EC13: ICS Core Curriculum (Free) Transitional Care for Continence in Congenital Malformation: What to do and when.

Workshop Chair: Giovanni Mosiello, Italy
14 September 2016 08:35 - 11:30

Start	End	Topic	Speakers
08:35	08:40	Presentation	Giovanni Mosiello
08:40	08:55	Guidelines (ESPU, ICCS, ICI, APAPU, et al)	Kim Kwang
08:55	09:05	Concerns in Adolescents with Standard Treatment: CIC and Drugs	Giovanni Mosiello
09:05	09:20	Botulinum Toxin Best Practice	Giulio Del Popolo
09:20	09:35	Augmentation in 2016: When and How	Rien Nijman
09:35	09:50	Sacral Neuromodulation Role	Giovanni Mosiello
09:50	10:05	Discussion	All
10:05	10:30	Break	None
10:30	10:45	Derivation, Channel and Stoma Management	Rien Nijman
10:45	11:05	Surgery for Continence: Sling, Bladder Neck Surgery, Atriphicial Sphincter	Enrico Finazzi Agro
11:05	11:25	Discussion	All
11:25	11:30	Take Home Messages	Giovanni Mosiello

Aims of course/workshop

Spina bifida, bladder exstrophy/epispadia, posterior urethral valves are managed immediately after the birth with a surgical procedure, but all these patients require lifelong urological care for the treatment of continence.
The aim of this workshop is to focus some critical aspects to define in transitional continence care correct management in childhood to avoid procedure that impair adult life, how to manage the mature pediatric urology patients. The objective of this Committee workshop is to critically define a best practice treatment in young patients using: CIC, botulinum toxin, neuromodulation, augmentation, stoma, artificial sphincter.

Learning Objectives

After this workshop participants should be able to:

1. Correct management in childhood to avoid procedure that impair adult life aspects,
2. Common knowledges in pediatric and adult health care professionals about adult life problems and congenital pathologies respectively
3. Transition out of childhood: who should manage the mature pediatric urology patients?

Learning Outcomes

After the Workshop participants will be able to:

1. Have knowledge about congenital pathologies impairing continence
2. To understand the treatment performed in childhood
3. To recognize concerns during adolescence and young adult age
4. To ameliorate a clinical practice for the transitional care of continence

Target Audience

Pediatrician, Pediatric Surgeon, Pediatric Urologist, Nurse, Physiotherapist, Surgeon, Urologist

Advanced/Basic

Advanced

Conditions for learning

This is a Committee workshop, open to all delegates

Suggested Learning before workshop attendance

- S. Tekgul, H.S. Dogan, E. Erdem, P. Hoebeke, R. Kocvara, J.M. Nijman, C. Radmayr, M.S. Silay, R. Stein, S. Undre. Management of neurogenic bladder in children. In Guidelines on Paediatric Urology, European Society for Paediatric Urology, European Association of Urology, chp, 3K, pp 36-41, 2015.
- Nijman R., Tekgul S., Chase J., Bael A., Austin P., von Gontard. Diagnosis and management of urinary incontinence in childhood. In Incontinence., Abrams P., Cardozo L., Khoury S., Wein A., 5th ed., Ch. 9, 5th ed. pp. 729-825, 2013.

Suggested Reading

- Bauer SB, Austin PF, Rawashdeh YF, de Jong TP, Franco I, Siggard C, Jorgensen TM; International Children's Continence Society. International Children's Continence Society'srecommendations for initial diagnostic evaluation and follow-up in congenital neuropathic bladder and bowel dysfunction in children. Neurourol Urodyn. 2012;31:610-4.
- Rawashdeh YF, Austin P, Siggaard C, Bauer SB, Franco I, de Jong TP, Jorgensen TM; International Children's Continence Society. International Children's Continence Society'srecommendations for therapeutic intervention in congenital neuropathic bladder and bowel dysfunction in children. Neurourol Urodyn. 2012;31:615-20.
- The good, the bad and the ugly of catheterization practice among elite athletes with spinal cord injury. Mosiello G, Jansen I, De Gennaro M. Spinal Cord. 2015 Sep;53(9):
- Effects of botulinum toxin type a in the bladder wall of children with neurogenic bladder dysfunction: a comparison of histological features before and after injections. Pascali MP, Mosiello G, Boldrini R, Salsano ML, Castelli E, De Gennaro M., J Urol. 2011 Jun;185(6 Suppl):2552-7.
- Current state of nerve stimulation technique for lower urinary tract dysfunction in children. De Gennaro M, Capitanucci ML, Mosiello G, Zaccara A. J Urol. 2011 May;185(5):1571-7.
- A 20-year study of persistence of lower urinary tract symptoms and urinary incontinence in young women treated in childhood. Petrangeli F, Capitanucci ML, Marciano A, Mosiello G, Alvaro R, Zaccara A, Finazzi-Agro E, De Gennaro M. J Pediatr Urol. 2014 Jun;10(3):441-5.
- Prevalence of "uncomplicated" stress urinary incontinence in female patients prior to surgery. Re: Norton PA, Nager CW, Brubaker L, Lemack GE, Sirls LT, Holley R, Chai TC, Kraus SR, Zyczynski H, Smith B, Stoddard A; for the Urinary Incontinence Treatment Network. The cost of preoperative urodynamics: A secondary analysis of the ValUE trial. Neurourol Urodyn. 2014 Oct 18. Finazzi-Agrò E.
- Long-term Efficacy and Safety of OnabotulinumtoxinA in Patients with Neurogenic Detrusor Overactivity Who Completed 4 Years of Treatment. Rovner E, Kohan A, Chartier-Kastler E, Jünemann KP, Del Popolo G, Herschorn S, Joshi M, Magyar A, Nitti V. J Urol. 2016 Apr 15.
- Summary of European Association of Urology (EAU) Guidelines on Neuro-Urology. Groen J, Pannek J, Castro Diaz D, Del Popolo G, Gross T, Hamid R, Karsenty G, Kessler TM, Schneider M, 't Hoen L, Blok B. Eur Urol. 2016 Feb;69(2):324-33.
- Is a closed bladder neck on preoperative videourodynamic studies an important factor for continence following augmentation ileocystoplasty in myelodysplastic patients? Ghanem MA, van Denhoek J, Nijman RJ. J Pediatr Urol. 2013

Kim Kwang

Spina Bifida

The management of neurogenic bladder dysfunction in children has changed over the years. The introduction of clean intermittent catheterisation (CIC) has revolutionised the management and today the conservative management is a very successful treatment option.

Standard treatment is CIC with anticholinergics: children do not have upper tract deterioration when managed early with IC and anticholinergic medication. CIC should be started soon after birth in all babies, especially in those with signs of possible outlet obstruction Furthermore the early initiation of CIC in the newborn period makes it easier for parents and for children to accept it. Early management results in reduced renal and bladder damage and in neurogenic bladders that are refractory to anticholinergics, injection of botulinum toxin into the detrusor seems to be effective to avoid or postpone during childhood surgery. Children with neurogenic bladder have disturbances of bowel function as well as urinary function. Bowel management, especially transanal irrigation is effective.

Posterior urethral valves

PUV are one of the few life-threatening congenital anomalies of the urinary tract found during the neonatal period. Antenatal treatment of PUV remains controversial. In a newborn with suspicion of PUV the first act is then to provide bladder drainage. This can be achieved by a 6 or 8 Fr. feeding tube or Tieman or Foley catheter inserted in the urethra as an alternative, a sovrapubic 5 Fr epicystostomy can be used. Today endoscopic valve ablation is the standard treatment with an endoscopic incision or resection with Valve ablation, and It is important in this maneuver to avoid extensive electrocoagulation, because the most common complication of this procedure is stricture formation.

Vesicostomy is used when the child is too small or in severe general condition. Otherwise, a cutaneous vesicostomy provides an improvement or stabilisation of upper urinary tracts although there has been concern that a vesicostomy could decrease bladder compliance or capacity High diversion should be considered if bladder drainage is insufficient to drain the upper urinary tract. Life-long monitoring of these patients is mandatory, as bladder dysfunction is very common and continence is a major problem.

Up to 75% of boys with PUV show abnormal bladder dynamic. Urodynamic studies allowed to identify different patterns of bladder dysfunction changing during time in boys with PUV: bladder overactivity; low compliance high voiding pressure and myogenic failure.

Bladder exstrophy – epispadias complex (BEEC)

Is one of a major challenges in paediatric urology. The modern approach is: 1) staged repair of BEEC consists of three distinct operations: closure of the bladder, posterior urethra and abdominal wall at birth; reconstruction of the epispadic urethra during infancy; and bladder neck reconstruction in early childhood. 2) one stage reconstruction, or complete repair. 1. The initial staged approach to functional bladder closure includes bladder, abdominal wall, and urethral closure in the newborn period with bilateral osteotomy, epispadias repair at 6 months to one year of age; and bladder neck reconstruction along with antireflux procedure later at 4 to 5 years. Different types of pelvic osteotomy have been suggested and osteotomy, is still debated for the different ages. Osteotomy anyway gives some advantages: reduces abdominal wall tension, placing the urethra in a deeper plane reinforcing outlet resistance and supporting bladder neck. 2 Complete Repair combines standard bladder closure with the "penile disassembly" technique for epispadias repair at the same time with the aim to reduce the number of procedures required for reconstruction and potentially improving continence without the need for formal bladder neck reconstruction. This procedure leaves a high percentage of patient 60% with hypospadia. The long term results of the 2 techniques are difficult to compare because is very common that every single centre choices one of these according to the training of the single urologist. Aim of surgical management of epispadias: is providing a satisfactory cosmetic appearance, as well as normal genital function and preservation of fertility, and functioning urethra and continence.

Giovanni Mosiello

CIC concerns

Conservative management of either or both the bladder and sphincter complex involve pharmacologic management, intermittent catheterization, bowel management. The objectives of these non-surgical strategies are to preserve renal tract function primarily, optimise quality of life and promote independence of self-care (de Jong 2008). Achievement of continence is of secondary importance to preservation of renal function. In the adolescent population some concerns are evident.

Regular evaluation of adherence to medication and CIC is mandatory. CIC must be performed with largest possible catheter: includes instruction and review of adequate hand hygiene, perineal hygiene, catheter cleaning, insertion of catheter without contamination, optimal interval between CIC Any mental impairment or physical difficulty limiting self-care should be considered. Overnight catheter drainage could be considered in some clinical situations, as well as suvrapubic catheter (buttom cistostomy).

Critical point could be the CIC refusal by adolescents as well as the parents refusal to accept "baby independence "starting a self CIC training program. Treatment and prevention of urinary tract infections: bacteriuria is usual in patients performing intermittent catheterization but may be ↓ by improving hydration and more frequent catheterizations.

Surveillance is mandatory during puberty as bladder capacity, maximum detrusor pressure and leak point pressure may increase after puberty.

Indications for surgical therapy could be related to arm function that preclude self CIC, Physical weight of child makes wheelchair transfers difficult, necessitating a catheterizable stoma as for preserving patient privacy in young people where caregiver is not a parent. If hydrophilic single use catheter is worldwide recommended, concerns are present in different geographical setting due to economical reason. Critical point remains lack of education and trained health care professionals.

Sacral NeuroModulation

From the first description in 1988 (Tanagho EA, J Urol) a significant number of reports have been published, and SNM became rapidly a well-accepted treatment in adults, and was approved by the Food and Drug Administration for the use in urology in 1997 for treatment of urge urinary incontinence, in 1999 for treatment of urinary urgency-frequency and nonobstructive urinary retention, and in 2011 for fecal incontinence. (Herbison GP 2009, Kessler TM 2007, van Kerrebroeck PE 2007). SNM is used in neurogenic bladder dysfunction (NBD) too, and in a systematic review, Kessler et al, analyzing 26 independent studies stated that there is evidence indicating that SNM may be effective in adults with NB, but it is still not possible to draw a definitive conclusion. (Kessler et al 2010). It is interesting to see in this review that on the 565 evaluated reports, 34 papers only were assessed for eligibility, because the other 531 were not referred to neurogenic LUTS.

The obvious conclusion is that SNM is widely accepted and used in adults for refractory non obstructive chronic urinary retention, urge incontinence, urgency-frequency syndrome, and in some cases has been used in NBD. For this reason is surprising that the first prospective randomized controlled study to evaluate the possible benefits of SNM in children has been performed in 2004 in NBD (Guys) , because before that , not considering the pioneering Tanagho experience (Tanagho 1992), only some sporadic pediatric cases have been reported in adults series Actually SNM is not a first-line treatment but rather as a second or better third line treatment for the patients who have failed conservative treatments. During the past years the technique of SNM has become less invasive, more safe, reliable and effective, with the technical improvements. The re-operation and complication rates decreased significantly. The clinical results have led to expanding indications. SNM are mainly used in children and young adults for overactive bladder （OAB）, Non-obstructive urinary retention, NOUR, interstitial cystitis, pelvic pain, NBD.

Giulio Del Popolo

OnabotulinumtoxinA (onaBNTa)

This treatment of neurogenic detrusor overactivity (NDO) is widely accepted after it has received the regulatory approval for this specific use in adults. International Guidelines support the use onaBNTa in patients refractory to oral treatment. Although the administration of onaBNTa is still considered off-label in children, data on its efficacy and safety have already been reported and phase III clinical trials are ongoing on this population. Therefore, nowadays there is high quality evidence for the efficacy of detrusor injections of onaBNTa in adults with NDO and in children and young people with myelodysplasia. However, there is still a lack of standardized protocols of treatment for NDO with onaBNTa supporting the patients in their transition from the childhood to the adult age.

Recommendations for best practice for using onaBNTa in transitional care
Patients' selection and assessment before treatment

1. Neurogenic diagnosis
2. Data of last urodynamic investigation, ultrasound, laboratory tests (blood and urine examinations)
3. Previous treatments for NDO and previous onaBNTa treatments; regarding last onaBNTa treatment: date, dose, technique of injection, possible side effects, efficacy.

Patient evaluation (clinical assessment):

Diaries

Instrumental evaluation:
Kidney and bladder ultrasound is mandatory, and recommended the use of cystometry, while videourodynamic investigation and cystography can be considered optional and used in selected cases depending on the clinician's opinion.

QoL test

QoL assessment has to be included in the general evaluation of the patient. Among various tools available, the Qualiveen-short-term test, a 10-items questionnaire, has to be preferred.

Antibiothics
Antibiosis must start 1 week before treatment in case of positive laboratory examinations. If urine examination and urine culture are negative, only perioperative antibiotics may be administered. Commonly 3rd generation cephalosporins can be administered or quinolones. The use of amynoglycosides is contraindicated.

Self-cateheterization training
As widely known, is mandatory before onaBNTa treatment that patients understand and accept the risk of urinary retention and potential need of cathterism. For this reason, a demonstration of this practice or a specific training is recommended.

Anaesthesia
Younger individuals may be treated under sedation; spinal anaesthesia is not recommended.

Cystoscope
Type of cystoscope is usually selected by the operator; therefore flexible or rigid cystoscope may be used.

Doses
As reported in Literature, it is well known that in younger individuals a dose of 10U/kg is administered, until 200U. Evaluating previous dosages administered to the patient, the first re-treatment should repeat the same amount of onaBNTa. As suggested by common practice, starting from 200U sub-divided in 30 injections sites, 1 cm apart one from the other, should be adopted.

Procedure technique
As recommended for children and adults, injection site is represent by the detrusor muscle. Also in transitional care, the trigone might be infiltrated only in those individuals who show to be non-responders to standard approach. It is mandatory the use of needles specifically designed for onaBNTa infiltration, 23 G and 4 mm of deep, to avoid onaBNTa diffusion outside from the bladder.

3) Post-treatment care
Being individuals of transitional care still young, it is advisable to take particular care of these subjects after treatment. Possibly, is recommended to treat early in the morning and allow patient to stay in the hospital some hours after onaBNTa injection. Intravenous fluid may be administered especially in patients submitted to general sedation.

4) Follow up and re-treatment
After discharge, patient has to be re-evaluated within 7 days by clinical assessment. In case of spinal disease, it is recommended a cystometric evaluation within 1 year. Re-treatment should be based on patient's request but also on objective measures.

Rien Nijman

Bladder augmentation

The indication for bladder augmentation, replacement of the bladder, or the creation of a continent urinary diversion, is either the morphological or functional loss of normal bladder function. The main goal of this surgery is to relieve high pressure and low capacity of the urinary bladder and create a new reservoir with low storage pressures that can be emptied periodically. It is particularly important that the patients understand that spontaneous voiding will not be possible after such surgery and life long intermittent catheterization will be required.

There are several important principles for bladder augmentation and replacement that should be respected:

- Use the minimal amount of bowel
- A low-pressure large capacity reservoir is essential (this requires detubularization of any intestinal segment used)
- A reliable continence mechanism (continent urinary outlet) must be assured
- Because of the only resorbable sutures and staples should be used (risk of stone formation)

The invasiveness of Enterocystoplasty, and its long-term severe complication rate, has greatly reduced its indication. Recently, it is gaining more attention, in relation of the availability of mini-invasive procedures, i.e. the robotic-assisted laparoscopy.
Ileocystoplasty is more commonly performed, but carries the risk of postoperative intestinal obstruction, mucus retention, increased rate of stone formation, and electrolyte imbalance. The risk of secondary malignancy of the augmented bladder is increased, although less than 20 cases have been described worldwide. Augmentation may be combined with ureteral reimplantation, bladder neck tightening (sling suspension, bladder neck reconstruction, artificial sphincter implantation) or the creation of a continent catheterizable urinary stoma (Mitrofanoff, Monti). As bladder augmentation lowers bladder pressure, diminishing or abolishing vesicoureteral reflux, ureteral reimplantation should only be performed in cases where high grade reflux occurs at low bladder pressure. Similarly, as bladder augmentation will improve continence, only patients with low leak point pressure need reinforcement of the bladder outlet. Urodynamic testing will determine surgical options

Autoaugmentation

The principle of auto-augmentation of the bladder is the excision of a great portion of the detrusor while leaving the urothelium intact, creating a large diverticulum for the storage of urine at lower pressures. This urine stored at a low pressure can be drained by intermittent catheterization. The theoretical advantages of this procedure are the low complication rates of the surgery, reduced operative morbidity with shorter stay in the hospital, absence of urine salt resorption, less mucous production in the urine and possibly absence of carcinogenic potential.

More recently, some authors have proposed the laparoscopic auto-augmentation as a minimally invasive procedure for the treatment of low capacity / low compliance bladder.

Catheterizable channels

In the long term it is necessary to have a catheterizable channel. Mitrofanoff's name is given to the principle of burying a narrow tube within the wall of the bladder or urinary reservoir whose distal end is brought to the abdominal wall to form a catheterizable stoma suitable for intermittent catheterization. The technique is simple and familiar to all urologists who are accustomed to re-implanting ureters. Several narrow tubes are available for the Mitrofanoff conduit. In the original description, the appendix was used. The system achieves reliable continence (90-100%) which is maintained in long term follow-up, for a high proportion of patients creating an abdominal continent catheterizable stoma into the bladder is a good option when urethral catheterization is impeded. Up to 21% of patients will have problems related to stoma leakage or stenosis within the first 2 years of its creation and require minor revision. An antegrade continence enema stopper effectively eliminates stomal stenosis. Patients with good manual dexterity and fine motor ability gain a greater ability to self-care and appreciate the privacy gained from not having to expose their genital area to a caregiver. In wheelchair-bound girls dependant on CIC, a catheterizable channel obviates transfers in the bathroom. Stoma creation in male patients only follows difficulty with urethral catheterization. As extreme weight gain can cause adjacent skin to partially obscure a catheterizable channel, postpubertal patients should be educated in nutrition and portion control. Dryness may also be achieved by closing the bladder neck combined with a cathetarizable stoma. Complications after a bladder neck closure have been reported in up to 31% of cases, with 15% developing vesicourethral fistula. Persistent leakage, more UTIs, stone formation, bladder perforation, and deterioration of the upper urinary tract have also been reported after bladder neck closure especially when CIC regularity is neglected. To date, patient compliance with longterm CIC appears to be good and is associated with preservation of the upper urinary tract.

Deriviation

Ileal conduit ('wet deviation') is no longer indicated except in case of severe mental impairment or severe renal dysfunction and no options for bladder reconstruction. Bladder replacement instead of augmentation may be appropriate in cases of bladder exstrophy where use of native bladder tissue is impossible

Enrico Finazzi Agrò

Surgery for Continence

Many surgical approaches have been described for increasing bladder outlet resistance to achieve continence, however long-term results are lacking.

Bulking agents

The injection of bulking substances in the tissues around the urethra and bladder neck to increase outlet resistance in children dates back to at least 1985. The search for safer, biocompatible substances to create periurethral compression has first led to the use of cross-linked bovine collagen, with initially reported success in about 20-50% of children.

Usually the substance is injected endoscopically in the bladder neck area (finding the best spot is often the most difficult part of the procedure): more than one procedure may be necessary. On average 2.8 – 3.9 ml is injected.

Fascial Sling

The technique involves suspension of the bladder neck with an autologous fascial strip or artificial material secured to the rectus fascia or the pubic symphysis. It is believed the mechanism of action involves co-aptation of the bladder neck due to traction, and/or elevation of the urethra to an intra-abdominal position, which increases tension on the bladder neck with abdominal straining. Complication rates are modest and include difficult catheterization and rectal injury, while in long-term erosions or persistent incontinence may occur.

Bladder Neck Closure / Reconstruction

In 'desperate' cases the bladder neck may be closed, the indication being persistent leakage despite several attempts to enhance outlet resistance. Long-term results are usually disappointing: persistent urinary leakage, stomal stenosis and leakage or stone formation.

The optimal bladder neck procedure should increase bladder outlet resistance at minimal cost of decreasing bladder capacity, maintaining easy catheterization and still allowing some leakage at high pressure in order to protect the upper urinary tract. Different operative techniques with the aforementioned aims have been used with varying outcomes.

Artificial Urinary Sphincters

Many surgeons are reluctant to implant an AUS as it consigns patients to further revision surgery, and the potential risk of deterioration in bladder function and a concomitant deleterious effect on upper urinary tract drainage. However, with improved durability of newer models that have an average life span of about 8 years, revision rates have become less. The ideal patients for AUS implantation are post-pubertal males or females, who can void volitionally and empty the bladder completely. On the contrary, a common problem is the development of reduced bladder compliance with time. Overall, 40 to 50% of neurogenic patients require a bladder augmentation concomitantly or subsequently to the AUS implantation.

Evaluation of Outcome

Our prejudice is that reconstruction does, indeed, improve the lives of children, Quality of life does not mean absence of disease or a level of complications acceptable to the reviewing clinician. It is a difficult concept to measure because lack of validated instruments, difficulties in translating from one culture or language to another, of the difficulties in selecting control groups and variations in clinical situations.

Conclusions

Stress incontinence due to sphincter incompetence is most commonly managed with an abdominoperineal puboprostatic autologous fascial sling procedure in boys and a transvaginal autologous fascial sling procedure in girls. The success rate for dryness or improved continence is variable, 25–100%. In boys preservation of erectile function after a fascial sling procedure can be expected. Synthetic suburethral slings can only be used in a tension free mode, due to risk of erosion. In neurogenic stress incontinence a firmer suspension is needed, making synthetic slings inappropriate. Currently, there are no reports describing long-term results of the synthetic suburethral slings, suggesting its use in a very young population should be tempered. Injection of a bulking agent into the bladder neck area as a primary treatment of bladder outlet incompetence is not recommended because of low success rates. Following insertion of the artificial urinary sphincter, efficacy rates for complete dryness between voids vary between 56% and 91%. The revision rate is high, about 1/3 require reoperation and 19% device removal due to erosion. Long-term survival (>10 years) of the prosthesis is up to 60%.

Approximately half of the individuals able to empty before insertion of the artificial sphincter can do so afterwards, however, bladder dynamics can change postoperatively. Up to 5 years later augmentation cystoplasty may be required in 33% of patients in order to minimize the effect of this change on kidney drainage and function.

ICS 2016, Tokyo 13th - 16th September 2016

Bambino Gesù
OSPEDALE PEDIATRICO

Concerns in Adolescents with standard Treatment: CIC and Drugs

GIOVANNI MOSIELLO
MD,FEAPU,FEBPS

ICS 2016, Tokyo 13th - 16th September 2016

Disclosures

Italian Society of Pediatric Urology
Other: Board Member
Italian Society of Urodynamics
Other: Chair of Children's Committee

Trial partecipation
Pfizer
Allergan

Consultant
Coloplast
Wellspect
Medtronic

ReviewArticle

ICS 2016, Tokyo 13th - 16th September 2016

AdultCareofChildrenFromPediatricUrology

ChristopherR.J.Woodhouse,*GuyH.Neild,RichardN.YuandStuartBauer

FromtheCentreforUrology,UniversityCollegeLondonHospitalsandtheCentreforNephrology,UniversityCollegeLondonRoyalFreeCampus,London,UnitedKingdom,andtheDepartmentofUrology,Children'sHospitalBoston,Boston,Massachusetts

- Has to be considered also that, children and families are accustomed to the holistic care received in a paediatric setting where several aspects of education, social care or family support are covered
- In this setting they should feel vulnerable when approach the adulthood
- Paediatric urology conditions requiring management in adulthood, including congenital anomalies on the genitourinary tract such us, **renal disease, congenital obstructive uropathy (PUV), spinal cord anomalies with neurogenic bladder or iatrogenic** causes
- **These conditions have a major lifelong implications and should require a bladder drainage mechanism**

LETTER TO THE EDITOR

The good, the bad and the ugly of catheterization practice

In our survey, CIC was found to be recommended worldwide and to be performed in all countries, with the lowest rate in China (15%); a high percentage of suprapubic and indwelling catheters were also seen in many countries. For CIC, the hydrophilic catheter was found to be the most used (in 12 countries), followed by the gel-coated catheter, nelaton catheter and rubber catheter (used in 4 countries). With regard to catheter reuse it was interesting to note that no reuse was reported by 100% of participants in only one country, the Netherlands, with a global proportion of 42% of single use worldwide. In 9 countries there was a common practice of catheter reuse at the rate of one per day, in 5 countries at the rate of one per week and in 4 countries at the rate of one per month. There was no consensus on how to clean a reused catheter (boiling water, 40%; home-made sodium hypochlorite solution, 20%; milton solution, 13% and so on).

Spinal Cord (2015) **53,** 712;

G Mosiello[1,3], I Jansen[2] and M De Gennaro[1,4]

ORIGINAL ARTICLE

Adherence to treatment in adolescents

D Taddeo, M Egedy, J-Y Frappier. Adherence to treatment in adolescents. Paediatr Child Health 2008;13(1):19-24.

Health care professionals must be alert to the high prevalence of low adherence to treatment during adolescence. Low adherence increases morbidity and medical complications, contributes to poorer quality of life and an overuse of the health care system. Many different factors have an impact on adherence. However, critical factors to consider in teens are their developmental stage and challenges, emotional issues

Definition

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- Poor medications adherence is common in children and adolescents with chronic illness
- Second the world health organization, adherence is defined as "***The extent to with a person behaviour corresponds with agreed recommendations from a healthcare provider***"
- Medications adherence refers to the degree to with the medication taken reflect the prescriber's intention

Introduction

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- Adolescence is a crucial moment of growing characterized by physical, and cognitive maturation as well as psychosocial changes, and identity formation
- This time they acquire also the independence from their parents starting to make own choices.
- **Having a chronic disease create a challenges to socializing**
- Is important to do not be different from their peers

Introduction

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- **Having diseases may led to filling failed**
- The way to gain control: not take their medications, missing appointments or not following dietary restrictions making adherence very difficult

A systematic review of interventions to enhance medication adherence in children and adolescents with chronic illness

Angela J Dean,[1-3] Julie Walters,[4] Anthony Hall[4,5]

ICS 2016, Tokyo 13th - 16th September 2016

- Different studies in literature analysed the degree of adherence in adolescent in different pathologies such as medications for Ashma or insulin injection reporting an adherence rate ranging from 10-89%

Ann Allergy Asthma Immunol. 2000 Nov;85(5):416-21.

Measurement of children's asthma medication adherence by self report, mother report, canister weight, and Doser CT.

Bender B[1], Wamboldt FS, O'Connor SL, Rand C, Szefler S, Milgrom H, Wamboldt MZ.

Antiretroviral medication adherence among the REACH HIV-infected adolescent cohort in the USA

Med Care. 2002 Sep;40(9):794-811.

Patient adherence and medical treatment outcomes: a meta-analysis.

DiMatteo MR[1], Giordani PJ, Lepper HS, Croghan TW.

Treatment Adherence in Adolescents: Development and Psychopathology

ICS 2016, Tokyo 13th - 16th September 2016

RICHARD J. SHAW
Stanford University, USA

The failure of the adolescent medical patient to adhere to prescribed medical treatment is one of the major reasons for psychiatric consultation in pediatric medical settings. This article reviews the developmental issues that interfere with treatment

Has seen a correlation between age and medication adherence with major prevalence around 11yrs peaking during mid-adolescence

Is important to consider different domains of adolescent development including social, emotional and cognitive.

Table 1. Developmental and psychopathological issues affecting treatment adherence

Separation–Individuation conflicts
Influence of illness on development
Influence of illness on caretakers
Difficulties with risk assessment
Cognitive maturity
Adolescent omnipotence
Affiliation with the peer group
Adaptive nonadherence
Psychiatric co-morbidity
Depression
Attention deficit hyperactivity disorder
Post-traumatic stress disorder
Personality pathology
Parent–child conflict
Cognitive limitations

CIC in neurogenic bladder

ICS 2016, Tokyo 13th - 16th September 2016

Anxiety disorders and depression is common in patients with chronic illness, especially regarding neurogenic bladder dysfunction,

• Kabra at al., screening adolescents with neurogenic bladder for depression and anxiety, found a high risk of anxiety in this group of patients and anxiety/depression in the caregivers

•In the other hand, Borzykowski at al. in 2004 analysing the social and psychological impact of CIC in children and adolescent with NB and this parents, shown that CIC or self-catheterization itself

did not cause major emotional and behavioural problems

Journal of Pediatric Urology (2015) 11, 75.e1–75.e7

Screening for depression and anxiety in childhood neurogenic bladder dysfunction

Aashish T. Kabra [a], Paul J. Feustel [b], Barry A. Kogan [c]

CIC

ICS 2016, Tokyo 13th - 16th September 2016

ORIGINAL ARTICLE

Self-catheterization during adolescence

What are the problems?

GUNDELA HOLMDAHL, ULLA SILLÉN, KATE ABRAHAMSSON, ANNALENA HELLSTRÖM, SONJA KRUSE & EWA SOLINES

Pediatric Urology and Nephrology Centre, Queen Silvia Children's Hospital, Göteborg, Sweden

Table I. Diagnoses.

Diagnosis	n
Myelodysplasia/sacral malformation	9
Persistent cloacal malformation	3
Epispadias–extrophy complex	4
Congenital urethral obstruction	3
Functional bladder dysfunction without reflux	3
Iatrogenic bladder distension	2

- The acceptance of CIC treatment decreases when the child gets closer to adolescence. Identifying problems and complications related to CIC in adolescence: retrospective study, median age of 16.5 yrs
- Results: **one of the main problem associated with self-catheterization during adolescence is non-compliance with treatment** A poor CIC routine can cause UTIs,

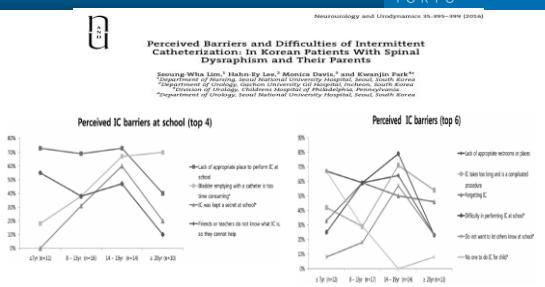
Table II. Symptoms. Values shown represent numbers of patients, with percentages in parentheses.

Symptom	Poor CIC routines (n = 13)	Good CIC routines (n = 11)
Recurrent UTI	10 (77)	2 (18)
Pyelonephritis	5 (38)	0 (0)
Decreasing renal function	4 (31)	0 (0)
Epididymitis*	3 (33)	0 (0)

*n = 9.

adolescent must be supported and motivated to return to regular catheterization.

CIC in neurogenic bladder



Neurourology and Urodynamics 35:395–399 (2016)

Perceived Barriers and Difficulties of Intermittent Catheterization: In Korean Patients With Spinal Dysraphism and Their Parents

Seoung-Wha Lim,* Hahn-Ey Lee,* Monica Davis,* and Kwanjin Park*†

*Department of Urology, Inje University Ilsan Paik Hospital, Goyang, Korea
†Department of Urology, Gachon University Gil Hospital, Incheon, South Korea
‡Division of Urology, Childrens Hospital of Philadelphia, Pennsylvania
§Department of Urology, Seoul National University Hospital, Seoul, South Korea

Perceived IC barriers at school (top 4)

Perceived IC barriers (top 6)

Moreover, to reduce the burden of hiding IC, careful counseling and enhanced communication with school are specifically necessary for adolescents.

How to identify low adherence

EDITOR'S CHOICE

A systematic review of interventions to enhance medication adherence in children and adolescents with chronic illness

Angela J Dean,[1–3] Julie Walters,[4] Anthony Hall[4,5]

Direct

- Assessment of blood drug metabolite (not available for all conditions)
- Pills count
- Electronic monitoring devices

Indirect

- Constructive dialogue with adolescents
- Is advised to do not be directly confronting adolescent and avoid being judgmental
- With questions investigating side effect of medications, the time that patients take the medications, if is hard or not to follow all recommendations

Low adherence should be identified by indirect or by direct methods

How to promote adherences

2995 abstracts identified and reviewed

17 articles remained for review

What this study adds

- In children and adolescents, education interventions alone are insufficient to promote adherence; adding a behavioural component may enhance outcomes but a number of negative studies reinforce the need for more research.
- No studies have identified effective interventions for young people with established poor adherence.

Education intervention

There is evidence suggesting that resilience is a function of the intersection of enhanced self-understanding in the context of understanding the illness experience and relevant medical knowledge [7,10]. The findings in this pilot

- Providing verbal or written information about illness, treatment benefit and the importance of follow the medication
- Studies in literature showing that education program should done by physician clinic visits, telephone contact, by video, web, book or by home visits with an high adherence compering to the control standard approach.

Journal of Pediatric Urology (2015) 11, 187.e1–187.e8

Self-cathing experience journal: Enhancing the patient and family experience in clean intermittent catheterization

Jennifer E. Holland [a], David R. DeMaso [a], Ilina Rosoklija [b], Kathryn L. Johnson [b], Diane Manning [b], Alexandra L. Bellows [b], Stuart B. Bauer [b]

CIC. The unique integration of real patient and family experiences with accurate and vetted medical knowledge has the potential to enhance resiliency among viewers who use CIC.

Conclusion:

- Low adherence increases morbidity and medical complications, worsening the quality of life and increasing unnecessary medical consults and investigations with high healthy cost.
- Involvement of families on daily medications, having close friends and a good family relationship, should influence positively the medications adherence, in contrast has seen that has seen that family conflicts led to low medication adherence

Conclusion:

It is important to explain that Medication is an important part of health care as well as important predictor of treatment outcomes.

Is crucial to identified low adherence with **non judgemental communications using**

motivotional interviewing ,

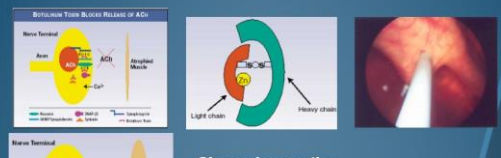
Regarding urological setting to increase the compliance of patients when performing CIC, is necessary to understand the difficulties encountered in daily life and to discuss about these to improve intermittent catheterization as well as medical treatment adherence.

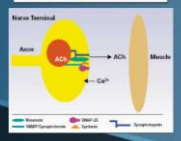
ICS

BOTULINUM TOXIN BEST PRACTICE

Giulio Del Popolo
Neuro-Urology Firenze (Italy)

Botulinum Toxin A





-Chemodenervation
- Relaxation muscle tone
-Fibre atrophy
- ↓ motor unit potential size
- ↓ the force of muscle contraction

Treatment satisfaction and improvement in health-related quality of life with onabotulinumtoxinA in patients with urinary incontinence due to neurogenic detrusor overactivity.
Sussman D, Patel V, Del Popolo G, Lam W, Globe D, Pommerville P. Neurourol Urodyn. 2012

Consistent long-term efficacy and safety of onabotulinumtoxinA in patients with neurogenic detrusor overactivity: final results of repeated treatments up to 4 years

Giulio Del Popolo[1], Gilles Karsenty[2], Heinrich Schulte-Baukloh[3], Roger Dmochowski[4], Karen Ethans[5], Brenda Jenkins[6], Steven Guard[7], Yan Zheng[8], Michael Kennelly[9]

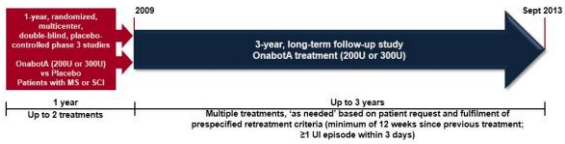
[1]Careggi University Hospital, Florence, Italy
[2]Aix-Marseille Université, Marseille, France
[3]St. Hedwig-Krankenhaus, Berlin, Germany
[4]Vanderbilt University, Nashville, TN, USA
[5]University of Manitoba, Winnipeg, Manitoba, Canada
[6]Allergan, Inc., Irvine, CA, USA
[7]Allergan, Ltd., Marlow, UK
[8]Allergan, Inc., Bridgewater, NJ, USA
[9]Carolinas Rehabilitation, Charlotte, NC, USA

Aim of the study

Aim of the study

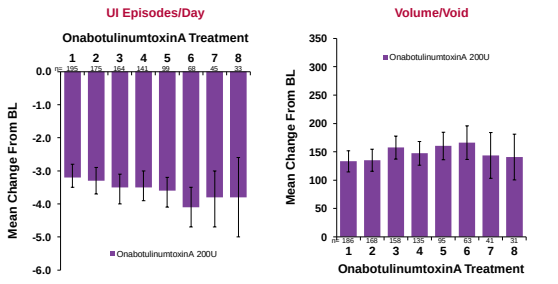
- To assess efficacy and safety after repeated onabotulinumtoxinA treatment of UI due to NDO
- Here we present final results from the multicentre, long-term study in which patients received multiple treatments for up to 4 years

Study design



Protocol amendment #3 (March 2011) removed the 300U dose group. Thereafter, all patients received 200U. MS = multiple sclerosis; NDO = neurogenic detrusor overactivity; onabotA = onabotulinumtoxinA; SCI = spinal cord injury; UI = urinary incontinence.

OnabotulinumtoxinA 200U consistently reduced urinary incontinence and improved volume/void over 4 years*

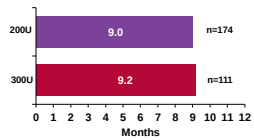


- Results were similar with onabotulinumtoxinA 300U

*Week 6 after each treatment; n values denote the number of patients with data available at week 6. BL = Baseline is prior to receiving treatment in the phase 3 studies for all patients entering the extension study. BL UI episodes/day = 4.1 (200U); BL volume/void = 153.8 mL. UI = urinary incontinence.

OnabotulinumtoxinA 200U had a duration of effect of ~9 months and was well tolerated with no new safety signals over 4 years

Duration of Effect*

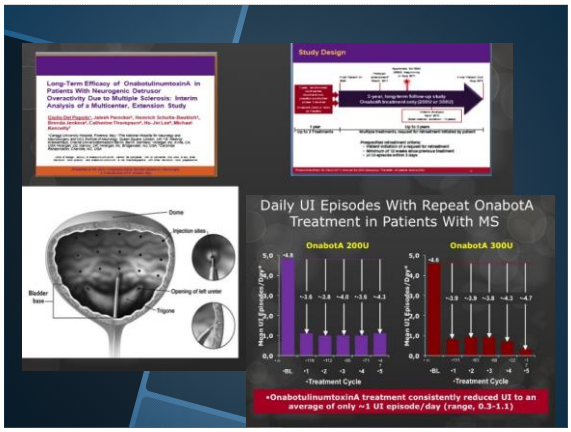


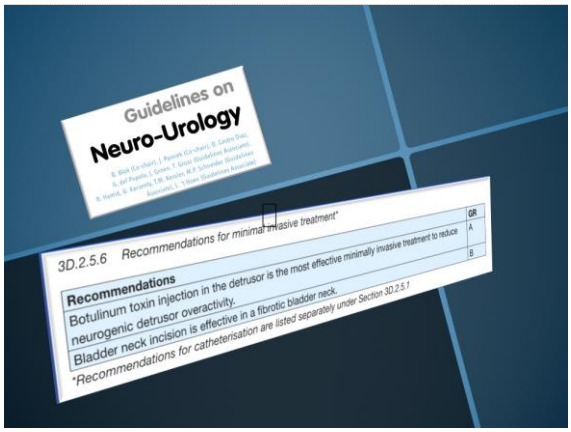
Adverse Events

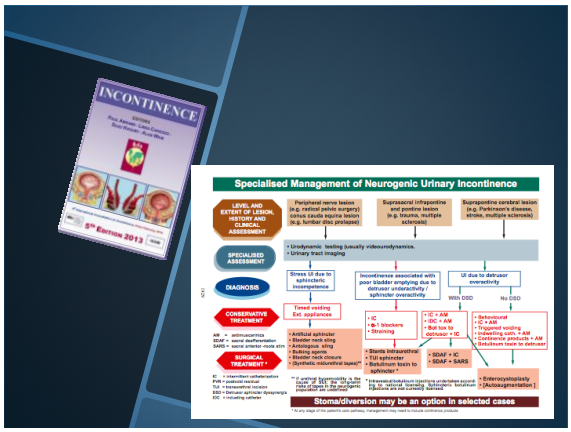
Urologic AEs (>5% and >1 Patient), %	OnabotulinumtoxinA 200U Treatment							
	1	2	3	4	5	6	7	8
	n=203	n=187	n=175	n=153	n=110	n=70	n=48	n=36
Overall	86.7	80.2	71.4	72.5	66.4	68.6	58.3	63.9
UTI	59.1	49.2	48.6	39.2	32.7	31.4	31.3	33.3
Urinary retention	20.2	8.0	6.3	2.6	1.8	0.0	0.0	0.0

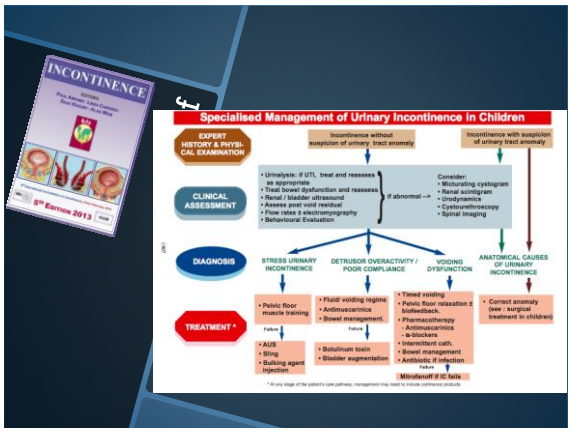
- De novo CIC rates for patients treated with the approved dose of onabotulinumtoxinA 200U were 29.5%, 3.4%, and 6.0% for cycles 1–3, respectively, and 0% for cycles 4–8
- Rates of de novo CIC use were higher with onabotulinumtoxinA 300U than 200U (43.0%, 15.0%, and 4.8% for cycles 1–3, respectively, and 0% for cycles 4–8)
- No new safety signals were observed over 4 years

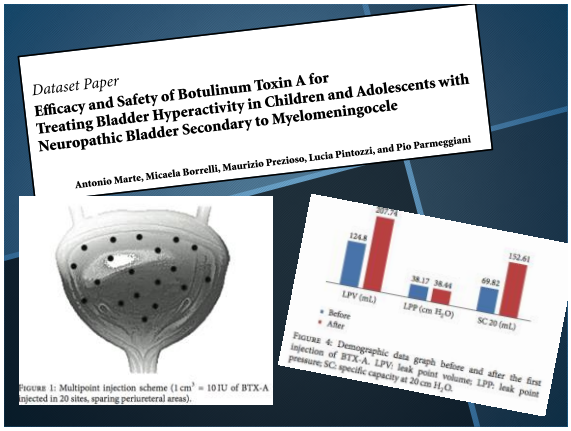
*Based on completed treatment cycles (ie, time in between an injection and the request for subsequent injection).
AE = adverse event; I-QOL = incontinence quality of life; MID = minimal important difference; UTI = urinary tract infection.

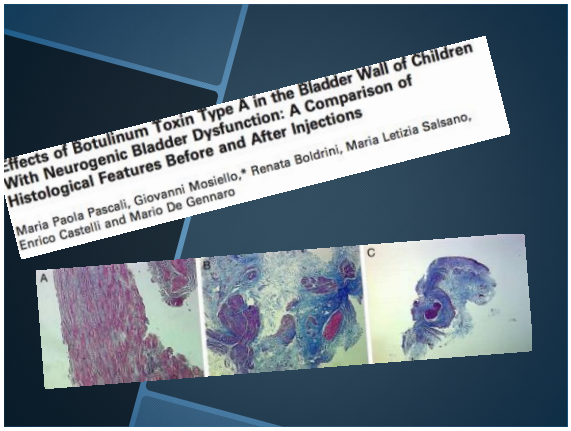

Long-Term Efficacy of OnabotulinumtoxinA in Patients With Neurogenic Detrusor Overactivity Due to Multiple Sclerosis: Interim Analysis of a Multicenter, Extension Study
Study Design
Daily UI Episodes With Repeat OnabotA Treatment in Patients With MS
OnabotA 200U
OnabotA 300U
Mean UI Episodes/Day*
Treatment Cycle
•OnabotulinumtoxinA treatment consistently reduced UI to an average of only ~1 UI episode/day (range, 0.3-1.1)


Guidelines on
Neuro-Urology
3D.2.5.6 Recommendations for minimal invasive treatment*
Recommendations
GR
Botulinum toxin injection in the detrusor is the most effective minimally invasive treatment to reduce neurogenic detrusor overactivity.
A
Bladder neck incision is effective in a fibrotic bladder neck.
B
*Recommendations for catheterisation are listed separately under Section 3D.2.5.1


INCONTINENCE
5th Edition 2013
Specialised Management of Neurogenic Urinary Incontinence
LEVEL AND EXTENT OF LESION, HISTORY AND CLINICAL ASSESSMENT
SPECIALISED ASSESSMENT
DIAGNOSIS
CONSERVATIVE TREATMENT
SURGICAL TREATMENT*
Urodynamic testing (usually videourodynamics.
Urinary tract imaging
Stoma/diversion may be an option in selected cases


INCONTINENCE
5th Edition 2013
Specialised Management of Urinary Incontinence in Children
EXPERT HISTORY & PHYSICAL EXAMINATION
CLINICAL ASSESSMENT
DIAGNOSIS
TREATMENT *
Incontinence without suspicion of urinary tract anomaly
Incontinence with suspicion of urinary tract anomaly
Urinalysis: if UTI, treat and reassess as appropriate
Treat bowel dysfunction and reassess
Renal / bladder ultrasound
Assess post void residual
Flow rates ± electromyography
Behavioural Evaluation
If abnormal -->
Consider:
Micturating cystogram
Renal scintigram
Urodynamics
Cystourethroscopy
Spinal imaging
STRESS URINARY INCONTINENCE
DETRUSOR OVERACTIVITY / POOR COMPLIANCE
VOIDING DYSFUNCTION
ANATOMICAL CAUSES OF URINARY INCONTINENCE
Pelvic floor muscle training
Fluid/ voiding regime
Antimuscarinics
Bowel management
Timed voiding
Pelvic floor relaxation ± biofeedback.
Pharmacotherapy
Antimuscarinics
α-blockers
Intermittent cath.
Bowel management
Antibiotic if infection
Correct anomaly (see : surgical treatment in children)
AUS
Sling
Bulking agent injection
Botulinum toxin
Bladder augmentation
Failure
Mitrofanoff if IC fails


Dataset Paper
Efficacy and Safety of Botulinum Toxin A for Treating Bladder Hyperactivity in Children and Adolescents with Neuropathic Bladder Secondary to Myelomeningocele
Antonio Marte, Micaela Borrelli, Maurizio Prezioso, Lucia Pintozzi, and Pio Parmeggiani
FIGURE 1: Multipoint injection scheme (1 cm³ = 10 IU of BTX-A injected in 20 sites, sparing periureteral areas).
FIGURE 4: Demographic data graph before and after the first injection of BTX-A. LPV: leak point volume; LPP: leak point pressure; SC: specific capacity at 20 cm H2O.
LPV (ml)
LPP (cm H2O)
SC 20 (ml)
Before
After


Effects of Botulinum Toxin Type A in the Bladder Wall of Children With Neurogenic Bladder Dysfunction: A Comparison of Histological Features Before and After Injections
Maria Paola Pascali, Giovanni Mosiello,* Renata Boldrini, Maria Letizia Salsano, Enrico Castelli and Mario De Gennaro
A
B
C

A Simplified Technique for Botulinum Toxin Injections in Children With Neurogenic Bladder

Maria Paola Pascali, Giovanni Mosiello,* Armando Marciano, Maria Luisa Capitanucci, Antonio Maria Zaccara and Mario De Gennaro

From the Department of Nephro-Urology, Urodynamics and NeuroUrology Unit, Bambino Gesù Pediatric Hospital, Rome, Italy

BE CONFIDENT

Administration of onaBNT/A remains still off-label in children, its use has been already adopted in the past 15 years and data on its efficacy and safety have been reported by several authors. However, there is still a lack of standardized onaBNT/A treatment protocols for NDO in this population of adolescents transitioning to adulthood

DRAFT: protocol of treatment for neurogenic detrusor overactivity with OnabotulinumtoxinA in young patients transitioning from childhood to adulthood (Italian Consensus 2014)

DRAFT: protocol of treatment for neurogenic detrusor overactivity with OnabotulinumtoxinA in young patients transitioning from childhood to adulthood (Italian Consensus 2014)

“ 1) patient’s selection and pre-treatment assessment
“ 2) treatment (technique, dose, management)
“ 3) post-treatment and follow-up.

DRAFT: protocol of treatment for neurogenic detrusor overactivity with OnabotulinumtoxinA in young patients transitioning from childhood to adulthood (Italian Consensus 2014)

Patient’s selection
pre-treatment assessment

Patient Selection

History and clinical evaluation

Symptomatic questionnaires and QoL assessment

Voiding diaries

Ultrasonography and measurements of Creatinine

Urodynamic tests

Self-catheterization training

DRAFT: protocol of treatment for neurogenic detrusor overactivity with OnabotulinumtoxinA in young patients transitioning from childhood to adulthood (Italian Consensus 2014)

Treatment
technique, dose, management

Antibiotic prophylaxis

Anesthesia - sedation

Cystoscope - rigid or flexible

Maximum dosage 200 U.I.

injection site into the detrusor muscle

Needles 20- 23 G and 2-4 mm deep

Post operative antibiotics prophilaxys is recommended

DRAFT: protocol of treatment for neurogenic detrusor overactivity with OnabotulinumtoxinA in young patients transitioning from childhood to adulthood (Italian Consensus 2014)

Post-treatment and follow-up.

Follow up

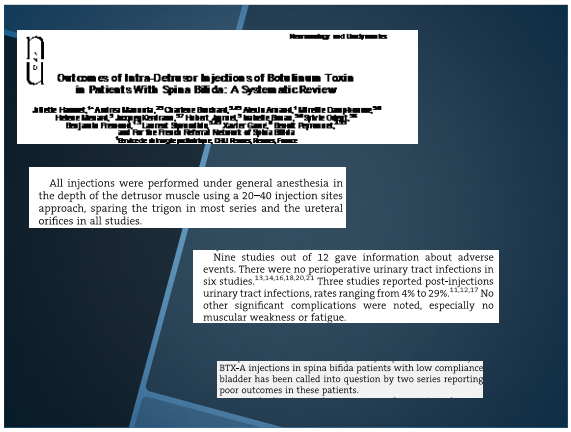
3 and 6 months

3-days voiding diary and QoL

Urodynamic, creatinine serum and ultrasound

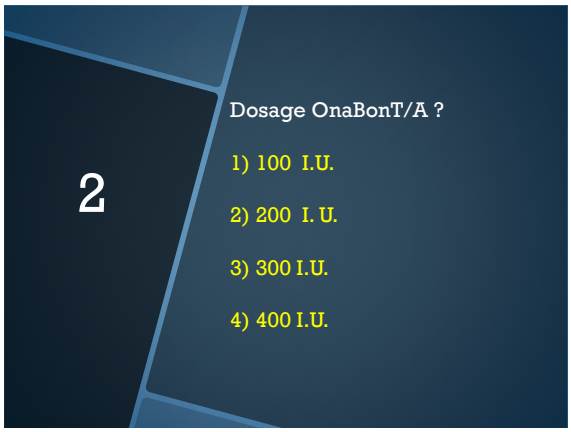
Re-treatment

every 6 to 9 months


Neurology and Urodynamics
Outcomes of Intra-Detrusor Injections of Botulinum Toxin in Patients With Spina Bifida: A Systematic Review
All injections were performed under general anesthesia in the depth of the detrusor muscle using a 20–40 injection sites approach, sparing the trigon in most series and the ureteral orifices in all studies.
Nine studies out of 12 gave information about adverse events. There were no perioperative urinary tract infections in six studies.[13,14,16,18,20,21] Three studies reported post-injections urinary tract infections, rates ranging from 4% to 29%.[11,12,17] No other significant complications were noted, especially no muscular weakness or fatigue.
BTX-A injections in spina bifida patients with low compliance bladder has been called into question by two series reporting poor outcomes in these patients.


Thank you !


3
Efficacy ?
1) 6 months
2) 8 months
3) 9 months
4) 12 months


2
Dosage OnaBonT/A ?
1) 100 I.U.
2) 200 I. U.
3) 300 I.U.
4) 400 I.U.


4
Approved for ?
1) MS
2) SCI
3) All neurological pts
4) MS and SCI

Bladder augmentation, when and how?

ICS Tokyo 2016

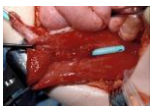
Rien JM Nijman,FEAPU,
Dept Urology and pediatric Urology
University Medical Center Groningen, The Netherlands

History of bladder reconstruction

Simon J. (1852)	Ureterosigmoideostomy (bladder exstrophy)
Coffey R.C. (1888)	Ureterosigmoideostomy
Maydl K.(1894)	The trigono-sigmoideoplasty (bladder exstrophy)
Gersuny R. (1898)	Rectal reservoir (rectal sphincter)
Bricker (1950)	Cutaneous incontinent diversion
Kock et al. (1982)	Continent ileal reservoir
Mitrofanoff (1980)	Continent appendicovesicostomy

Function of normal and reconstructed bladder

- To store urine within physiological bladder capacity at low pressure and without leakage
- To evacuate urine without residual at socially accepted intervals
  - normal voiding
  - intermittent catheterization



Bladder reconstruction: indications

- End-stage bladder diseases
  - PUV
  - MMC
  - Tumors (Rabdomyosarcoma)
  - Exstrophy / Epispadias
  - Bilateral ureteral ectopia
- Urinary reconstruction may be necessary
  - Choice of tissue: Ureter / Bowel / Tissue engineering?
  - Outlet channel: Appendix / Monti tube / other

Bladder reconstruction: techniques

- Many indications, many techniques
- Augmentation with ileum / ureter / auto augmentation / seromuscular lined colon …….
- Replacement of the bladder (Mainz pouch / Indiana pouch….)
- In combination with bladder neck enforcement / AMS sphincter prosthesis / BN plasty / sling ….
- In combination with catheterizable channel

Bladder reconstruction: techniques

- Mostly used: ileocystoplasty + channel (appendix)
- +/- BN reconstruction / sling / AMS
- +/- BN closure
- Alternatives: personal preference

Bladder reconstruction: when

- When other therapies fail
  - Anticholinergics
  - CIC
  - Botulinum toxin A
  - Neuromodulation
- When renal function is endangered
  - DSD / severe OAB / high pressures
- When the child is ready for it (counseling is extremely important)
- When the parents / care givers are ready
- For improvement of QoL

Bladder reconstruction: typical patient

MMC	refractory incontinence / noncompliant bladder / +/- sphincteric incompetence / VUR
Age	> ? 7 yrs (any age)
Therapy	counseling 2 x 1 hr ileocystoplasty + BN enforcement + Mitrofanoff (umbilicus / R lower quadrant) MACE rarely done: bowel irrigation with Peristeen system is usually preferred

Neuropathic bladder in children
continent diversion

Independent

Less time consuming

Improves self-esteem

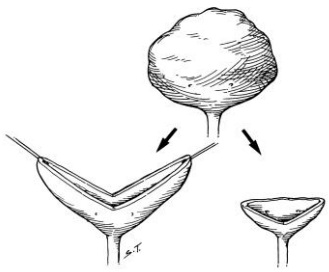
Bladder augmentation

Possibilities

- Intestinoplasty (clam cystoplasty)
- Gastrocystoplasty
- Ureterocystoplasty
- Autoaugmentation (detrusorotomy,detrusorectomy)
- Autoaugmentation with use of seromuscular segment of sigmoid or stomach)
- (Tissue engineering)

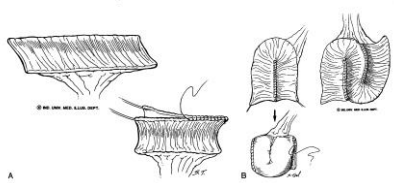
Objective: increase capacity /
improve compliance: lower the pressure

Clam cystoplasty

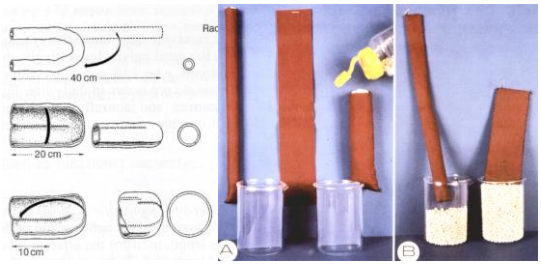


Detubularization

- Bowel can generate up to 60-100 cm H20
- opening the bowel on its antimesenteric border….and subsequent reconfiguration into spherical shape

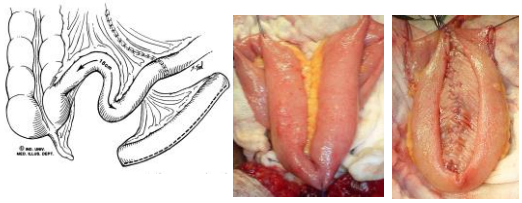


detubularization



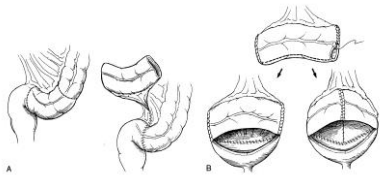
Ileocystoplasty

- The least contractile tissue
- 20-30 cm of ileum, resection ends 15-20 cm proximal to the ileocaecal valve
- Reconfigured into a U shape or S, or W



Sigmoid cystoplasty

- redundant and dilated in spinal dysraphism, adjacent to the bladder
- 15-20 cm segment
- detubularization and reconfiguration (into U or S)

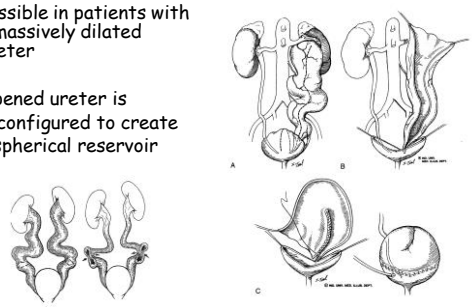


Ureterocystoplasty

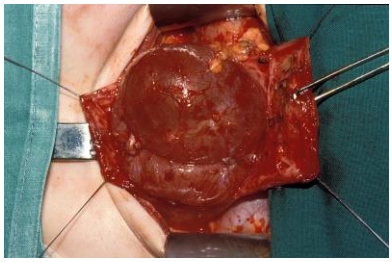
(Bellinger 1993)

possible in patients with a massively dilated ureter

Opened ureter is reconfigured to create a spherical reservoir

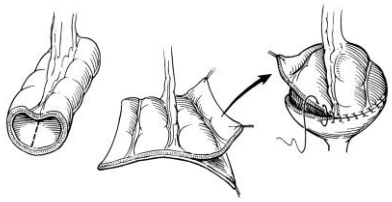


Auto-augmentation



Autoaugmentation with seromuscular segments

- demucosalized sigmoid or gastric segment (with urothelial lining or without)



Autoaugmentation with seromuscular segments - results

- tedious procedure, continent stoma not feasible
- long-term results excellent in 90% of patients (10% failure only - with ileal segments)

  329% increase in bladder capacity

Lima et al. 2004

Long-term follow-up cystoplasty

- ultrasonography
- serum creatinine, electrolytes, Ph, PCO2 etc
- urodynamics
- cystoscopy (yearly at 10 years postoperatively ??)
- Bone density?

Stones in a reconstructed bladder risk factors, incidence

- urinary stasis
- abnormal urine pH
- bacteriuria (urea-splitting)
- mucus production
- poor bladder emptying (Continent stoma!!)
- foreign body (staples)
- Pre-existing history

gastrocystoplasty (uric acid st.)	2 - 9 %
enterocystoplasty	12-50 %
ileocolonic cystoplasty	19 %

augmentation / complications

Long-term results bladder augmentation

- secondary procedures 21 %
  - stones / stomal stenosis
  - capacity / leakage
- tertiary procedure 9 %
- more than 4 procedures 4 %

- Good result after primary procedure 66 %
  - continent / no stenosis / CIC 4-6 dd

At 10 years follow-up: 66 % → 52 %

About half need more than 1 procedure!!

Other complications

- Mucus production (irrigation each day)
  - Hussman: daily irrigation with 250 ml saline significant reduction in UTI / stones
- Urinary tract infection….irrigate!!
- Spontaneous bladder perforation (most concerning, in 4,5-16.5 %, CT)
- Malignancy in a reconstructed bladder (mostly in the mixture of urinary and fecal streams, latency period, endoscopy beginning (10 years after op??)

Long-term results bladder augmentation

N=203 adult SB patients (Mayo Clinics), 2015

- alcohol abuse 12 %
- drug abuse 16 %
- non-compliance CIC 6 %
- bladder perforation 2 %

- mental retardation n=36
  - > non-compliance CIC 16 %
  - > bladder perforation 25 %

Long-term outcome bladder augmentation

80 high risk SB patients

- normal kidney function at transfer
- 32 developed new scars
- 10/32 silent scars
- 12/32 > stage 3 CRF !!
- 15/32 renal stones

➔ 12/80 = 15 % progressed to > stage 3 CRF !!

Long-term results bladder augmentation

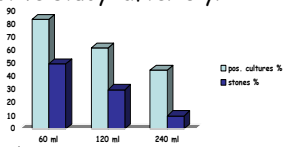
- UTI's + bladder stones
- Study Mayo clinics 2015: 78 adult SB patients
  all augmented + outlet procedures + cont. channels
  all presented with bladder stones + were treated
- 3 groups: A. irrigation with 60 ml saline daily
  B. irrigation with 120 ml saline daily
  C. irrigation with 240 ml saline daily
  } + AB

Long-term results bladder augmentation

- UTI's + bladder stones
  3 groups: A. irrigation with 60 ml saline daily
  B. irrigation with 120 ml saline daily
  C. irrigation with 240 ml saline daily
  } + AB
- Noncompliance: missed 1 per week
  - A. 13 %
  - B. 15 %
  - C. 20 %

Long-term results bladder augmentation

- UTI's + bladder stones in adult Spina Bifida patients
- Prospective study: after 5 yr



- 60 vs 240 ml P < 0,05
- Metabolic abnormalities 91% / hypocitraemia 75% (rec. stones 100%!!)
- Upper tract stones 13%

Long-term results bladder augmentation

- Conclusion:

  Daily irrigation with 240 ml !!!!!

  use active irrigation + syringe

  tab water as effective !! + cheap

Long-term results bladder augmentation

- SB patients are different from other patients with congenital abnormalities
  - they do not adhere to CIC at regular intervals
  - transfer to adult urology needs a lot of attention + special care / facilities
  + life-long follow-up !!!
  - cognitive function is impaired !!!

It is not that they don't want to do it, but they just won't

Journal of Pediatric Urology (2014) 10, 1043–1050

ELSEVIER

Journal of Pediatric urology

Cumulative incidence of outcomes and urologic procedures after augmentation cystoplasty

Bruce J. Schlomer [a,*], Hillary L. Copp [b]

Methods: Children ≤18 years who underwent AC in the Pediatric Health Information System from 1999 to 2010 were included. All follow-up encounters up to June 2012 were included. Cumulative incidences for 15 outcomes and urologic procedures were calculated using non-informative censoring. Sensitivity analyses were performed to determine effect of censoring

Table 1 Augmentation cystoplasty patient characteristics.

Total number	2831
Number with follow-up	2074 (73%)
Median years of follow-up[a]	3.3 (1.5–6.1)
Median number of encounters[a]	5 (3–10)
Female	53.4%
Race	
White	46.8%
Black	7.8%
Hispanic	18.8%
Other/missing	26.7%
Diagnosis	
Spina bifida	55.1%
BEEC	12.6%
LUTO	2.9%
CAM	4.5%
NB	13.8%
Other	11.2%
Mean age in years (SD) at AC	9.1 (4.7)
Bladder neck surgery at AC	16.8%
Catheterizable stoma at AC	39.3%
Median LOS in days[a]	8 (6–10)

AC = augmentation cystoplasty; NB = neurogenic bladder unspecified; BEEC = bladder exstrophy epispadias complex; LUTO = lower urinary tract obstruction; CAM = cloacal or anal malformation; LOS = length of stay.
[a] Data presented as median (25–75 percentile).

Table 2 Cumulative incidence of outcomes and urologic procedures at 1, 3, 5, and 10 years assuming non-informative censoring.

	1 year N = 1698	3 year N = 1118	5 year N = 701	10 year N = 101
Outcomes				
Bladder rupture	1.1 (0.7–1.6)	3.5 (2.7–4.6)	4.1 (3.2–5.3)	6.4 (4.9–8.3)
Bladder stone	2.3 (1.7–3.1)	10.9 (9.4–12.7)	17.7 (15.6–20.3)	36.0 (31.1–41.4)
Upper tract stone	0.9 (0.5–1.4)	3.4 (2.5–4.4)	6.0 (4.7–7.5)	15.5 (11.7–20.3)
Pyelonephritis	8.9 (7.7–10.3)	16.9 (15.2–18.9)	23.3 (21.1–25.7)	37.1 (32.6–41.9)
Small bowel obstruction	3.6 (2.8–4.5)	6.0 (5.0–7.2)	8.1 (6.8–9.7)	10.3 (8.4–12.6)
Bowel fistula	0.7 (0.4–1.3)	2.0 (1.4–2.9)	3.0 (2.2–4.2)	5.9 (4.0–8.3)
Chronic kidney disease	3.5 (2.7–4.4)	7.0 (5.8–8.4)	9.5 (8.0–11.3)	20.3 (16.4–25.1)
Death	0.2 (0.1–0.6)	0.6 (0.3–1.2)	1.2 (0.7–2.0)	1.8 (1.1–3.1)
Procedures				
Ureteroscopy	0.4 (0.2–0.8)	0.9 (0.6–1.5)	1.5 (1.0–2.4)	2.4 (1.4–4.0)
PCNL	1.1 (0.7–1.6)	2.9 (2.2–3.9)	4.2 (3.2–5.5)	8.8 (6.4–12.1)
Cystolithopaxy	3.2 (2.5–4.1)	11.3 (9.8–13.0)	17.7 (15.6–20.0)	35.3 (30.4–40.7)
Reaugmentation	1.8 (1.3–2.5)	5.2 (4.2–6.4)	7.3 (5.9–8.9)	13.4(10.6–16.9)
Stoma surgery	5.6 (4.6–6.7)	13.0 (11.4–14.8)	16.9 (15.0–19.0)	27.1 (23.4–31.3)
Bladder neck surgery	2.9 (2.2–3.8)	7.1 (6.0–8.5)	9.6 (8.1–11.3)	12.6 (10.5–15.2)
Bladder neck injection	4.5 (3.7–5.6)	8.8 (7.5–10.3)	11.5 (9.9–13.4)	17.2 (14.6–20.2)

Results presented as cumulative incidence, % (95% CI).
PCNL = percutaneous nephrolithotomy.

Sensitivity analysis 2: excluded hospitals without complete datasets

	1 year N = 1503	3 year N = 996	5 year N = 633	10 year N = 93
Outcomes				
Bladder rupture	1.0 (0.7–1.6)	3.5 (2.7–4.7)	3.9 (3.0–5.1)	5.8 (4.4–7.8)
Bladder stone	2.3 (1.8–3.3)	11.5 (10.0–13.4)	18.6 (16.3–21.1)	37.6 (32.5–43.2)
Upper tract stone	0.8 (0.5–1.4)	3.2 (2.3–4.3)	5.5 (4.3–7.2)	15.1 (11.3–20.0)
Pyelonephritis	8.8 (7.5–10.3)	16.8 (14.9–18.8)	22.9 (20.5–25.4)	35.9 (31.1–41.0)
Small bowel obstruction	3.3 (2.5–4.2)	5.5 (4.5–6.8)	7.4 (6.1–9.0)	9.4 (7.4–11.7)
Bowel fistula	0.8 (0.5–1.3)	2.2 (1.5–3.1)	3.1 (2.3–4.3)	5.8 (3.9–8.6)
Chronic kidney disease	3.5 (2.7–4.6)	7.0 (5.7–8.5)	9.7 (8.1–11.6)	19.6 (15.7–24.5)
Death	0.2 (0.1–0.6)	0.6 (0.3–1.2)	1.1 (0.6–2.0)	1.8 (1.0–3.2)
Procedures				
Ureteroscopy	0.4 (0.2–0.9)	0.9 (0.5–1.5)	1.5 (0.9–2.5)	2.5 (1.4–4.2)
PCNL	1.1 (0.7–1.7)	2.7 (2.0–3.7)	3.7 (2.8–5.0)	8.5 (6.0–12.1)
Cystolithopaxy	3.4 (2.6–4.4)	11.8 (10.2–13.7)	18.3 (16.0–20.8)	35.5 (30.6–41.0)
Reaugmentation	1.6 (1.1–2.3)	4.6 (3.6–5.8)	6.7 (5.4–8.4)	12.9 (10.0–16.5)
Stoma surgery	5.1 (4.1–6.3)	10.4 (8.8–12.1)	13.3 (11.5–15.3)	21.8 (18.2–25.9)
Bladder neck surgery	2.8 (2.0–3.6)	6.6 (5.4–8.0)	8.8 (7.3–10.6)	10.9 (8.9–13.2)
Bladder neck injection	5.2 (4.2–6.4)	9.6 (8.1–11.3)	12.6 (10.8–14.6)	18.7 (15.9–22.0)

Results presented as cumulative incidence, % (95% CI).
PCNL = percutaneous nephrolithotomy.

Bladder augmentation:

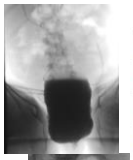
- Many complications !!
- > 50 % of patients need secondary surgery < 10 yrs
- more emphasis on prevention!!

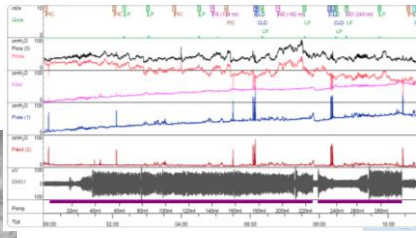
Conclusions

- Bladder augmentation should be performed only after all available conservative measures failed
- primary objective is to preserve upper tract + to become continent + become independent
- you may have to go back for 2nd procedure: use omentum to cover the bladder / fix pouch so you can have easy percutaneous access
- Patient should be followed-up life-long and widely informed about possible complications

thank you

Case





Boy, 9 yr old, Spina Bifida

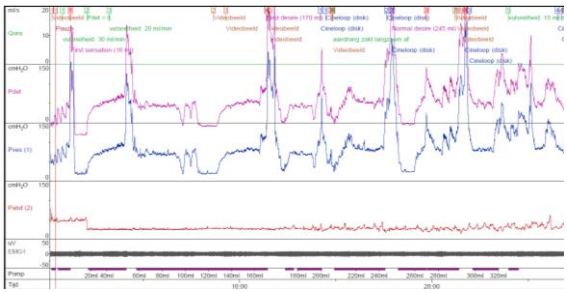
Incontinent on CIC + anticholinergics

Case

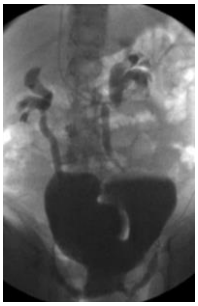
- Poor compliance
- Tx: bladder augmentation + continent channel

- After surgery: dry + CIC (no problems)
- After 6 mo: difficulty CIC + pain both flanks with full bladder

- Videourodynamic study



Case



Video urodynamics:

Lively contractions pouch

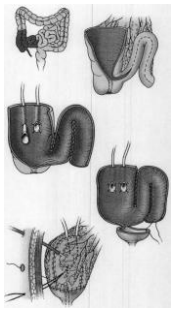
High pressures during contractions + pain both flanks: VUR

UTI: when treated no more pain etc.

Exclude UTI or treat it before such a study!!

Surgical technique of bladder substitution

- *Colon*
- *Ileocecal segment*
- *Small bowel*
  - 30-40 cm (optimal length)



Long-term results in bladder substitution in children

Kock pouch

Reoperation in 69%

Deterioration of renal function in 8/19 after 3-10 years (Abd-el Gawad et al. 1999)

Risk of stenosis in submucosal tunneling (13%)

Abol-Eneim and Ghoneim (1994) – inter-serosal tunnel implantation

97% continence

appendiceal stoma, tapered ileal segment, invaginated ileal nipple (Stein 1999, Filipas 2001)

Bladderstones in up to 50%

Bladder rupture

(less during C.I.C) in up to 25 %,

Mainz pouch II – 95 % of continence, 69 % use oral alkalinizing drugs (D Elia et al. 2004)

Bambino Gesù
OSPEDALE PEDIATRICO

ICS 2016, Tokyo
TOKYO 13th - 16th September 2016

SACRAL NEUROMODULATION

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ICS 2016, Tokyo
TOKYO 13th - 16th September 2016

Disclosures

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Other: Board Member
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Other: Chair of Children's Committee

Trial partecipation
Pfizer
Allergan

Consultant
Coloplast
Wellspect
Medtronic

Bladder, bowel, sexual DYSFUNCTIONS

ICS 2016, Tokyo
TOKYO 13th - 16th September 2016

- spina bifida, open and closed
- anal atresia with sacral anomalies
- sacral agenesis
- trauma
- neurologic diseases
- Iatrogenic lesions

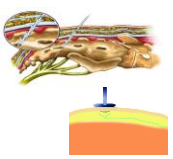
- Exstrophy
- Ano-rectal malformation

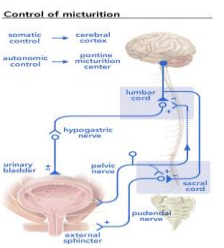
Review Article

ICS 2016, Tokyo

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

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





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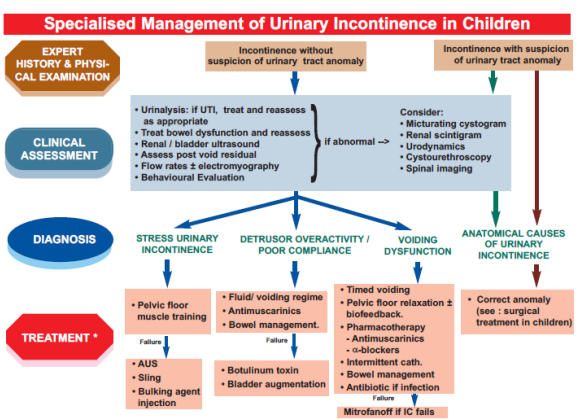
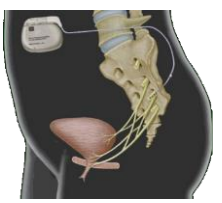


Neuromodulation

ICS 2016, Tokyo
TOKYO 13th - 16th September 2016

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

- Detrusor
- Rectum
- Pelvic floor
- sphincters



8

Neuromodulation

ICS 2016, Tokyo 13th - 16th September 2016

- Overactive bladder
- Dysfunctional voiding
- Underactive bladder (lazy bladder)
- Neurogenic bladder dysfunction

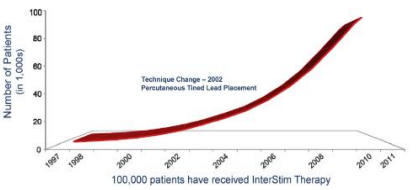
- Foecal incontinence
- Chronic constipation

Implantable Neuromodulation for Urinary Urge Incontinence and Fecal Incontinence

Urol Clin N Am 39 (2012) 397–404

Paul D.M. Pettit, MD*, Anita Chen, MD

Number of InterStim implants worldwide



100,000 patients have received InterStim Therapy

8

outcome measures

50% improvement in one of the criteria is defined as good candidate

Neurogenic Bladder

leaking episodes per day (number and degree)

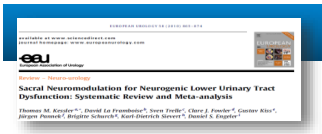
Number of pads replaced per day

Post void residual

N° of intermittent catheterisms per day

Neurogenic Bowel

- Episodes of faecal incontinence per day
- Number of defecation per day
- Wexner score



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

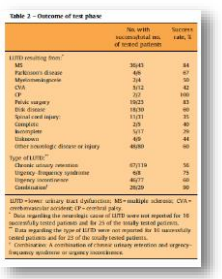


Table 2 – Outcome of test phase

	No. with successful test no. of tested patients	Success rate, %
LUTD resulting from:†		
MS	39/43	84
Parkinson's disease	4/6	67
Myelomeningocele	3/4	50
CVA	3/12	42
CP	2/2	100
Pelvic surgery	19/23	83
Disk disease	18/30	60
Spinal cord injury:	11/31	35
Complete	2/5	40
Incomplete	5/17	29
Unknown	4/9	44
Other neurologic disease or injury	48/80	60
Type of LUTD:‡		
Chronic urinary retention	67/119	56
Urgency-frequency syndrome	6/8	75
Urgency incontinence	46/77	60
Combination§	28/29	96

LUTD = lower urinary tract dysfunction; MS = multiple sclerosis; CVA = cerebrovascular accident; CP = cerebral palsy.
* Data regarding the neurologic cause of LUTD were not reported for 16 successfully tested patients and for 2% of the totally tested patients.
† Data regarding the type of LUTD were not reported for 81 successfully tested patients and for 22 of the totally tested patients.
‡ Combination: A combination of chronic urinary retention and urgency-frequency syndrome or urgency incontinence.

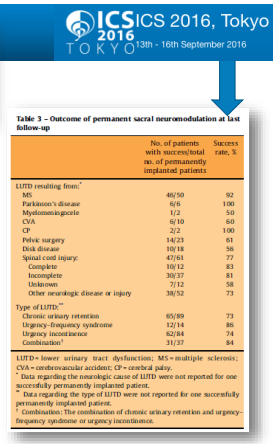


Table 3 – Outcome of permanent sacral neuromodulation at last follow-up

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

LUTD = lower urinary tract dysfunction; MS = multiple sclerosis; CVA = cerebrovascular accident; CP = cerebral palsy.
* Data regarding the neurologic cause of LUTD were not reported for one successfully permanently implanted patient.
** Data regarding the type of LUTD were not reported for one successfully permanently implanted patient.
† Combination: The combination of chronic urinary retention and urgency-frequency syndrome or urgency incontinence.

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

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

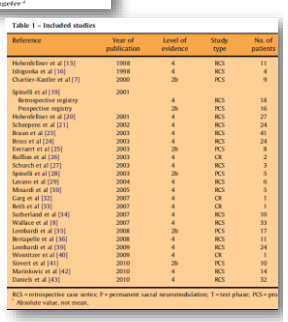
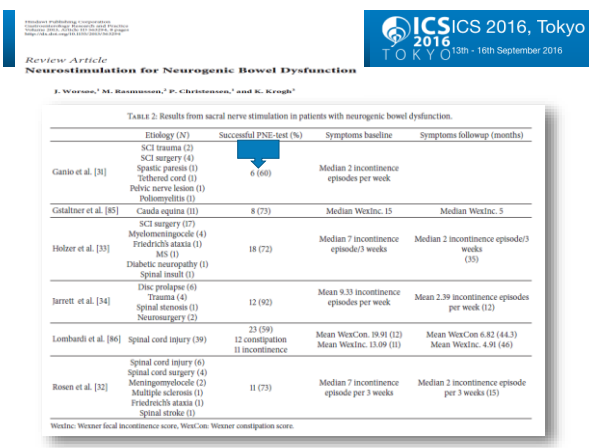


Table 1 – Included studies

Reference	Year of publication	Level of evidence	Study type	No. of patients
Hohenfellner et al [15]	1998	4	RCS	11
Ishigooka et al [16]	1998	4	RCS	4
Chartier-Kastler et al [7]	2000	2b	PCS	9
Spinelli et al [19]	2001			
Retrospective registry		4	RCS	18
Prospective registry		2b	PCS	16
Hohenfellner et al [20]	2001	4	RCS	27
Schmpero et al [21]	2002	4	RCS	24
Braun et al [22]	2003	4	RCS	41
Bross et al [24]	2003	4	RCS	24
Everaert et al [25]	2003	2b	PCS	8
Ruffion et al [26]	2003	4	CR	2
Schurch et al [27]	2003	4	RCS	3
Spinelli et al [28]	2003	2b	PCS	3
Lavano et al [29]	2004	4	RCS	6
Misardi et al [30]	2005	4	RCS	5
Garg et al [32]	2007	4	CR	1
Roth et al [33]	2007	4	CR	1
Sutherland et al [34]	2007	4	RCS	10
Wallace et al [8]	2007	4	RCS	33
Lombardi et al [35]	2008	2b	PCS	17
Bertapelle et al [36]	2008	4	RCS	11
Lombardi et al [39]	2009	4	RCS	24
Wenitzer et al [40]	2009	4	CR	1
Siewert et al [41]	2010	2b	PCS	10
Marinkovic et al [42]	2010	4	RCS	14
Danieli et al [43]	2010	4	RCS	32

RCS = retrospective case series; P = permanent sacral neuromodulation; T = test phase; PCS = pro
* Absolute value, not mean.



Review Article
Neurostimulation for Neurogenic Bowel Dysfunction

J. Worsøe,† M. Rasmussen,† P. Christensen,† and K. Krogh†

Table 2: Results from sacral nerve stimulation in patients with neurogenic bowel dysfunction.

	Etiology (N)	Successful PNE-test (%)	Symptoms baseline	Symptoms followup (months)
Ganio et al. [31]	SCI trauma (2) SCI surgery (4) Spastic paresis (1) Tethered cord (1) Pelvic nerve lesion (1) Poliomyelitis (1)	6 (60)	Median 2 incontinence episodes per week	
Gstaltner et al. [85]	Cauda equina (11)	8 (73)	Median WexInc. 15	Median WexInc. 5
Holzer et al. [33]	SCI surgery (17) Myelomeningocele (4) Friedrich's ataxia (1) MS (1) Diabetic neuropathy (1) Spinal insult (1)	18 (72)	Median 7 incontinence episode/3 weeks	Median 2 incontinence episode/3 weeks (35)
Jarrett et al. [34]	Disc prolapse (6) Trauma (4) Spinal stenosis (1) Neurosurgery (2)	12 (92)	Mean 9.33 incontinence episodes per week	Mean 2.39 incontinence episodes per week (12)
Lombardi et al. [86]	Spinal cord injury (39)	23 (59) 12 constipation 11 incontinence	Mean WexCon. 19.91 (12) Mean WexInc. 13.09 (11)	Mean WexCon 6.82 (44.3) Mean WexInc. 4.91 (46)
Rosen et al. [32]	Spinal cord injury (6) Spinal cord surgery (4) Meningomyelocele (2) Multiple sclerosis (1) Friedreich's ataxia (1) Spinal stroke (1)	11 (73)	Median 7 incontinence episode per 3 weeks	Median 2 incontinence episode per 3 weeks (15)

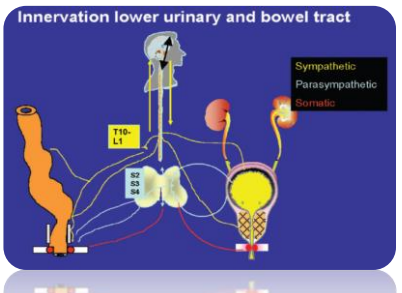
WexInc: Wexner fecal incontinence score, WexCon: Wexner constipation score.

SNM & Neurogenic bowel

ICS 2016, Tokyo 13th - 16th September 2016

- Mainly, spinal cord patients and of those only incomplete lesions
- Amelioration around 60% in implanted patients
- same clinical efficacy in short and medium term
- No correlation between clinical success and manometry parameters.
- Early implantantion (< 3 years) as positive predictive parameter for success
- Significant positive impact on QoL ($p<0.05$) reported by authors

ICS 2016, Tokyo 13th - 16th September 2016



NEUROMODULATION

Level of evidence: 3.
Grade of recommendation C

Guys JM, Haddad M, Planche D et al. Sacral neuromodulation for neurogenic bladder dysfunction in children J Urol 2004

ICS 2016, Tokyo 13th - 16th September 2016

- First multicenter study published on SNM in children
- 42 patients with spina bifida, randomized NMS vs conventional treatment
- Other than 1 child who achieved continence with CIC, the study failed to demonstrate significant beneficial effects.
- More regular fecal transit and reduced urinary leak were observed in 50% of patients, and bladder sensation was reported in 14%.
- A significant increase in leak point pressure was observed in the implant group.

ICS 2016, Tokyo 13th - 16th September 2016

SACRAL NEUROMODULATION FOR NEUROGENIC BLADDER DYSFUNCTION IN CHILDREN

J. M. GUYS

JOURNAL OF UROLOGY
172, 1673–1676, October 2004

This study was based on the rationale that residual neurogenic activity can subsist in the medullary cone of patients with congenital neurogenic bladder due to defects such as spina bifida and that the level of response depends on the extremely variable extent of intact nerve structures.

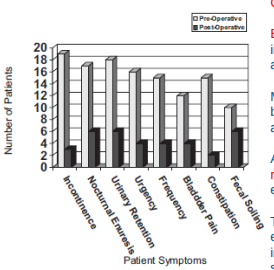
Humphreys, M.R., Vandersteen, D.R., Slezak, J.M et al. Preliminary results of sacral neuromodulation in 23 children Journal of Urology 2006

ICS 2016, Tokyo 13th - 16th September 2016

- 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

ICS 2016, Tokyo 13th - 16th September 2016



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.

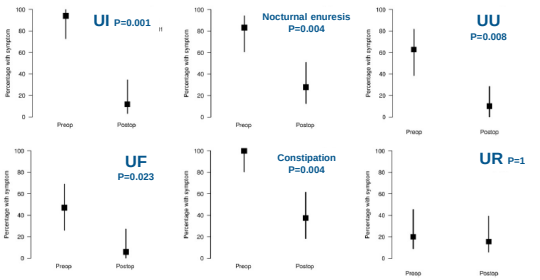
After InterStim placement, an average satisfaction rate of 64% for pts and 67% for caregivers was expressed.

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.

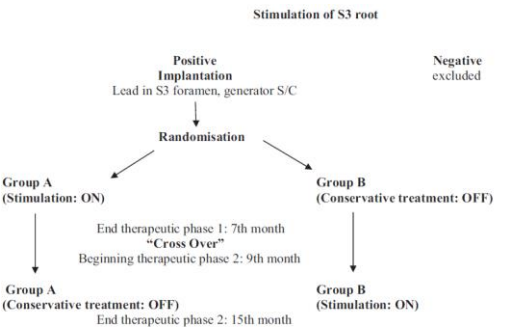
Roth TJ, Vandersteen DR, Hollatz P et al., J Urol 2008
Sacral neuromodulation for the dysfunctional elimination syndrome: a single center *experience with 20 children.*



Sacral Neuromodulation in Children With Urinary and Fecal Incontinence: A Multicenter, Open Label, Randomized, Crossover Study
M. Haddad, * R. Besson, D. Aubert et al., THE JOURNAL OF UROLOGY 2010

- A total of 41 patients underwent trial assessment between April 2004 and September 2007, mean age 12.22 ± 5.09 years.
- The S3 root was detected in only 33 patients who were randomized, overall implantation success was 81%.
- Incontinence was urinary only in 9 patients, fecal only in 5 and mixed in 19. A total of 17 patients with urinary incontinence were on CIC.
- The most frequent underlying etiologies were: spina bifida in 10 patients, sacral agenesis in 8, miscellaneous neurological anomalies in 7 (including 2 tumors), and congenital colonanal and urinary malformations in 5.
- Patients were randomly divided into 2 treatment groups

Sacral Neuromodulation in Children With Urinary and Fecal Incontinence: A Multicenter, Open Label, Randomized, Crossover Study
*M. Haddad, * R. Besson, D. Aubert et al., THE JOURNAL OF UROLOGY 2010*



Sacral Neuromodulation in Children With Urinary and Fecal Incontinence: A Multicenter, Open Label, Randomized, Crossover Study
*M. Haddad, * R. Besson, D. Aubert et al., THE JOURNAL OF UROLOGY 2010*

- Clinical response was significantly better when SNM was ON than OFF (75% vs 21%, p 0.001). No patient was scored as a responder when SNM was OFF and nonresponder when SNM was ON.
- A significant increase in cystometric bladder capacity was observed during stimulation (delta 24.27 ml vs 37.45 ml, p 0.01). The bladder was significantly more overactive with than without neuromodulation (1 vs 0.36, p 0.001). No significant difference was noted between other urodynamic and rectomanometric variables
- The procedure was well tolerated: two types of complications occurred, ie infection (4 cases) and electrode migration (2). No patients dropped out of the study due to worsening urodynamic parameters with upper tract deterioration.

ORIGINAL CONTRIBUTION

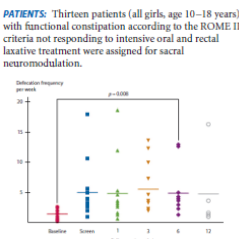
Sacral Neuromodulation Therapy: A Promising Treatment for Adolescents With Refractory Functional Constipation

Bart P. van Wunnik, M.D.[1] • Babette Peeters, M.D.[2] • Ilas Govaert, M.D., Ph.D.[1]
Fred H. Nieman, Ph.D.[3] • Marc A. Benninga, M.D., Ph.D.[2] • Cor G. Baeten, M.D., Ph.D.[1]

Dis Colon Rectum 2012; 55: 278–285
DOI: 10.1097/DCR.0b013e3182405c61

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.



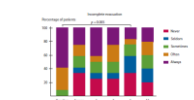


FIGURE 1. Defecation frequency.

Journal of Pediatric Surgery

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

Jason P. Sulkowski [a,b], Kristine M. Nacion [a], Katherine J. Deans [a,b], Peter C. Minneci [a,b], Marc A. Levitt [b], Hayat M. Mousa [b,c], Seth A. Alpert [b,d], Steven Teitch [b,e]

Table 1
Baseline characteristics of patients who underwent placement of sacral nerve stimulator (SNS).

	SNS placement participants (N = 29)
Male, n (%)	13 (44.9)
Race, n (%)	
White	26 (89.7)
Non-white	3 (10.3)
Age, median (IQR)	12.1 (9.4, 14.1) years
Symptoms, n (%)	
Gastrointestinal	27 (93.1)
Urinary	19 (65.5)
Both	17 (58.6)
History, n (%)	
Idiopathic	19 (65.5)
Hirschprung's disease	1 (3.4)
Sprina	1 (3.4)
Imperforate anus	8 (27.6)
With tethered cord	1 (3.4)
With myelomeningocele	1 (3.4)

Data are presented as medians and interquartile ranges (IQR) for continuous variables and frequencies and percentages for categorical variables.

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 in this 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

Pediatric Urology

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

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

Table 4. Causes of reoperation after sacral neuromodulation for refractory symptoms of the dysfunctional elimination syndrome in 105 consecutive children with 3.1 years of average follow-up

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

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 worsen. Urinary incontinence, constipation, frequency and/or urgency, and nocturnal enuresis improved in 89 of 101 (88%), 73 of 92 (79%), 56 of 81 (67%), and 59 of 89 (66%) children, respectively, and resolved in 41 of 101 (41%), 37 of 92 (40%), 23 of 81 (28%), and 25 of 89 (28%) children, respectively. Outcomes among patients who did and did not undergo the trial were not significantly different ($P = .19$-1.00), and only 2 of 88 patients did not undergo permanent implantation. Reoperations (n = 85) 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 2.68 years since implantation (median, 2.36 years; range, 0.03-9.04 years), mainly for complete symptom resolution (n = 12). Explantation 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 anesthetics without sacrificing outcomes. UROLOGY 84: 911–918, 2014. © 2014 Elsevier Inc.

Suggested in Dys.Elimination Syndrome

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, 1239-1244, 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.

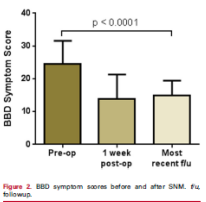


Figure 2. BBD symptom scores before and after SNM. f/u, followup.

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.

Evaluation

- patient's history and physical examination
- urinalysis
- bladder scan / post-void residual (PVR)
- uroflow/electromyography (EMG)
- renal/bladder ultrasound
- voiding cystourethrogram (VCU)
- urodynamics tests
- Neurophysiological tests

SELECTION

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

Sacral neuromodulation: an effective treatment for lower urinary tract symptoms in multiple sclerosis

Neurogenic bowel management after spinal cord injury: A systematic review of the evidence

Management of sexual dysfunction due to central nervous system disorders: a systematic review

Although the results of SNM in neurological patients are promising, the evidence level of the studies is generally low, and RCTs are lacking.

Sacral Neuromodulation for Treating Neurogenic Bladder Dysfunction: Clinical and Urodynamic Study

Wassim Chaabane,[1] Julien Guillotreau,[1] Evelyne Castel-lacanal,[1] Sami Abu-Ana,[1] Xavier De Boissezon,[2] Bernard Malavaud,[1] Philippe Marque,[1] Jean-Pierre Sarramon,[1] Pascal Rischmann,[1] and Xavier Game[1]*

34 NDO & 28 UR included

Positive test in 41 cases (66.1%)

37/41 were definitively implanted

Stable results in a mean follow-up ~ 4.3 ys

The neurological disease which associated with a better rate of test response was peripheral neuropathy

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

	Before the test	During the test	P
Mean maximum flow rate (ml/sec)	7.6 ± 3.3	14.6 ± 4.9	0.03
Mean post-void residual volume (ml)	550.0 ± 124.5	34.0 ± 16.3	<0.0001
Mean maximum cystometric capacity (ml)	341.4 ± 224.3	331.5 ± 221.1	n.s.
Mean compliance	44.9 ± 43.5	39.3 ± 23.2	n.s.
Mean maximum urethral closure pressure (cm H_2O)	68.8 ± 42.7	57.0 ± 18.1	n.s.

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

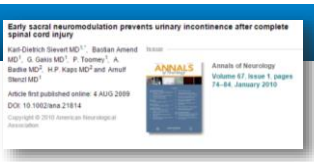
	Before the test	During the test	P
Voiding diary (24 hr)			
Mean number of micturitions	10.90 ± 3.18	6.07 ± 2.05	0.0002
Mean number of incontinence episodes	5.08 ± 0.93	0.14 ± 0.15	<0.0001
Mean number of urgency episodes	7.57 ± 0.48	1.55 ± 0.83	<0.0001
Mean number of nocturia	2.65 ± 0.41	0.35 ± 0.10	<0.0001
Urodynamic evaluation			
Mean maximum flow rate (ml/sec)	18.8 ± 3.5	18.9 ± 3.25	n.s.
Mean post-void residual volume (ml)	33.3 ± 4.5	11.7 ± 10.0	n.s.
Mean volume of first uninhibited detrusor contraction (ml)	85.3 ± 22.7	162.0 ± 34.3	0.0022
Mean maximum cystometric capacity (ml)	139.7 ± 12.5	285.0 ± 31.38	0.0022
Detrusor sphincter dyssynergia			
Yes	9	1	0.0167
No	73	82	
Mean maximum intravesical pressure (cm H_2O)	46.0 ± 14.56	20.0 ± 6.9	0.026
Mean compliance (ml/cm H_2O)	35.80 ± 10.2	32.2 ± 6.8	n.s.
Mean maximum urethral closure pressure (cm H_2O)	64.7 ± 25.4	55.0 ± 24.1	n.s.


Clinical concomitant benefits on pelvic floor dysfunctions after sacral neuromodulation in patients with incomplete spinal cord injury.

Retrospective study
75 incomplete SCI pts
37/75 with at least two pelvic dysfunctions

RESULTS:
14/ 37 subjects who manifested two pelvic dysfunctions at baseline maintained notable clinical improvement in two pelvic functions (median follow-up >3 years)

CONCLUSIONS:
SNM may be beneficial to selected incomplete SCI with concomitant pelvic functional disturbances.


Early sacral neuromodulation prevents urinary incontinence after complete spinal cord injury

complete SCL

Ten patients with complete SCL underwent **bilateral SNM** during the phase of atonic-detrusor muscle.

The mean follow-up was 26.2 months.

RESULTS:
Videourodynamics (VU) confirmed detrusor acontractility, resulting in **urinary continence** as well as significant reductions in urinary tract infections (UTIs). **Bowel** movements did not require oral laxatives; additional preprogrammed parameters achieved **erections** for intercourse.

OPBG: personal experience 2016 :42 pts

14 Neurogenic ,(2012)
Incomplete neurologic lesion
Mixed bladder emptying regime (spontaneous and CIC)
7 Congenital NBD 7 Acquired NBD
Motivated patients and families

A

Response = Patients satisfaction + one or more of the following criteria:
- <50% Incontinence episodes
- <50% Post voiding residual
- <50% Need for CIC
- >50% Increase voided volume

OPBG 2012

- 14 children, mean age 16.1 (10-21) yrs.
- Total success 71,4%
- 6/7 (86%) Acquired NBD positive response
- 4/7 (57%) Congenital NBD positive response
- Limited number :no statistical difference between the two groups

A

literature

Groen - Hoebeke et al., 2012
5 pts. 3 Congenital, 2 Acquired

Haddad – Besson et al., 2010
30 pts

Sievert-Amend et al., 2010
1 pt. Acquired Complete lesion

Wosnitzer-Walsh et al., 2009
1 pt. Acquired Incomplete lesion

Guys – Haddad et al., 2004
21 pts. 16 Congenital, 5 Acquired

Total: 57 pt.

- Total response 70,4 %
- 18 Congenital
- 14 Acquired
- 25 Unknown

- Pathologies are not well described

B

Results

Evaluation of our patients together with patients found in literature

- Total 71 patients
- Total response: 71,4% (OPBG) and 70,4% (literature)
- Response incomplete SCI: 75% (OPBG) and 100% (literature)
- Response complete SCI: 0% (literature)
- Response myelomeningocele: 0% (literature)
- Response closed spina bifida: 67% (OPBG)

A + B

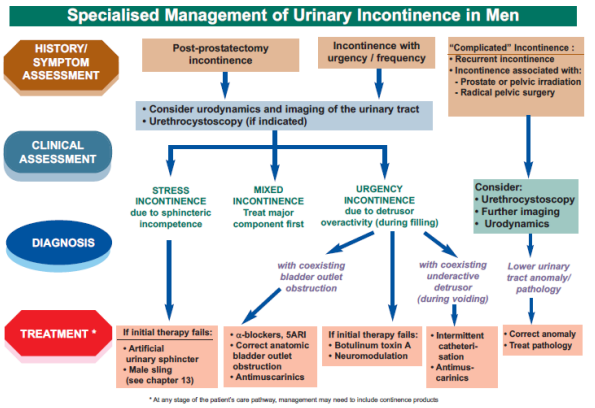
Sacral Neuromodulation in Children

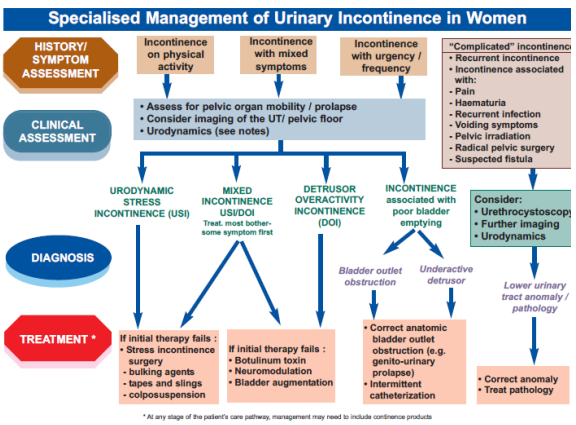
- sacral abnormalities: sacral roots and foramen?
- future need for MRI
- dislocation for traumas (children / adolescents)
- statural growth

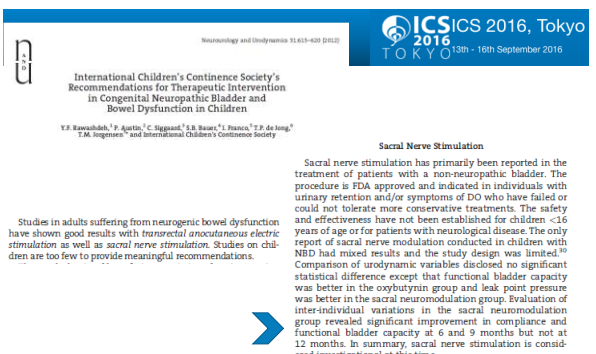
Experience from adults offered this treatment modality suggests future positive development in children to be likely.

Level of evidence: 3.

Grade of recommendation C







Neurourology and Urodynamics 31:615–620 (2012)

ICS 2016, Tokyo 13th - 16th September 2016

International Children's Continence Society's Recommendations for Therapeutic Intervention in Congenital Neuropathic Bladder and Bowel Dysfunction in Children

Y.F. Rawashdeh,[1] P. Austin,[2] C. Siggaard,[3] S.B. Bauer,[4] I. Franco,[5] T.P. de Jong,[6] T.M. Jorgensen[7]* and International Children's Continence Society

Studies in adults suffering from neurogenic bowel dysfunction have shown good results with *transrectal anocutaneous electric stimulation* as well as *sacral nerve stimulation*. Studies on children are too few to provide meaningful recommendations.

Sacral Nerve Stimulation

Sacral nerve stimulation has primarily been reported in the treatment of patients with a non-neuropathic bladder. The procedure is FDA approved and indicated in individuals with urinary retention and/or symptoms of DO who have failed or could not tolerate more conservative treatments. The safety and effectiveness have not been established for children <16 years of age or for patients with neurological disease. The only report of sacral nerve modulation conducted in children with NBD had mixed results and the study design was limited.[10] Comparison of urodynamic variables disclosed no significant statistical difference except that functional bladder capacity was better in the oxybutynin group and leak point pressure was better in the sacral neuromodulation group. Evaluation of inter-individual variations in the sacral neuromodulation group revealed significant improvement in compliance and functional bladder capacity at 6 and 9 months but not at 12 months. In summary, sacral nerve stimulation is considered investigational at this time.

Continent catheterizable reservoirs

Rien JM Nijman, FEAPU, FEBU
Dept of Urology and Pediatric Urology
University Medical Center Groningen
The Netherlands

Bladder reconstruction: indications

- End-stage bladder diseases
  - PUV
  - MMC
  - Tumors (Rabdomyosarcoma)
  - Exstrophy / Epispadias
  - Bilateral ureteral ectopia
- Urinary reconstruction may be necessary
  - Choice of tissue: Ureter / Bowel / Tissue engineering?
  - Outlet channel: Appendix / Monti tube / other

Bladder reconstruction: typical patient

MMC	refractory incontinence / noncompliant bladder / +/- sphincteric incompetence / VUR
Age	> ? 7 yrs (any age)
Therapy	counseling 2 x 1 hr ileocystoplasty + BN enforcement + Mitrofanoff (umbilicus / R lower quadrant) MACE rarely done: bowel irrigation with Peristeen system is usually preferred

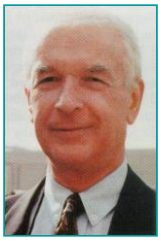
Neuropathic bladder in children
continent diversion

Independent

Less time consuming

Improves self-esteem

Prof. Paul Mitrofanoff



Cystostomie continente trans-appendiculaire dans le traitment des vessies neurologiques

Chic Pediatr 1980: 21, 297-305

Mitrofanoff principle

- Conduit
- Antireflux mechanism
- Stoma
- complications

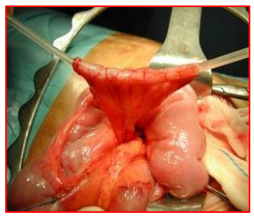
Mitrofanoff priciple

conduit

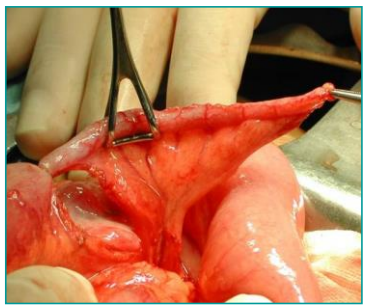
- Straight
- Supple
- Short
- Supported

- 4 x S !!

- Appendix
- Bowel segment
- Fallopian tubes
- Ureter / preputial tube / bladder



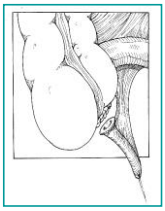
Mitrofanoff priciple

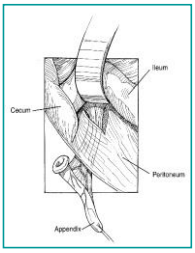


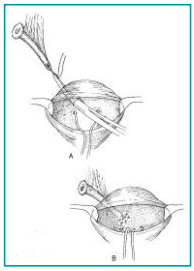
appendix

Mitrofanoff priciple

appendix

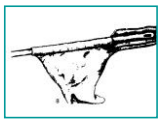


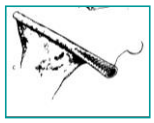


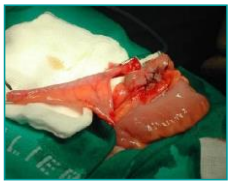


Mitrofanoff priciple

Appendix: cecal flap →lenghtening



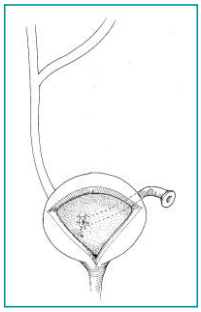




Mitrofanoff priciple

ureter

- Moro Y, Kajbafzadeh AM, German K
  - The role of ureter in the creation of Mitrofanoff channels in children, J Urol 1997, 157, 635-637



Mitrofanoff priciple

Ileum: Yang Monti

Yang WH

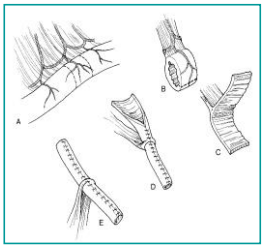
Yang needle tunneling technique in creating anti-reflux and continent mechanism

J. Urol 1993: 150, 830-834

Monti PR et al

New technique for construction of efferent conduits based on the Mitrofanoff principle

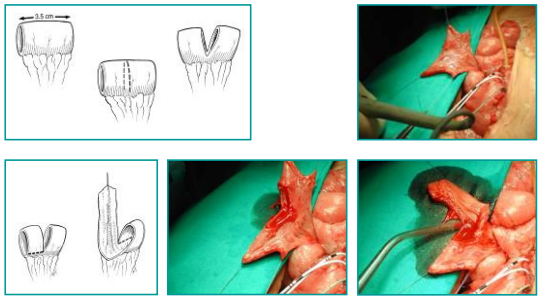
Urology 1997: 49, 112-115



Mitrofanoff priciple

Spiral Monti

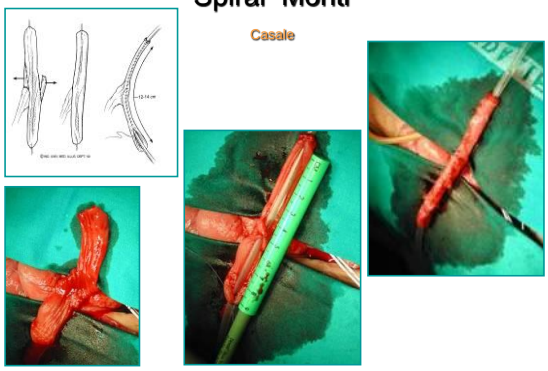
Casale



Mitrofanoff priciple

Spiral Monti

Casale

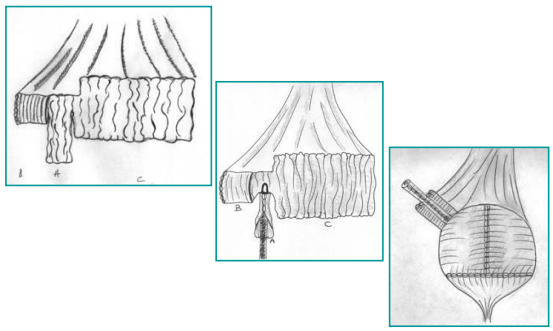


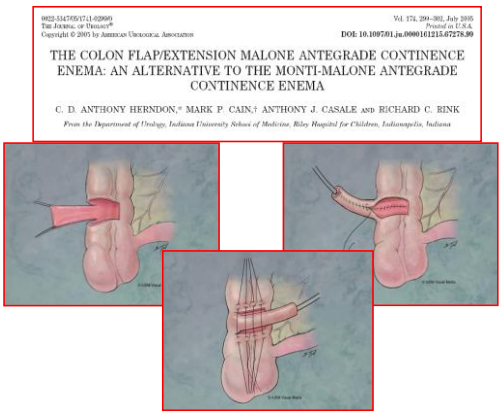
Full Monti (R Rink)

- Bladder + ACE

Mitrofanoff priciple

Ileum tube: Passerini





THE COLON FLAP/EXTENSION MALONE ANTEGRADE CONTINENCE ENEMA: AN ALTERNATIVE TO THE MONTI-MALONE ANTEGRADE CONTINENCE ENEMA

C. D. ANTHONY HERNDON,* MARK P. CAIN,† ANTHONY J. CASALE AND RICHARD C. RINK

Mitrofanoff priciple

Ant-reflux mechanism

Intra-

Extra-vesical (Lich-Gregoir)

Anterior

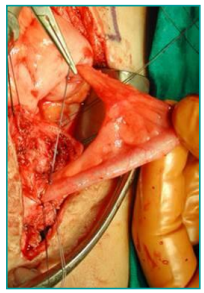
Bladder wall

Posterior

Mitrofanoff priciple

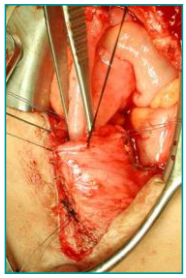
Extra Vesical: Lich Gregoir





Mitrofanoff priciple

Extra Vesical: Lich Gregoir


Mitrofanoff priciple

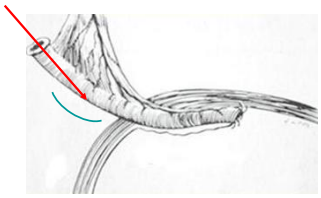
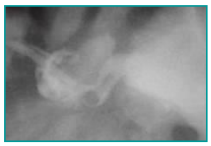
stoma

- Position
  - Lower abdominal quadrant
  - Umbilicus

- External appearence & shape

Mitrofanoff priciple

Stoma: lower abdomen / iliac fossa

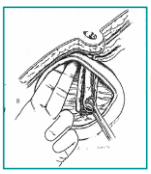
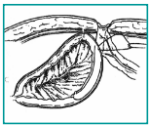



Avoid kinking

1. Curved gentle angle
2. Poor backing on anterior bladder wall
3. Whenever possible use posterior bladder wall + fix appendix to abdominal wall

Mitrofanoff priciple

Stoma sites: umbilicus

Stoma
Umbilicus

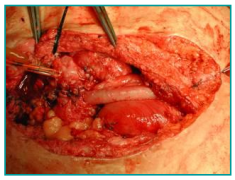
Posterior

Anterior

Mitrofanoff priciple

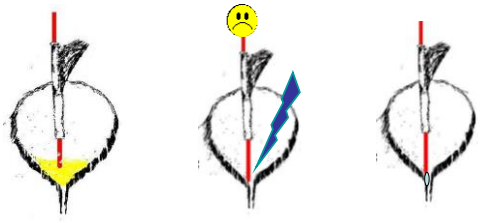
Stoma: umbilicus


Good cosmesis
Straight conduit
Good backing



Mitrofanoff priciple

Stoma: umbilicus

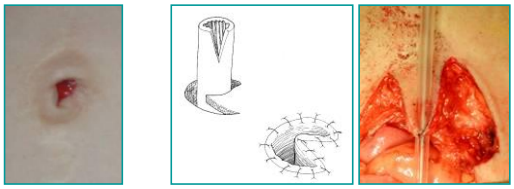


Poor drainage | pain + CIC | trauma / sting

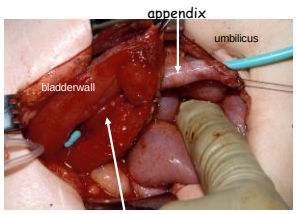
Mitrofanoff priciple

stoma

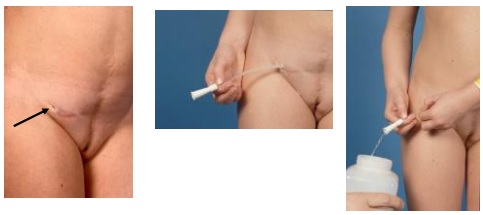
Flush | skin V flap VQZ - Ransley



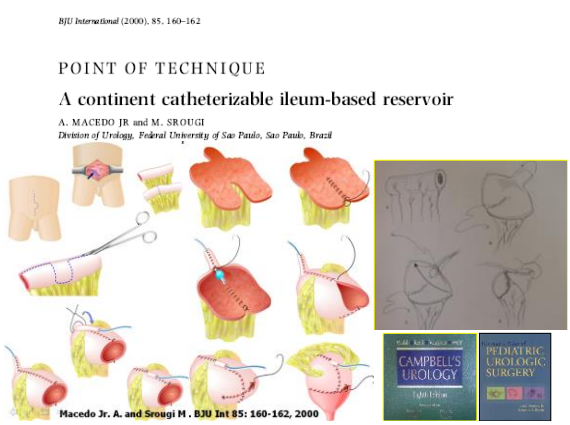
Channel in umbilicus (mucosa

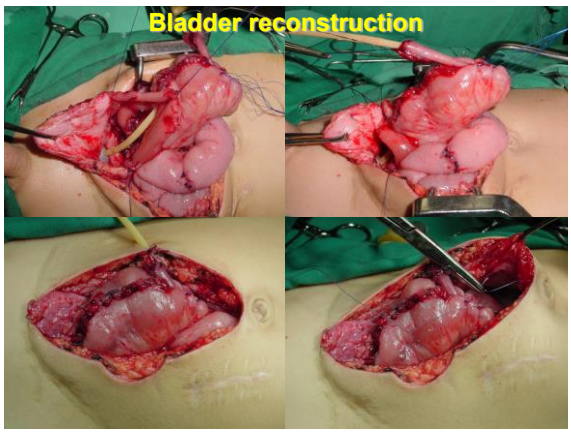


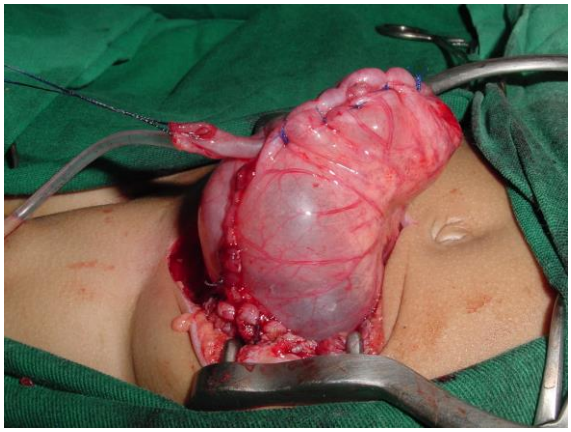
Submucosal tunnel



Girl with bladder exstrophy, continent diversion R lower quadrant, no mucosa visible

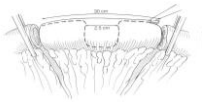


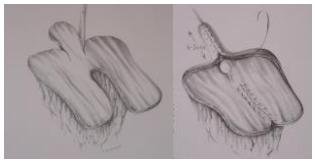




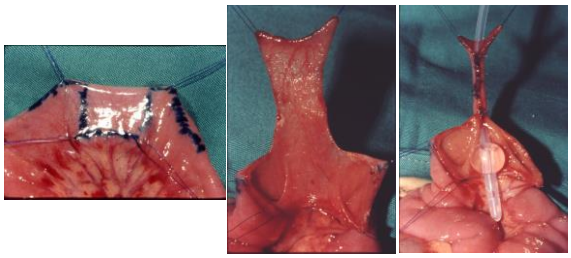
Continent catheterizable reservoir

- What have we learned?
  - The flap can be incised up to the posterior border of the ileum in the meso
    - Longer flap/ tube (up to 6cm)
    - Made from 2.5 to 3cm wide flap (Foley tube 12Fr)
    - Interrrupted polyglicolic 3.0 sutures



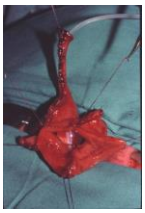


Continent catheterizable reservoir



Continent catheterizable reservoir

- Configuration of the reservoir
  - Inverted U-shape
  - Uninterrupted 3.0 long-acting absorbable sutures
    - Posterior/anterior wall



Continent catheterizable reservoir

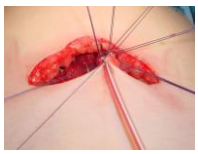
- Continence mechanism
  - Embedding the tube
  - Uninterrupted non absorbable 3.0 sutures (Prolene)

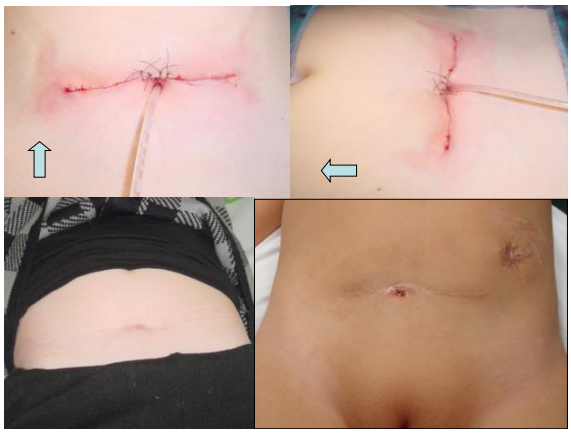
Continent catheterizable reservoir

- If angulation is important, make sure:
  - Stoma never in umbilical scar (augmentations)
  - Anchor anterior surface of the reservoir to the abdominal wall
  - Stoma in the midline

Continent catheterizable reservoir

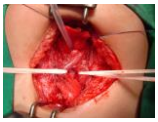
- Cosmesis
  - Past: longitudinal incisions
  - Today: transverse incisions
  - Stoma made from a semicircular midline incision



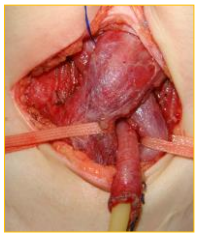


Continent catheterizable reservoir

- Very last improvement in the technique…
- Second continence mechanism
  - Improve 7% leakage in the first 100 cases
  - Rectus abdominal neosphincter (Yachia, 1997)
    - Ideal technique
      - Surgical revisions
      - Second continence line: elective indication



Continent catheterizable reservoir



Mitrofanoff complications

- Urinary leakage
- Stoma problems
  - Stenosis
  - Prolapse
  - Poor cosmesis
- Channel problems
  - Subfascial stenosis
  - Kinking
  - Stenosis at junction with the bladder
  - Polyps (benign)

Yang- Monti tubes
Continent Catheterizable Bladder Channels

- Significant controversy - increased complications in APV vs Yang- Monti tube (transverse)
- Yes*- 2:1 increased complications for Monti >APV
  - Cutaneous Stenosis equivalent
  - Sub-facial complications more frequent
    - —Pouches- false passages - angulations
- No**

*Narayanaswamy et al, BJU Int 2001, Szymanski et al, J of Ped Urology 2015

**McAndrew & Malone 2002, Lemell et al, J of Urology 2004
Castellian et al, BJU Int 2005, Piaggio et al, J of Ped Urol 2007

APV vs Monti
Meta-analysis and Systematic Review

- Reviewed 307 published articles
- Seventeen articles had pt that fit the criteria for review
- All are single institutional reviews
  - A total of 687 pts - APV
  - A total of 400 pts - single transverse Monti

APV vs Monti
Meta-analysis and Systematic Review

- Stomal stenosis – requiring surgery
- Sub-fascial revision –
  - Stricture of conduit
  - Stricture appendico-vesical junction
  - Angulation
  - Conduit prolapse
  - Parastomal hernia
  - False passage - perforation

APV vs Monti
Meta-analysis and Systematic Review

- Mean age at time of surgery
  - 9 yrs identical for APV and Monti
- Length of Follow-up
  - APV = 6 yrs (687 pts)
  - Monti = 7 yrs (400 pts)

APV vs Monti
Meta-analysis and Systematic Review

- Primary incontinence
  - APV 5.3% (37/687) vs 5.7% (23/400) Monti
  - p = 0.6974
- Secondary incontinence
  - APV 2.5% (17/687) vs 1% (4/400) Monti
  - p = 0.7954
- Continence
  - APV 92.2% (634/687) vs 93.3% (373/400)
  - p= 0.5144

APV vs Monti
Meta-analysis and Systematic Review

- Stomal stenosis
  - APV 18.3% (126/687) vs 14% (56/400) Monti
  - p = 0.6453
- Sub-fascial procedures*
  - APV 13% (92/687) vs 20.7% (83/400) Monti
  - p=0.001456*
- Need for multiple stomal revisions
  - APV 8.7% (60/687) vs 8.7% (34/400) Monti

APV vs Monti
Meta-analysis and Systematic Review

APV

- Continence
  - 92.2% (633/687 pts)
- Stomal Stenosis
  - 18.3% (126/687 pts)
- Sub-Fascial
  - 13% (92/687)
- Pt with stomal revision
  - 35% (241/687)
- Urinary diversions
  - 1.7% (12/687)

Monti

- Continence
  - 93.3% (273/400 pts)
- Stomal Stenosis
  - 14% (56/400 pts)
- Sub Fascial
  - 20.7% (83/400) p= 0.0145
- Pt with stomal revision
  - 36% (145/400)
- Urinary diversions
  - 1% (4/400)

Historical
Initial Mitrofanoff's APV vs APV

Mitrofanoff's APV (n=23 pts)

- Continence
  - 70%
- Stomal Revision
  - 39%
- Urinary diversion
  - 26%
- Mean age at diversion
  - 11 yrs
- Mean Age at F/U
  - 31 yrs

APV (N= 687 pts)

- Continence
  - 92.2%
- Stomal Revisions
  - 36%
- Urinary diversion
  - 1.7%
- Mean age at diversion
  - 9 yrs
- Mean age at F/U
  - 15 yrs

Transitional patients
APV (median 16 yrs) vs Monti (Median 11 yrs)

- APV = 166 pts Monti = 30 pts
- Mean age at surgery
  - 10 years identical for both
- Median F/U
  - APV 16 yrs (1-35 yrs)
    - Age 26 yrs (19-51 yrs)
  - Monti 11 yrs (1-15 yrs)
    - Age 22 yrs (19- 31 yrs)

Transitional Urology Clinic
APV (Median 16 yrs) vs Monti (Median 11 yrs)

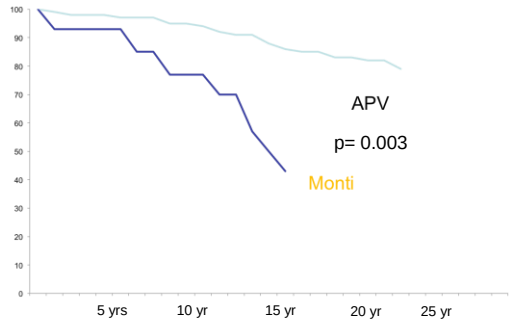
APV (N= 166pts)

- Continence
  - 85.5% (142/166 pts)
- Stomal Stenosis
  - 8.4% (14/166 pts)
- Sub-Fascial
  - 15.6% (26/166)
- Pt with stomal revision
  - 24% (40/166)
- Urinary diversions & SP
  - 14.5% (24/166)

Monti (n=30 pts)

- Continence
  - 80% (24/30 pts)
- Stomal Stenosis
  - 16% (5/30 pts)
- Sub Fascial
  - 50% (15/30) p= 0.00002
- Pt with stomal revision
  - 56% (17/30) p = 0.003
- Urinary diversions
  - 20% (6/30)

Percent of Patients Without Stomal Revision



Opinions

- In adult patients expect more complications with APV / Monti
- Double Monti → significantly more problems
- I would choose Monti tubes in adults only out of duress
  - Prefer Mainz pouch
- Highly select pts for surgery based on compliance with intermittent cath
  - Beware of affects of alcohol/drugs on compliance*

*Fox et al, J of Urology, 2010

Conclusion

- Excellent continence rates with APV /Monti
- Adults (MMC): poor compliance with CIC
- Risk of malignancy 5-8 %: regular cystoscopy ??
  - Use flexible URS (diameter 5-8 Fr).
- Bladder irrigation remains important!!
  - Saline 250 ml each time + use syringe!!
- Keep the channel as short as possible + straight + fixed to the abdominal wall

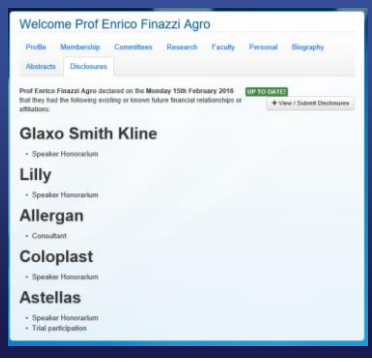
ICS 2016 TOKYO

EC13 ICS Core Curriculum (Free) Transitional Care for Continence in Congenital Malformation: What to do and when

Surgery for Continence: Sling, Bladder Neck Surgery, Artificial Sphincter

Prof. Enrico Finazzi Agrò
Dept. of Experimental Medicine and Surgery
Tor Vergata University
Unit of Functional Urology
Tor Vergata University Hospital
S. Lucia Rehabilitation Hospital
Rome, ITALY

Disclosures



Agenda

- Male and female USI
- Neurogenic USI
- Pediatric USI
- No urgency incontinence
  - No OnobotulinumtoxinA
  - No SNS

WHAT CAN WE DO IN WOMEN?

SURGERY FOR URINARY INCONTINENCE

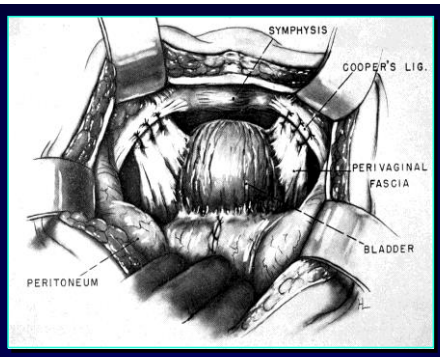
S. Salvatore

Urethrovaginal fixation to Cooper's ligament for correction of stress incontinence, cystocele, and prolapse

JOHN C. BURCH, M.D.
Nashville, Tennessee

- First performed 1958
- Three stitches each side
- No 2 Chromic catgut

Burch,1961



The completion of the fixation. Two additional sutures are added to the first fixation suture and the procedure repeated on the opposite side

Cooper's ligament urethrovesical suspension for stress incontinence

Nine years' experience—results, complications, technique

JOHN C. BURCH, M.D.*
Nashville, Tennessee

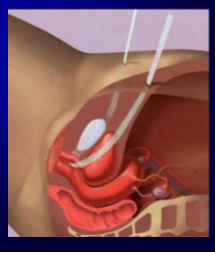
- 143 women aged 20-79 years
- 10-60 months follow-up
- 93% cured
- 7.6% enterocele

Burch, 1968

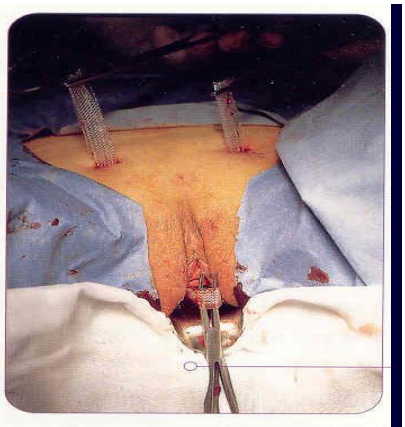
Low-tension Mid-Urethral Sling

Tension free intravaginal slingplasty

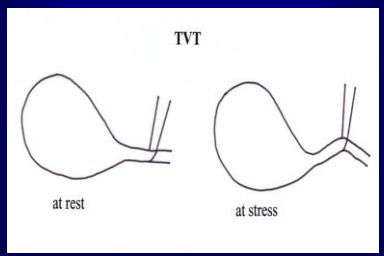
Ulmsten & Petros 1995



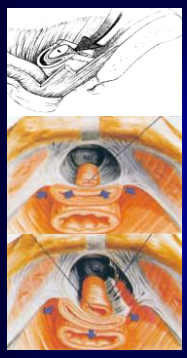
TVT



TVT

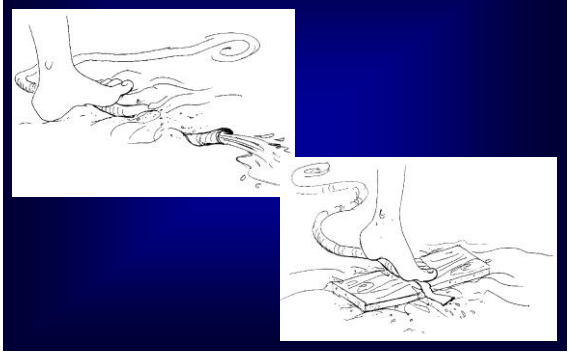


Background



HAMMOCK THEORY

- The supporting structures of the bladder neck and urethra form a sort of hammock
- Forces against this hammock determine urethral compression and avoid bladder neck descent
- This mechanism prevent stress urinary incontinence



Low-tension Mid-Urethral Sling

TOT - TRANSOBTURATOR TAPE

- Tape runs through both obturator foramina
- Cystoscopy not necessary (bladder perforation unlikely)

Delorme 2001

Single-incision mini-sling (SIMS) vs standard midurethral slings (SMUS) for female SUI

Mostafa A. Neurourol Urodyn 2013:32(6):526-8(abs.4)

- Systematic review and meta-analysis of n=25 RCTs including N=3,114 women with SUI (literature search until March 2013)
- SIMS:
  - Mini-Arc: n=6 studies; N=566 women
  - Ajust: n=3 studies; N=350 women
  - Ophira: n=1 study; N=130 women
  - Contasure: n=1 study; N=257 women
  - TFS: n=1 study; N=80 women
  - Solyx: n=1 study; N=30 women
  - TVT-Secur: n= 12 studies; N=1,606 women
- No significant differences between SIMS and SMUS (when excluding TVT-Secur) in patient-reported cure rate and objective cure rate at 12-24 mo FU

RR (95% CI; *P* value)	SIMS vs SMUS	SIMS excl. TVT-Secur vs SMUS
Patient reported cure rate	0.90 (0.85-0.95; *P*=0.0003)	0.96 (0.88-103; *P*=0.26)
Objective cure rate	0.90 (0.84-0.95; *P*=0.0003)	0.97 (0.92-1.02; *P*=0.26)

RR: relative risk; CI: confidence interval

Single-incision mini-sling (SIMS) vs standard midurethral slings (SMUS) for female SUI

Mostafa A. Neurourol Urodyn 2013:32(6):526-8(abs.4)

- SIMS vs SMUS
  - Better operative and peri-operative outcomes
  - Earlier return to normal activities and work

SIMS vs SMUS	WMD (95% CI)
Operative time	-2.04 min (-3.51 to -0.58 min)
Postoperative groin pain	-2.51 (-3.62 to -1.40)

WMD: weighted mean difference; CI: confidence interval

- No difference in lower urinary tract injuries, postoperative voiding difficulties, de-novo urgency/worsening of pre-existing urgency, QoL and sexual function
- Vaginal erosion and repeat continence surgery were significantly higher in the SIMS vs SMUS group but this was mainly due to significant difference in the TVT Secur group

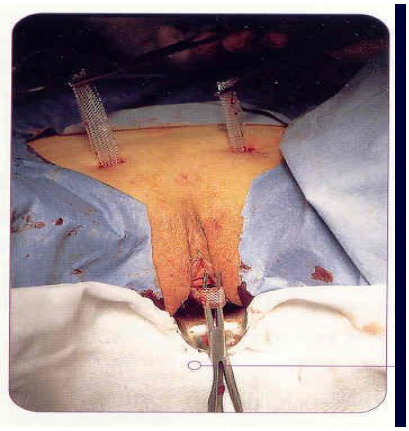
SIMS, excluding TVT-Secur, seem to have a similar cure rate and better post-operative outcomes vs SMUS at 12-24 mo FU

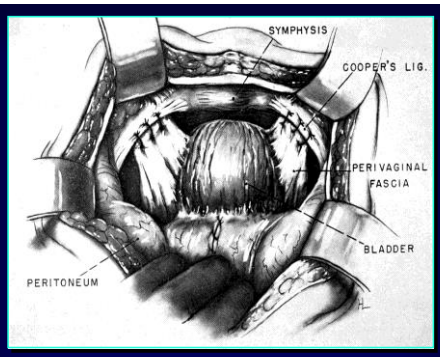
Recommendations for surgery for uncomplicated stress urinary incontinence in women	GR
Offer the mid-urethral sling to women with uncomplicated stress urinary incontinence as the preferred surgical intervention whenever available.	A
Warn women who are being offered a retropubic insertion of mid-urethral sling about the relatively higher risk of peri-operative complications compared to transobturator insertion.	A
Warn women who are being offered transobturator insertion of mid-urethral sling about the higher risk of pain and dyspareunia in the longer term.	A
Warn women who are being offered a single-incision sling that long-term efficacy remains uncertain.	A
Do a cystourethroscopy as part of the insertion of a mid-urethral sling.	C
Offer colposuspension (open or laparoscopic) or autologous fascial sling for women with stress urinary incontinence if mid-urethral sling cannot be considered.	A
Warn women undergoing autologous fascial sling that there is a high risk of voiding difficulty and the need to perform clean intermittent self-catheterisation; ensure they are willing and able to do so.	C
Inform older women with stress urinary incontinence about the increased risks associated with surgery, including the lower probability of success.	B
Inform women that any vaginal surgery may have an impact on sexual function.	B
Only offer new devices, for which there is no level 1 evidence base, as part of a structured research programme.	A*
Only offer adjustable mid-urethral sling as a primary surgical treatment for stress urinary incontinence as part of a structured research programme.	A*
Do not offer bulking agents to women who are seeking a permanent cure for stress urinary incontinence.	A*

* *Recommendation based on expert opinion.*

EAU Guidelines on Urinary Incontinence in Adults

TVT

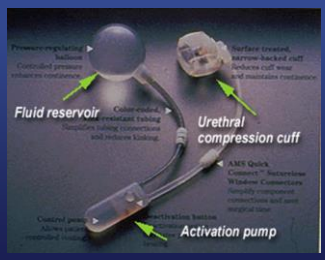




The completion of the fixation. Two additional sutures are added to the first fixation suture and the procedure repeated on the opposite side

ACT™ Ballons (Uromedica)

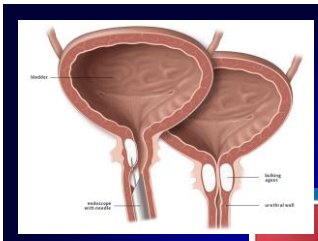
AMS 800 (AMS)

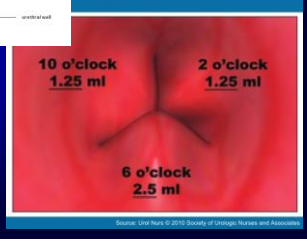


Recommendations	GR
Management of complicated stress urinary incontinence should only be offered in expert** centres.	A*
The choice of surgery for recurrent stress urinary incontinence should be based on careful evaluation of the individual patient including mutichannel urodynamics and imaging as appropriate.	C
Warn women with recurrent stress urinary incontinence, that the outcome of a surgical procedure, when used as a second-line treatment, is generally inferior to its use as a first-line treatment, both in terms of reduced efficacy and increased risk of complications.	C
Consider secondary synthetic sling, colposuspension or autologous sling as first options for women with complicated stress urinary incontinence.	C
Warn women receiving AUS or ACT that, even in expert centres, there is a high risk of complications, mechanical failure or a need for explantation.	C

AUS = artificial urinary sphincter; ACT = adjustable compression therapy.
** Recommendation based on expert opinion.*
*** Expert centres refers to the comments on surgeon volume in the introduction to the surgical chapter.*

EAU Guidelines on Urinary Incontinence in Adults





Summary of evidence	LE
Peri-urethral injection of bulking agent may provide short-term improvement in symptoms (3 months), but not cure, in women with SUI.	2a
Repeat injections to achieve therapeutic effect are often required.	2a
Bulking agents are less effective than colposuspension or autologous sling for cure of SUI.	2a
Adverse effect rates are lower compared to open surgery.	2a
There is no evidence that one type of bulking agent is better than another type.	1b
Transperineal route of injection may be associated with a higher risk of urinary retention compared to the transurethral route.	2b

Acceptability of Treatment

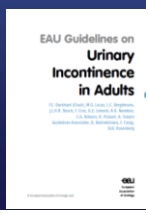
	Yes	No
Pelvic floor exercises for 6 months	60%	26%
Pelvic floor exercises for life	41%	44%
Regular drugs for life	14%	69%
Drugs to take as needed	51%	32%
Major operation (85% cure; 2% risk of catheterising)	23%	57%
Minor operation (85% cure; 2% risk of catheterising)	38%	43%
Clinic procedure (60% improvement; no long term risk)	57%	24%
Long term catheter	3%	79%
Learning to self catheterise	11%	73%

Robinson et al, 2003

WHAT CAN WE DO IN MEN?

Agenda

- Male urinary stress incontinence
  - Bulking agents
  - Fixed male slings
  - Adjustable male slings
  - Compression devices in males
    - Circunferential (AUS)
    - Non Circunferential (Adjust. Balloons)



Agenda

- Male urinary stress incontinence
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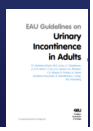
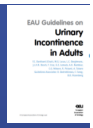
  - Fixed male slings
  - Adjustable male slings
  - Compression devices in males
    - Circunferential (AUS)
    - Non Circunferential (Adjust. Balloons)



Bulking agents

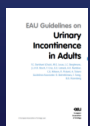


- Few studies
- The only one included in a Cochrane Rev was on Macroplastique
  - Bulking agent vs. AUS:
    Continence rate 46% vs. 82%

Evidence summary	LE
There is no evidence that bulking agents cure post-prostatectomy incontinence.	2a
There is weak evidence that bulking agents can offer temporary, short-term, improvement in QoL in men with post-prostatectomy incontinence.	3
There is no evidence that one bulking agent is superior to another.	3

Agenda

- Male urinary stress incontinence
  - Bulking agents
  - Fixed male slings
  - Adjustable male slings
  - Compression devices in males
    - Circunferential (AUS)
    - Non Circunferential (Adjust. Balloons)



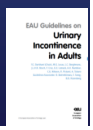
Fixed Male slings

4.3.5.2 Fixed male sling

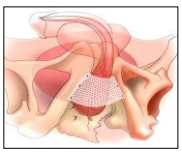
As well as external compression devices and bulking agents, slings have been introduced to treat postprostatectomy incontinence. Fixed slings are positioned under the urethra and fixed by a retropubic or transobturator approach. The tension is adjusted during the surgery and cannot be re-adjusted postoperatively.

For the restoration of continence by these male slings, two concepts are now being proposed:

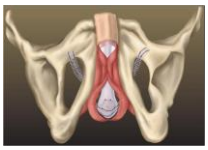
- continence restoration by urethral compression (InVance®, Istop TOMS, Argus®)
- continence restoration by repositioning the bulb of urethra (AdVance) [394].



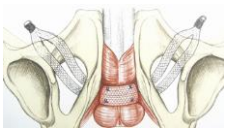
Non adjustable Slings



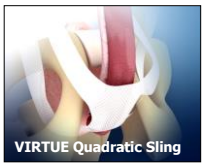
InVance Bone Anchor



AdVance Transobturator

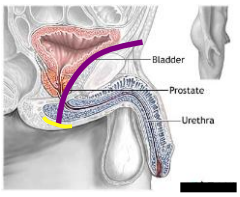


I-STOP TOMS



male slings :

permanentely increase the urethral resistance
use bulbar venous tissue



W.Hübner, Korneuburg

EUROPEAN UROLOGY 56 (2009) 934–936

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Platinum Priority – Editorial and Replies from Authors

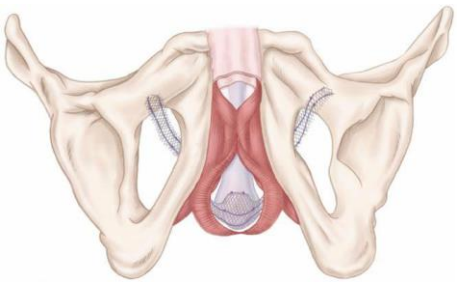
Referring to the articles published on pp. 923–927 and on pp. 928–933 of this issue

Males Slings: Compressive versus Repositioning

Drogo K. Montague *

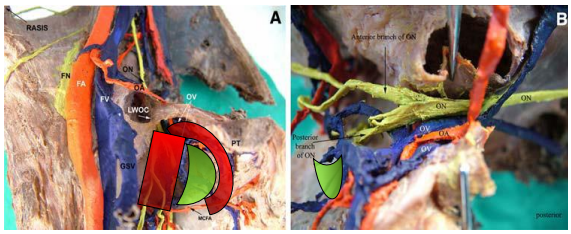
Glickman Urological and Kidney Institute, Cleveland Clinic, 9500 Euclid Avenue, Cleveland, OH 44195, USA

Trans obturator slings



AdVance Transobturator

The green half moon



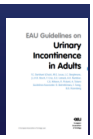
Courtesy F. Fusco

Quadratic (4- Point) Sling

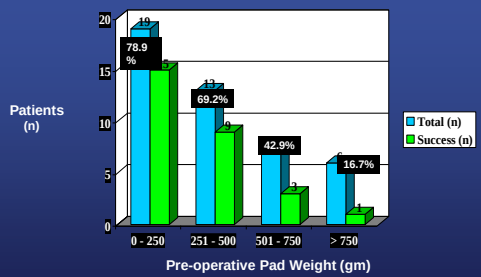
Fixed Male slings

Subjective cure rate: 50%; Improvement 30%; Falilure: 20%

Evidence summary	LE
There is limited short-term evidence that fixed male slings cure or improve post-prostatectomy incontinence in patients with mild-to-moderate incontinence.	3
Men with severe incontinence, previous radiotherapy or urethral stricture surgery may have less benefit from fixed male slings.	3
There is no evidence that one type of male sling is better than another.	3



Success by Pre-op Pad Weight



Success - 75.8% chance if preoperative *pad weight* < **496** gm
Odds of a successful surgery if pad wt < 496 gm are 7X greater than odds of successful surgery if pad wt > 496 gm

Agenda

- Male urinary stress incontinence
  - Bulking agents
  - Fixed male slings
  - Adjustable male slings
  - Compression devices in males
    - Circunferential (AUS)
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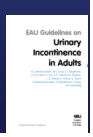
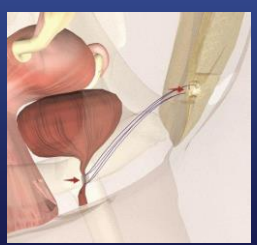
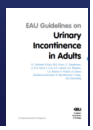


Adj. Male Slings Remeex™ (Neomedic)



Adj. Male Slings

Evidence summary	LE
There is limited evidence that adjustable male slings can cure or improve SUI in men.	3
There is limited evidence that early explantation rates are high.	3
There is no evidence that adjustability of the male sling offers additional benefit over other types of sling.	3



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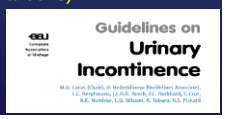
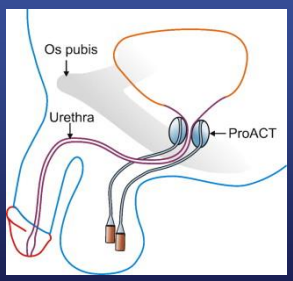
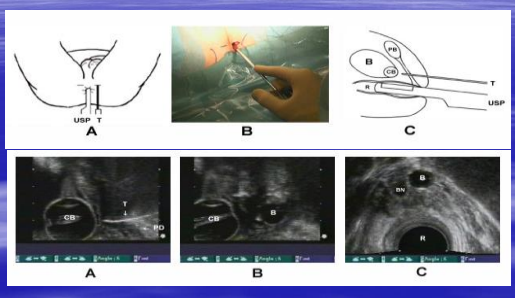


Adj. Ballons



Inflating the ballons…

Surgical Technique (US)

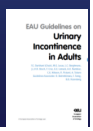


Gregori A: Eur Urol, 2010

Adj. Ballons

Improved pts: 65%

Very limited short-term evidence suggests that the non-circumferential compression device (ProACT®) is effective for treatment of post-prostatectomy SUI.	3
The non-circumferential compression device (ProACT®) is associated with a high failure and complication rate leading to frequent explantation.	3



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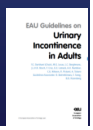
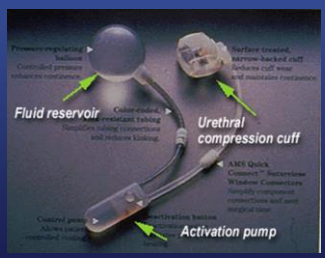
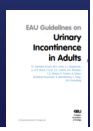


AMS 800 (AMS)



AMS 800 (AMS)

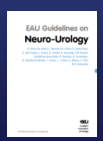
- Two systematic reviews (poor quality studies)
- Continence rate: 80%
  - Lower in pts after RXT
  - More erosion if complete continence
- Effective as «salvage» treatment



WHAT CAN WE DO IN NEUROGENIC PTS?

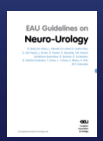
Bladder neck and urethral procedures

- Increasing the bladder outlet resistance: risk of high intravesical pressure.
- Procedures to treat sphincteric incontinence suitable only when the detrusor activity can be controlled and when no significant reflux is present.
- A simultaneous bladder augmentation and IC may be necessary.



Bladder neck and urethral procedures

- Urethral sling
  - Various materials have been used for this procedure with enduring positive results. The procedure is established in women with the ability to self-catheterize.
  - There is growing evidence that synthetic slings can be used effectively with acceptable medium to long-term results and minimal morbidity in neuropathic patients. In men, both autologous and synthetic slings may also be an alternative.



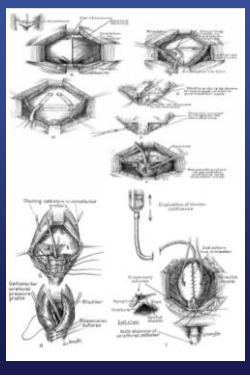
Bladder neck and urethral procedures

- Artificial urinary sphincter
  - This device was introduced by Light and Scott for patients with neurourological disorders. It has stood the test of time and acceptable long-term outcomes can be obtained.
- Functional sphincter augmentation
  - By transposing the gracilis muscle to the bladder neck or proximal urethra, there is a possibility to create a functional autologous sphincter by electrical stimulation. This opens the possibility of restoring control over the urethral closure.

Bladder neck and urethral procedures

- Bladder neck and urethra reconstruction:
  - The classical Young-Dees-Leadbetter procedure for bladder neck reconstruction in children with bladder exstrophy, and Kropp urethra lengthening improved by Salle, are established methods to restore continence provided that IC is practiced and/or bladder augmentation is performed.

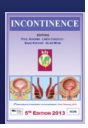
Young-Dees-Leadbetter technique



WHAT CAN WE DO IN CHILDREN?

BULKING AGENTS

- On average 2.8 – 3.9 ml is injected.
- More than 50% of patients need more than one injection.
- Initial success rate: 75%; after 7 years only 40% remained dry
- Success rates of 0 - 70%
- Poor surgical candidates.

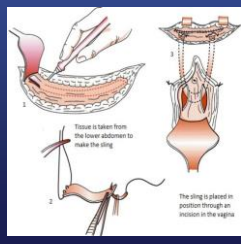


Artificial Urinary Sphincter

- Patients with pure sphincteric incompetence who voids spontaneously and has good bladder capacity and compliance.
- The AUS may also be used in patients dependent on clean intermittent catheterization. The compatibility of the AUS with intermittent catheterization/ enterocystoplasty is well documented.

FASCIAL SLINGS

- Fascial slings constructed with the fascia of the anterior rectus muscle have been used to increase outlet resistance in incontinent children, particularly those with neurogenic dysfunction.
- The sling is used to elevate and compress the bladder neck and proximal urethra.

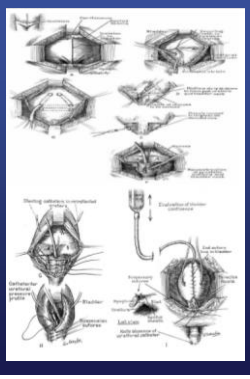


http://www.urology.co.nz/info/pubovaginal-sling

FASCIAL SLINGS

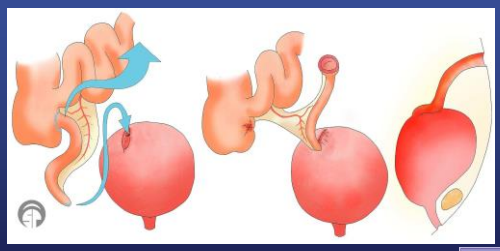
- The fascial strip may be a graft or a flap based on the rectus sheath on one side. The fascial strip can be crossed anteriorly or wrapped around the bladder neck to enhance urethral compression.
- Short-term success: encouraging; few data on long term (female > male)
- Need of CIC
- Overall success between 50 and 80% in females.

Young-Dees-Leadbetter technique



ALTERNATIVE CONTINENCE CHANNELS

- Mitrofanoff



Breen M, Phelps A, Estrada C, Chow JS. The role of imaging in pediatric bladder augmentation. Pediatr Radiol. 2015

Conclusions

- No one-fit-all treatment for children (or young adults) with incontinence for neurogenic lower urinary tract dysfunction or malformations
- The type of surgery depends on patient's conditions and age
- Artificial sphincter and slings are probably the most used solutions in several indications
- What is the time for surgery?