s.

## Patients with DO

TABLE IV. Comparison of the Bladder/Diary and the Urodynamic Evaluation Before and During the Sacral Neuromodulation Test Stimulation in Patients With Detrusor Overactivity

	Before the test	During the test	P
<b>Voiding diary (74 hr)</b>			
Mean number of micturitions	10.90 ± 3.18	6.07 ± 2.05	0.0002
Mean number of incontinence episodes	3.08 ± 0.53	0.14 ± 0.15	<0.0001
Mean number of urgency episodes	7.57 ± 0.48	1.53 ± 0.83	<0.0001
Mean number of nocturia	2.83 ± 0.41	0.15 ± 0.10	<0.0001
<b>Urodynamic evaluation</b>			
Mean maximum flow rate (ml/sec)	18.8 ± 3.5	18.9 ± 3.25	n.s.
Mean post-void residual volume (ml)	35.3 ± 4.5	11.7 ± 10.0	n.s.
Mean volume of first uninhibited detrusor contraction (ml)	83.3 ± 22.7	161.0 ± 34.3	0.0022
Mean maximum cystometric capacity (ml)	139.7 ± 12.5	285.0 ± 31.38	0.0022
<b>Detrusor-sphincter dysynergia</b>			
Yes	9	1	0.0167
No	53	61	
Mean maximum intravesical pressure (cm H <sub>2</sub> O)	46.0 ± 16.56	20.0 ± 8.9	0.026
Mean compliance (ml/cm H <sub>2</sub> O)	35.83 ± 10.2	32.2 ± 6.0	n.s.
Mean maximum urethral closure pressure (cm H <sub>2</sub> O)	64.7 ± 25.4	55.3 ± 26.1	n.s.

## 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

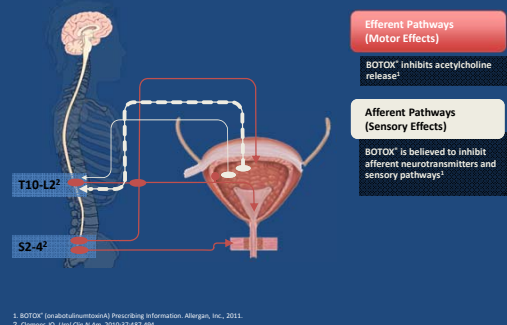
- Patients with Interstim can be imaged safely with no apparent adverse effect to the patient or the device
- Can't always find a radiologist to perform MRI

- 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

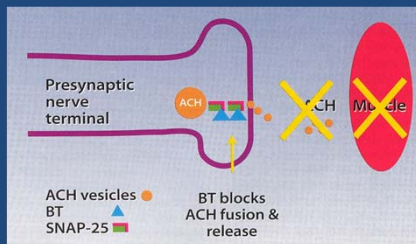
- Botox
  - Decreases episodes of DO
  - Decreases intravesical pressure
- 20% risk of new onset urinary retention
- Patients must be willing to perform clean intermittent catheterization
  - PATIENT MUST BE ABLE TO HAVE CIC DONE

## BOTOX® Mechanism of Action

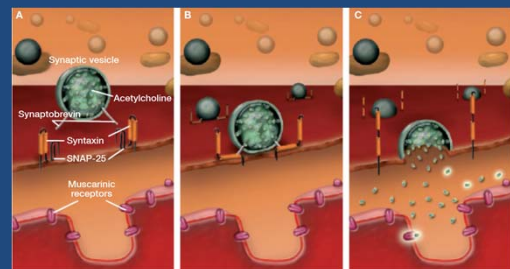


## Botulinum Toxin

- 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

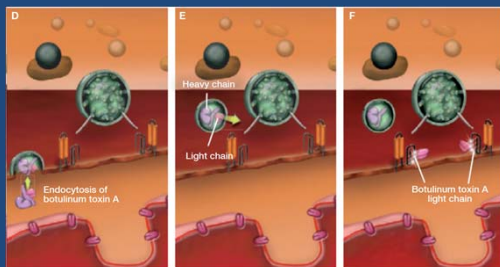


## Release of Acetylcholine at the Neuromuscular Junction



SNAP-25=synaptosome-associated protein 25 kDa  
 Reprinted by permission from Macmillan Publishers Ltd: Chancellor MB, et al. Nature Clin Pract Urol. 2008;5:319-328.

## Inhibition of Acetylcholine Exocytosis by BOTOX®



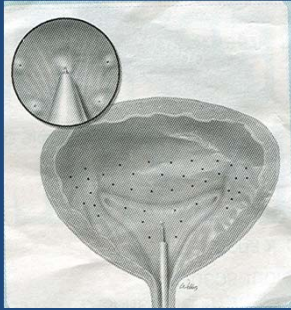
Reprinted by permission from Macmillan Publishers Ltd: Chancellor MB, et al. Nature Clin Pract Urol. 2008;5:319-328.

## Prior to Procedure

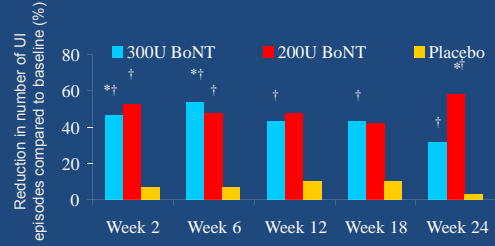
Patients not on self-catheterization <sup>1</sup>	<ul style="list-style-type: none"> <li>• Assess willingness and ability to catheterize</li> </ul>
Urine <sup>2</sup>	<ul style="list-style-type: none"> <li>• Test the urine:</li> <li>• Confirm no urinary tract infection (UTI)</li> <li>• If UTI present, do not inject</li> </ul>
Pre-procedure antibiotics <sup>2</sup>	<ul style="list-style-type: none"> <li>• Consider administration of appropriate pre-treatment antibiotic prophylaxis</li> </ul>
Antiplatelets/anticoagulants <sup>2</sup>	<ul style="list-style-type: none"> <li>• Discontinue antiplatelet therapy ≥3 days before procedure</li> <li>• Manage patients on antiplatelet/anticoagulant therapy appropriately to decrease risk of bleeding</li> </ul>

1. Data on file, Allergan, Inc.  
 2. BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

## Botox Injection Technique



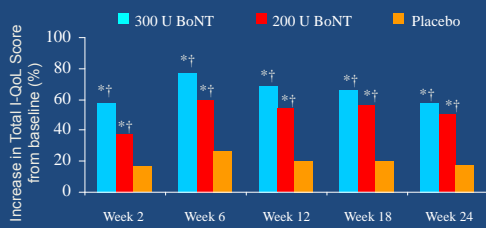
## Results (NDO): UI Episodes



\* $p < 0.05$  for differences between BoNT group and placebo  
 † $p < 0.05$  for difference within-group changes from baseline

Schurch. J Urology, 2005

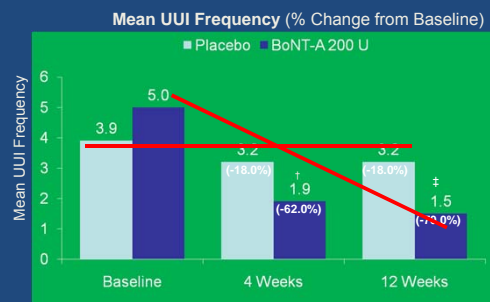
## Results: Quality of Life



\* $p < 0.05$  for pairwise contrasts between BoNT groups and placebo  
 † $p < 0.002$  for within-group differences from baseline

Schurch. J Urology, 2005

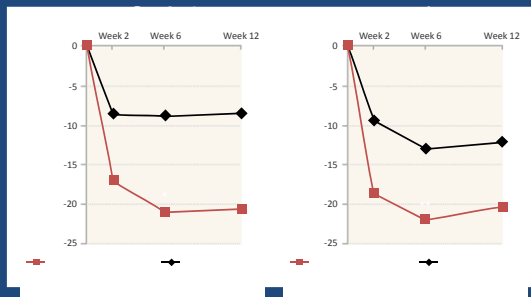
## Decreases in Urge Urinary Incontinence With BoNT-A



† BoNT-A vs placebo  $P = 0.0047$   
 ‡ BoNT-A vs placebo  $P = 0.0878$

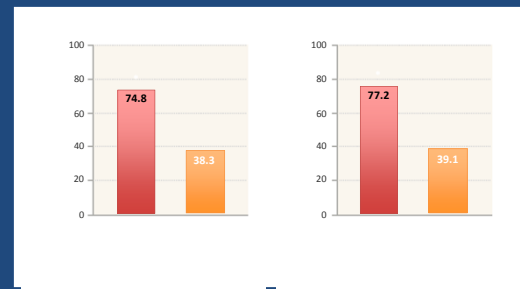
Sahai A, et al. J Urol. June 2007.

## Mean Reduction in Weekly Urinary Incontinence Episodes



\* $P < 0.001$ , \*\* $P < 0.05$  in pairwise comparison versus placebo  
 BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

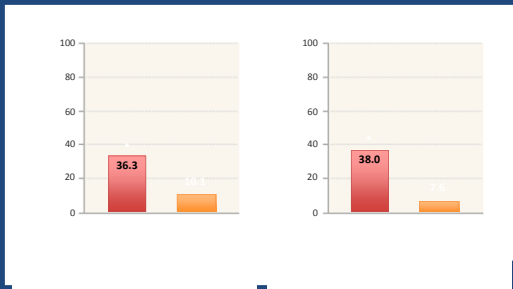
## Responder Analysis of Proportion of Patients With $\geq 50\%$ Reduction in Incontinence Episodes at Week 6



\* $P < 0.001$  in among-group comparison

1. Data on file, Allergan, Inc.  
 2. BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

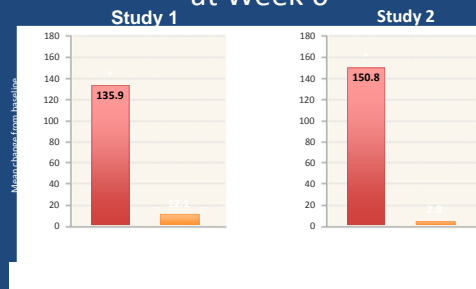
### Responder Analysis of Proportion of Patients With 100% Reduction in Incontinence Episodes at Week 6



\*P<0.001 in among-group comparison

1. Data on file, Allergan, Inc.  
2. BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

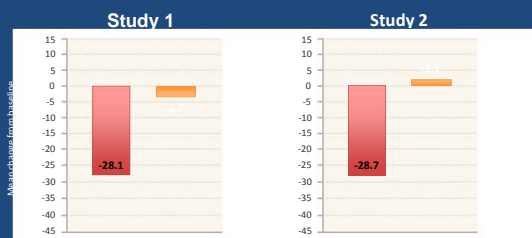
### Mean Change in MCC From Baseline at Week 6



\* P < 0.001 in pairwise comparison versus placebo  
MCC=mean cystometric capacity

BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

### Mean Change in MDP During First IDC at Week 6



IDC=involuntary detrusor contraction; MDP=maximum detrusor pressure  
BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

### Adverse Events: First 12 Weeks

Adverse reactions reported by ≥ 2% of BOTOX® treated patients and more frequent than in placebo-treated patients within the first 12 weeks in double-blind, placebo-controlled clinical trials<sup>1\*</sup>

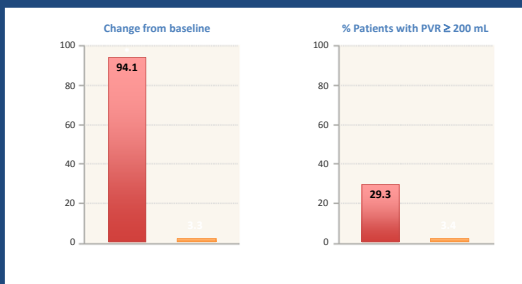
Adverse Event	BOTOX® 200 U (N=262)	Placebo (N=272)
Urinary Tract Infection <sup>†</sup>	64 (24%)	47 (17%)
Urinary retention <sup>‡</sup>	45 (17%)	8 (3%)
Hematuria	10 (4%)	8 (3%)
Fatigue	10 (4%)	3 (1%)
Insomnia	4 (2%)	0 (0%)

\* The following adverse rates with BOTOX® 200 U were reported at any time following initial injection and prior to re-injection or study exit (median duration of 44 weeks exposure): UTI (49%), urinary retention (17%), fatigue (6%), constipation (4%), muscular weakness (4%), dysuria (4%), fall (2%), gait disturbance (2%), insomnia (2%), and flu-like signs (2%).

<sup>†</sup> Defined as a positive urine culture results with a bacteriuria count of ≥10<sup>5</sup> CFU/mL, conjunct with a leukocyturia > 5/hpf or a positive urine culture that in the investigator's opinion, required antibiotic therapy.  
<sup>‡</sup> If there was a meaningful change from baseline in PVR urine volume, measurements was repeated and the final PVR urine volume recorded. If PVR did not decrease after the second attempt, the investigator determined if urinary retention was present.

1. BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.  
2. Data on file, Allergan, Inc.

### Increase in PVR at Week 2 (in patients not using CIC at baseline)



Mean baselines: BOTOX® 200 U = 62.9 mL, Placebo = 57.3 mL

\* P < 0.001 in among-group comparison  
Data on file, Allergan, Inc.

### Median Duration of Response

Treatment Group	Median Duration of Response in Pivotal Trials <sup>1</sup> (Based on Patient Qualification for Retreatment)
BOTOX® 200 U	295-337 days (42-48 weeks)
Placebo	96-127 days (13-18 weeks)

#### Retreatment qualification criteria<sup>1</sup>

- a minimum of 12 weeks had elapsed since the first treatment and
- the patient requested treatment, and experienced loss of effect on incontinence episode frequency
- 50% of effect in study 1
- 70% of effect in study 2

BOTOX® (onabotulinumtoxinA) Prescribing Information, Allergan, Inc., 2011.

### 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

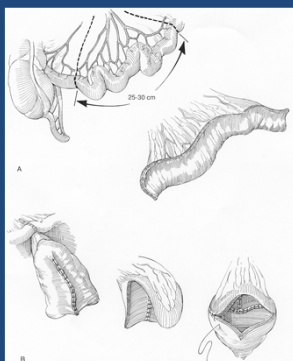
### Detrusor Overactivity or Poor Compliance not responding to other Treatments

- Bladder Augmentation
  - If poor urethra – add catheterizable stoma
- Urinary Diversion
  - Ileovesicostomy
  - Ileal conduit

### Enterocystoplasty

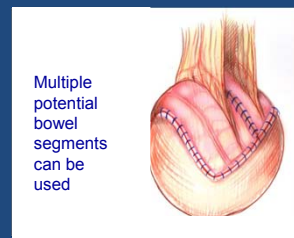
Increase in bladder capacity  
Interruption of coordinated detrusor contractions  
Low pressure system

### Enterocystoplasty



### Augmentation Cystoplasty

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



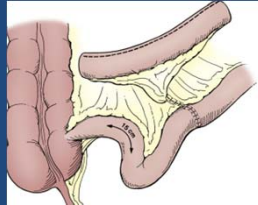
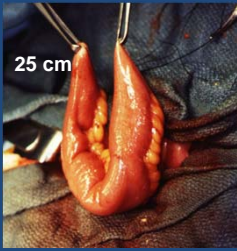
Multiple potential bowel segments can be used

© OCF

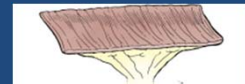
Zachoval et al: Urol Int. 2003; Herschorn: Urology.1998



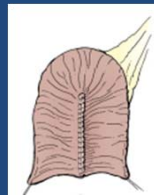
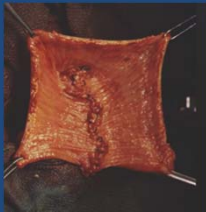
### U-shape Configuration of Intestinal Segment



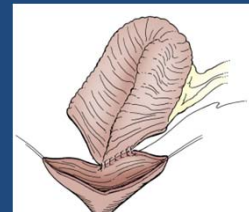
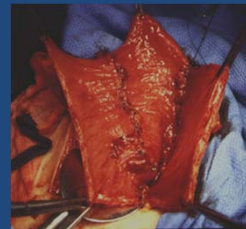
### Detubularization of Bowel Segment



### Creation Of Ileal Patch

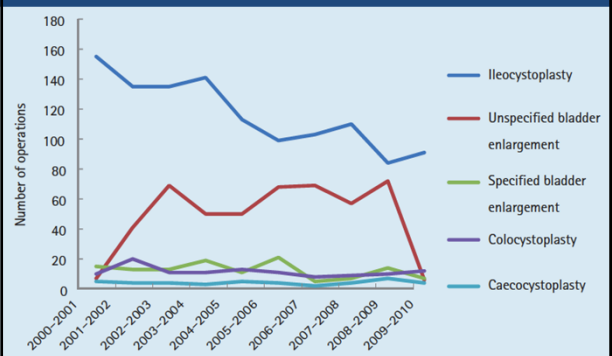


### Bladder to Ileal Patch Anastomosis



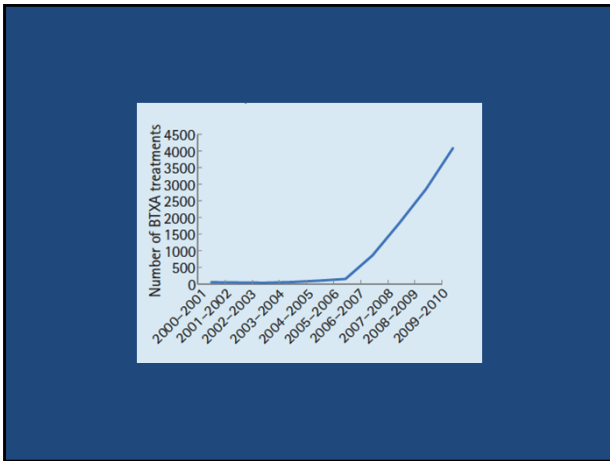
### Augmentation Cystoplasty

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



SM Biers, et al, BJU, 2011





### 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 anastomoses
- Simple
- Problems with poor flow out
  - UTIs, bladder stones

### Ileovesicostomy

Gauthier A and Winters J: NeuroUrol Urodynam, 2003; Leng W, et al: J Urol, 1999

### Ileal Conduit

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

### Suprapubic Tube

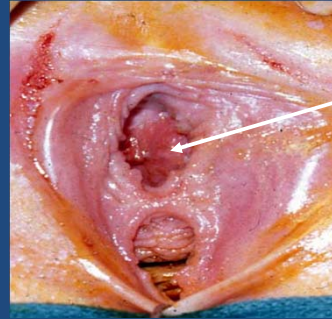
- Simple
- Not (usually) a "major" procedure
- Catheter is not ideal
- But in special populations may not have options
- Issues with UTI, catheter obstruction, bladder remodeling

**Suprapubic catheter in place**

### Suprapubic Tube

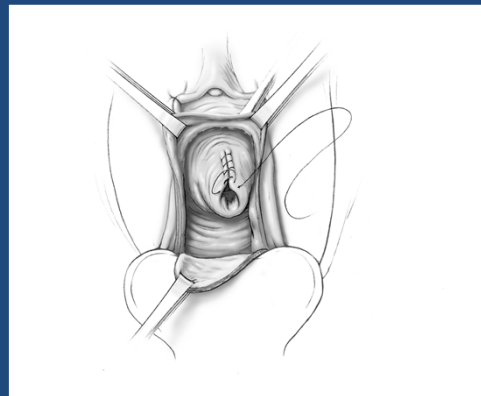
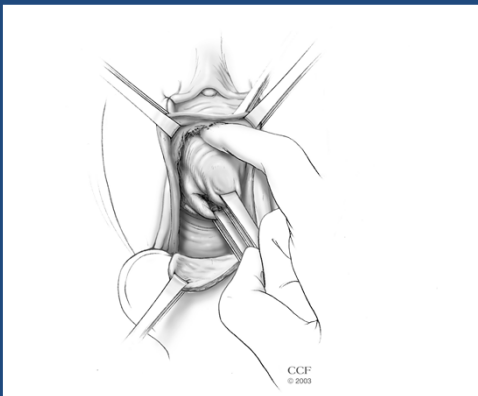
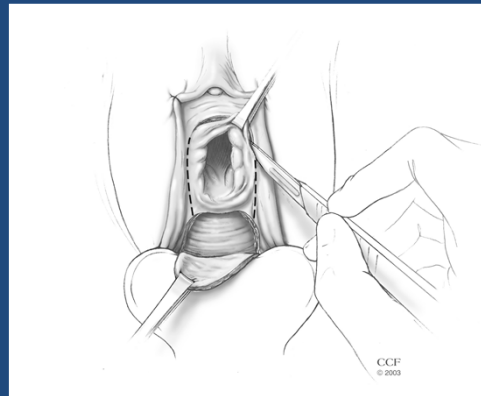
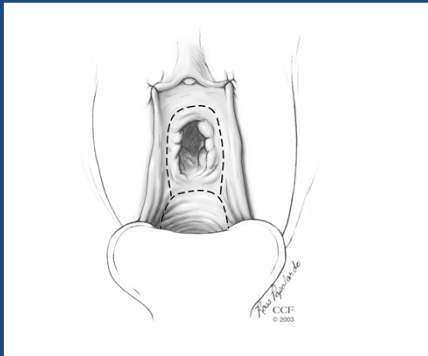
- Effective for Urinary Retention
- Less effective for "OAB"
  - Leakage around the catheter
    - Sometimes utilize Botox in such a case

### Urethral Destruction after Long Term Foley



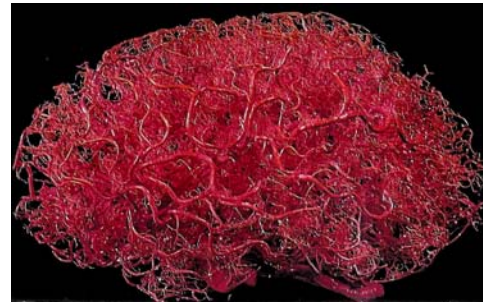
Bladder neck

### Bladder Neck Closure



# Stroke (CVA)

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



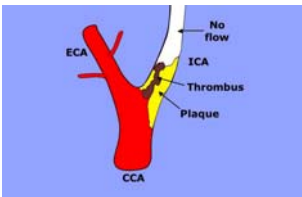
## Incontinence in neurological disorders: Stroke



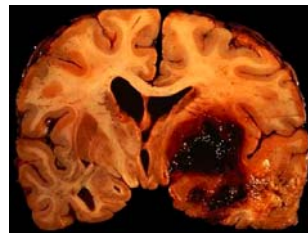
Jalesh N. Panicker  
Consultant Neurologist  
Department of Uro-Neurology  
National Hospital for Neurology and Neurosurgery  
and UCL Institute of Neurology  
Queen Square, London



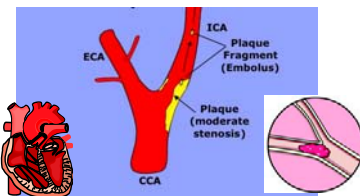
### Thrombotic



### Haemorrhagic



### Embolic



## 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

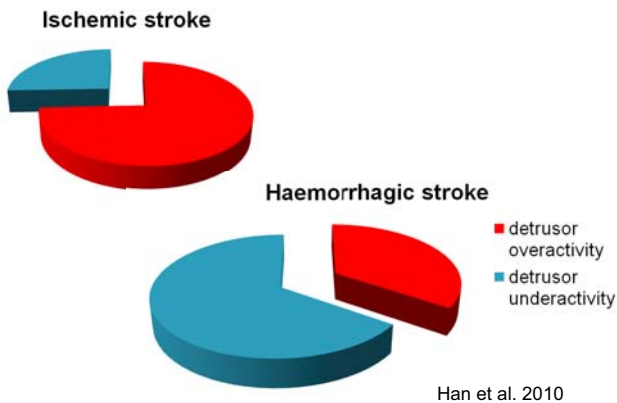
### Acute stroke

- 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)

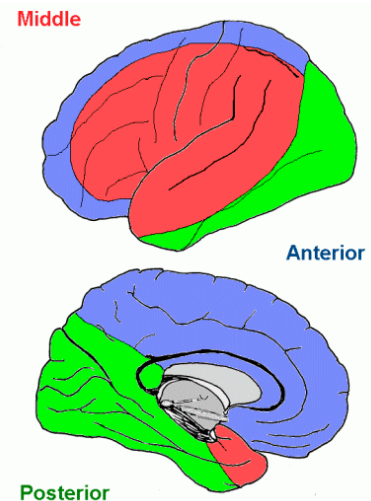
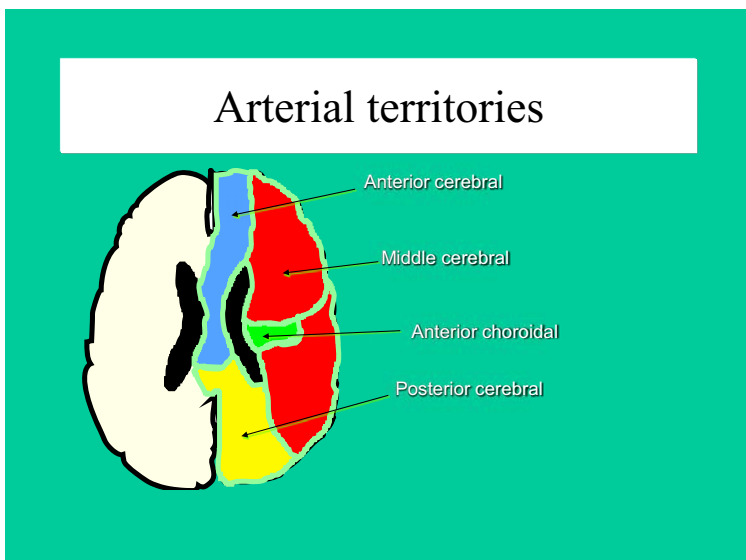
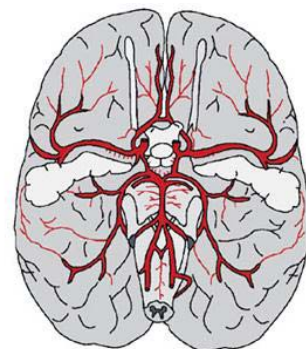
### Incontinent patients fare poorly

- 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?



### A neuroanatomical correlation?

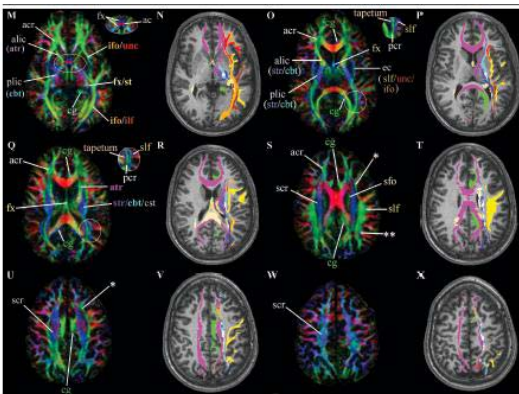


Sakakibara et al., 1996

### Site of lesion and incontinence

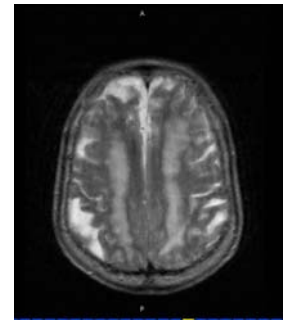
- More anterior the stroke, more likely are bladder symptoms
- Size of the lesion
- Basal ganglia lesions have been associated with Detruso sphincter dyssynergia
- Cerebellar lesions- retention
- Laterality- ?right hemispheric lesions
- Deficits associated with incontinence: hemiplegia, aphasia, visual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

### The white matter



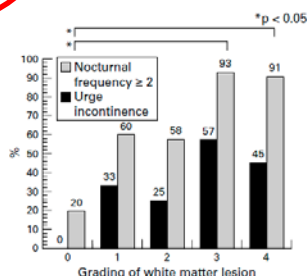
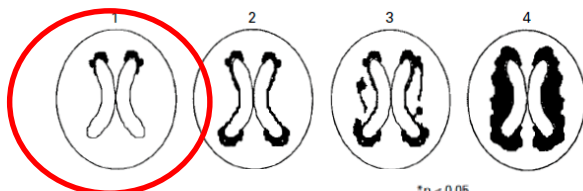
Wakana et al. 2004

### White matter disease: leukoaraiosis



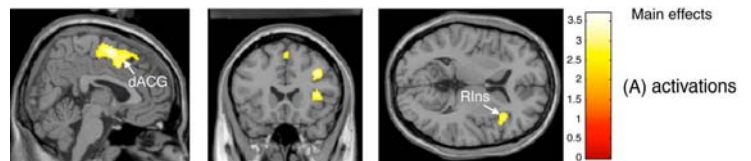
- Disease of the small vessels
- Affects memory, mobility, continence

### Leukoaraiosis and incontinence



Sakakibara et al., 1999

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

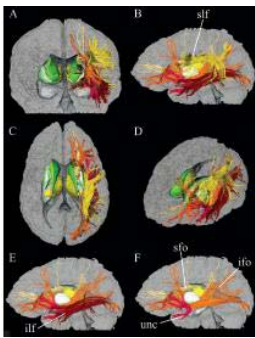


- Brain regions activated by bladder filling become more prominent with increased burden of white matter hyperintensities

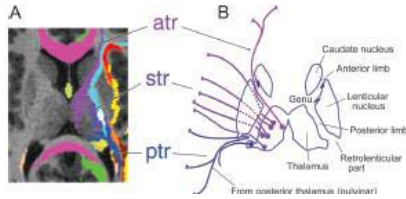
Tadic et al., 2010



Any particular white matter tracts?



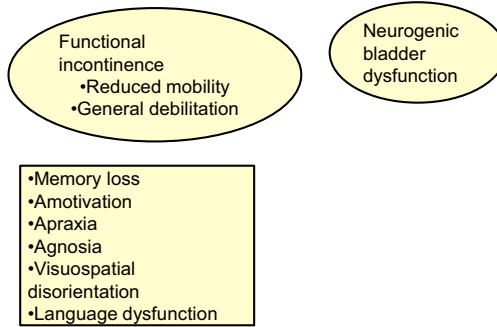
Superior longitudinal fasciculus



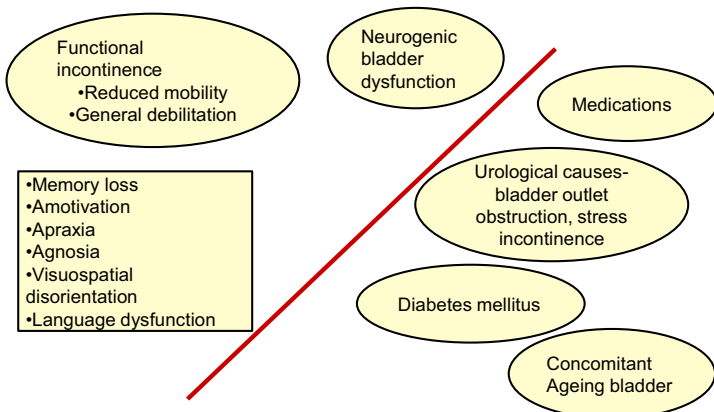
Anterior thalamic radiation

Wakana et al. 2004

Incontinence and the patient with stroke



Incontinence and the patient with stroke



Management

- | Acute Stroke  | Chronic Stroke   |
|---|--|
| <ul style="list-style-type: none"> <li>• Exclude UTI</li> <li>• Bladder scan</li> <li>• Catheterisation?</li> <li>• Containing continence: penile sheath, pads</li> <li>• Antimuscarinics?</li> </ul> | <ul style="list-style-type: none"> <li>• Exclude UTI</li> <li>• Bladder scan</li> <li>• Urodynamics?</li> <li>• Antimusarinics</li> <li>• CISC</li> <li>• Second line treatments?</li> </ul> |

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

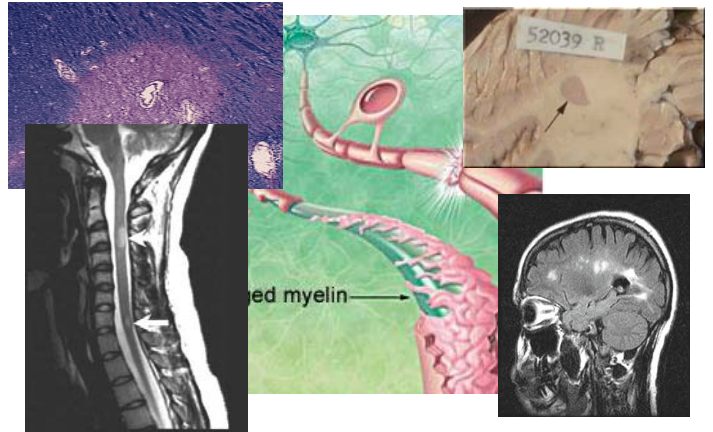


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and UCL Institute of Neurology  
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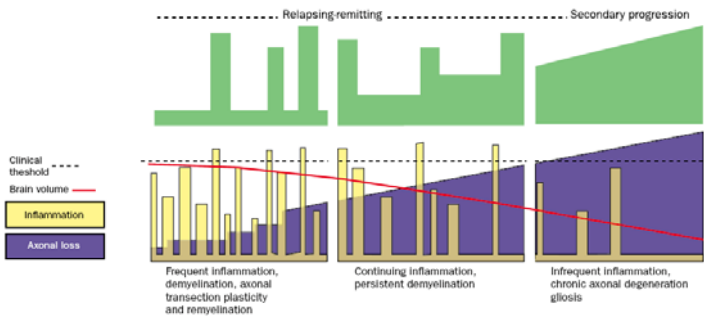


No competing interests to be declared

## MS- a demyelinating disorder

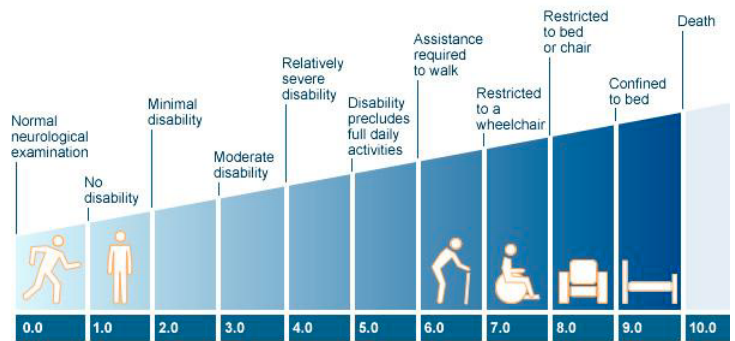


## Course of MS



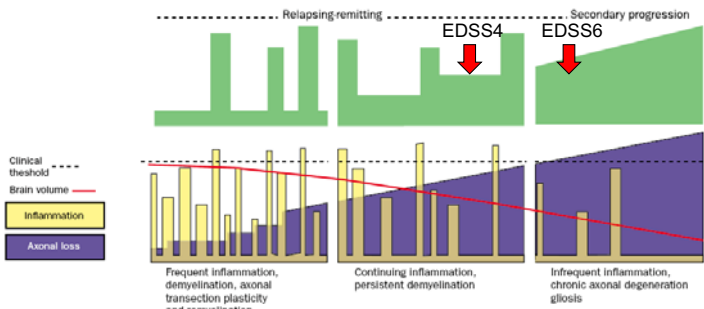
Compston and Coles, 2002

## Expanded Disability Status Scale (EDSS)



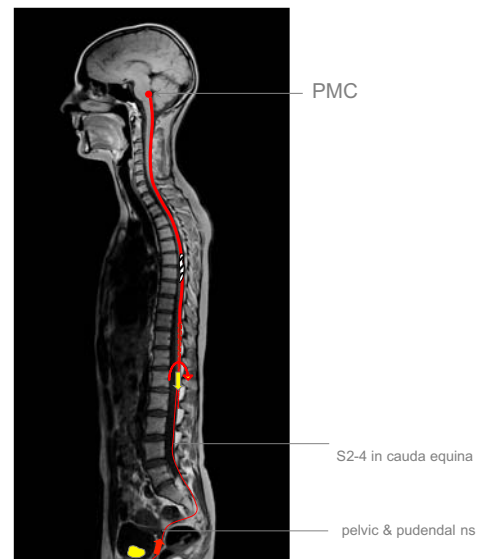
[www.msdecisions.org.uk/content/rating.htm](http://www.msdecisions.org.uk/content/rating.htm)

## Course of MS

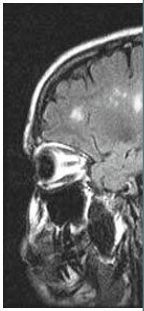


Compston and Coles, 2002

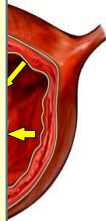
- Involuntary bladder contractions
- Small capacity
- Incomplete emptying



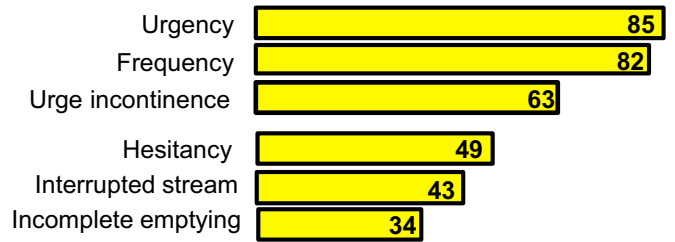
### MS & LUTS: Facts and Figures



- 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)

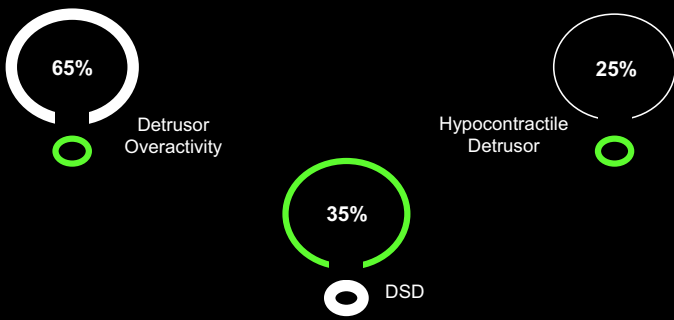


### Urinary symptoms (%) of 170 patients (mean 12 years duration MS)



Betts et al., 1993

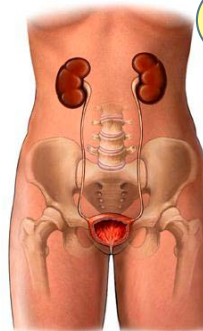
### Urodynamics in MS



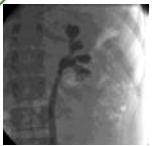
May be normal in 10% of symptomatics

de Sèze 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 Kirby, M Lucas, N Macleod, J Mangnall, A North, B Porter, S Reid, N Russell, K Watkiss and M Wells

J. Neurol. Neurosurg. Psychiatry 2009;80:470-477  
doi:10.1136/jnnp.2008.159178

Email: [j.panicker@ion.ucl.ac.uk](mailto:j.panicker@ion.ucl.ac.uk) for PDF copy

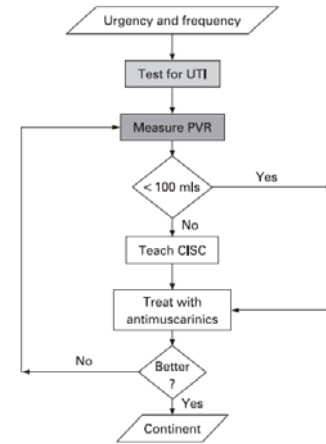


## Urodynamics for all?

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

(Grade D)

Fowler, Panicker, et al., JNNP, 2009



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 Ib evidence in patients with DSD
- Effect is limited



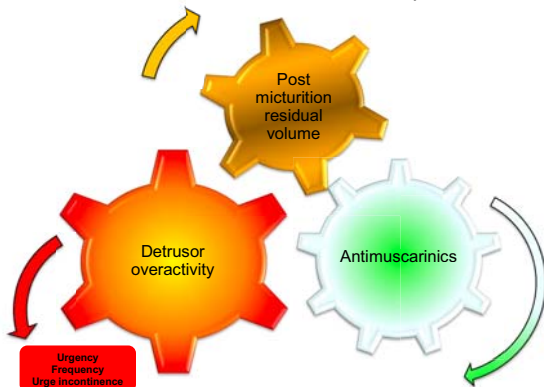
Table 2 Results of key outcome measures at two weeks following each randomized treatment (n = 28)

	No treatment	Abdominal pressure	Vibration
Mean frequency of micturition (± SD) (per 72 hours)	27 (±10.3)	26 (±9)	25 (±8.8)
Number of patients with no incontinence	16	12	20
Mean episodes of incontinence (range) (0-20)	1.9 (0-20)	1.6 (0-20)	1.3 (0-20)
Post-void residuals (ml) (±SD)	231 (±119)	191 (±132)	126 (±121) *p = 0.002

\*Compared with no treatment.

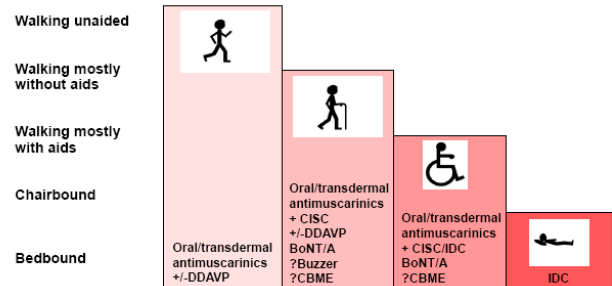
Prasad, et al., Clin Rehabil, 2003

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



Chris J. Fowler 2009

## Progression of MS and the risks on the urinary tract with time



Fowler, Panicker et al. JNNP 2009

## Desmopressin (DDAVP)

Desmospray, Desmotabs, Desmomelt

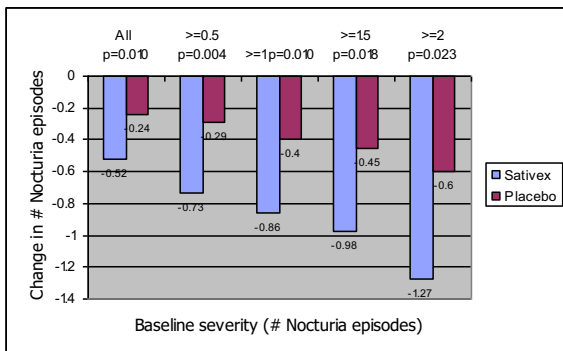
- Level Ia evidence in MS
- Situational
- once/24 hours
- extreme care in >60 years old
- not indicated with ankle swelling

## Sublingual medicinal cannabis extract



Brady et al., 2004

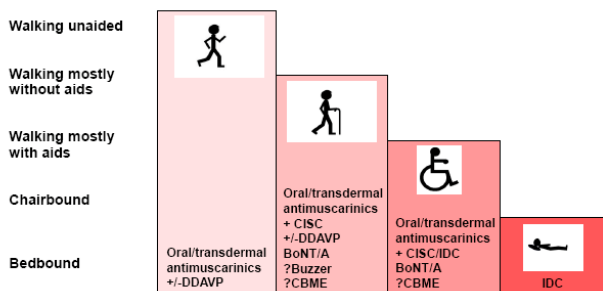
## Change in number of nocturia episodes related to severity of baseline episodes



Kavia et al., 2006



## Progression of MS and the risks on the urinary tract with time



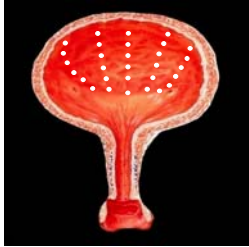
Fowler, Panicker et al. JNNP 2009

## BOTULINUM-A TOXIN FOR TREATING DETRUSOR HYPERREFLEXIA IN SPINAL CORD INJURED PATIENTS: A NEW ALTERNATIVE TO ANTICHOLINERGIC DRUGS? PRELIMINARY RESULTS

B. SCHURCH,\* M. STÖHRER, G. KRAMER, D. M. SCHMID, G. GAUL AND D. HAURI  
From the Swiss Paraplegic Centre, University Hospital Balgrist and Departments of Urology, University Hospital, Zurich and BG Unfallklinik, Murnau, Switzerland

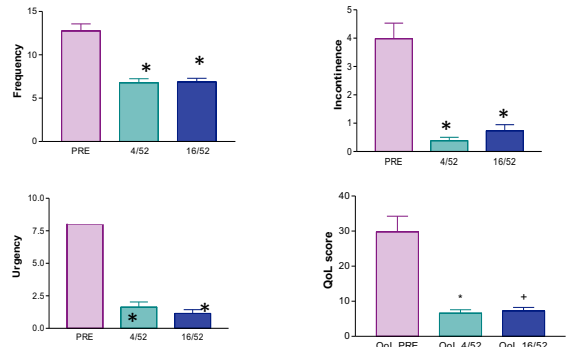
## “Dasgupta Method” at Queen Square

- 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

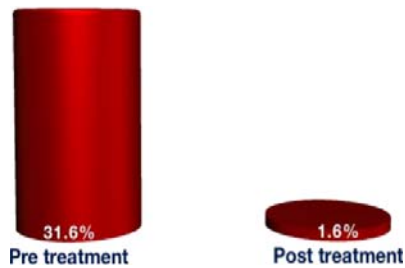
## Single injection improves bladder symptoms and QoL in MS



Kalsi et al., 2007

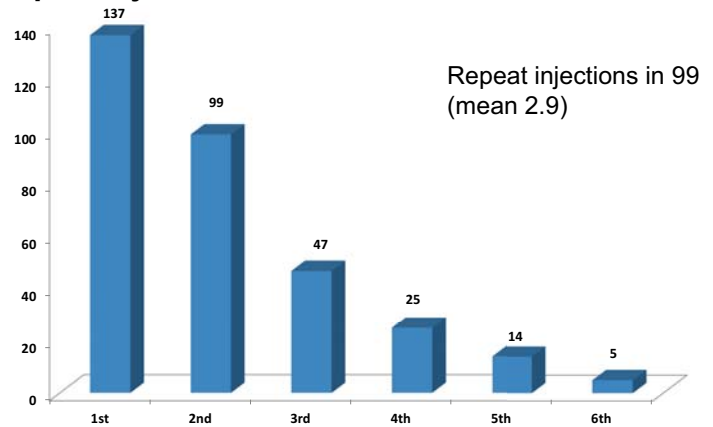
## Catheterisation after botulinum toxin

Number of patients not requiring catheterization

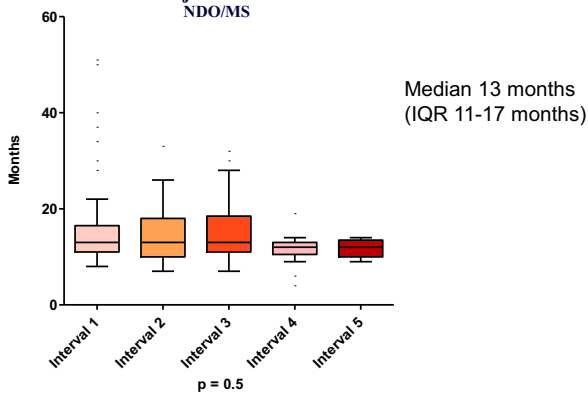


Khan et al. Poster BAUS, 2009

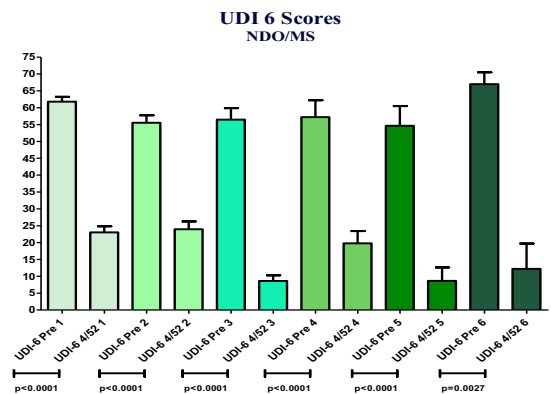
## Repeat injections



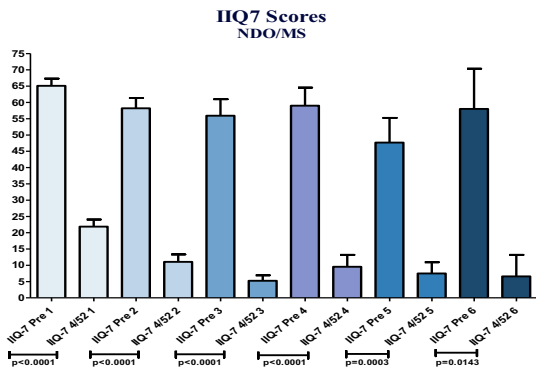
## Inter Injection Interval NDO/MS



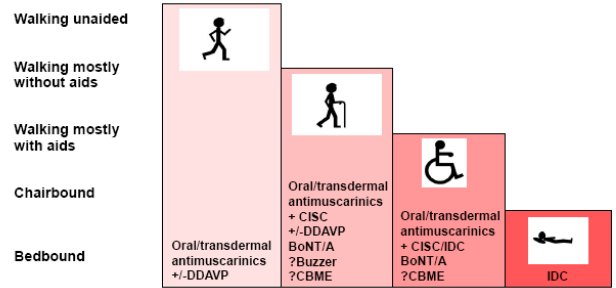
## QoL: Urogenital symptoms in MS



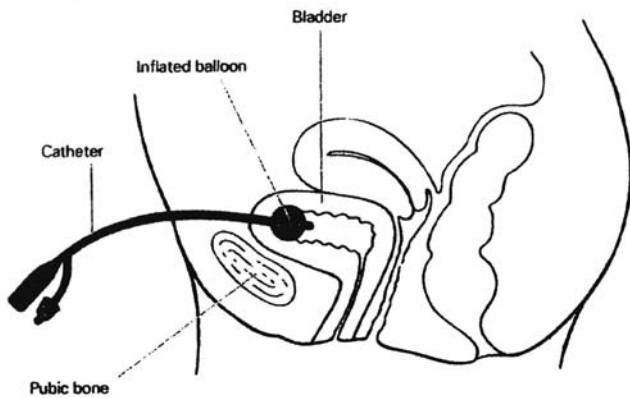
**QoL: Incontinence**



Progression of MS and the risks on the urinary tract with time



Fowler, Panicker et al. JNNP 2009



- 01/09/2005 - 30/06/2009, 259 incidents were reported relating to suprapubic catheters
- 9 bowel perforations – three deaths and seven cases of severe harm

Degree of harm	No. of incidents	Bowel perforation
Death	3	3
Severe harm	7	6
Moderate harm	18	0
Low harm	104	0
No harm	127	0
<b>TOTAL</b>	<b>259</b>	<b>9</b>

**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**

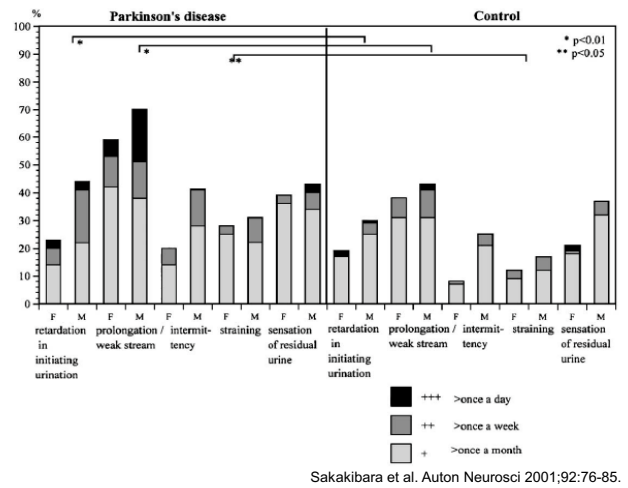
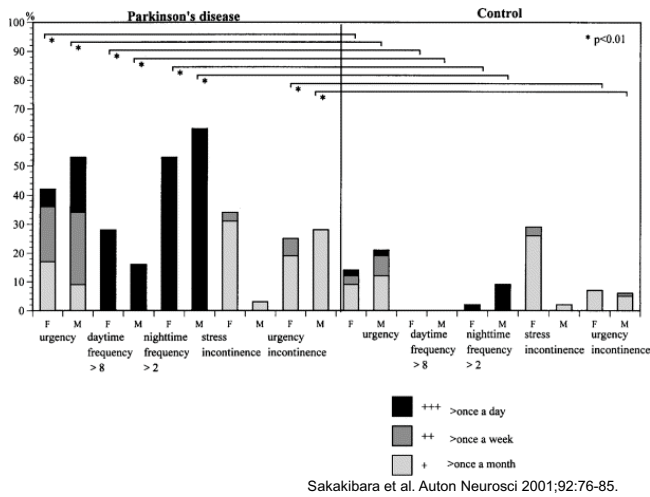
- 68, male
- Progressive slowness in walking, tremor right hand
- Bradykinesia, rigidity, rest tremor
- Urgency, frequency, nocturia
- Incontinence- daily
- Erectile dysfunction



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

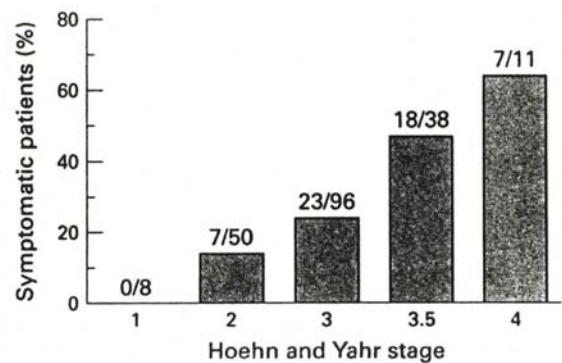
Nocturia	59.50%
Urinary urgency	53.60%
Constipation	50.20%
Blues	48.20%
Insomnia	44.30%
Concentration	44.00%
Anxiety	43.40%
Memory	43.10%
Restless legs syndrome	40.30%
Dribbling	40.10%

Movement Disorders 2007; 22: 1623–1629. n=545



### Voiding symptoms in Parkinson's Disease

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



Araki and Kuno, 2000

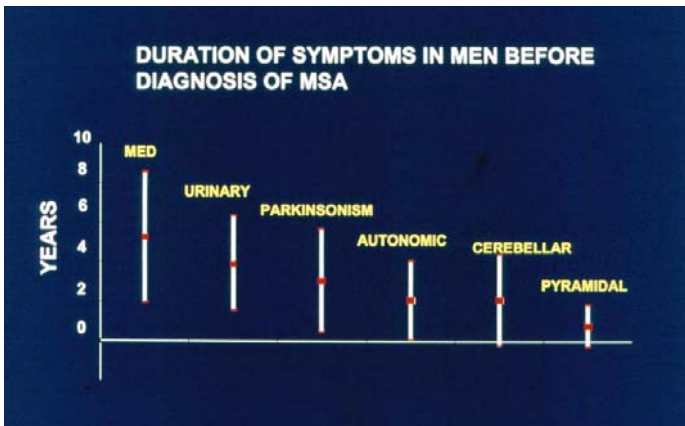


### L-dopa on/off

- 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

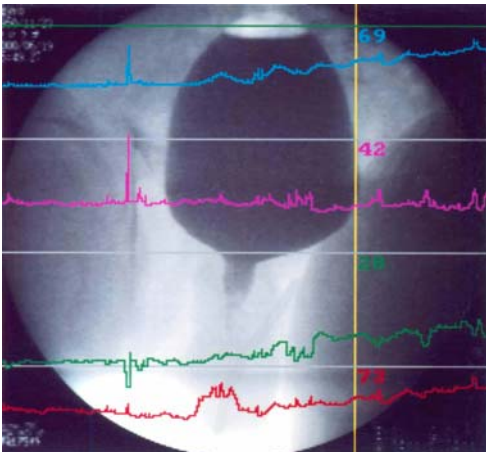
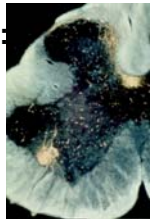
### Is it Multiple System Atrophy (MSA)?



Beck et al., 1994

### 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



Open bladder neck in a man with MSA

Sakakibara et al., 2000

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

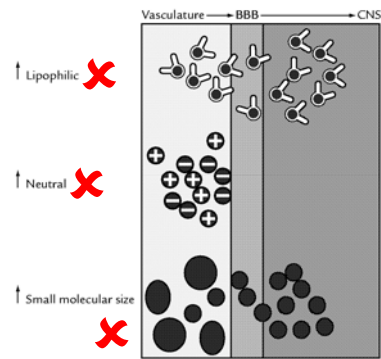
**Benign Prostatic Obstruction and Parkinson's Disease— Should Transurethral Resection of the Prostate be Avoided?**

Beat Roth, Urs E. Studer, Clare J. Fowler\* and Thomas M. Kessler†,‡,§



2009

**Trospium chloride**



**Muscarinic receptor affinity**

Agent	Formulation	Dosing	Dose	Chemical Structure	Muscarinic M <sub>3</sub> :M <sub>1</sub> Affinity (K <sub>i</sub> Ratios)*
Darifenacin <sup>4,5</sup>	Controlled release	Once daily	7.5, 15 mg	Tertiary amine	9.3
Oxybutynin <sup>5,6</sup>	Immediate release	Two or three times daily	5 mg	Tertiary amine	1.5
	Extended release	Once daily	5, 10, 15, 20 mg		
	Skin patch	3–4 days	3.9 mg/d		
Solifenacin <sup>7,8</sup>	Controlled release	Once daily	5, 10 mg	Tertiary amine	2.5
Tolterodine <sup>5,9</sup>	Immediate release	Twice daily	1, 2 mg	Tertiary amine	0.6
	Extended release	Once daily	2, 4 mg		
Trospium <sup>5,10</sup>	Immediate release	Twice daily (at least 1 hour before food)	20 mg	Quaternary amine	1.5

**Botulinum toxin in Parkinson's disease?**

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

Giannantoni et al. 2009

**Acknowledgements**

Department of Uro-Neurology

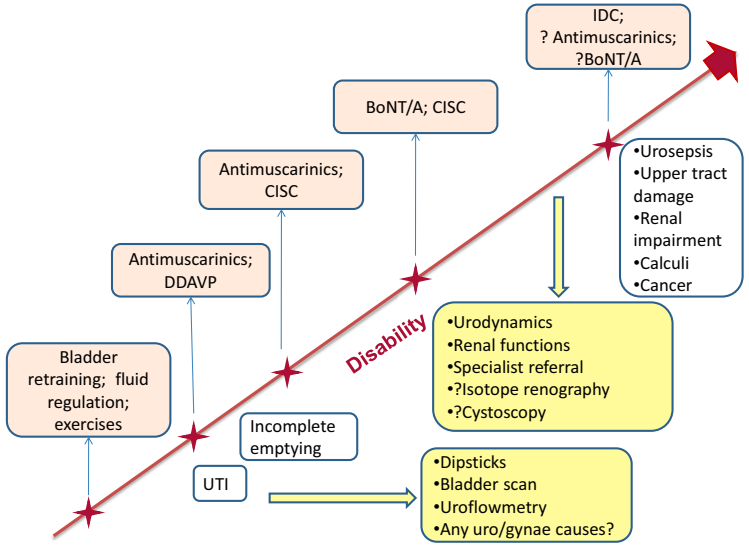


**Urology referral**



- 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



	Time / Volume (mL)					Fluid intake	Episodes of leakage	
	Time	10 AM	12:30 PM	3 PM	4:15 PM			7 PM
24/3/2008	Volume	140	120	160	200	180	1500	3
Time to bed- 9 PM	Time	8:45 PM	2 AM	4 AM	7 AM			
Time out of bed- 6 AM	Volume	90	140	160	120			
	Time							
	Volume							

- Intake/output
- Frequency- day and night
- Volume of voids
- Functional bladder capacity
- Incontinence





## Notes

Record your notes from the workshop here