W26: ICS Core Curriculum (Free): Step by Step Basic Neurourology Teaching: Diseases Specificities

Workshop Chair: emmanuel Chartier-Kastler, France
13 September 2017 11:00 - 12:30

Start	End	Topic	Speakers
11:00	11:05	Introduction	Emmanuel Chartier-Kastler
11:05	11:20	Spinal cord injury	Pierre Denys
11:20	11:35	Multiple Sclerosis	Charalampos Konstantinidis
11:35	11:50	Dementia	Giulio del Popolo
11:50	12:05	Myelomeningocele	Pierre Denys
12:05	12:20	Parkinson disease	Charalampos Konstantinidis
12:20	12:30	Diabetes mellitus	Giulio del Popolo

Speaker Powerpoint Slides
Please note that where authorised by the speaker all PowerPoint slides presented at the workshop will be made available after the meeting via the ICS website www.ics.org/2017/programme Please do not film or photograph the slides during the workshop as this is distracting for the speakers.

Aims of Workshop
This course is the second step of the MOOC (Massive Online Open Course) project of the neurourology promotion committee. During 90 minutes, 6 12 minutes talks will be provided aimed to focus on neurologic diseases specificities for voiding disorders and general recommendation that can be offered. This course is the second step of a long process of production of recorded courses produced on the same format able to offer to any starting team in the field of neurourology basic information.

Learning Objectives
- Describe pathophysiology of each of the 6 selected neurogenic diseases.
- Explain which main voiding disorders we may find.
- Give a quick general description of the main principle of management of voiding disorders for this diseases.

Learning Outcomes
After the course the attendees will be able to evaluate patients in their own practice with basic knowledge on waited voiding disorders.

Target Audience
medical doctors and non medical doctors working in the field of neurourology or at least for disabled patients.

Advanced/Basic
Basic

Conditions for Learning
This will be a very interactive course made by the top speakers in this field issued from the NU promotion committee.

Suggested Learning before Workshop Attendance
None except basic knowledge in urodynamics.

Suggested Reading
1 Neurourol Urodyn. 2016 Jun;35(5):551-63. doi: 10.1002/nau.22764. Epub 2015 Mar 25.
A guideline for the management of bladder dysfunction in Parkinson's disease and other gait disorders.
Sakakibara R1, Panicker J2, Finazzi-Agro E3, Iacovelli V4, Bruschini H5; Parkinson's Disease Subcomittee, The Neurourology Promotion Committee in The International Continence Society.
2 Clinical Characteristics and Urodynamic Analysis of Urinary Dysfunction in Multiple Sclerosis.
Wang T, Huang W, Zhang Y.
Chin Med J (Engl). 2016 Mar 20;129(6):645-50

Other Supporting Documents, Teaching Tools, Patient Education etc
ICI report (2016 if available), in case not 2012 published 2013.

Spinal cord injury
Pr Pierre Denys

During the course of a spinal cord injury majority of patients suffered from severe urinary disorders. After the injury the spinal shock phase is usually characterised by a complete urinary retention due a fast recovery of uretral tone without any detrusor contraction. Progressively after weeks or months a new spinal bladder reflex reappears under the influence of neurotrophic factors at the bladder, peripheral nerves and spinal cord that modifies the phenotype of afferences. Silent C fibers become mechanosensitive. In case of suprasacral lesion the usual symptoms are : incontinence due to neurogenic detrusor overactivity, and retention by detrusor sphincter dyssynergia. A high pressure regimen associated to the chronic urinary retention is at very high risk of complications such as urinary tract infections and upper urinary tract complications that may lead to renal failure. In term of goal of treatment it is always a combination of prevention of upper urinary tract deterioration and improvement of quality of life by improving continence. Several medical and surgical revolutions during the past 40 years modifies strongly the algorithm of treatment. Intermittent catheterization as a micturition with medical treatment of NDO is the gold standard of treatment. First line is anticholinergic drugs, second line is Onabotulinum toxin A and third line surgery. If intermittent catheterization is impossible for many reasons (cognitive, prehension) for example in high thoracic patients another possibility is sphincterotomy to permit a balance voiding with complete emptying and low detrusor pressure. The place of brindley stimulator and non continent urinary diversion is for highly selected patients. The last challenge is the follow up and how to standardise and customise a life long follow up to adapt therapeutics and evaluate risks.

Multiple Sclerosis
Charalampos Konstantinidis

The normal urinary track function is the outcome of a central control on the micturition reflex (inhibition or release of the reflex) by the cerebral involving centers. The signal from the bladder to the brain and vice versa has to transport properly and all the procedure requires intact central and peripheral nervous system. Any lesion to any part of the nervous system can affect the urinary tract function. The pattern of the dysfunction depends on the topography and the degree of the lesion. Multiple Sclerosis (MS) is a progressive degenerative disease which can develop “plaques” to any part of the Central Nervous System (CNS) and can express a large spectrum of urinary dysfunction patterns.

MS patients usually do not pay a lot of attention to their symptoms, as the disorders are developing step by step and they are seeking for medical help only when a huge impact on their family or social life is developing. Additionally, patients and doctors are more focused on the mobility status and a lot of other issues stay at the background for a long time. On the other hand micturition and sexual dysfunction are responsible for reduction on QoL in MS patients, so the detection and treatment of these disorders is very essential.

The symptoms are not always correlated with the severity of the disease and there is a poor correlation between symptoms and underlying urodynamic disorder. Frequent follow up, including urodynamic investigation is mandatory for the proper documentation of the disorder. As MS is a progressive disease, neurogenic urinary disorder may change urodynamic profile.

The main goal in neurogenic bladder management is the protection of the renal function, the prevention from the development of possible complications and the incontinence care. Proper renal function is associated with “life” and continence is related to QoL. A low pressure, continent, urine reservoir, which can periodically empty completely, under low pressure conditions is the target of our therapeutic approach. If there is Neurogenic Detrusor Overactivity (NDO) antimuscarinics, beta-3 agonists, botulinum toxin, neuromodulation and in rare cases invasive surgical interventions, such as bladder augmentation or urinary diversion, can be administrated. During voiding if there is detrusor – sphincter dyssynergia or any sphincter overactivity, intermittent catheterization is the gold standard for the proper bladder evacuation. Relaxation of the pelvic floor during voiding and alpha blockers may help in the early stages of voiding dysfunction. Surgical procedures, such as sphincterotomies are performed rarely and the use of indwelling (urethral or suprapubic) catheters is not recommended. Antimuscarinic drugs and intermittent catheterizations are the mainstream in the management of neurogenic bladder in MS patients.

Urological problems of MS patients are a real challenge for proper evaluation and treatment as almost all the spectrum of neurourology can be expressed. The efficient management targets on the maintenance of renal function and the improvement of QoL.

Dementia
Giulio Del Popolo

Dementia is a medical condition that affects especially old people, causing the memory and other mental abilities to gradually become worse, and leading to confused behaviour. People with dementia have consistent poor decision making, loss of memory, difficulty having conversation, loss of the space temporal control. There are various forms of dementia: Alzheimer, Vascular, Fronto-temporal, Creutzfeldt-Jacob, Lewy-Bodies, Parkinson dementia. It is not easy to differentiate lower urinary tract

dysfunctions (LUTDs) caused by ageing or by cognitive impairment. There are no real and definitive data on prevalence of LUTDs in patients affected by cognitive impairment and it's estimated in a wide range from 10% of out-patients to more than 90% in institutionalized people. Some studies in a geriatric population affected by some sort of dementia showed that incontinence is much more frequent than in non-dementia. Lewy-body dementia is wider associated with neurogenic LUTDs in literature. Ransmayer et al reported a higher incidence of urge incontinence (53%) compared to Parkinson (27%) and Alzheimer disease (12%) [14]. Likely, considering urodynamics, neurogenic detrusor overactivity, was found much higher (92%) in Lewy-body patients compared with Parkinson and Alzheimer (range 23%-48%). Worsening of incontinence seems to be dependent to the disease progression, with a ratio of urinary incontinence in individuals with dementia reported as 1:15 in males and females, respectively. Again, urinary incontinence seems to be found in the advanced stages of Alzheimer, whereas an early occurrence of urgency in vascular dementia and dementia with Lewy-bodies has been seen. Moreover, severity of LUTDs seems to be correlated with the grade of the cortical loss. As a matter of fact a brain CT study done by Sugiyama et al. in Alzheimer Disease (AD) showed that the degree of brain atrophy was more severe in those AD patients with neurogenic detrusor overactivity than those without it. Again, Franssen et al. examining the occurrence of some developmental reflexes such as the tactile suck reflex, the palmar and plantar grasp reflexes, and the plantar extensor reflex in healthy elderly and patients with AD [15]. Their findings suggested that reflexes rose sharply with the onset of progressive incontinence, probably due to the loss of the Central Nervous System control. Regarding the treatment options it's important to underline the possible negative effect on SNC of antimuscarinics, which is the main limit for the use in this population. Focus on it, the risk of worsening the cognitive condition if associated with central acethylcholinesterase inhibitors seems to be low. Sakakibara et al. reported that addition of 5 mg/day donepezil to 20 mg/day propiverine improved OAB without cognitive changes. The first approach is behavioural, mainly including the toilet training and prompted voiding to adequately treat incontinence in dementia. Therefore, caregivers are the means to gain continence and must be involved to provide physical and cognitive assistance. Moreover, besides the cognitive impairments, the general medical condition of this population can be also influenced by mobility, comorbidities, aging which should be identified and managed whether they are further barriers from dementia to toilet.

- Encourage the person to use the bathroom on a regular schedule.
- Restrict liquids a few hours before bedtime.
- If the person has trouble remembering where the bathroom is, show him or her the way and mark the bathroom and toilet clearly with signs ("Bathroom," "Toilet"). Use pictures when the person can no longer understand words.
- Remove or cover objects the person may mistake for the toilet.
- Consider using absorbent pads or briefs such as Attends or Depends. To avoid sores, make sure the skin under these undergarments stays clean and dry.
- Remember that a person with dementia cannot control this problem. In some cases, he or she may be aware of the problem and feel embarrassed or ashamed about it.

Myelomeningocele/Spina Bifida

Pr Pierre Denys

Myelomeningocele is the most prevalent disease of neurogenic bladder in children. As well as for spinal cord injury in adults, renal failure is a major risk in this population of patients. Other spinal dysraphism may also impair bladder sphincter physiology such as thetered cord, sacral agenesia or lipomeningocele. Spinal level lesion predicts poorly the type of bladder and sphincter dysfunction. Urodynamics is clearly mandatory to evaluate risk factors of renal failure, and to lead the type of treatment. Low pressure reservoir is the ultimate goal to prevent complications usually achieve by intermittent catheterization and medical or surgical treatment of NDO in case of unhibited detrusor contractions. Even more than in SCI times count and regular evaluation permit to adapt management. This is particularly true during the first years of life and at adolescence. An extensive evaluation based on risk factors leading strategy is mandatory during all life of the patient.

Parkinson disease

Charalampos Konstantinidis

Parkinson's disease (PD) is a neurodegenerative disorder, which very often affects the lower urinary tract (LUT) function. One of the pathways which inhibits the micturition reflex is based on the frontal-basal ganglia and acts through a dopamine D1-GABAergic pathway. The alternation of this pathway in PD is the cause for the clinical expression of urinary urgency, frequency and/or urge incontinence which are the most common symptoms. This neurogenic LUT dysfunction has a high impact on patients' QoL.

After urodynamic investigation, Neurogenic Detrusor Overactivity (NDO) is documented in the majority of the cases, while Detrusor Underactivity (DU) during voiding or concomitant obstruction associated with BPH, may co-exist. The Post Void Residual (PVR) is usually limited. This is an essential finding that can differentiate PD from Multiple System Atrophy (MSA), a more aggressive and quickly progressive disease which is associated to urinary retention.

The standard medical treatment of PD is levodopa, which improves the motor dysfunction. The effect of this treatment on bladder function is variable. The addition of antimuscarinics is useful, targeting the NDO. Consideration of cognitive side effects is recommended, especially in the elderly. Beta-3 adrenergic agonists, with limited side effects on the CNS, is an alternative treatment option, despite its use is off label for NDO. More invasive therapeutic approach for PD, such as Deep Brain Stimulation (DBS), has a positive outcome on motor control and in bladder function, as well. Intradetrusoreal Botulinum Toxin injections, which is an established treatment for NDO due to Spinal Cord Lesions or Multiple Sclerosis, can be used with a significant risk of urinary retention. In cases of urinary retention due to BPH, TURP is a valid option, if MSA has be excluded. Multidisciplinary approach, by urologists and neurologists is mandatory for improving in the best way the patients' QoL which is related to urinary function.

Diabetes mellitus
Giulio Del Popolo

Diabetic bladder dysfunctions can manifest in a wide spectrum of clinical filling and voiding symptoms. Like for other diabetic complications, catch the bladder problem and prevent a permanent injury is a challenge since often the bladder dysfunction often stays silent and unsuspected for years before suddenly manifesting itself. Therefore, the clinical manifestations are often mixed and time-dependent. Considering the time, it's worth to underlying that, because of the patients' age, comorbidities related (e.g. polyuria) or not (e.g. prostatic hyperplasia) to diabetes can also hide and/or amplify the urinary dysfunction related to diabetes.

As a matter of fact, the reason of why diabetic people can develop bladder dysfunction is further complicated by the fact that the same diabetic people can develop all of the same bladder and voiding problems as people who don't have diabetes. Thus, a subject affected by diabetes may have bladder dysfunction with multiple causes, only one or few of which is diabetes.

Regarding the aetiologies, the pathological time-dependent alterations may include detrusor muscle, neuronal impairment, and urothelial changes (Yoshimura et al., 2005). Therefore, rather than the classification as a neurogenic or cystopathic bladder, this should be considered a stand-alone entity, better termed as "diabetic bladder".
Based on Daneshgari et al. (2009) "temporal theory" hyperglycemia-induced polyuria plays a major pathophysiological role during the early stages of diabetes polyuria, causing compensatory bladder hypertrophy and associated myogenic and neurogenic alterations. This stage is compatible with findings of filling dysfunctions secondary to overactive detrusor. By the time the oxidative stress may result in the impairment of the voiding function followed by the classical signs and symptoms of detrusor underactivity.

The choice of an individual treatment of DB depends on the multifactorial aspects influencing the urinary dysfunctions. The main goals include the relief of symptoms, the prevention of urinary tract infections and the amelioration of QoL. Surely, at the first stages of treatment, conservative strategies should be suggested. Considering that, some behavioural modifications such as changing in diet and emphasizing glucose control, regulating the fluid intake, encouraging pelvic floor exercises and voiding techniques can be helpful to reduce symptoms and prevent complications.
Because of the possible co-presence of voiding dysfunction in patients complaining urge incontinence, antimuscarinics should be prescribed carefully and post-voiding residual should be monitored. In patients mainly presenting urinary retention can benefit of surgery whether the condition is affected by some bladder outlet obstruction. Instead, regarding non-obstructive urinary retention treatment, it's worth mentioning that it's not clear yet whether diabetes is a negative prognostic factor for the success of sacral neuromodulation, despite few promising results reported in literature (Daniels et al. 2010). Anyway, it seems related to higher risk of post-SNM complication.

Therefore, nowadays there is no specific treatments for diabetic bladder, but only preventive life-style interventions. Whereas, pharmacological or surgical treatment can be an option in some case and this is could be also not strictly related to the diabetes. In conclusion, further study are needed to understand the possible molecular mechanisms to provide new targets for specific treatment.

References
Yoshimura N., Chancellor M. B., Andersson K. E., Christ G. J. (2005). Recent advances in understanding the biology of diabetes-associated bladder complications and novel therapy. BJU Int. 95, 733–738.
Daneshgari F., Liu G., Imrey P. B. (2006). Time dependent changes in diabetic cystopathy in rats include compensated and decompensated bladder function. J. Urol. 176, 380–386
Daniels D. H., Powell C. R., Braasch M. R., Kreder K. J. (2010). Sacral neuromodulation in diabetic patients: success and complications in the treatment of voiding dysfunction. Neurourol. Urodyn. 29, 578–581

Spinal Cord Injury

Pr Pierre Denys
Hopital Raymond Poincaré APHP Garches France
University of Versailles

Pierre Denys

ICS 2017 FLORENCE

Affiliations to disclose[†]:

Allergan / speaker investigator
Ipsen / investigator
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† All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

☐ Self-funded
☐ Institution (non-industry) funded
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The prototopycal neurourological patient

- The most studied aetiology of neurourological disorders
- First cause of mortality in the 50' by urological complications
- All major advances in neurourology tested in this population

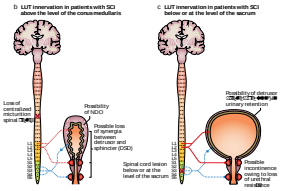
- Complications remain important, still first cause of rehospitalization
- Life long management with life expectancy close to the general population
- Tailored management

Cardenas DD, Etiology and incidence of rehospitalization after traumatic **spinal cord injury**: a multicenter analysis. Arch Phys Med Rehabil. 2004 Nov;85(11):1757-63.

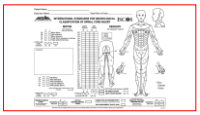
Goals of treatment

- Prevention of complications (infections, upper urinary tract) but also to preserve fertility/sexuality by managing risk factors if indicated
- Improvement of quality of life by restoring continence when it's possible
- Bladder management is a part of a comprehensive global approach

Level of lesion

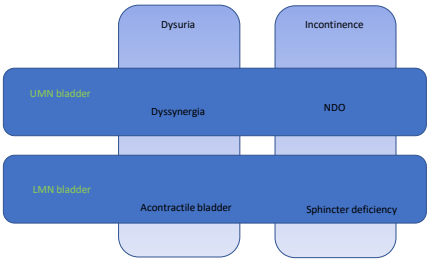


Wyndaele JJ. The management of neurogenic lower urinary tract dysfunction after spinal cord injury. Nat Rev Urol. 2016 Dec;13(12):705-714.



- Modify bladder sphincter function
- But also
  - Transfer ability
  - Prehension
  - Walking ability

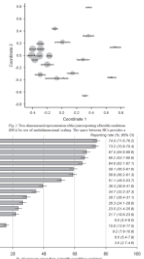
Symptoms and Patho-physiology



Chronic SCI patients

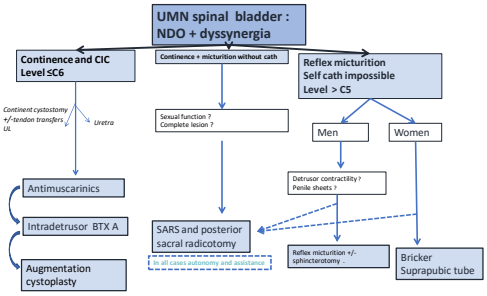
A high proportion of community based SCI population report bladder problems

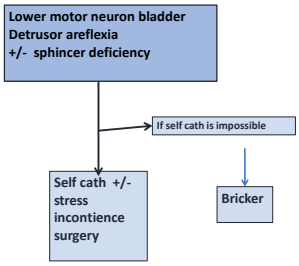
Some factors may predict continence and complete voiding at 1 yr 32%
- LEMS at ISNCSCI
- Light touch sensation at S3
- SCIM subscale for respiration and sphincter



Brinkhof M et al. Health related conditions in people with spinal cord injury : contemporary evicence from a pop. based community survey in switzerland J Rehabil Med 2016; 48: 197-209

Pavese C. Prediction of Bladder Outcomes after Traumatic Spinal Cord Injury: A Longitudinal Cohort Study. PLoS Med 13(6): e1002041. doi:10.1371/journal.pmed.1002041





Some SCI specificities

- A better adherence to antimuscarinics than in the iOAB population
- A benefit a two anticholinergics is possible
- A clear evidence for the long term efficacy of BTX A detrusor injection

Tijnagel et al. BMC Urology (2017) 17:30 DOI 10.1186/s12894-017-0216-41.

Nardulli et al. Combined antimuscarinics for the treatment of neurogenic overactive bladder. Int J Immunopathol Pharmacol. 2012 Jan-Mar;25(1 Suppl):35S-41S

Autonomic dysreflexia

- Sudden raise in blood pressure >20mmHg
- With associated symptoms
  - Anxiety
  - Headache
  - Sweating ….
- At risk of severe complications
- Needs to be adressed for UD and cystoscopy
- Lesion >T6

ORIGINAL ARTICLE

Autonomic dysreflexia severity during urodynamics and cystoscopy in individuals with spinal cord injury

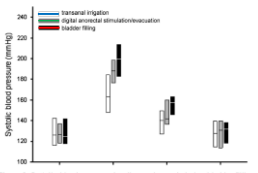


Figure 1 Systolic blood pressure (median and range) during bladder filling (black), transanal colorectal irrigation (white) and digital anorectal stimulation/evacuation (gray) in subjects with high SCI. Results are given for baseline, maximum stimulation (Max.stim.), 3 min after maximum stimulation (+3 min) and 12 min after maximum stimulation (+12 min). The boxes are displayed slightly offset for better reader friendliness.

Surveillance

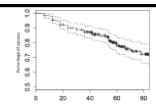


FIGURE 2 Long-term failure-survival curve

Table 4
Recommended neurogenic lower urinary tract dysfunction surveillance by organizations with published guidelines

Evaluation	Frequency (mo)	Organization	Bladder Management	Total Recommending (No., %)	Ave. (mo)
Renal function testing	12 12	EAU[1] VHA[5]	ND ND	2/5 (40)	12
Imaging	6 1–2 12	EAU NICE VHA	ND ND ND	3/5 (60)	12
Urodynamics	12–24 ND ND ND ND	EAU NICE CSCM AUA/SUFU VHA[5]	ND ND Reflex voiding ND ND	5/5 (100)	18
Cystoscopy	ND ND	CSCM VHA[5]	Indwelling catheter Indwelling catheter	2/5 (40)	ND
Infection monitoring	2 12	EAU VHA	ND ND	2/5 (40)	7

Abbreviation: ND, not discussed.
[4] BUN/Creatinine.
[5] BUN/Creatinine and 24-h creatinine clearance or renal scan.
[1] Various indications.
[6] With random biopsy and urine cytology.

Joussain C. *Long-term outcomes and risks factors for failure of intradetrusor onabotulinumtoxin A injections for the treatment of refractory neurogenic detrusor overactivity. Neurourol Urodyn. 2017 Jul 26. doi: 10.1002/nau.23352*

Randy A. Vince, Jr. MDa, Adam R. Klausner, MD Surveillance Strategies for Neurogenic Lower Urinary Tract Dysfunction. Urol Clin N Am 44 (2017) 367–375

WORKSHOP 26

ICS CORE CURRICULUM (FREE): STEP BY STEP BASIC NEUROUROLOGY TEACHING: DISEASES SPECIFICITIES

MULTIPLE SCLEROSIS

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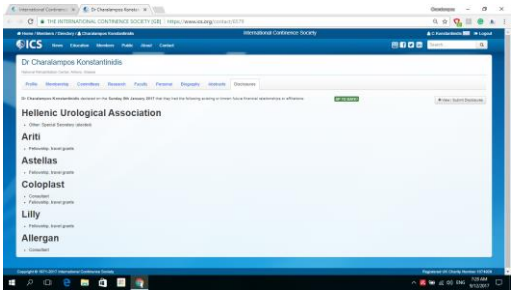
Disclosures



NLUTD due to MS is Important

- Micturition and sexual dysfunction are responsible for reduction on QoL in MS patients
- The detection and management of these disorders are challenging

MW Nortvedt, et al. Reduced quality of life among multiple sclerosis patients with sexual disturbance and bladder dysfunction. Multiple Sclerosis (2001) 7, 231 ±235

Clinical evaluation is essential

NLUTD due to MS is Common

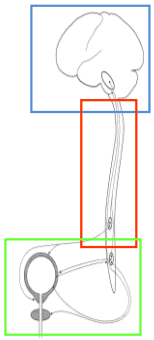
- Prevalence:
  - 50 to 90% of patients at 6 years of evolution
  - patients with ambulatory difficulties close to 100%

de Seze M, Ruffion A, Denys P, Joseph PA, Perrouin-Verbe B. The neurogenic bladder in multiple sclerosis: review of the literature and proposal of management guidelines. Mult Scler 2007;13:915–28.
Gallien P, Robineau S, Nicolas B, Le Bot MP, Brissot R, Verin M. Vesicourethral dysfunction and urodynamic findings in multiple sclerosis: a study of 149 cases. Arch Phys Med Rehabil 1998;79:255–7.
Giannantoni A, Scivoletto G, Di Stasi SM, Grasso MG, Vespasiani G, Castellano V. Urological dysfunctions and upper urinary tract involvement in multiple sclerosis patients. Neurourol Urodyn 1998;17:89–98.
Hinson JL, Boone TB. Urodynamics and multiple sclerosis. Urol Clin North Am 1996;23:475–81.

Nervous System & Low Urinary Tract

Anatomical and functional integrity and interaction

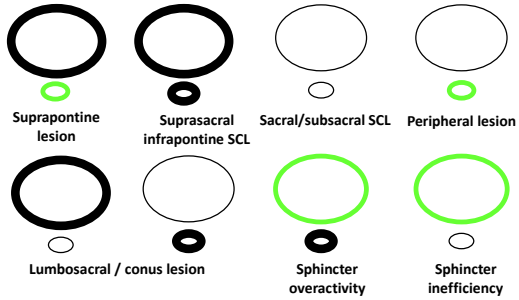
- **Brain**
- **Spinal Cord**
- **Peripheral nerves**



MS can affect any part of CNS

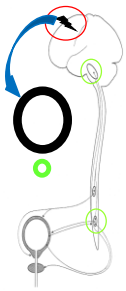
- Suprapontine Lesions
  - Cerebral lesions
  - Brain stem lesions
- Spinal Cord Lesions (SCL)
  - Suprasacral infrapontine SCL
- Sacral Lesions (more rare)
  - Conus lesions
  - Epiconal lesions

Madersbacher's Classification



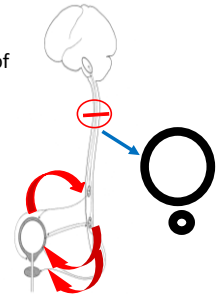
Suprapontine lesions lead to Neurogenic Detrusor Overactivity (NDO)

- Cerebral centers inhibit bladder contractions during storage phase
- Damage of these centers leads to diminish of this inhibition



Spinal Cord Lesions lead to DSD

- Suprasacral infrapontine SCL
  - There is no voluntary control of voiding
  - Micturition reflex takes place through the lumbosacral micturition center
  - Detrusor overactivity and sphincter contraction during voiding: Detrusor – Sphincter Dyssynergia (DSD)



MS lesions at Spinal Cord are Incomplete lesions

- Urinary dysfunction depends on location and extent of the lesion
- Partial control of micturition and some filling sensation may exist
- If DSD exists, in general is less severe than in complete lesions
- Detrusor and sphincter may be affected in different degree

Special considerations in MS

- Most patients underestimate their symptoms, as the disease is progressive and some symptoms rising slowly
- Both patients and physicians place greater emphasis on movement disorders
- They face the problems when there is great impact on family and social life

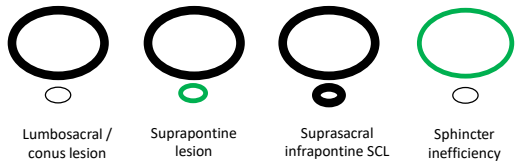
Special considerations in MS

- MS can affect any part of the CNS, thus voiding disorders vary and may be combined
- MS is often a progressive disease, thus neurogenic urinary disorder alternates its urodynamic profile
- Poor correlation between symptoms and underlying urodynamic disorder

Ciancio SJ, Mutchnik SE, Rivera VM, Boone TB. Urodynamic pattern changes in multiple sclerosis. Urology. 2001 Feb;57(2):239-45.

Symptoms only can not identify the underlying pathology

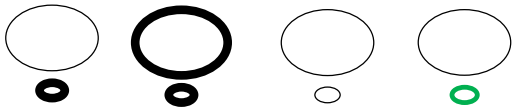
- Storage symptoms
  - Frequency, nocturia, urgency
  - Incontinence



Lumbosacral / conus lesion | Suprapontine lesion | Suprasacral infrapontine SCL | Sphincter inefficiency

Symptoms only can not identify the underlying pathology

- Voiding symptoms
  - Hesitancy, difficulty in initiating micturition
  - Low stream, Intermittent stream
  - Drippling



Lumbosacral / conus lesion | Suprasacral infrapontine SCL | Sacral/subsacral SCL | Peripheral lesion

MS is an "unreliable witness"

- Symptoms in 170 MS patients and Urinary dysfunction
  - 34% feeling of incomplete emptying
  - Only 47% of those who had high PVR had the feeling of incomplete emptying
  - 83% of those who had the feeling of incomplete emptying, had also high PVR
  - In 63%, PVR>100ml, Average 220ml (100-700ml)

Betts CD, D'Mellow MT, Fowler CJ. Urinary symptoms and the neurological features of bladder dysfunction in multiple sclerosis. J Neurol Neurosurg Psychiatry. 1993 Mar;56(3):245-50

Managing NLUTD - Goals

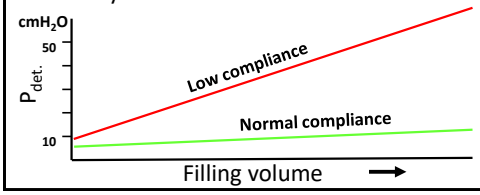
1. Upper urinary track protection

   (Matter of Life)
   - Sufficient capacity and compliance
   - Storage under low pressure (Pdet<40cmH_2O)
   - Complete voiding under acceptable pressure (Pdet<80cmH_2O)
2. Continence or contained continence

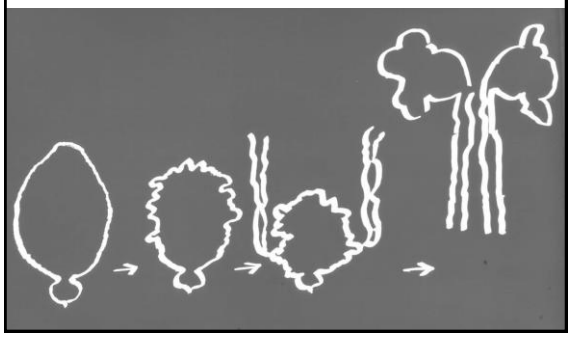
   (Matter of Quality of Life)

Managing NLUTD - Goals

- Secure pressure for upper urinary track
  - Storage phase: until 40cm/H_2O
  - Voiding phase: up to 80cm/H_2O
- Storage phase takes place during the 99,8% of the daytime



High pressure leads to renal failure



MS and Upper Urinary Track

- Renal failure and extrarenal dialysis in patients with SCL-MC-MS
  - Not in MS group

Lawrenson R, Wyndaele JJ, Vlachonikolis I, Farmer C, Glickman S. Renal failure in patients with neurogenic lower urinary tract dysfunction. Neuroepidemiology. 2001 May;20(2):138-43.

- Upper Urinary Track damage in less than 1% in MS patients

Litwiller SE, Frohman EM, Zimmern PE. Multiple sclerosis and the urologist. J Urol. 1999 Mar;161(3):743-57

MS and Upper Urinary Track

- The incidence of Upper Urinary Tract damage in MS patients varies (from 0% to 25%), depending on the material composition of each study

Lemack GE, Hawker K, Frohman E. Incidence of upper tract abnormalities in patients with neurovesical dysfunction secondary to multiple sclerosis: analysis of risk factors at initial urologic evaluation. Urology. 2005 May;65(5):854-7.

Jameson RM. Management of the bladder in non-traumatic paraplegia. Paraplegia. 1974 Aug;12(2):92-7

Andersen JT, Bradley WE. Abnormalities of detrusor and sphincter function in multiple sclerosis. Br J Urol. 1976 Jun;48(3):193-8.

.

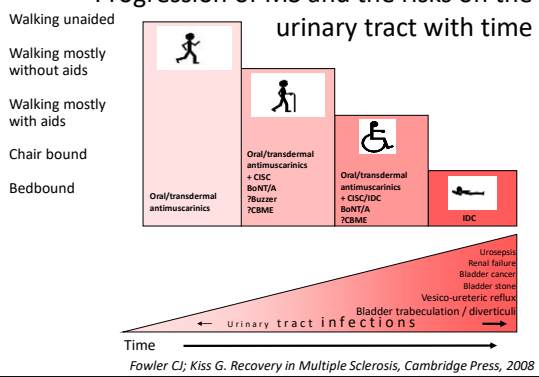
Low Pressure – Complete empting

- Storage Phase
  - **Antimuscarinics**
  - Beta 3 agonists
  - Botulinum toxin
  - Surgical treatment
- Voiding Phase
  - Pelvic floor relaxation
  - Alpha blockers
  - **Intermittent catheterization**
  - Sphincterotomy (chemical – surgical)
  - Continuous bladder drainage (indwelling catheters, incontinent stoma)

Managing NLUTD - Strategy

- Underlying pathology
  - Urodynamic diagnosis
- Additional aggravating factors
  - Reflux, stones
- Special considerations depending on the clinical status of the disease
  - EDSS, Cognitive impairment, Ambulatory status
- Skills and needs of each individual patient
  - Functional status
  - Realistic treatment approach

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



Fowler CJ; Kiss G. Recovery in Multiple Sclerosis, Cambridge Press, 2008

Take Home Message

- NLUTD in MS is very common, although symptoms' severity is very variable
- Close follow up (Urodynamics included) is needed for the proper evaluation of NLUTD
- Low pressure reservoir and total empting are the therapeutic goals
- Low pressure increases the surveillance and continence increases the QoL

Take Home Message

- Antimuscarinics and Intermittent Catheterizations are the mainstream in the treatment of NLUTD
- QoL improvement has to be taken under consideration in any management strategy
- NLUTD in MS is a real challenge for proper evaluation and treatment as almost all the spectrum of neurourology can be expressed, thus the proper management may be complicated and demanding but mandatory at the same time.

Thank you for your attention

WORKSHOP 26

ICS CORE CURRICULUM (FREE): STEP BY STEP BASIC NEUROUROLOGY TEACHING: DISEASES SPECIFICITIES

Giulio Del Popolo, Careggi University Hospital
Florence (Italy)

Giulio Del Popolo

Affiliations to disclose[+]:

Wellspect, Medtronic, Coloplast (Lecture)
IPSEN (Trial)

[+] All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- ☐ Self-funded
- ☐ Institution (non-industry) funded
- ☐ Sponsored by:

D Detrusor & Dysfunctions
e Evaluation
M Mind & Memory matters
e Environment
N Nursing
T Treatment
i Individuality
A Acceptancy

Detrusor & Dysfunctions

Table 3 Comparison of lower urinary tract function in DLB, AFPD, PAF, PD and MSA (see text)

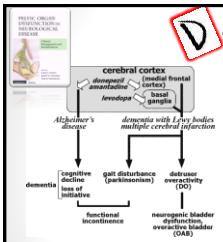
Disease	IUI symptoms	Urinary incontinence (storage dysfunction)	PVR >100 ml (voiding dysfunction)	No. of patients	Reference	Detrusor overactivity (central type)	Low compliance (peripheral type)	Behavioral representation of micturition (central type)	Neurogenic change of sphincter EMG (peripheral type)	No. of patients	Reference
MSA	Rare	63%	32%	121	9	94%	31%	19%	93%	121	9, 11
DLB	100%	91%	27%	11	7	71%	29%	2/3	3/3	7	7
AFPD	100%	63%	29%	7	19	86%	29%	2/3	3/4	7	19
PAF	100%	33%	33%	6	17	67%	33%	2/3	5/6	6	17
PD	33-70%	10-38%	0%	110	18	85%	0%	Not performed	0%	31	11

AFPD, autonomic failure with Parkinson's disease; DLB, dementia of Lewy body type; GSD, ganglion; LUT, lower urinary tract; MSA, multiple system atrophy; MUP, motor unit potential; PAF, pure autonomic failure; PD, Parkinson's disease; PVR, post void residual.

- The incident rate of LUTS is higher in those with dementia than without it (Sakakibara R et al *Neurourol & Urodyn.* 2004;23(2):154–15)
- Storage symptoms are more common than voiding symptoms (93 vs. 71%). The most frequent LUTS were urgency (64%), frequency (64%), and incontinence (57%). (Sakakibara R et al Neurourol Urodyn 2008;27:507–10)
- The median interval between the onset of dementia and LUTS is only 9–11 months (Grant R. L et al *PLoS Medicine.* 2013;10)
- In LBD urge incontinence is 53% compared to Parkinson 27% and Alzheimer disease 12% (Ransmayr GN et al. *Neurology.* 2008 Jan 22;70(4):299-303)

R Sakakibara et al. *J Neurol Neurosurg Psychiatry* 2005;76:729–732

Detrusor & Dysfunctions



A higher prevalence of neurogenic detrusor overactivity in patients with LBD, when compared to ALD patients.

UI is associated with severe cognitive decline in pure ALD but usually precedes severe mental failure in LBD

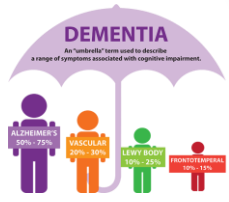
Ransmayr GN et al. Neurology. 2008 Jan 22;70(4):299-303

Evaluation

LUTS in dementia patients can be caused by:

- Dementia itself
- Specific treatment disease
- Ageing
- Comorbidities

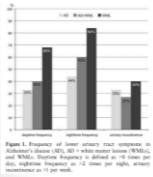
Averbeck MA, et al Neurourology and Urodynamics 36:245–252 (2017)



Evaluation

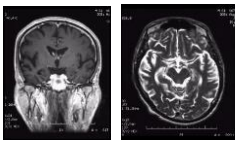
LUTDs seems to be correlated with the grade of the cortical loss.

Sugiyama M et al J Am Geriatr Soc. 2012 Dec;60(12):2370-1.



A brain CT study AD showed a degree of brain atrophy more severe in AD patients with NDO than those without it

Sugiyama M et al Int J Urol 1994 Dec;1(4):337-40.

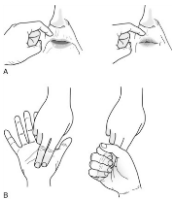


Evaluation

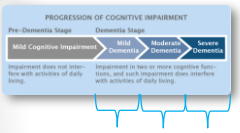
In patients with AD is suggested that prevalence of developmental reflexes such as the tactile suck reflex, the palmar and plantar grasp reflexes and the plantar extensor rose with the onset of incontinence, due to the loss of the CNS control

Thus the presence of those reflexes could be useful in differentiating incontinence of cortical origin from incontinence resulting from potentially reversible causes.

Franssen EH et al *J Geriatr Psychiatry Neurol.* 1997 Jan;10(1):22-8.



Mind & memory



Types of Dementia

Type of Dementia	History	Signs and Symptoms	Pathology/Imaging
Alzheimer's Disease (70–80% of all dementia cases)	Gradual, progressive onset	• Memory loss, especially for names and recent events • Language deficits • Rapid forgetting • Impaired visuospatial skills • Normal gait and neuro exam early • Later affective disturbances, behavioral symptoms such as aggression	• Generalized atrophy (esp. medial temporal) • Beta amyloid plaques • Neurofibrillary tangles
Vascular (20–30%)	Abrupt or gradual onset	• Focal neurological signs • Signs of vascular disease	• Strokes • Lacunar infarcts • White matter lesions • Vulnerable to cerebrovascular events
Lewy Body (10–15%)	Insidious onset, progressive with fluctuations	• Fluctuating cognition • Visual hallucinations • Neuroleptic sensitivity • Shuffling gait • Increased tone • Tremors • Falls	• Generalized atrophy • Lewy bodies in cortex and midbrain
Frontotemporal (10–15%)	Insidious onset, typically in 50s-60s; rapid progression	• Disinhibition • Socially inappropriate behavior • Poor judgment • Apathy, decreased motivation • Poor executive function	• Frontal and temporal atrophy • Pick cells and pick bodies in cortex

Environment

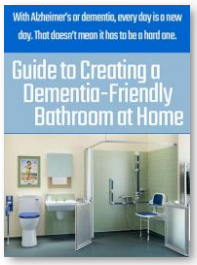
Incontinence may include:

- Not being able to react to the sensation of needing the toilet
- Mobility issues
- Not being able to communicate their need for the toilet
- Forgetting how to go to the toilet e.g. forgetting to remove clothing
- Not making an attempt to find the toilet
- Getting disorientated and forgetting where the toilet is

Environment

People with dementia sometimes experience embarrassment and shame in relation to continence problems and may fear what they perceive as humiliating and degrading procedures linked to toileting support

Continence problems may contribute to people with dementia withdrawing from social life or feeling socially excluded by other people



Nursing

The proportion of people with dementia living at home ranges from 66% in high-income countries to 94% in low- to middle-income countries, with even higher estimates in rural areas within Europe

Wimo A & Prince M (2010) Alzheimer's Disease International, London.

However, very few studies have focused on continence problems specifically experienced by community-dwelling people with dementia

Drennan V & Cole L (2009) Journal of Integrated Care 17, 15–25

- Daily routine
- Nutrition & body weight
- Personal hygiene
- Toilet habits and incontinence
- Accidents
- Fluid management
- Moods and emotions
- Wandering
- Disturbed sleep
- Interpersonal relationship

Treatment

Caregiver dependent behavioral intervention

1. Scheduled toileting
2. Habit training
3. Prompted voiding

TABLE II. Main Results of Studies on Behavioral Strategies for Dementia Patients With Urinary Incontinence

References	Publication year	Study type	LE*	N	Most relevant results
Snowe[36]	1991	Case series	4	N/R	Six weeks of scheduled toileting did not improve incontinence in a group of demented and dependent nursing home residents, although poor staff compliance with the toileting program contributed to the negative outcome.
Gitlin et al.[37]	1995	Prospective study	4	17	An occupational therapist delivered intervention in five visits over 3 months to family caregivers. The intervention focused on behavioral strategies. "Toileting schedule" was poorly accepted.
Adkins et al.[38]	1997	Case report	4	2	Prompted voiding can be implemented by family caregivers. Intervention reduced incontinence for both participants.
Snowe et al.[39]	2001	Randomized controlled trial	2b	118	Individualized scheduled toileting was agreed with carer. The authors reported a decrease (unspecified amount) in incontinence at 6 months compared to baseline in 28 of 44 participants (64%) in the experimental group.
Engberg et al.[40]	2002	Randomized controlled study (cross-over design)	2b	19	Prompted voiding achieved 60% reduction in daytime incontinence episodes.
Lasnoski et al.[41]	2013	Case report	4	1	The use of the alarm system and caregivers' prompts was effective in helping the three patients reduce their large urinary accidents to zero or near zero levels.
Dunnan et al.[42]	2012	Systematic review	4	3†	There was insufficient evidence from any studies to recommend any strategies.

*Level of evidence.
†Three studies included in the quantitative analysis.

Averbeck MA, et al Neurourology and Urodynamics 36:245–252 (2017)

Treatment

In general, antimuscarinic-induced cognitive impairment is considered reversible on discontinuation of antimuscarinic therapy.

However, a few studies suggest that antimuscarinics may be associated with an increased risk for dementia.

Antimuscarinic Acetylcholinesterase inhibitors

Averbeck MA, et al Neurourology and Urodynamics 36:245–252 (2017)

The extensive and aggressive therapy of incontinence in AD patients should be reserved for those with good general status and ambulation (gr C)

Treatment

TABLE III. Main Results of Studies on the Concomitant Use of Antimuscarinics and Acetylcholinesterase Inhibitors (AChIBs)

References	Publication year	Study type	LE*	N	Most relevant results
Pierce et al.[34]	1998	Case report	4	2	Abrupt discontinuation of antimuscarinics or anticholinergics with high antimuscarinic properties in patients receiving long-term acetylcholinesterase inhibition therapy may be associated with a reduction of seizure threshold.
Edwards et al.[35]	2002	Case report	4	1	Concomitant use of tolterodine and AChIBs (donepezil and rivastigmine) caused cognitive deterioration. After tolterodine was discontinued, patients returned to their baseline status within 24–48 hr.
Siegler et al.[33]	2006	Case report	4	1	Combination was clinically effective.
Gill et al.[31]	2005	Population-based retrospective cohort study	3	44,884	Older adults with dementia who were dispensed cholinesterase inhibitors (n = 20493) had an increased risk of subsequently receiving an antimuscarinic (6.5% vs. 3.3%, $P < 0.001$; adjusted hazard ratio, 1.55; 95% confidence interval, 1.39–1.73).
Barton et al.[32]	2008	Case series	4	100	Twenty-eight out of 100 patients referred to a memory disorders clinic for evaluation were being treated with a cholinesterase inhibitor at the time of their evaluation. Of these, 4 (14%) were also taking > or =1 medication with anticholinergic properties.
Sink et al.[29]	2008	Prospective cohort	3	376	Dual use of AChIBs and antimuscarinics (oxybutynin or tolterodine) may result in greater rates of functional decline than use of AChIBs alone.
Sakakibara et al.[30]	2009	N/A	N/A	N/A	Combined use of donepezil and propiverine in elderly individuals with dementia: no further deterioration of cognition or dementia was observed.
Isik et al.[28]	2009	Prospective cohort	3	36	Subgroup of AUD patients who received combination of trospium and galantamine. Trospium increased satisfaction and reduced the number of nocturia episodes and pads/day. The mini-mental state scores were not significantly changed at 6-month follow-up.

Averbeck MA, et al Neurourology and Urodynamics 36:245–252 (2017)

Individuality

Individuals > 65 years with dementia have a significantly higher number of comorbidities

However, this could be due to the older age of patients with dementia

Table 3 Odds ratios (OR) of dementia-associated chronic comorbidities in ≥65-year-old men and women

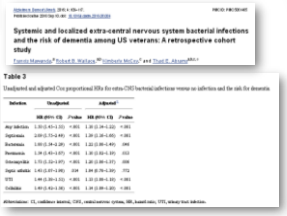
Men			Women		
Disease	OR	CI 95%	Disease	OR	CI 95%
Anxiety, neuroses	2.19	(1.84 – 2.60)	Chronic skin ulcers	2.89	(2.38 – 3.53)
Parkinson's disease	2.13	(1.49 – 3.06)	Anxiety, neuroses	1.79	(1.63 – 1.96)
Chronic skin ulcers	2.05	(1.41 – 2.96)	Anemia	1.57	(1.37 – 1.79)
Anemia	1.95	(1.58 – 2.41)	Cerebrovascular disease	1.57	(1.29 – 1.90)
Retinal disorders	1.72	(1.03 – 2.87)	Behavior problems	1.53	(1.22 – 1.92)
Cerebrovascular disease	1.63	(1.28 – 2.07)	Congestive heart failure	1.42	(1.15 – 1.75)
Cardiac arrhythmia	1.53	(1.25 – 1.88)	Parkinson's disease	1.41	(1.02 – 1.94)
Thyroid disease	1.43	(1.07 – 1.91)	Cardiac arrhythmia	1.24	(1.06 – 1.45)
Prostatic hypertrophy	1.29	(1.11 – 1.50)	Thyroid disease	1.17	(1.02 – 1.35)

Poblador-Plou et al. BMC Psychiatry 2014, 14:84

Individuality

They had higher complication rates for:

- **urinary tract infections**
- pressure ulcers
- pneumonia delirium
- dehydration and electrolyte imbalance
- more acute cardiac events



Exposure to any extra-CNS bacterial infection was associated with a significantly increased risk for dementia

Acceptance

Assessing Quality of Life in Older Adults With Cognitive Impairment

Rebecca G. Logsdon, PhD, Laura E. Gibbons, PhD, Susan M. McCurry, PhD, and Linda Teri, PhD

Psychosomatic Medicine 64:510–519 (2002)

- Assessing QOL in cognitively impaired older adults is a challenge
- Despite this challenge it is possible especially for individuals with mild to moderate dementia to reliably and validly rate their own QOL

Each of these domains is highly relevant to evaluating QoL in persons with dementia.

Lawton MP. San Diego, Academic Press, 1991, pp 3–27.


"My memory is so bad."
"How bad is it?"
"How bad is what...?"
Doctors be like... Go and buy this

Spina bifida

Pr Pierre Denys
Raymond Poincaré Hospital AP-HP
University of Versailles Saint Quentin
France

Pierre Denys

ICS 2017 FLORENCE

Affiliations to disclose†:

Allergan / speaker investigator
Ipsen / investigator
Wellspect coloplast Astellas / adboard

† All financial ties (over the last year) that you may have with any business organization with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

☐ Self-funded
☐ Institution (non-industry) funded
☒ Sponsored by: *Allergan*

Spinal Dysraphism

Open dysraphism
MC, MMC (Spina Bifida)
0.1 à 5 ‰ birth

Occult dysraphism
0.05 à 0.1‰ birth

- Lipomas
- Diastematomyelia
- Anterior meningocele….

"Tethered cord syndrome"

Open VS Occult dysraphism

Open	Occult
CNS Malformation	Loco-Regional Malformation
Accidental	Genetic
Folic Acid dependant	Folic Acid independant
Very frequent	Rare
M = F	F >>> M
Spine and Spinal Cord ± Chiari, brain …	Spinal Cord ± Spine, Kidney, bladder, bowel …
Myelodysplasia	Compression, Tethering, microtraumatism, Myelodysplasia

Goals of Treatment evolve with age

Initial Management : Preserve renal function

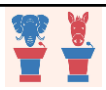
School age : Preserve renal function and improve urine and fecal continence

Adolescent and adult : preserve renal function and improve urine and fecal continence and sexual function

Initial evaluation and management in newborns and young age

- Priority of spinal closure and neural defect management (can be fetal repair)
- In Newborns 225 pts (Bauer SB 2016 Neurogenic Bladder)
  - Bladder function
    - Contractile 63%
    - Acontractile poor compliance 17%
    - Acontractile good compliance 20%
  - Sphincter function
    - Dyssynergy 37%
    - Synergy 27%
    - Complete denervation 36%

The debate



- No debate for patients with low pressure, complete voiding, normal ultrasound
- Debate is around the time of urodynamic and time of intervention specially CIC and anticholinergic
- Two strategies
  - Conservative : clinical and ultrasound follow up, Urodynamics CIC+- anticholinergics used only in case of clinical deterioration or hydronephrosis
  - Proactive management : early and regular urodynamic testing CIC intiation based on risk management to prevent complications.
- Benefit in term of renal function is a matter of debate
- But it seems that conservative strategy increase the risk of augmentation cystoplasty

Snow Lisy D 2015 J Urol
Kessler T et al. Early proactive management improves upper urinary tract function and reduces the need for surgery in patients with myelomeningocele. Neurourol Urodyn. 2006;25(7):758-62.

The ideal evaluation

- Post void residual
- Renal and bladder ultrasound
- Urodynamic study
- Serum creatinine after 5 to 7 days of life
- Voiding cysto-urethrogram
- Nuclear scanning if reflux or hydronephrosis

Conservative treatment

- Intermittent catheterization
- Anticholinergics (special attention to cognitive disorders)
- BTXA injections (randomized controlled trials ongoing) but open label studies are promizing

(Shulte Baukloh H Neuro Urol Urodyn 2006; Hoebeke P J Urol. 2006)

Surgery to improve storage

- In case of high pressure resistant to conservative management
- In case of reflux or hydronephrosis resistant to conservative management
- To treat DO incontinence resistant to conservative management
- Augmentation cystoplasty with specific attention to long term complications depending on the type of tissue used (gastric, colonic, ileum)
- Autoaugmentation with conflicting results

Rawashdeh YF International children's continencence society's recommendations for therapeutic intervention in congenital neuropathic bladder and bowel dysfunction in children Neurourol Urodyn 2012
Dik P, Tsachouridis GD, Klijn AJ, et al. Detrusorectomy for neuropathic bladder in patients with spinal dysraphism. J Urol 2003;170:1351–4.

Surgery to treat stress incontinence

- Facial slings
- Artificial urinary sphincter
- Bladder neck reconstruction
- Risk of bladder function modifications after surgery (artificial urinary sphincter)

Rawashdeh YF International children's continencence society's recommendations for therapeutic intervention in congenital neuropathic bladder and bowel dysfunction in children Neurourol Urodyn 2012
Kryger JV, Gonzalez R, Barthold JS. Surgical management of urinary incontinence in children with neurogenic sphincteric incompetence. J Urol 2000; 163:256–63.

Intradetrusor electrical stimulation

- Used in the passed to improve storage and micturition
- Poor results of the only randomized trial (T Boone J Urol 1992)

Special attention to

- Fecal incontinence and bowel management (Verhoef M Spinal Cord 2005)
- Sexual dysfunction
- Transition to adult

- And the long term follow-up because of patient, transition and treatment specific risks

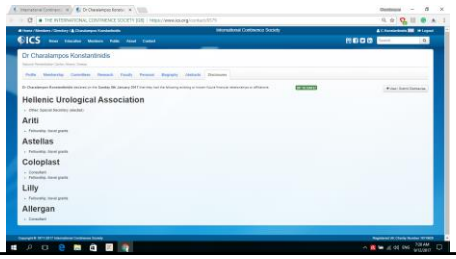
WORKSHOP 26

ICS CORE CURRICULUM (FREE): STEP BY STEP BASIC NEUROUROLOGY TEACHING: DISEASES SPECIFICITIES

PARKINSON DISEASE

Charalampos Konstantinidis, MD, FEBU, FECSM
Consultant in Urology & Sexual Medicine
National Rehabilitation Center, Athens, Greece

Disclosures



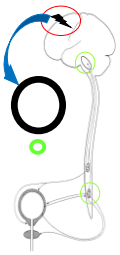
Parkinson's disease (PD) - Introduction

- Common movement disorder (tremor at rest, rigidity, and gait difficulty) associated with the degeneration of dopaminergic neurons in the substantia nigra
- Non-motor symptoms: sensory symptoms, neuropsychiatric, sleep, and autonomic disorders.
- **Bladder dysfunction** is one of the most common autonomic disorders in PD (up to 75%) which influences quality-of-life (QOL) measures, early institutionalisation, and health economics

Jain S. Multi-organ autonomic dysfunction in Parkinson disease. Parkinsonism Relat Disord 2011;17:77–83.
Sakakibara R, Uchiyama T, Yamanishi T, et al. Bladder and bowel dysfunction in Parkinson's disease. J Neural Transm 2008;115:443–60.

Suprapontine lesions lead to Neurogenic Detrusor Overactivity (NDO)

- Cerebral centers inhibit the micturition reflex (bladder contractions) during storage phase
- Damage of these centers leads to diminish of this inhibition
- One of the inhibition pathways is based on the frontal-basal ganglia and acts through a dopamine D1-GABAergic pathway
- Further facilitation by glutamatergic and D2 dopaminergic mechanisms



Yokoyama O, Yoshiyama M, Namiki M, et al. Changes in dopaminergic and glutamatergic excitatory mechanisms of micturition reflex after middle cerebral artery occlusion in conscious rats. Exp Neurol 2002;173:129–35.

LUTS in PD

- 38–71% of patients (LOE2), nocturia ~70%
- Storage symptoms (urgency, frequency, nocturia, and incontinence)
- Voiding symptoms (e.g., hesitancy, interrupted or poor stream, and double voiding)
- The severity of LUTS increases with the progression of PD and parallels other autonomic dysfunction
- Association with other features, such as falls

Sakakibara R, Tateno F, Kishi M, et al. Pathophysiology of bladder dysfunction in Parkinson's disease. Neurobiol Dis 2011;Oct 10.
Magerkurth C, Schnitzer R, Braune S. Symptoms of autonomic failure in Parkinson's disease: Prevalence and impact on daily life. Clin Auton Res 2005;15:76–82.
Balash Y, Peretz C, Leibovich G, et al. Falls in outpatients with Parkinson's disease: Frequency, impact and identifying factors. J Neurol 2005; 252:1310–5.

Urodynamic findings

- NDO ~ 81%
- External sphincter relaxation problems ~33% (No DSD)
- Detrusor - hypocontractility ~ 66% of women and 40% of men
- Mild outlet obstruction, a mean Abrams-Griffiths number (outflow obstruction > 40) of 40% in women and 43% in men
- Average PVR ~ 18 ml (LOE2)

Uchiyama T, Sakakibara R, Yamamoto T, et al. Urinary dysfunction in early and untreated Parkinson's disease. J Neurol Neurosurg Psychiatry 2011;82:1382–6
Sakakibara R, Hattori T, Uchiyama T, et al. Videourodynamic and sphincter motor unit potential analyses in Parkinson's disease and multiple system atrophy. J Neurol Neurosurg Psychiatry 2001;71:600–6.

Medication for PD and LUTS

- Drugs for motor dysfunction
  - levodopa, dopamine agonists, and monoamine oxidase type B (MAO-B) inhibitors.
  - can affect (either ameliorate or worsen) bladder function
- Urodynamic studies showed DO in both treated and untreated patients

Pavlakis AJ, Siroky MB, Goldstein I, et al. Neurourological findings in Parkinson's disease. J Urol 1983;129:80–3.

The National Collaborating Centre for Chronic Conditions, ed. Symptomatic pharmacological therapy in Parkinson's disease. Parkinson's Disease. London: Royal College of Physicians. 2006, pp. 59–100. ISBN 1860 162835.

Medication for PD and LUTS

- Levodopa (L-Dopa)
  - Precursor of dopamine - standard therapy for motor dysfunction for more than 30 years
  - Unclear effect on LUTS in PD patients
  - D1 (excitatory) post-synaptic dopamine receptors inhibits voiding
  - D2 (inhibitory) receptor activation facilitate bladder contraction
  - Dopamine's affinity for D1 receptors is lower than D2 receptors

Wullner U, Schmitz-H€ubsch T, Antony G, et al. Autonomic dysfunction in 3414Parkinson's disease patients enrolled in the German Network on Parkinson's disease (KNP e V.) the effect of ageing. Eur J Neurol 2007;14:1405–8.

Missale C, Nash R, Robinson SW, et al. Dopamine receptors from structure to function. Physiol Rev 1998;78:189–225

Medication for PD and LUTS

- Levodopa (L-Dopa)
  - Acute administration
    - D2-mediated effect prevails over the D1-mediated effect in naive patients
    - Suppression of the nigral cells
    - Facilitation of the micturition reflex
    - Inhibition of bladder contraction and improvement of bladder function
  - Chronic treatment
    - down-regulation of dopamine receptors that correlates with the development of motor fluctuations

Sakakibara R, Tateno F, Kishi M, et al. Pathophysiology of bladder dysfunction in Parkinson's disease. Neurobiol Dis 2011;Oct 10

Hwang WJ, Yao WJ, Wey SP, et al. Downregulation of striatal dopamine D2 receptors in advanced Parkinson's disease contributes to the development of motor fluctuation. Eur Neurol 2002;47:113–7.

Medication for PD and LUTS

- Dopamine receptor agonists
  - Attempt to delay L-Dopa (drug-induced motor complications)
  - Imitation of the dopamine effect by binding directly to the post-synaptic dopamine receptors
  - Selective affiliation to D1 or D2 receptors
  - Improvement of storage function
  - May increase bladder capacity (apomorphine)

The National Collaborating Centre for Chronic Conditions, ed. Symptomatic pharmacological therapy in Parkinson's disease. Parkinson's Disease. London: Royal College of Physicians. 2006, pp. 59–100. ISBN 1860 162835.

Aranda B, Cramer P. Effect of apomorphine and l-dopa on the parkinsonian bladder. Neurourol Urodynam 1993;12:203–9.

Medication for PD and LUTS

- Monoamine oxidase type B (MAO-B) inhibitors
  - Block the metabolism of dopamine, increasing its level in the striatum
  - No established specific effect on bladder function
  - Preliminary data show positive effect

Brusa L, Musco S, Bernardi G, et al. Rasagiline effect on bladder disturbances in early mild Parkinson's disease patients. Parkinsonism and Related Disorders 2014;20:931–2.

Medication for LUTS in PD

- Antimuscarinics and alpha-adrenergic antagonists
- New drugs (solifenacin, darifenacin, fesoterodine, mirabegron): "Off label" use in neurogenic bladder dysfunction, including PD.
- Take care of Post Void Residual (PVR)
- There are no RCTs specifically for PD patients taking antimuscarinics

B. Blok, J. Pannek, D. Castro-Diaz et al. Guidelines on Neurogenic Lower Urinary Tract Dysfunction. EAU Guidelines 2017; pp. 18–20.

Medication for LUTS in PD (targeting NDO)

- Botulinum neurotoxin type a (BoNT/A)
  - Established treatment of refractory NDO
  - Intradetrusoreal injections of 100 or 200 Units of onabotulinumtoxinA (BOTOX)

Giannantoni A, Conte A, Proietti S, et al. Botulinum toxin type A in patients with Parkinson's disease and refractory overactive bladder. J Urol 2011;186:960–4.

Kulaksizoglu H, Parman Y. Use of botulinim toxin-A for the treatment of overactive bladder symptoms in patients with Parkinsons's disease. Parkinsonism Relat Disord 2010;16:531–4.

Anderson RU, Orenberg EK2, Glowe P. OnabotulinumtoxinA office treatment for neurogenic bladder incontinence in Parkinson's disease. Urology 2014;83:22–7.

Medication for LUTS in PD (targeting BOO)

- Alpha blockers
  - Decrease the bladder outlet resistance in NLUTS

B. Blok, J. Pannek, D. Castro-Diaz et al. Guidelines on Neurogenic Lower Urinary Tract Dysfunction. EAU Guidelines 2017; pp. 18–20.

- Botulinum toxin in the sphincter
  - 100 Units of onabotulinumtoxinA (BOTOX), limited data

Anderson RU, Orenberg EK2, Glowe P. OnabotulinumtoxinA office treatment for neurogenic bladder incontinence in Parkinson's disease. Urology 2014;83:22–7.

Other treatments of LUTS in PD

- Deep brain stimulation (DBS)
  - Stimulation of the subthalamic nucleus (STN)
  - Established surgical treatment for motor symptoms in PD patients
  - Positive effect on storage LUTS, improvement of urodynamic parameters

Seif C, Herzog J, van der Horst C, Effect of subthalamic deep brain stimulation on the function of the urinary bladder. Ann Neurol 2004;55:118–20.

Herzog J, Weiss PH, Assmus A, et al. Improved sensory gating of urinary bladder afferents in Parkinson's disease following subthalamic stimulation. Brain 2008;131:132–45.

Winge K, Nielsen KK. Bladder dysfunction in advanced Parkinson's disease. Neurourol Urodyn 2012;31:1279–83.

Other treatments of LUTS in PD

- Prostatic surgery (TUR-P)
  - BPH and PD may coexist
  - Targeting QoL, surgical treatment of BPH is a valid option
  - TUR-P is no longer contraindicated in PD, especially after retention
  - Preoperative investigations, UDs including, are mandatory
  - Storage symptoms may insist after obstruction relief (due to underlying neurological disorder) or its treatment

Roth B, Studer UE, Fowler CJ, et al. Benign prostatic obstruction and Parkinson's disease should transurethral resection of the prostate be avoided. J Urol 2009;181:2209–13

Staskin DS, Vardi Y, Siroky MB. Post-prostatectomy continence in the parkinsonian patient: The significance of poor voluntary sphincter control. J Urol 1988;140:117–8.

Special consideration - MSA

- Multiple system atrophy (MSA) is similar to PD, more progressive and leads to urinary retention (formerly called Shy-Drager syndrome)
- The incidence of MSA versus PD is approximately 1:10
- 50% of MSA are initially misdiagnosed as having PD
- Conservative management of bladder symptoms is recommended (If TUR-P is planed, MSA has to be excluded)

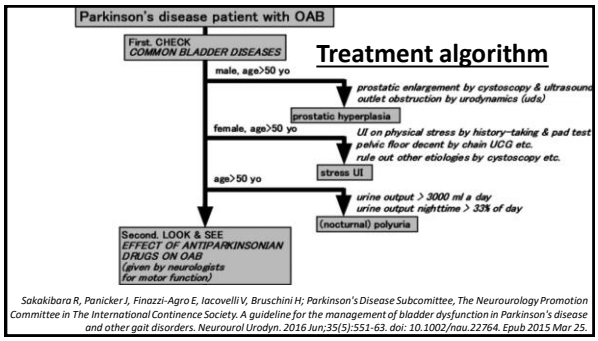
Fowler CJ, Dalton C, Panicker JN. Review of neurologic diseases for the urologist. Urol Clin North Am 2010;37:517–26.

Sakakibara R, Hattori T, Uchiyama T, et al. Videourodynamic and sphincter motor unit potential analyses in Parkinson's disease and multiple system atrophy. J Neurol Neurosurg Psychiatry 2001;71:600–6.

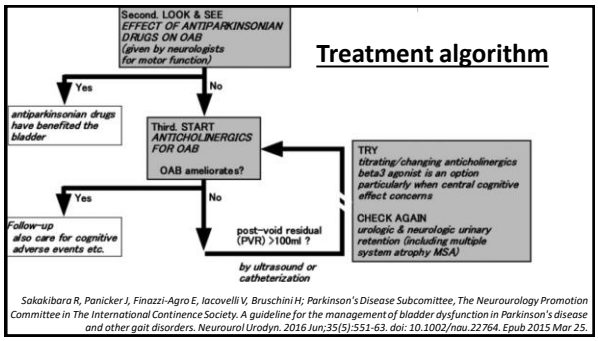
Special consideration - MSA

- Urodynamic differentiation
  - Open bladder neck with no detrusor contraction
- Neurophysiological investigations
  - Neurogenic change of sphincter EMG
- Suspect MSA if there is
  - Poor response to antimuscarinics
  - Early onset of severe incontinence
  - Early onset of erectile dysfunction in men
  - High PVR or Urinary retention

Staskin DS, Vardi Y, Siroky MB, et al. Post-prostatectomy incontinence in the parkinsonian patient: the significance of poor voluntary sphincter control. J Urol 1988;140:117–8.



Sakakibara R, Panicker J, Finazzi-Agro E, Iacovelli V, Bruschini H; Parkinson's Disease Subcomittee, The Neurourology Promotion Committee in The International Continence Society. A guideline for the management of bladder dysfunction in Parkinson's disease and other gait disorders. Neurourol Urodyn. 2016 Jun;35(5):551-63. doi: 10.1002/nau.22764. Epub 2015 Mar 25.



Sakakibara R, Panicker J, Finazzi-Agro E, Iacovelli V, Bruschini H; Parkinson's Disease Subcomittee, The Neurourology Promotion Committee in The International Continence Society. A guideline for the management of bladder dysfunction in Parkinson's disease and other gait disorders. Neurourol Urodyn. 2016 Jun;35(5):551-63. doi: 10.1002/nau.22764. Epub 2015 Mar 25.

Thank you for your attention

WORKSHOP 26

ICS CORE CURRICULUM (FREE): STEP BY STEP BASIC NEUROUROLOGY TEACHING: DISEASES SPECIFICITIES

Giulio Del Popolo, Careggi University Hospital Florence (Italy)

Giulio Del Popolo

Affiliations to disclose†:

Wellspect, Medtronic, Coloplast (Lecture)
IPSEN (Trial)

† All financial ties (over the last year) that you may have with any business organisation with respect to the subjects mentioned during your presentation

Funding for speaker to attend:

- ☐ Self-funded
- ☐ Institution (non-industry) funded
- ☐ Sponsored by:

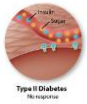
DIABETES MELLITUS

Diabetes Type 1

Is a chronic disease that occur when the pancreas does not produce enough insulin to properly control blood sugar levels.

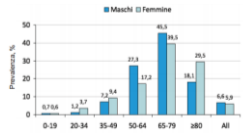
Diabetes Type 2

Called non-insulin dependent diabetes due to high blood glucose in the context of insulin resistance and deficiency.



EPIDEMIOLOGY

In Italy the prevalence of diabetes is 5,4% of males and 5,4% of females (Istat ,2015), The prevalence increased (90%) from 3.9% (2001) to 4.8% (2014).

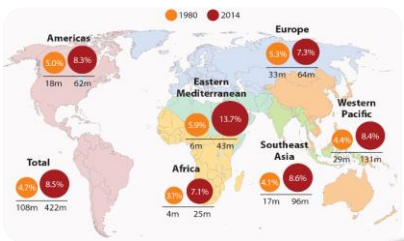


(Italian ARNO study, 2015)

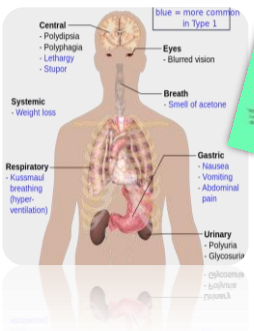
There are about 60 million people with diabetes in the European Region, or about 10.3% of men and 9.6% of women aged 25 years and over.

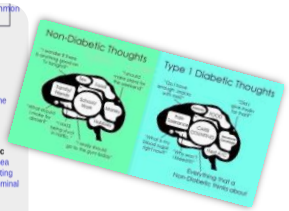
(WHO Europe 2016)

EPIDEMIOLOGY



SYMPTOMS





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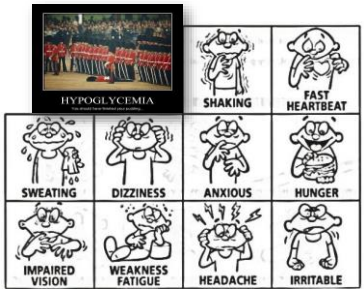

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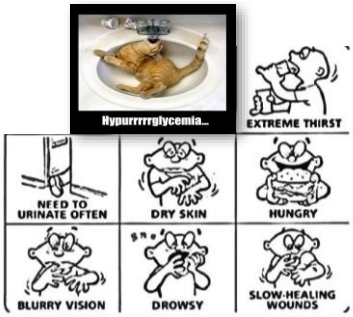
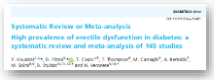


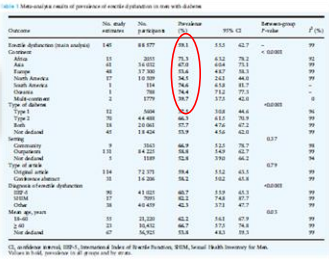
SYMPTOMS

Prevention

DIABETES AND ERECTILE DYSFUNCTION

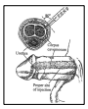

Systematic Review or Meta-analysis

High prevalence of erectile dysfunction in diabetes: a systematic review and meta-analysis of 145 studies



PDE5i

ICI



Vacuum

DIABETES AND GASTRO-INTESTINAL DYSFUNCTION

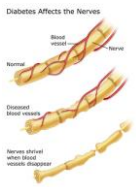
Faecal incontinence in diabetes patients may be due to impaired anorectal sensation and/or decreased anal closing pressure after hyperglycemic episodes

Gastro-intestinal symptoms impact negatively on health-related QoL in diabetes mellitus.

Patients with diabetes and fecal incontinence should have anorectal manometry performed before introducing therapy for fecal incontinence

DIABETES MELLITUS AND LUTS

Diabetes is a risk factor for UI in most studies. While diabetic neuropathy and/or vasculopathy are possible mechanisms
(ICI 2016)



Diabetes can affect the lower urinary tract function by multifactorial pathogenetic mechanisms

"Cystopathic bladder" with alteration of :

- the detrusor muscle cell
- the function of the neuronal component
- urothelial function

(Yoshimura,2005)

Diabetic bladder **+/-** interaction with benign prostate hyperplasia, female prolapse, obesity, and metabolic perturbations

DIABETES MELLITUS AND LUTS

Temporal Theory

hyperglycemia-induced polyuria provokes compensatory bladder hypertrophy and associated myogenic and neurogenic alterations. With filling dysfunctions secondary to DO

By the time the oxidative stress may result in the impairment of the voiding function followed by the classical signs and symptoms of detrusor underactivity.

Daneshgari et al. (2009)

DIABETES MELLITUS AND LUTS

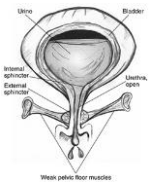
Diabetes is one of the commonest causes of polyneuropathy and polyuria.

Diabetic men were significantly more likely to have UI.
Shamliyan TA et al, 2009

Overall, up to 59% of diabetic patients will report urinary symptoms, while 75-100% of those with evidence of peripheral neuropathy will develop NLUTD.
Hunskar S et al, 2004 & Irvin DE et al, 2006

In diabetic patients (Type II) "Diabetic Cystopathy" occurs in 43% to 87%.
Coyne KS et al, 2009

It is also described in about, 25% of diabetic patients on oral hypoglycemic treatment.
Niang L. et al, 2010



Diabetes might cause overflow or a paralysed pelvic floor and hence stress incontinence.

DIABETES MELLITUS AND LUTS

Regarding nocturia, there may also be numerous other underlying causes for the associations, such as autonomic nervous system hyperactivity and/or metabolic syndrome

Absolute insulin deficiency/Increase counter regulatory hormones
↓
↑Catabolism of carbohydrate, fats and proteins
↓
Hyperglycemia
↓
Osmotic diuresis
↓
Polyuria and nocturia (loss of electrolytes + fluid)

In FINNO Study diabetes was associated with nocturia after adjustment for other factors only in women
Kari A. O. Tikkinen Am J Epidemiol 2009 Aug 1; 170(3): 361–368.

DIABETES MELLITUS AND LUTS

Urodynamic studies showed delayed first sensation (>250 mL), increased capacity (>600 mL) underactive detrusor, DO, high postvoid residual urine volume and BOO in 23.1% to 78.8%, of the men
Bansal,R. 2011

In the late stage with severe LUTS have impaired bladder sensation, detrusor underactivity and impaired emptying

While in the early stage have detrusor overactivity and urgency incontinence .

Coyne KS et al, 2012

[The impact of mellitus diabetes on the lower urinary tract: A review of Neuro-urology Committee of the French Association of Urology].

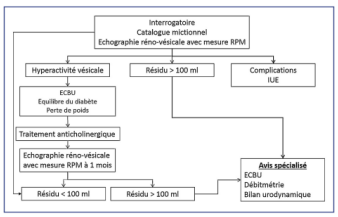


Figure 1. Algorithme de dépistage et de prise en charge initiale des SBAU par le médecin généraliste ou le diabétologue.

TREATMENT

CONSERVATIVE

- **Behavioral modifications**
- **Diet and glucose control**
- **Fluid intake**
- **Pelvic floor exercises**
- **Voiding techniques**
  - **a) Prompted voiding**
  - **b) Intermittent catheterization**

TREATMENT

PHARMACOLOGY

- Antimuscarinics should be prescribed carefully and post-voiding residual should be monitored

- *Alpha Blocker can be used in man with BOO*

- *UTI prophylaxis and treatment*

TREATMENT

ELECTROSTIMULATION AND SURGERY

- Sacral neuromodulation few promising results in non obstructive retention *Consider an higher risk of post-SNM complication.* *(Daniels et al. 2010).*

- *TUIP or TURP in obstructive men but distal sphincter and detrusor function should be assessed accurately before surgery*

- *Female sling voiding function should be assessed accurately pre-op*

CONCLUSIONS

Diabetic cystopathy occurs in up to 80% of insulin dependent diabetes mellitus.

Urinary incontinence is strongly associated with insulin dependent diabetes only.

Overactive bladder is not uncommon in diabetes in the early stage

Patients with diabetic cystopathy generally can have OAB and/ or impaired detrusor contractions with increased post-void residual.

CONCLUSIONS

Post void residual measurement should be performed yearly.

Recurrent urinary tract infections might be a long term problem.

There is a lack of specific treatment for diabetic cystopathy, but early treatment is advised by:

a) Prevention
b) Lifestyle
c) Conservative treatment