

Start	End	Topic	Speakers
07:30	07:35	Introduction	None
07:35	07:45	Let's All Talk the Same Language: Standardisation of Definitions and Terminology	Selcuk Yucel
07:45	08:00	Dysfunctional Voiding in Children and Adolescents	Mario De Gennaro
08:00	08:10	Pelvic Floor Muscles Re-training and Urotherapy	Nelly Faghani
08:10	08:20	Minimally Invasive Treatment and Surgical Options	Giovanni Mosiello
08:20	08:30	Questions	All

Speaker Powerpoint Slides

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Aims of Workshop

During this Workshop, you will receive updated information on the standard terminology and assessment methods and treatment options for *Lower Urinary Tract Symptoms Dysfunctional Voiding in Children and Adolescents*, including conservative and minimally invasive surgery. There will be 4 lectures from various disciplines, all focusing on a functional approach, to increase the understanding of the pathophysiology, diagnostics and treatment of the above-mentioned conditions from childhood to young adult age. Treatment will not be focused only on medication or surgery but also on non-pharmacological approach, urotherapy and pelvic floor muscle training and rehabilitation.

Learning Objectives

Standardisation of terminology for paediatric and transitional LUTS and dysfunctional voiding.
Understanding of the pathophysiology of dysfunctional voiding in children and young adults.
Understanding and indication of the updated methods for pelvic floor training/re-training and pelvic floor muscles rehabilitation.
Learning regarding indication and techniques for "open" or minimally invasive surgery.

Learning Outcomes

After this workshop, you will be able to define, assess and indicate appropriate referral or medical, surgical, non-medical/non-surgical treatment for children and adolescents affected by LUTS and dysfunctional voiding.

Target Audience

Urologists, Paediatric Urologists, Physiotherapists, Occupational Therapists, Nurses, Other Specialties.

Advanced/Basic

Advanced

Suggested Reading

ICS Standardisation of Terminology Document
ICCS Standardisation of Terminology Document

Other Supporting Documents, Teaching Tools, Patient Education etc

Pre-Workshop Questionnaire distributed at the workshop (will be filled by the attendees before the start of the workshop)
End-of-workshop Questionnaire distributed at the workshop (will be filled by the attendees at the end of the workshop)

Let's All Talk the Same Language: Standardisation of Definitions and Terminology

Selcuk Yucel, MD

The standardization of definitions and terminology for lower urinary tract and bowel function is imperative to understand, evaluate, discuss and communicate on symptoms, findings, history taking, diagnosis, diagnostic tools and methods, treatment and success for lower urinary system dysfunction in children and adolescents. Terminology and definitions should be internationally accepted and used to eliminate possible confusion among the urologists and other specialists and subspecialists who are dealing with lower urinary system dysfunction problems in children. Lower urinary system dysfunction in children and adolescents is a very common and heterogenous broad term across the world and it is imperative to talk the same language by all healthcare providers and associated parties.

One of the tasks of International Continence Society Children and Young Adults' Committee is to contribute to form a platform for such a common terminology language. For this purpose, we wish to cooperate with other societies and committees who have been publishing and producing on standardization of those definitions and terms. We noted that there is a significant increase in paediatric lower urinary system dysfunction published studies in the last 15 years. Moreover, with no geographical limits, there is approximately four fold increase in the likelihood of usage of recommended terminology by Standardization Committee of the International Children's Continence Society following their publication on standardization of terminology for lower urinary tract dysfunction. However, one fourth of recent publications, unfortunately fail to follow those recommended terms and definitions.

In this course we aim to transfer the terminology offered by the Standardization Committee of the International Children's Continence Society revised in 2016. Terminology will consist of manifestations and symptoms such as day time frequency, incontinence and tools of investigation such as voiding diaries, uroflometrics, urodynamics, post voiding residuals, ultrasound measurements, and conditions/diseases with subgroups, and treatments along with objective success rates.

Dysfunctional Voiding in Children and Adolescents

Mario De Gennaro

The lack of coordination between detrusor muscle contraction and relaxation of the urethral sphincter, is the pathogenetic factor at the basis of functional bladder outlet obstruction in children. When this pathologic mechanism occurs in neuropathic patients, it is defined as detrusor-sphincter dyssinergia, (DSD). When occurring in non-neuropathic patients, it is defined as dysfunctional voiding, (DV). The obsolete terms for DV are Hinman Syndrome or non-neurogenic neurogenic bladder, which are both obsolete and not recommended as terminology, by the International Children Continence Society, (ICCS). Children and adolescents, affected by DV, pass urine in spurts with a typical pattern at urinary flowmetry called "staccato void." They usually come to the attention of a Physician for either difficulty in voiding, recurring urinary infection, suprapubic pain, or accidental ultrasonographic detection of a thickened bladder wall. The majority of these cases have associated bowel disturbances and day-time and/or night time urinary leak, which can be also associated to "reactive" overactive bladder and frequency of micturition.

Assessment of these cases is based on a basic urological work-up, urinary flowmetry with EMG of pelvic floor muscles, evaluation of bowel function and pattern of bowel movements as well as consistency of the feces (Bristol Stool Scale). An ultrasound to assess rectal diameter or a plain abdominal x-ray are used in different centres, to assess the possibility of associated fecal load. In some cases with suspect of spina bifida occulta, (SBO), or Tethered cord, (TC), or in case of previous operations for posterior urethral valves, other congenital urological anomalies, an invasive urodynamic evaluation with cystometry and pressure-flow study, may be required. In this case a video-urodynamic evaluation will be the most indicated. Cases diagnosed later on in life (adolescence) may be considered also for nephrologic evaluation and possibly also for nuclear medicine renal scan (DMSA). Current management is based on biofeedback of the pelvic floor muscles and/or medication. New child friendly softwares, make it easy to attract interest from the young patients, who are interested in the interactive work of the PFM's contraction/relaxation exercises. Usually 4 session of biofeedback succeed in improving symptoms. Should biofeedback be unsuccessful or partially successful, alfa-blockers such as tamsulosine and doxazosine are utilized also in children, with careful monitoring of the blood pressure and of the school performance and attention. Neuromodulation (PTNM) or neuromodulation at the level of S3 with neuromodulation implanted devices, are also a third line of treatment for these patients. As previously mentioned DV is frequently associated to bowel disturbances, with obstinate constipation or intermediate severity of constipation, with periodic episode of fecal impaction. This is called bladder and bowel disorder (BBD) a term recognized by the International Children Continence Society Standardization of Terminology Document, (2015 and 2016). Bowel disorders need always to be tackled and resolved, before embarking in the management of the urinary issues. Details of Assessment, Management and comorbidities will be discussed.

Pelvic Floor Muscles Re-training and Urotherapy

Nelly Faghani, Physiotherapist, Canada

The treatment of pelvic floor dysfunction in the pediatric population is extremely under-served. These dysfunctions contribute to undo stress for the child and family and have significant consequences on quality of life. Also, pediatric bladder (and bowel) dysfunction can persist into adulthood; pelvic rehabilitation providers must direct attention to the pediatric population to improve the current and future health in our patient populations.

Physiotherapists are an important part of a multidisciplinary team in treating urinary tract symptoms and dysfunctional voiding in paediatrics. The assessment begins with a very detailed subjective history to determine the onset of the current problem. Evaluation of basic bladder and bowel habits can be further investigated by looking at a voiding diaries and fibre diaries. This is an extremely important outcome measure that will let us evaluate the fluid intake, contribution of bladder irritants, voiding frequency and habits, urinary or fecal urge and leakage, bowel frequency (note of type, straining or pain) and fibre intake. Appropriate outcome measures should be administered at regular intervals to monitor change throughout the treatment program.

The objective evaluation will include assessment of posture, breathing patterns and clearing of the lumbar spine and sacroiliac joints. Any overall muscle imbalances including over-activity or under-activity must be evaluated and subsequently addressed. The objective evaluation will also include doing a neurologic screen, assessing for scar tissue restriction, diastasi recti, and external visualization of the appropriate sphincter action, anal reflex and sensory testing. Biofeedback may be utilized to help

visualize recruitment and relaxation patterns of the pelvic floor muscles. Can the child activate the pelvic floor muscles without compensation (breath holding, adductors, gluts)? Are they able to effectively maintain this contraction (and for how long) and are they able to get back to their baseline resting tone (and is this a delayed relaxation)?

Once a problem list has been identified and short and long-term goals have been made, treatment strategies can include:

- Education on the anatomy and function of the lower urinary tract
- Behavioral modification including fluid intake, timed or scheduled voiding and avoidance of holding maneuvers
- Diet modification with emphasis on avoidance of bladder irritants, adequate water consumption and fiber intake
- Constipation management programs
- Education on toileting postures and positions, including double voiding
- Skin care and proper wiping
- Deep (diaphragmatic) breathing
- Neuromuscular reeducation of the pelvic floor muscles to improve awareness to ensure proper activation, relaxation, endurance and coordination (biofeedback)
- Global muscular strength and coordination
- Manual therapy to address external muscle over activity
- Postural education
- Mindfulness practice
- Cognitive Behavioral Therapy (CBT)
- Appropriate referral when indicated

Pelvic floor muscle retraining and Urotherapy are an integral part of the multidisciplinary approach to treating lower urinary tract symptoms and dysfunctional voiding in paediatrics. This functional approach can significantly improve symptoms and increase our patients overall quality of life into adulthood.

Minimally Invasive Treatment and Surgical Options

Giovanni Mosiello, Italy

Some new procedures with, mininvasive can be useful to consider in these patients after the failure of conservative treatment. The management strategies of incontinence in these children will be not defined by urodynamics studies and urinary tract imaging only, and in our experience a multidisciplinary approach is mandatory, with a team involving at minimum an urologist, urotherapist, psychologist. Lower urinary tract dysfunction have to be related to coexisting pathologies too, as well as quality of life. The separate classification of over or underactivity in both the detrusor and the urinary sphincter determines the pattern of bladder dysfunction and directs tailored management.

Detrusor overactivity or decreased compliance during storage:


Detrusor underactivity during emptying:

Sphincter overactivity during emptying:

Sphincter underactivity during storage:


The most important urological advancement in NBD treatment in these years remains the use of onabotulinum toxin A that has revolutionized the treatment of overactive detrusor especially in neurogenic conditions. In the recent years onabotulinum toxin A has changed dramatically the treatment of NBD in adults and pediatrics in many centers the indications to bladder augmentation were dramatically reduced, and children have been treated with success and during time, avoiding bladder augmentation. In our experience onabotulinum toxin A confirmed its efficacy and safety as well as in the experiences of other colleagues. No severe complications were observed maybe due to our pre-intra and postoperative protocol treatment and only in 3 cases we observed persistent hematuria 24 hours longer. Botulinum toxina A safety was confirmed regarding the effects on bladder wall after repeated injections While this treatment seems to be more effective in bladders with detrusor muscle overactivity, scant data are reported on low-compliant high pressure bladders The most commonly used dose of botulinum toxin is 10 U/kg with a maximum dose actually still of 300 units, that of course will be reduced as in adults to 200 UI. Of course it is unclear how many times this treatment can be repeated, although repetitive treatment has been found to be safe in children and in adults Histological studies have not found ultrastructural changes after injection In the guidelines of European Urological Association for Neurogenic Lower Urinary Tract Dysfunction the role of onabotulinumtoxin A is presented in a different way respect to ICCS document. Onabotulinum toxin could be a treatment alternative in other pathologies as PUV.. When NBD is associated to untreatable severe vesico-ureteral reflux (VUR), surgery is often required. In the past years we suggested a combined endoscopic injections of botulinum toxin type A (BoNTA) and dextranomer/hyaluronic acid (DxHA) as an effective minimally invasive treatment of VUR and NBD not responding to CIC and anticholinergics. Another very promising treatment option is Sacral neuromodulation (SNM), that was used extensively in adults. It has been suggested that sacral root stimulation facilitates bladder recovery, we have experienced sacral neuromodulation (SNM) in children with incomplete injury and SNM seems to be a promising therapeutic modality in selected ones. In some cases of severe dysfunction when there is an overactive sphincter patients have to perform CIC. and when patients, or their caregivers, are unable to catheterize the native urethra surgical alternatives have to be considered: urinary continent derivation according to Mitrofanoff's principle, that can be performed laparoscopically Recently good results were reported with button cystostomy using mini-invasive endoscopic insertion with a Mic-Key gastrostomy, button (Kimberly-Clark/Ballard, USA) was inserted endoscopically according to original Subramaniam's technique. The mean overall operative time was 40 minutes, no surgical complications were reported. All the buttons are in situ, well working. No peristomal urine leakage, wound infection, erosion granuloma, were observed. Buttons were changed every 3 months and all relatives and patients are satisfied about urinary drainage, opening the

button and connecting it the feeding tube. Regarding bladder outlet insufficiency treatment, this may be well managed by bulking agents. Of course this a temporary treatment with a short term efficacy useful in pediatric population in order to postpone major surgical procedure. A valid option seems to be the laparoscopic bladder neck reconstruction according to Chrzan.

W2 Luts in pediatrics 

Lower Urinary Tract Symptoms in Paediatrics and Dysfunctional Voiding: A Functional Approach to Treatment

07:30 **Introduction** Giovanni Mosiello
 07:35 **Let's All Talk the Same Language: Standardisation of Definitions and Terminology**
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 Mario De Gennaro
 08:00 **Pelvic Floor Muscles Re-training and Urotherapy**
 Nelly Faghani
 08:10 **Minimally Invasive Treatment and Surgical Options**
 Giovanni Mosiello
 08:20 **Questions**


GIOVANNI MOSIELLO, MD, FEAPU, FEBPS 

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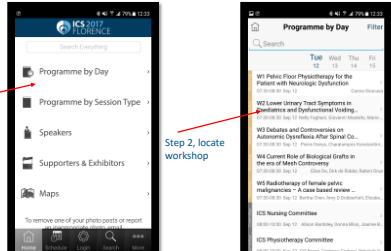
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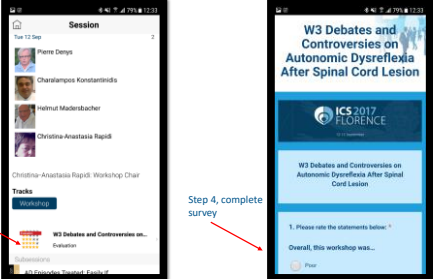
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Step 1, open app and select programme by day


Step 2, locate workshop

W2 Luts in pediatrics 




Step 3, scroll to find evaluation button

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W2 Luts in pediatric 

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Let's All Talk The Same Language: Standartisation of Definitions and Terminology

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Affiliations to disclose[†]:

none

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

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References

The Standartization of Terminology of LUT Function in Children and Adolescents: Report from the Standartisation Committee of International Children's Continence Society. Neveus T., et al., J Urology,176:314-324;2006

The Standartization of Terminology of LUT Function in Children and Adolescents: Update Report from the Standartisation Committee of International Children's Continence Society. Austin PF., et al., J Urology,191:1863-1865;2014

The Standartization of Terminology of LUT Function in Children and Adolescents: Update Report from the Standartisation Committee of International Children's Continence Society. Austin PF., et al., NeuroUrology,35:471-481;2016

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Why Standartization is Essential ?

Global Disease

Different Specialities and Subspecialities

Research (for Etiology and Management)

Diagnostic Work-up

Disease Classification

Academic Purposes

Good care of Children

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Is Vigorous Work on Standartization Worthed ?

More Publications (Almost 50% every three years)

Widely Accepted Terminology (almost 4 fold)

No Geographical Tendency

Still way to go (25% not using standard terminology)

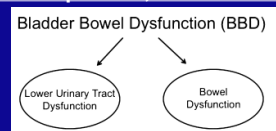
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Bladder and Bowel Dysfunction (BBD)

Discourage Dysfunctional Elimination Syndrome since it points out a particular condition (Bowel and Bladder together).

BBD can be subdivided into LUT Dysfunction and Bowel Dysfunction.

If only both are present, BBD should be used.



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Symptomatic Terms

Age:

Only >5 years of age for LUT symptoms
Only >4 years of age Bowel symptoms

However, younger ages could be selectively labelled as well, depending on maturation level.

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Symptomatic Terms

Storage Terms:

Increased or Decreased Voiding Frequency:

8 or more times voiding daily
3 or less times voiding daily
documented with a formal chart or diary

Urgency :

Sudden and unexpected compelling to urinate
Only after bladder control

Nocturia:

Has to wake up at night to urinate only

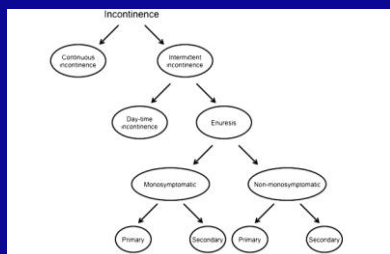
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Symptomatic Terms

Storage Terms:

Incontinence:

Involuntary leakage of urine



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Symptomatic Terms

Voiding Terms:

Hesitancy:

Difficulty in initiating voiding

Straining:

Need for intense effort to increase intraabdominal pressure to initiate and maintain voiding

Weak Stream:

Observed stream or uroflow is weak

Intermittency:

Not continuous voiding but several stop and start spurts

Dysuria:

Burning or discomfort during voiding

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Symptomatic Terms

Others:

Holding Maneuver:

Observable moves to postpone voiding or urgency

Feeling of incomplete emptying:

Not feeling empty after voiding and may return voiding again

Urinary Retention:

Inability to void despite distended bladder

Postmicturition dribble:

Involuntary leakage of urine right after voiding

Spraying of the urinary stream:

Spray/split of urine stream instead of single stream

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Symptomatic Terms

Genital and LUT Pain:

Bladder Pain:

Suprapubic discomfort, pain or pressure

Urethral Pain:

Pain felt in urethra

Genital Pain:

Pain in vagina or penis:

Vaginal irritation related to incontinence, Penile pain or episodic priapism related to full bladder, constipation or phimosis

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Tools of Investigation**Bladder Diary:**

Complete bladder diary: 7 day incontinence episodes and night time urine volume measurement

Frequency and volume chart: 48 hours (not necessarily consecutive 2 days)

Bowel diary:

7 day bowel diary Bristol Stool Form Scale

Constipation: Rome III criteria

Questionnaires:

LUT Function Quest:

DVSS and PIN-Q

Psychol Screening:

Child Behavior Checklist (CBL)

Strengths and Difficulties Quest of

Behavior Assesmt for Children (SDQ of BASC)

Short Screening Instr for Psychol Problems in Enuresis (SSPIE)

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Tools of Investigation**Urine Flow Measurement**

Toilet trained and >50% of EBC voiding and multipl
With or without EMG

Flow rate:

Qmax over 2 sec and $(Q_{max})^2 > \text{voided vol}$

Curve Shapes:

Bell (Normal)

Tower (OAB)

Staccato (Dysfunctional)

Interrupted (Underactive)

Plataeu (BOO)

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Tools of Investigation**Curve Shapes:**

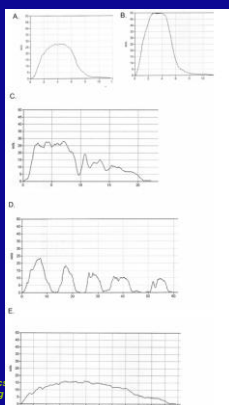
Bell

Tower

Staccato

Interrupted

Plataeu



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Tools of Investigation**Pelvic Ultrasound (EBC: (age+1)x30)
VV+PVR:BC****PVR:**

4-6 y-o: Single PVR>30 ml or >21% BC
rePVR>20 ml or >10% BC

7-12 y-o: Single PVR>20 ml or >15% BC
rePVR:>10 ml or >6% BC

Bladder should be btw %50-115% of EBC
PVR should be obtained <5 min of voiding

Bladder Wall Thickness:

Normal values do not exist and differ with filling

Rectal Distention:

>3 cm suggestive of fecal impaction

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Tools of Investigation**Invasive Urodynamics:****Cystometry (Filling Phase)**

Complete emptying of bladder

Filling rate 5-10% of EBC per min

Temp btw 25-37°C

Not prolonged instill if pain or

pdet >40 cmH₂O

Documentation of

Bladder sensation

Detrusor activity

Bladder compliance

Bladder capacity

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Tools of Investigation**Invasive Urodynamics:****Cystometry (Filling Phase)****Bladder sensation**

Reduced or Absent

Detrusor activity

Any detrusor activity before voiding is abn

Detrusor overactivity is involuntary det contr

Spont or provoked

Phasic or terminal

Sympt or none

Neurog or Idiopath

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Tools of Investigation

Invasive Urodynamics:

Cystometry (Filling Phase)

Bladder capacity :

Cystometric capacity is bladder volume where normal desire to void

Maximum cystometric capacity is the volume where no longer to delay micturation

Bladder compliance:

Change of volume by Change of Pdet C: $dV/dPdet$

Note the curve of compliance

Should be linear until bladder is full

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Tools of Investigation

Invasive Urodynamics:

Cystometry (Filling Phase)

Urethral Function during Filling : with EMG

Incompetant urethral closure

only with incr abd press and no det contr

Urethral relaxation incontinence

no abd pres and no det contr

Urodynamic stress incontinence

only coughing and no det contr

Leak Point Pressures:

Detrusor LPP

Static test at the lowest det pressure where leakage occurs with no inc abd pressure or det contr

Abdominal LPP

Dynamic test lowest value of intentionally increased vesical pressure provoking urinary leakage with no det contr

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Invasive Urodynamics:

Voiding Cystometry (Pressure Flow Studies)

Detrusor Function during Voiding

Detrusor Underactivity

Reduced contr of det during voiding with incomplete emptying. Acontractile is no contr whatsoever. PFS is good a differ of BOO vs underactive bladder

Urethral Function during Voiding:

Dysfunctional voiding

Intermittent or fluctuating flow due to intermittent contract of muscles during voiding in neurol normal children. EMG or videoUD is required to differentiate from underactive detrusor with abdominal voiding

Detrusor Sphincter Dyssynergia (DSD)

Incoordination of det and urethral sphincter due to neurol disorder characterized by active EMG during det contr.

Spinning top urethra can be seen in both conditions.

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Conditions/Diagnosis

Incontinence:

minimum age of 5y-o

minimum 1 episode in 1 month

minimum duration of 3 months

Significant if >1 episode in 1 month and 3 episodes in 3 months

Enuresis is frequent if >4 per week and infrequent <4 per week

Enuresis:

a symptom or condition of intermittent incontinence during sleep.

Subgroups:

Monosymptomatic No LUT symptom

Non-monosymptomatic LUT symptoms

Secondary >6 months of dry period

Primary Less dry periods

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Daytime Conditions/Diagnosis

BBD

Combination of bowel and bladder disturbances in neurol normal. If upper tract deformation occurs severe BBD called Hinman's syndrome

Overactive Bladder

Urgency frequency or nocturia with or without incontinence in absence of UTI. Detrusor overactivity is a UD term.

Voiding Postponement

Habitually postponing moves. Low frequency, urgency and incontinence from full bladder. Oppositional Defiant Disorder

Underactive Bladder

Children who raise abd pressure to void. Low frequency with interrupted flow and detrusor underactivity in UD

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Daytime Conditions/Diagnosis

Dysfunctional voiding

Habitual contrac of sphincter or pelvic floor during voiding with staccato or interrupted flow where EMG is noted in neurol normal child

Bladder Outlet Obstruction

Impediment of urine flow by increased Pdet and low flow rate.

Stress Incontinence

Involuntary leakage of urine during exertion

Vaginal Reflux

Toilet trained girls complain about only day time incontinence right after voiding with no other LUT symptom related to urine entrapment in introitus

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Daytime Conditions/Diagnosis

Giggle incontinence

extensive emptying or leakage only during laughter

Extraordinary daytime only urinary frequency

At least one time voiding per hour with <50% EBC (typically 10-15%) only during day . Exclude polydipsia, DMD, DI, polyuria, UTI or viral infection

Bladder Neck Dysfunction

Impaired or delayed opening of bladder neck resulting in low flow and normal to high Pdet. Prolonged opening time can be noted with UF with EMG. EMG lag time remains to be validated

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Treatment

Definitions of Treatment Methods

No Standard/Maintenance Therapy but Define Them

Pharmacological Therapy or Surgical Therapy

Use of Drugs or Surgery

Neuromodulation

Alteration and Modulation of Nerve Activity through central and peripheral electrical stim or chemical agents to target sites

Alarm Treatment

A device giving a strong sensory signal immediately after a incontinence episode and can be used day or night

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Treatment

Definitions of Treatment Methods

Urotherapy

Conservative based therapy with rehabilitation of LUT through different healthcare providers .

Standard therapy

- Information and demystification
- Instruction
- Life style advice
- Registration
- Support and encouragement

Specific Interventions

- Biofeedback
- Neuromodulation
- CIC
- Cognitive Behavioral Therapy
- Psychotherapy

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Treatment

Definitions of Treatment Outcome

Three basic principles:

- a. Symptom frequency at baseline and after treatment documentation
- b. Assessment of outcome must be based on baseline registration of frequency of symptoms
- c. Response of treatment should be noted as well as after treatment cessation

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Treatment

Definitions of Treatment Outcome

Initial Success

- No Response:** <50% reduction
- Partial Response:** 50-99%reduction
- Complete Response:** 100% reduction

Long term Success

Relapse : More than one symptom recurrence per month

Continued Success: No relapse in 6 months after stopping treatment

Complete Success: No relapse in 2 years after stopping treatment

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W2. Lower Urinary Tract Symptoms in Paediatrics and Dysfunctional Voiding: A Functional Approach to Treatment

Dysfunctional Voiding in Children and Adolescents

Mario De Gennaro



Urology & Urodynamics
Bambino Gesù Children Hospital
Roma, Italy

Mario De Gennaro



Affiliations to disclose[†]:

No disclosure

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ICCS - Paediatric Continence Care

In collaboration with Continence Foundation of Australia

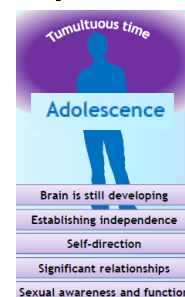


L 701 – Transitional Care

continuity of care



www.i-c-c-s.org



DISCONTINUE THERAPY

↓

Lose any gains

↓

Risk to the upper urinary tracts and renal function

Ceasing regular catheterisation

↓

can have

↓

Dramatic consequences

Urinary Incontinence: from Childhood to Adulthood

J Urol. 2006 March; 175(3 Pt 1): 989-993.

Childhood Urinary Symptoms Predict Adult Overactive Bladder Symptoms

- **Participants:** 2109 women aged 40 to 69 yrs
- **Results:**
 - Frequent **nocturia** in childhood was strongly associated with adult nocturia (OR 2.3; $p < 0.001$)
 - Childhood **daytime incontinence** was associated with adult urge incontinence (OR 2.6; $p < 0.05$), as with childhood nocturnal enuresis (OR 2.7; $p < 0.01$)
 - A history of more than 1 childhood **UTI** was associated with adult UTIs (OR 2.6; $p < 0.001$)

Effect of Childhood Dysfunctional Voiding on Urinary Incontinence in Adult Women

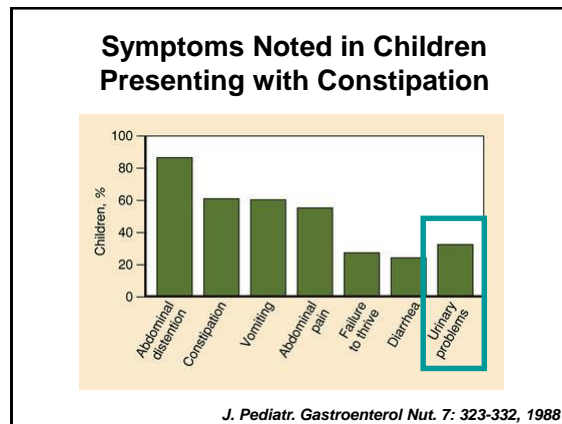
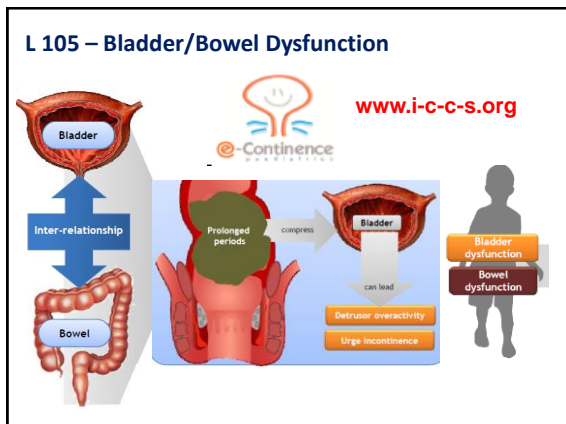
Yankh A. Mianian, MD, Danny Lovatt, MD, Denise Pasali, MD, May Alarab, MD, and Harold P. Drac, MD

VOL. 107, NO. 4, JUNE 2006

OBSTETRICS & GYNECOLOGY 1327

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- **Design:** case-control study 84 women urogynae outpatient clinic and 86 controls
- **Results:** Higher prevalence of a history of childhood dysfunctional voiding in women with current
 - frequency (OR 2.48, $P = 0.004$)
 - urgency (OR 2.02, $P = 0.03$)
 - SUI (OR 2.21, $P = 0.01$)
 - and UUI (OR 2.48, $P = 0.009$)



- ### Conditions – LUT Symptoms
- ❖ OAB / urge incontinence
 - ❖ Voiding postponement
 - ❖ Dysfunctional voiding
 - ❖ Underactive bladder
 - ❖ Obstruction
- www.i-c-c-s.org
- ❖ Stress incontinence
 - ❖ Vaginal reflux
 - ❖ Giggle incontinence

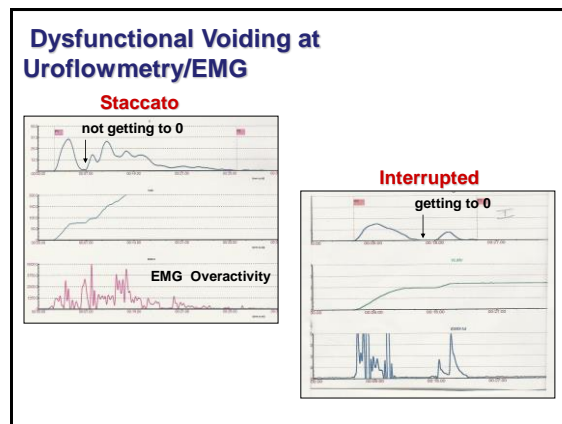
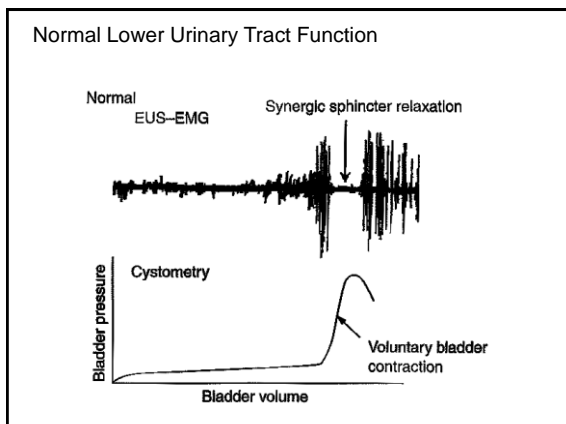
Definition

- “The child with **dysfunctional voiding** (this phrasing is preferred instead of voiding dysfunction) habitually **contracts the urethral sphincter during voiding**. The term cannot be applied unless repeat uroflow measurements show curves with a staccato pattern, or unless verified by invasive urodynamic investigation”

(Neveus et al 2006)

www.i-c-c-s.org

KCCS slide library v1 2010



Assessment

- Diaries
 - Uroflow – EMG – PVR
- Phys. Exam – normal genital, perineum, back, lower extremities
(exclude neurogenic bladder)

Charts/questionnaires

- Frequency volume chart**
- Voiding diary
 - Bowel diary
 - Scoring systems for childhood LUTS
 - To be repeated

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Uroflow

- Non-invasive
- To be done according to ICCS guidelines with adequate filling
- Describes voided volume, **post void residual**, flow rate and pattern
- Measures Qmax, Qave
- Helps identify voiding disorders, cannot diagnose on one flow study
- Simultaneous EMG of PFM**
- Used a measure of success of intervention

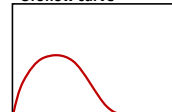
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Normal bladder function

Voiding chart

	Day 1	Day 2	Day 3
08	○	○	○
09			
10			○
11	○		○
12		○	○
13			○
14	○	○	○
15		○	
16	○		
17		○	U○
18			
19		○	
20	○		○
21			

Uroflow curve



Residual urine: 0
Voided volume: 30 + (30 x age) ml

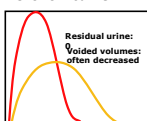
- = micturition
- U = urgency
- V = damp
- W = wet

Overactive bladder

Voiding chart

	Day 1	Day 2	Day 3
08	○	○	○
09	○		
10		W	
11	U	○	U○
12			○
13	U	○	U
14		○	
15		○	
16	UV	○	
17	○	○	UW
18		○	U○
19	U○	UV	
20		○	○
21		○	

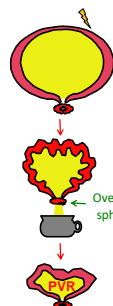
Uroflow curve



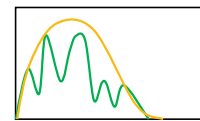
Residual urine:
Voided volumes:
often decreased

- = micturition
- U = urgency
- V = damp
- W = wet

Dysfunctional voiding



Uroflow curve



CASA: 04/05/06				CASA: 05/05/06				CASA: 10/05/06			
ora	PIPI	me	WET	ora	PIPI	me	WET	Ora	PIPI	me	WET
8:00	2:30	Acquatic		8:00	2:00	Acquatic		8:00	2:20	Acquatic	
13:00	60			14:00	60			14:00	50		
17:00	60			18:00	50			18:00	40		
20:00	60	++		21:00	60			21:00	30		

Bowel mov

Evacuazione: SI NO Evacuazione: SI NO Evacuazione: SI NO

Dysfunctional voiding

• Definition

- disorder of **emptying**, NOT a disturbance of LUT function
- ext. sphincter contraction during voiding \Rightarrow \downarrow detrusor reflex & slow uroflow
- May coexist with storage disorders

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Non pharmacologic treatment

- Urotherapy measures
 - Education, bowel management, drinking, voiding regimes, diaries, outcome measures
- Toilet posture/ relaxed voiding techniques
- Comprehensive BFB programs – EMG, flowrate
- Neuromodulation
- CIC
- Antibiotics if recurrent UTI
- Behavioural or **psychiatric co-morbidities** addressed concurrently

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Dysfunctional voiding

\rightarrow Severe Dysfunctional Voiding (underactive detrusor)

• Consequences

- \rightarrow if high bladder fill pressure \Rightarrow reflux, renal damage
- \rightarrow if post void residual \Rightarrow recurrent UTI

• Symptoms & Signs indicating further testing

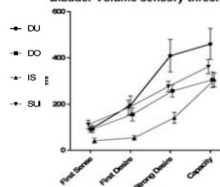
- Straining to void +/- overflow incontinence
- Prolonged, unsustained detrusor contraction
- Intermittent, staccato uroflow
- Large bladder (sensation disturbed)

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■ Detrusor Underactivity:

- associated with **altered perception** of bladder volume
- not necessarily diminish detrusor contractility

Bladder Volume sensory thresholds



- First Sensation: something in your bladder
- First Desire: first thought to empty
- Strong Desire: would interrupt what are doing

P. Smith, 2014

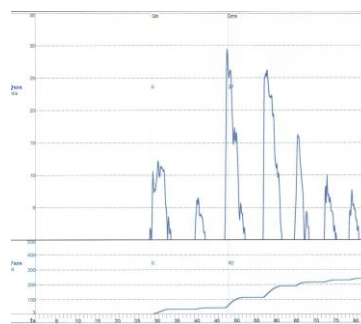
Severe Dysfunctional Voiding Underactive detrusor

ICCS Standardization & Definitions

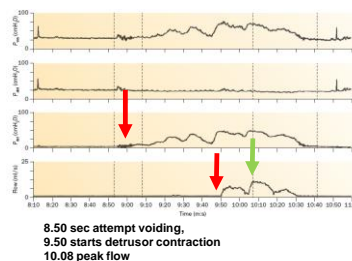
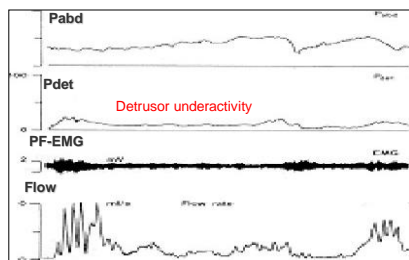


Educational Committee Chair
(Mario De Gennaro)

- Beer, 1915 Apathetic children
- Laidley, 1942 Achalasia
- Paquin, 1960 Megacystis Syndrome
- Williams, 1969 Occult Neuropathic Bladder
- Hinman, 1970-73 Non Neurogenic Neurogenic Bladder
- Hanna, 1981 Pseudo-Neurogenic Bladder
- Hinman, 1986 Hinman's Syndrome



Underactive Bladder at Urodynamics PFS + EMG

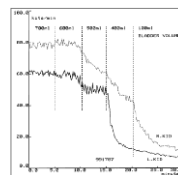


Dysfunctional voiding and detrusor underactivity

- CIC
- Bowel management and UTI prevention
- Voiding regime and fluid management
- Prevention of nocturnal bladder distension – high Volume
- Little evidence for management
- From experience

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Pressure Bladder Volume (PVR) Dependent Obstruction



Little pressure + high volume
can damage kidneys
... thus, drain urinary tract

Underactive Bladder - Treatments

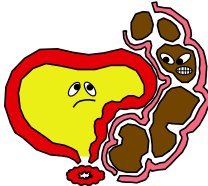

- **Urotherapy** (II level)
 - FKT – pelvic floor
 - Double voiding regimen
 - BFB
 - Neuromodulation (peripheral)
- **Drugs**
 - Alpha blockers
 - Botulin toxin
- **Neuromodulation** – sacral implant

Dysfunctional voiding → Severe Dysfunctional Voiding (underactive detrusor)

- **Consequences**
 - if high bladder fill pressure \Rightarrow reflux, renal damage
 - if post void residual \Rightarrow recurrent UTI

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The bladder and the bowel
- partners in crime -


Dysfunctional voiding / (Elimination Syndrome)

- Dysfunctional Elimination
 - Coexistence of urinary & fecal retention
- Consequences
 - Rectal & abdominal distension with pain
 - Disorders of filling

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THANK YOU
GRAZIE
ARRIVEDERCI
A ROMA

Bambino Gesù
Children Hospital
ROMA

SAVE THE DATE

ICCS
2018
26-29
September
Meeting Chair
Mario De Gennaro

defoe Meeting Info | +39.0523.338391 | iccs2018@defoe.it

TOPICS

<ul style="list-style-type: none"> ✓ LUTS ✓ Enuresis ✓ Urodynamics ✓ Neurourology ✓ Urotherapy ✓ Neuromodulation 	<ul style="list-style-type: none"> ✓ Drugs for Continence ✓ Surgery for continence ✓ Urinary Tract Infections (UTI) ✓ Bowel and Bladder Dysfunction ✓ Neurogenic Bladder & Bowel in Children & Adolescents
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Workshops & Educational Courses

Workshops on Urodynamics & on Urotherapy | 26 Sep 2018
Bladder & Bowel Dysfunction in Children toward Adults | 27 Sep 2018
Call for Abstract Panels & Lectures

ICCS
2018
26-29
September
Meeting Chair
Mario De Gennaro

www.iccs2018.info

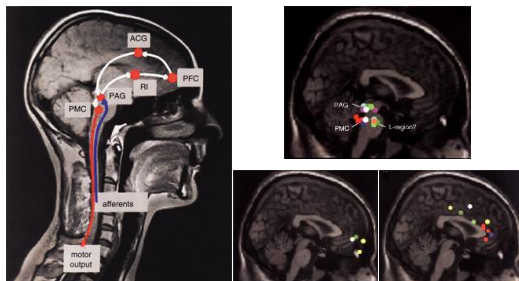


ICCS
2018
26-29
September
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Let's
meet in

CNS Control over Lower Urinary Tract Function



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Background

- Overlooked
- True epidemiology unknown
- 4.2%-32% children with wetting problems
- Multi-factorial aetiology
- Learned unconscious behaviour, maturational delay, perpetuation of infantile patterns, congenital
- Co-exist OAB –compensating EUS/PFM
- Assoc >PVR, UTI, detrusor hypertrophy, trabeculated bladder, VUR, upper tract damage
- Bladder decompensation and hypocontractility – CIC
- Associated bowel dysfunction

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Daytime urgent UI – 2.5y boy Toilet training at age of 2y – Large bladder

Dry in the night.
Uroflowmetry: normal bell shape
PVR <5ml.

Q1: What is your interpretation for voiding diary?
Q2: what is your treatment plan?

日期 時間	Drink		Leak	VV		Drink	Leak
	VV	Drink		VV	Leak		
10:00							
10:15	100						
10:30							
10:45	100						
11:00							
11:15	100						
11:30							
11:45	100						
12:00							
12:15	100						
12:30							
12:45	100						
13:00							
13:15	100						
13:30							
13:45	100						
14:00							
14:15	100						
14:30							
14:45	100						
15:00							
15:15	100						
15:30							
15:45	100						
16:00							

Interpretation of Voiding Diary:

Q1: Polyuria and Large VV

Q2: Treatment plan

→ Fluid restriction and timed voiding

→ Stop beating the child when he wetted the pants.

Clinical Outcomes

- Quickly became dry in one week and persistent dry thereafter.
- **Lessons: Large bladder capacity may be related to Urgent UI in children**

Pelvic Floor Muscles Re-training and Urotherapy

Nelly Faghani

Registered Physiotherapist
nelly@pelvichealthsolutions.ca
www.pelvichealthsolutions.ca



Nelly Faghani



Affiliations to disclose[†]:

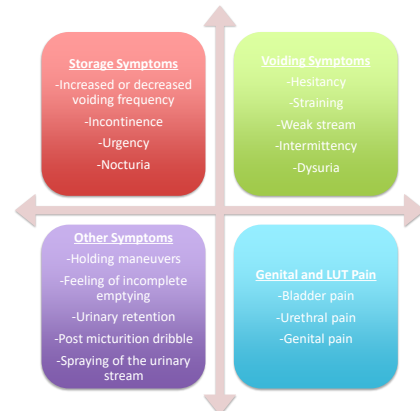
No disclosures

† 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:

- Paediatric population extremely under-served
- As children grow older, UI is seen as more of a burden Schulpen 1997 and levels of parental intolerance increase Butler et al 2002
- Significant consequence on quality of life Fan et al 2008
- Paediatric bladder (bowel) dysfunction can persist into adulthood



Questionnaires

(The Standardization of Terminology of LUT Function in Children and Adolescents: Update Report From the Standardization Committee of the International Children's Continence Society 2015)

- LUT
 - Dysfunctional Voiding Symptoms Score (DVSS) Farhat et al 2000
 - Pediatric Urinary Incontinence Quality of Life Score (PIN-Q) Bower et al 2006
- Psychological
 - Short Screening Instrument for Psychological Problems in Enuresis (SSIPPE) Van Hoeck et al 2007



Effects of Urinary Incontinence (UI)

- UI in school-aged children associated with emotional distress, behavior problems and quality of life Joinson et al 2006, 2007, von Gontard et al 2011, 2015, Thibodeau et al 2013
- Children who experience anxiety causing event may have a higher risk of developing UI, and in turn having incontinence causes significant stress and anxiety in children Thibodeau et al 2013
- Adolescents with UI reported a range of psychosocial problems and clinicians should be aware that they might require support from psychological services Grzeda et al 2017

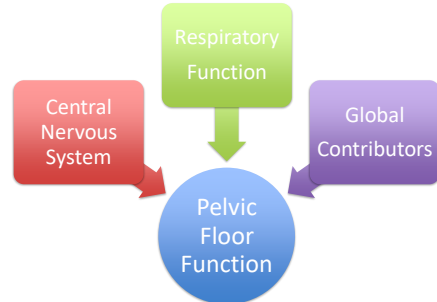


Constipation

- Constipation accounts for 3% visits to paediatrician and 25% to paediatric gastroenterologist Bharucha et al 2006, Drossman 1999
- Urinary incontinence (and faecal incontinence) are significantly more common in children with constipation Loening-Baucke 2007
- Treatment of constipation can resolve UI Erikson et al 2003 Loening-Baucke et al 2007, 1997



Physiotherapy Objective Assessment



Urotherapy

(The Standardization of Terminology of LUT Function in Children and Adolescents: Update Report From the Standardization Committee of the International Children's Continence Society 2015)

- Information and demystification
- Instruction on how to resolve LUT dysfunction
- Life-style advice
- Registration of symptoms and voiding habits
- Support and encouragement
- Specific intervention



Bladder and Bowel Diaries

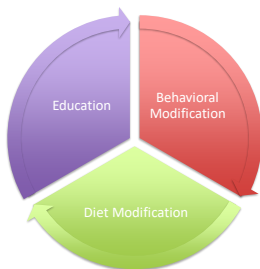
Time	Drinks		Urine		Pads
	Amount (ml)	Type	Amount (ml)	Bladder Sensation	
6am WAKE			SDD	2	
7am	300	Water		2	
8am				2	
9am					
10am					
11am	Cup	Tea	LEPR	3	✓
Midday					



Dehydration Urine Color Chart



Treatment



Diaphragmatic Breathing Exercises and Pelvic Floor Training with Dysfunctional Voiding (DV) Zivkovic 2012

- Aim: to investigate the role of abdominal and pelvic floor muscle training in children with DV
- Conclusions: In combination with standard urotherapy, abdominal and pelvic muscle training is beneficial for curing UI, nocturnal enuresis and UTI's in children with DV as well as normalizing urinary function



Physiotherapy Treatment

- Re-education of the PFM
 - Biofeedback Chase et al 2010
 - Contraction
 - Relaxation
 - Coordination
- Manual therapy
 - External muscle over activity
 - ILU massage
- Parasacral TENS Lordelo et al 2010, PTNS Capitanucci et al 2009
- Global muscular strength and coordination



Combined Functional Pelvic Floor Muscle (PFM) Exercises with Swiss Ball & Urotherapy for Management of Dysfunctional Voiding in Children

Ladi Seyedian et al 2014

- Conclusion: Functional PFM exercises with Swiss ball combined with behavioral urotherapy proved as safe and effective therapeutic modality, reducing the frequency of urinary incontinence, post void residual and the severity of constipation in children with dysfunctional



Summary

- Multidisciplinary approach
- Motivate to improve compliance
- Education on treatment options
- Pelvic floor training and urotherapy are effective
- Be creative, use incentives and rewards
- Increase confidence
- Give hope and self-efficacy



Thanks you

nelly@pelvichealthsolutions.ca

Acknowledgements:
Dawn Sandalcidi DSD PT





Minimally invasive treatment and surgical options in dysfunctional Voiding.

Giovanni Mosiello

Affiliations to disclose:

Medtronic: consultant
Wellspect: consultant
Coloplast: consultant
Pfizer: PI in clinical trial
Ipsen: PI in clinical trial
Allergan: PI in clinical trial

Funding for speaker to attend:

Institution (non-industry)

Severe Dysfunctional Voiding

AUTHOR, YEAR	PTS	Mean age yrs	F-UP yrs	ICC n.	Vescicotomy	Bladder Augm	Renal failure
Hinman, 1973	14	9.7	ND	0	0	0	ND
Allen, 1977	21	ND	ND	0	ND	4	5 (24%)
Jayanthi, 1997	7	< 1	ND	6	7	3	2 (28%)
Yang, 1997	27	12	4.1	8	1	5	5 (18%)
Handel, 2003	4	14.5	5.0	3	1	2	0
Kari, 2006	4	4.3	ND	4	0	0	4 (100%)
Al Mosawi, 2007	7	6	ND	0	4	0	4 (57%)
Silay, 2011	22	9.1	6.7	22	0	8	1 (4%)

10.5 Recommendations for the treatment of daytime lower urinary tract conditions

	LE	GR
Daytime LUTS in children are common and a stepwise treatment approach is recommended, starting with the least invasive approach.	4	B
Initial management consists of urotherapy. Urotherapy includes non-invasive training and reeducation, as well as non-invasive neurostimulation.	2	B
Pharmacotherapy (mainly antispasmodics and anticholinergics) would be the next step.	1	C
In case of therapy resistance, re-evaluation will be required which may consist of video-urodynamics and MRI of LS spine which can guide to off-label treatment like some of the non-licensed drugs in children, botulinum toxin injection and sacral nerve stimulation. Such treatment should only be offered in highly experienced centres.	3	C

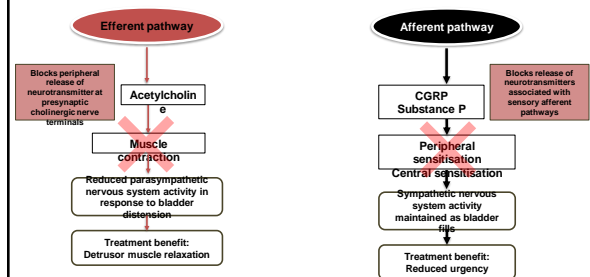
Despite the low level of evidence for the use of anticholinergics and antimuscarinics, their use is recommended

Although alpha-blocking agents are used occasionally, an RCT showed no benefit

Treatment :

- Onabotulinum toxin A
- Sacral Neuromodulation
- Surgery

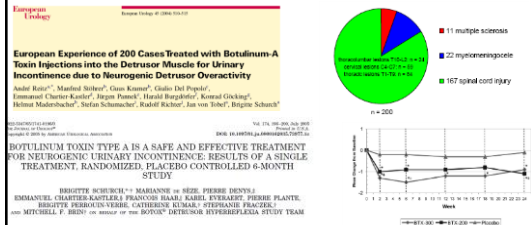
Onabotulinum Toxin A targets both the afferent and efferent pathways



Botox
External sphincter injection

- Steinhardt , J Urol, 158: 190, 1997
- Radojicic et al, J Urol,176: 332, 2006
- Mkhless et al, J Urol, 176: 1767, 2006
- Franco et al, J Urol, 178: 1775, 2007
- Thom et al, J Pediatr Urol, 7(3): 2011

Onabotulinum toxin A is effective



European Experience of 200 Cases Treated with Botulinum-A Toxin Injections into the Detrusor Muscle for Urinary Incontinence due to Neurogenic Detrusor Overactivity
 André Klotz¹, Manfred Sillkes², Claus Kasper³, Günter Del Pupolo⁴, Emanuel Charles Kasper⁵, Jürgen Pommer⁶, Harald Berglitz⁷, Konrad Gökking⁸, Helmut Maderbacher⁹, Stefan Schumacher¹⁰, Rudolf Richter¹¹, Jan von Tolier¹², Brigitte Schurch¹³

RECOMMENDATIONS ON THE USE OF BOTULINUM TOXIN IN THE TREATMENT OF LOWER URINARY TRACT DISORDERS AND PELVIC FLOOR DYSFUNCTIONS: A EUROPEAN CONSENSUS REPORT
 Agostinho Apóstolo^{1*}, Pablar Dierigges², Florin Demay³, Sahar Elabd⁴, Clave J. Fowler⁵, Annamaria Giannini⁶, Gilio Garavito⁷, Heinrich Schulze-Brahm⁸, Brigitte Schurch⁹, Jean-Jacques Wynant¹⁰

Recommendations on the Use of Botulinum Toxin in the Treatment of Lower Urinary Tract Disorders and Pelvic Floor Dysfunctions: A European Consensus Report 2009

Children

Detrusor injections in children
 Dose range should be determined by body weight: 5-10 U/kg body weight up to a maximum dosage of Botox 300 U
 has been shown to be effective and safe. Caution is recommended for the total dosage in children also treated for spasticity.
 A minimum age of 3 yr is suggested because there are little data for younger ages.
 Other recommendations follow adult NDO indications.

OAB LoE 3
Dosage determined by body weight:
5 – 10 U/kg up to 300 U Botox®
Older than 3 years
Effective and safe

Sphincter LoE 3

Botox injection PEDIATRICS
OAB

The Effect of Botulinum-A Toxin in Incontinent Children With Therapy Resistant Overactive Detrusor

- 1st pediatric report of non-NGB refractory OAB
- Non-randomized, selected, clinical cohort (21 pts)
- 15 children > 6 mos follow-up
- 67% had full response
- 1 child (5%) had transient urinary retention

Hoebeke et al, J Urol, 176: 328-331, 2006

Botulinum toxin injections in the management of non-neurogenic overactive bladders in children

Cases	Weekly incontinent episodes (IE)		Preoperative management	constipation	DAY				
	Age at injection	VEB			UTI	Before BTA	After BTA	Before BTA	After BTA
1	12	—	—	Oxybutynin	tested	7	4	7	2
2	11	+	+	Oxybutynin, PFNS	Treated	14	2	5	1
3	11	—	—	Oxybutynin + desmopressin	No	0	0	5	1
4	14	—	—	Oxybutynin, therapeutic education	No	0	0	7	0.5
5	16	—	—	Oxybutynin	Treated	20	15	21	7
6	15	—	—	Oxybutynin	No	7	0	7	1
7	13	—	+	Oxybutynin	Treated	7	2	7	4
8	10	—	—	no	7	1	0	0	0
Mean	12.5	—	+	Oxybutynin, PFNS	no	7.75	3	7.38	2.06
Median	12.5	—	—	no	7	1.5	7	1	1

Conclusion: Intradetrusor Botulinum toxin injections are a potential therapeutic option for the management of non-neurogenic detrusor overactivity in children resistant to the usual treatments.

Long-Term Efficacy and Durability of Botulinum-A Toxin for Refractory Dysfunctional Voiding in Children
 PF Austin 2014 Journal of Urology, 191, S5, 1586-1591,

- 12 with dysfunctional voiding who underwent botulinum toxin A injection to the external urinary sphincter.
- Mean patient age at surgery was 10.5 years (range 4 to 19).
- Average follow-up was 45 months (range 20 to 71).
- Eight of the 12 children (67%) experienced significant improvement
- Half of the cohort required a second injection an average of 15 months later.
- Three of the 4 patients who failed to show improvement had neuropsychiatric problems and 1 had evidence of bladder underactivity.
- Conclusions reasonable efficacy and durability of intrasphincteric botulinum toxin A injection in children with refractory dysfunctional voiding.

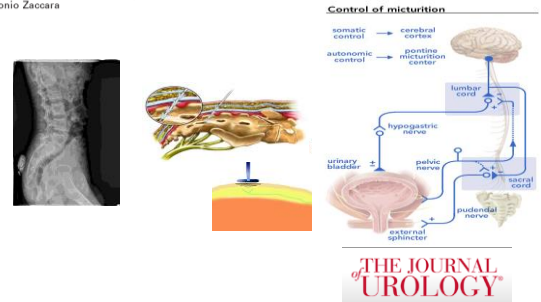
OnabotulinumtoxinA PEDIATRIC IDO

- Few studies in pediatrics
- Side effects: CIC risk
- ANAESTHESIA
- UTI?
- Phase III clinical trial in Pediatrics is on the road
- A future **RADICAL CHANGE IN THE TREATMENT OF IDO IN PEDIATRICS AS FOR NDO?**

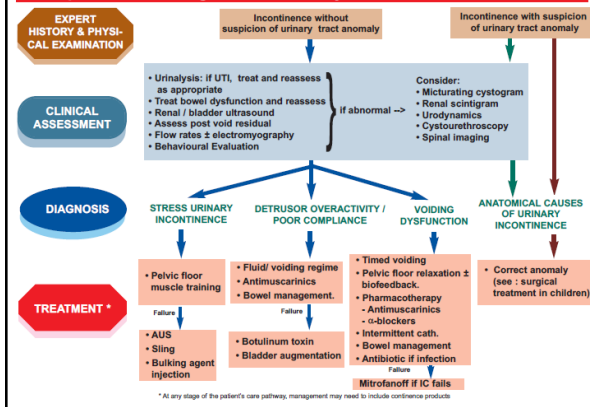
Review Article

Current State of Nerve Stimulation Technique for Lower Urinary Tract Dysfunction in Children

Mario De Gennaro,* Maria Luisa Capitanucci, Giovanni Mosiello and Antonio Zaacara

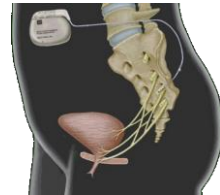


Specialised Management of Urinary Incontinence in Children



Concept: NM, applied in urology to chronic diseases, modulates the reflexes pathways which control the activity of:

- Detrusor
- Rectum
- Pelvic floor
- sphincters



- Overactive bladder
- Dysfunctional voiding
- Underactive bladder (lazy bladder)
- Neurogenic bladder dysfunction
- Foecal incontinence
- Chronic constipation

EUROPEAN UROLOGY 54 (2010) 182-174

available at www.elsevier.com/locate/eurow

Journal homepage: www.elsevier.com/locate/eurow

Review - Systematic review

Sacral Neuromodulation for Neurogenic Lower Urinary Tract Dysfunction: Systematic Review and Meta-analysis

Thomas M. Keyler^{a,*}, David La Franchette^b, Sven Frelte^c, Chae J. Fowler^d, Gustav Klotz^e, Jürgen Pannek^c, Brigitte Schorch^b, Kurt Günther-Sewer^b, Daniel S. Knapp^f

25/563 included for meta-analysis

A pooled success rate of 68% for the test phase and of 92% for permanent SNM as well as a pooled

adverse event rate of 0% for the test phase and of 24% for permanent SNM

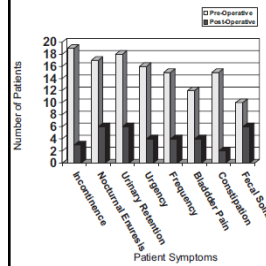
Reference	Year of publication	Level of evidence	Study type	No. of patients
Hinkeldey et al [15]	1998	4	RCS	11
Shigamki et al [16]	1999	4	RCS	4
Charter-Kastler et al [7]	2000	2b	RCS	5
Spittell et al [19]	2001	4	RCS	18
Retrospective registry				
Prospective registry		2b	RCS	16
Hinkeldey et al [16]	2001	4	RCS	27
Schepers et al [21]	2002	4	RCS	24
Brown et al [20]	2003	4	RCS	45
Boss et al [24]	2003	4	RCS	24
Brown et al [20]	2003	2b	RCS	8
Ruffini et al [26]	2003	4	CR	2
Schwartz et al [27]	2003	4	RCS	2
Spittell et al [28]	2003	2b	RCS	5
Lambert et al [29]	2004	4	RCS	5
Misraji et al [30]	2005	4	RCS	5
Lang et al [31]	2007	4	CR	1
Boh et al [33]	2007	4	CR	1
Goldmann et al [34]	2007	4	RCS	10
Wallace et al [8]	2007	4	RCS	33
Lombardi et al [25]	2008	2b	RCS	17
Bergqvist et al [36]	2008	4	RCS	11
Lombardi et al [25]	2009	4	RCS	24
Wong et al [40]	2009	4	CR	1
Savini et al [41]	2010	2b	RCS	16
Murphy et al [42]	2010	4	RCS	14
Danev et al [43]	2010	4	RCS	32

RCS = retrospective case series; P = permanent sacral neuromodulation; T = test phase; PCS = postoperative clinical cost review.

Humphreys, M.R., Vandersteen, D.R., Slezak, J.M et al.
 Preliminary results of sacral neuromodulation in 23 children
 Journal of Urology 2006

- 23 patients tested (6 to 15 years of age), 21 pts with definitive implant, mean FU 13.3 months
- symptoms of dysfunctional voiding, enuresis, incontinence, UTIs, bladder pain, urinary retention, urgency, frequency, constipation and/or fecal soiling.
- Of the 19 patients with UI 16% had complete resolution, 68% had improvement, 11% had no change, 5% noted worsening of their UI.
- Preoperatively, 6 patients with urinary retention (NOUR) required treatment with CIC 3 to 4 times daily. Of these patients 2 (33%) no longer required CIC, while 4 remained on self-catheterization.

Humphreys, M.R., Vandersteen, D.R., Slezak, J.M et al.
 Preliminary results of sacral neuromodulation in 23 children
 Journal of Urology 2006



Constipation improved in 80% of the 23 patients.

Bladder pain resolved in 2 of 12 patients (17%), improved in 6 (50%), was unchanged in 3 (25%) and was worse in 1 (8%) postoperatively.

Mean number of medications required per patient before the procedure was 4.5 and decreased to 1.5 after permanent implant.

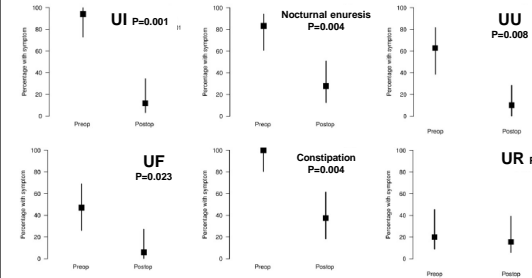
After InterStim placement, an average satisfaction rate of 64% for pts and 67% for caregivers was expressed.

The procedures were well tolerated. 2 leads were explanted among 23 patients, for a total implant rate of 91%. Complications cited were seroma anterior to the neurostimulator device, transient episode of skin sensitivity over the device site, two IPG failures, and one lead that required revision.

Roth TJ, Vandersteen DR, Hollatz P et al., J Urol 2008
 Sacral neuromodulation for the dysfunctional elimination syndrome: a single center experience with 20 children

- SNM in 20 children with urinary retention
- Less invasive, innovative technique using limited fluoroscopy and surgical incisions with a low complication rate.
- At 1 to 2 years' follow up the resolution/improvement rate ranged from 40% to 50% (constipation and nocturnal enuresis) to 80% to 90% (frequency, UI).
- Urinary retention was resolved in 1 of 4 children.

Roth TJ, Vandersteen DR, Hollatz P et al., J Urol 2008
 Sacral neuromodulation for the dysfunctional elimination syndrome: a single center experience with 20 children.



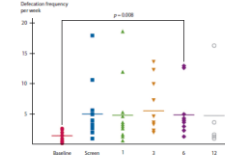
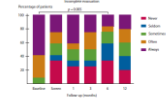
ORIGINAL CONTRIBUTION

Sacral Neuromodulation Therapy: A Promising Treatment for Adolescents With Refractory Functional Constipation

Bart P. van Wuijckhuijs, M.D.¹ • Babette Poeters, M.D.² • Bas Govaert, M.D., Ph.D.¹
 Fred H. Nieman, Ph.D.³ • Marc A. Benninga, M.D., Ph.D.⁴ • Cor G. Baeten, M.D., Ph.D.¹

Dis Colon Rectum 2012; 55: 278–285
 DOI: 10.1007/s12621-012-0285-1
 ©The ASCRS 2012

PATIENTS: Thirteen patients (all girls, age 10–18 years) with functional constipation according to the ROME III criteria not responding to intensive oral and rectal laxative treatment were assigned for sacral neuromodulation.



CONCLUSION: Sacral neuromodulation appears to be a promising new treatment option in adolescents with refractory functional constipation not responding to intensive conservative therapy. Larger randomized studies with long-term follow-up are required.

Journal of Pediatric Surgery
 Contents lists available at ScienceDirect
 Journal homepage: www.elsevier.com/locate/jps

Sacral nerve stimulation: a promising therapy for fecal and urinary incontinence and constipation in children?

Jason P. Selkowski^{a,b}, Kristine M. Nacson^a, Katherine J. Deans^{a,b}, Peter C. Minocci^{a,b}, Marc A. Levitt^a, Hayat M. Moussa^{a,c}, Seth A. Alpert^{a,c}, Steven Teich^{a,c}

In this prospective study they have treated 29 patients with a mixture of neuropathic and non neuropathic BBD. Outcomes at 17 weeks shown an overall improvement of 62% (87.5% improvement in gastrointestinal symptoms and 78.5% in urinary parameters

In conclusion: The short term improvement in symptoms and QoL study suggest that the SNS may be a promising therapy in pediatric patients with both gastrointestinal and urinary dysfunction that has been refractory to standard medical management

	SNS placement participants (N = 20)
Male, n (%)	12 (60%)
Race, n (%)	
White	20 (100%)
Hispanic	0
African American	0
Asian	0
Other	0
Age, median (IQR)	12.1 (9.4, 14.3) years
Symptoms, n (%)	
Gastrointestinal	27 (93.1)
Urinary	19 (65.5)
Both	17 (58.6)
History, n (%)	
Idiopathic	19 (65.5)
Hirschsprung's disease	1 (3.4)
Spina	1 (3.4)
Imperforate anus	8 (27.6)
With tethered cord	1 (3.4)
With myelomeningocele	1 (3.4)

Data are presented as median and interquartile range (IQR) for continuous variables and frequency and percentages for categorical variables.

Pediatric Urology

Sacral Neuromodulation for the Dysfunctional Elimination Syndrome: A 10-Year Single-center Experience With 105 Consecutive Children

Moira E. Dwyer, David R. Vanderstoep, Pam Hollatz, and Yuri E. Reinberg

There were 105 consecutive patients who underwent a 2-stage procedure with a trial period (n = 89) or a single procedure (n = 16) for device implantation. They were followed up prospectively for a median of 2.72 years (average, 3.18 years; range, 0.01-9.63 years) for symptom improvement and resolution.

Nearly all children (99 of 105 [94%]) experienced improvement of at least 1 symptom; 12 of 105 patients (11%) had at least 1 symptom worse. Urinary incontinence, constipation, frequency and/or urgency, and nocturnal enuresis improved in 89 of 101 (88%), 73 of 92 (79%), 54 of 92 (59%), and 59 of 89 (66%) children, respectively, and resolved in 41 of 101 (41%), 37 of 92 (40%), 21 of 81 (26%), and 25 of 89 (28%) children, respectively. Outcomes among patients who did not undergo the trial were not significantly different (P = .19-1.02), and only 2 of 80 patients did not undergo permanent implantation. Reoperations (n = 53) occurred in 59 of 105 children (56%), mainly for device malfunction (n = 42), whereas explantation was performed in 36 of 104 children (35%) at an average of 2.65 years since implantation (median, 2.36 years; range, 0.03-9.04 years), mainly for complete symptom resolution (n = 13). Explanation for any reason was less common after single-stage procedures (1 of 16 [6%] vs 35 of 88 [40%] patients; P = .01). Sacral neuromodulation should be considered for children with dysfunctional elimination syndrome whose symptoms are refractory to maximum medical therapy understanding that the risk of reoperation is >50%. Elimination of the trial period reduces the number of general anesthesia without sacrificing outcomes. UROLOGY 94:911-918, 2014. © 2014 Elsevier Inc.

Cause	Procedures Performed for Device Revision or Replacement	Procedures Performed for Device Removal
Device	35	7
Malfunction		12
Stable resolution of symptoms		9
Infection	2	1
Trauma	5	1
Ineffective		5
Patient removal of temporary leads	1	1
Exhaustion	1	
Safety depletion	2	
Patient feeling that activities are limited		2
Pain	1	
Patient fear of device		1
Total	47	38

Suggested in D.Elimination S.

Prospective Evaluation of Sacral Neuromodulation in Children: Outcomes and Urodynamic Predictors of Success

Matthew D. Mason,* Heidi A. Stephany, Daniel P. Casella, Douglass B. Clayton, Stacy T. Tanaka, John C. Thomas, Mark C. Adams, John W. Brock III and John C. Pope IV

http://dx.doi.org/10.1016/j.juro.2015.11.084
Vol. 195, 1229-1234, April 2016
Printed in U.S.A. www.jurology.com | 1239

Results: During 45 months 30 patients were enrolled. Median age was 8.3 years at enrollment. Median followup was 14.8 months. Patients had significant improvement in quality of life and symptom scores, which persisted at the most recent followup. Patients who had uninhibited detrusor contractions on preoperative urodynamic assessment had significantly greater improvement in symptoms. Of the patients 23% had a complication requiring reoperation, most commonly neurostimulator lead breakage in those with a significantly lower body mass index.

Conclusions: Sacral neuromodulation significantly improves quality of life and symptom severity in children with refractory bowel bladder dysfunction. Children gain greater benefit if they show uninhibited bladder contractions on preoperative urodynamic evaluation. Children have a high rate of lead breakage requiring operative revision, which was seen after minor trauma in those with a lower body mass index.

Sacral Neuromodulation in Children

- **sacral abnormalities: sacral roots and foramen?**
- **future need for MRI**
- **dislocation for traumas (children / adolescents)**
- **statural growth**

Experience from adults offered this treatment modality suggests future positive development in children to be likely.

Level of evidence: 3.

Grade of recommendation C

CIC

Level of evidence 4 Grade of Recommendations C CONCERN

Introduction

Gastrostomy button is a continent catheterizable LATEX FREE device used to deliver enteral nutrition.

In 1996 De Badiola at al., firstly used a Bart Gastrostomy kit for temporary closure of vesicostomy in children after urodynamic evaluations.

de Badiola, J Urol, 1996. 156(2 Pt 2): p. 618-20.

INDICATION

- **First line treatment** (in a significant neurogenic and mental disability for a easier management , severe urethra)
- **Second line treatment** (in children presenting complications using CIC, or refusing it , severe functional dysfunction)
- **Third line as temporary bladder drainage** in patients discussing for continent diversion

PATIENTS & METHODS

35 pts

- 19 males
- 16 females
- Mean age: 8.84 ± 5.1 yrs

Diagnosis

- 91.4% (32/35) presented neurogenic bladder
- 8.6% (3/35) presented NOUR

Previously bladder drainage

- CIC 45.7% (16/35)
- Suprapubic cystostomy indwelling tube 42.9% (15/35)
- Nephrostomy 2.9% 1/35

Mosiello G, J Urology 2017



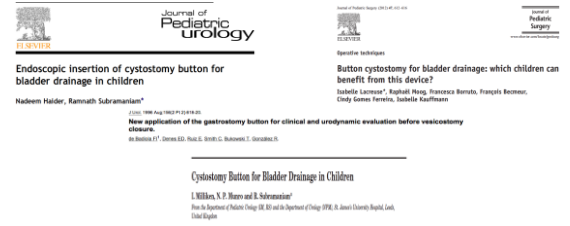
Different surgical steps of button cystostomy placement.
 A,B: The bladder is puncturing twice percutaneously and the polypropylene 2-0 monofilament suture is inserted. C,D: The loop created inside the bladder and the traction of the bladder wall; E: visualization of the traction inside the bladder; F: Amplatz dilator sizing the cystostomy; G) Cystostomy button in place

RESULTS

Author	N° Pts*	Technique	Complications	Mean follow-up	Satisfaction
De Badiola ⁴ (1996)	3	Open	None	30 days	Not Evaluated
Miliken ¹⁴ (2007)	17	Open	1 wound infection 4 leakage after the insertion period	16 months	Yes
Bradshaw ¹² (2014)	30	Open	7 UTI, 1 UTI and leak, 2 Wound infection 1 Wound infection and granulation, 5 Leak 3 Granulation	18 months	Yes
Haider ¹¹ (2008)	12	Percutaneous	None	11 months	Yes
Lacrouse ⁴ (2010)	21	Percutaneous	1 bladder lithiasis and peristomal leakage, 3 UTI 1 UTI and peristomal leakage, 5 peristomal leakage	24 months	Yes
Hitchcock ⁶ (2006)	21	Open	1 UTI, 2 button side infections, 3 leakage 1 leakage and side infection, 1 UTI side infection 2 UTI granulation, 2 granulation (Two revision for button displacement and for persistent leakage)	30 months	Not Evaluated
Our Series	35	Open and percutaneous	1 button decubitus, 6 UTI, 1 UTI button side infection 1 stone with UTI, 1 button leakage and UTI 1 difficulties in bladder emptying and UTI 1 button leakage (Two reparations: one for button decubitus and one for bladder stone)	37 months	22 patients on-going cystostomy button are satisfied

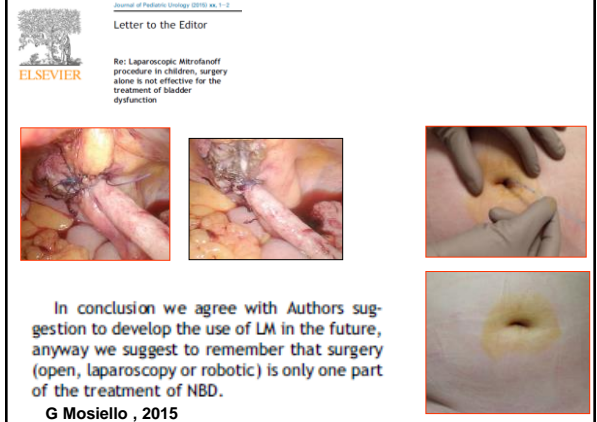
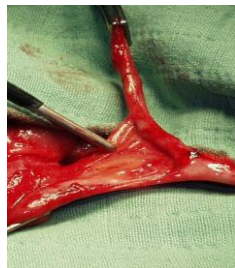
Discussion

Several paper in literature demonstrated the safety and efficacy of button cystostomy. Button cystostomy has demonstrated to present mostly minor long term complications represented by UTI, leakage, button decubitus, button side infections.



Mitrofanoff's Principle : Appendico-cutaneo-stomy

- Carefull identification of vascular pedicle
- Disconnect from caecum
- Reimplant distal end in the bladder
- Reimplantation of appendix in bladder
- Lich Gregoir technique
- Minimum 2 cm lenght
- Stoma through rectus muscle!!



In conclusion we agree with Authors suggestion to develop the use of LM in the future, anyway we suggest to remember that surgery (open, laparoscopy or robotic) is only one part of the treatment of NBD.

G Mosiello , 2015

Contents lists available at ScienceDirect
Journal of Pediatric Surgery
 www.elsevier.com/locate/jps

Bladder continent catheterizable conduit (the Mitrofanoff procedure): Long-term issues that should not be underestimated
 Alice Faure ^{*,1}, Rebecca Coakley ^{*,1}, Aurore Bouay ^{*,1}, Alan Woodward ^{*,1}, John Hunsley ^{*,1}, Miller O'Brien ^{*,1}, Steve Hinchey ^{*,1}
^{*}Paediatric Urology, Department of Paediatric Urology, Wilkes, Australia

Background: Mitrofanoff bladder (MBO) requires the direct anastomosis of a catheterizable conduit (CC) to the bladder. It is critical for oral preservation and social integration. Use of a continent catheterizable conduit (CCC) as a specific alternative procedure provides effective bladder drainage, however, it brings a subsequent maintenance.

Methods: Retrospective review of the indications and long-term outcomes of 54 patients with a Mitrofanoff procedure in a single center over a 20-year period (1995-2015).

Results: Indications of CC include 21 neurogenic bladders, 12 patients with spina/pelvic anomaly, 13 bladder outlet obstruction, 6 megacystis and 2 Cloaca. Median age at surgery was 4.3 years (4 months-20 years). The appendix was used in 75% of cases. Most frequently encountered complication was sternal dehiscence (n = 17/54, 30%), occurring at median time of 8 months (2 months-13 years). The other complications were leakage (n = 2/54, 3.7%), conduit stricture (n = 5/14, 35%), angulation of the conduit (n = 2/23, 8.7%) and prolapse (n = 1/1). Operative revision was necessitated by 10/54 (18.5%) patients, due mainly to the first 2 years. Median follow-up was 4.3 years (2 months-10 years).

Conclusion: CCC has a high incidence of complication. It has to be used only when the native vesica is not suitable for catheterization. Careful patient and families must be prepared to deal with both the complexity of their condition and the complexity of this procedure.

Neurology and Urodynamics

20 Years Experience With Appendicovesicostomy in Paediatric Patients: Complications and Their Re-interventions

Sarah H.M. Reuvers ^{*,1}, Joop van den Hoek ^{*,1}, Bertil F.M. Blok ^{*,1}, Teima C. de Oliveira Barbosa ^{*,1}, Katja P. Wöllnhoff ^{*,1}, and Jeroen B. Schaepe ^{*,1}
^{*}Department of Urology, Erasmus MC, Rotterdam, The Netherlands

	Others	PUV	BBECC	Neurogenic bladder
Dehiscence	25%	33%	25%	38%
Leakage	17%	17%	8%	24%

CONCLUSIONS 1

- A wide therapeutic choice available to clinicians.
- Many of the commonly used treatments are of dubious value and have not been rigorously evaluated in careful clinical trial.
- Children who suffer of these distressing condition and their families need clear guidance in order to have protection by treatments which do not work.

CONCLUSIONS

- Targeted approach optimizes treatment
- In presence of no- responders consider other treatment but first of all re-consider your diagnosis
- Onabotulinumtoxin and SNM are effective in selected cases: treatments with Level of evidence 3, Grade of recommendations C
- Surgery must be the last step