

Diagnosis and Management of Bladder and Bowel dysfunction in children

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Outline

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- Introduction to Bladder & Bowel Dysfunction
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Importance of Bladder & Bowel Dysfunction

Bladder & Bowel Dysfunction (BBD) is one of the most common reasons for referral to pediatric urology clinics, responsible for up to 40% of clinic consults.



Importance of Bladder & Bowel Dysfunction

- BBD is a known risk factor for urinary tract infection (UTI) and vesicoureteral reflux (VUR).
- Many studies have shown the importance of BBD management in prevention of UTIs and treatment of VUR.
- BBD is associated with reduced quality of life and significant psychosocial burden for children and families.

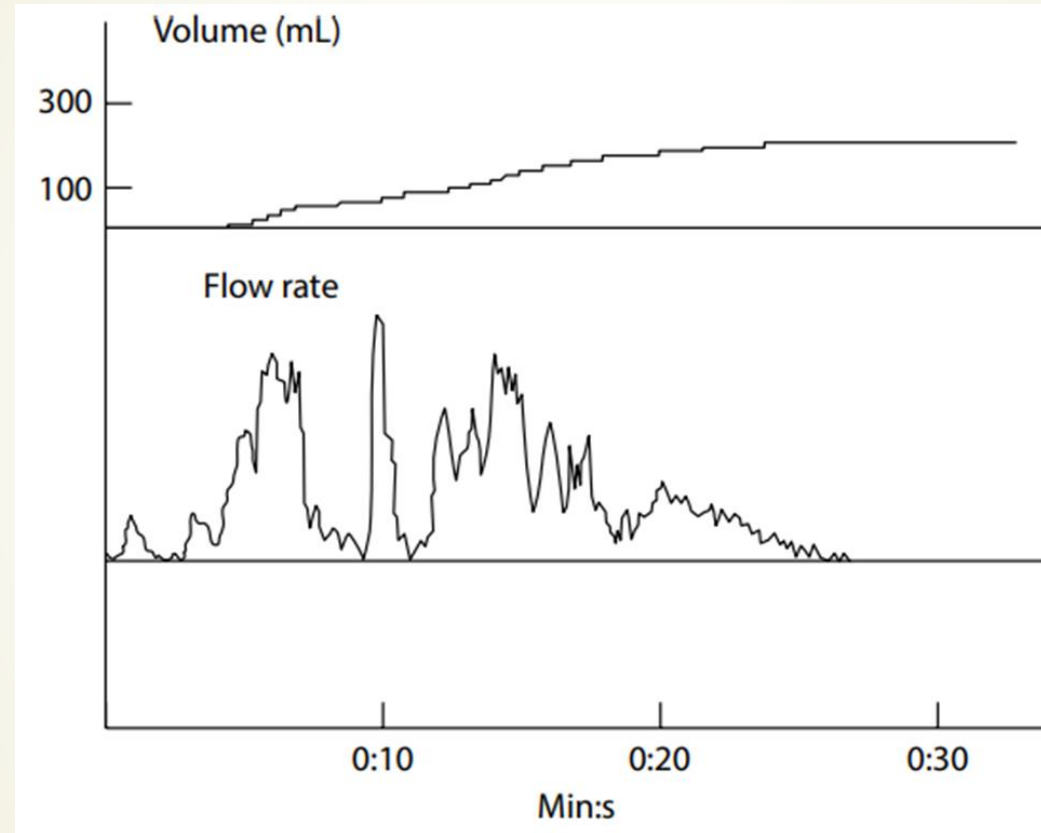
Importance of Bladder & Bowel Dysfunction

- Most children gain urinary control before 5 years of age.
- Most children urinate between four and seven times per day, and defecate daily or at least every other day.
- Bladder & Bowel Dysfunction is characterized by discoordination of the detrusor and EUS that occurs only during the voiding phase of the micturition cycle.

Introduction to Bladder & Bowel Dysfunction

- An inflammatory reaction in the bladder wall may produce an irritability that affects the sensory threshold and increases the need to void sooner than anticipated.
- The discoordination between the bladder and sphincter can also result in a functional BOO that disrupts the laminar flow pattern that normally exists.

Introduction to Bladder & Bowel Dysfunction



This stop-and-start (staccato) voiding is a prominent pattern of dysfunction in girls leading to recurrent infection.

Staccato voiding is seen in this 8-year-old girl with recurrent infection.

ICCS Classification of LUT Symptoms

- 1.Storage symptoms
- 2.Voiding symptoms
- 3.Other symptoms

ICCS Classification of LUT Symptoms

1. Storage symptoms

- a. Increased or decreased voiding frequency
- b. Incontinence
- c. Urgency
- d. Nocturia

ICCS Classification of LUT Symptoms

2. Voiding symptoms

- a. Hesitancy
- b. Straining
- c. Weak stream
- d. Intermittency

ICCS Classification of LUT Symptoms

3. Other symptoms

- a. Holding
- b. Feeling of incomplete emptying
- c. Postmicturition dribble
- d. Genital or LUT pain

Evaluation

The evaluation of a neurologically normal-appearing child with incontinence and/or other evidence of voiding dysfunction includes:

- History and physical examination
- Voiding diary
- Radiologic evaluation:
 - ✓ Renal and bladder ultrasound
 - ✓ Abdominal x-ray
 - ✓ ± VCUG

Evaluation

- Noninvasive urodynamic testing:
 - ✓ Uroflowmetry
 - ✓ Flow EMG
- ± Invasive urodynamic testing

physical examination

physical examination may be normal.



Voiding Diary

A voiding diary or frequency volume chart should include a record of child's:

- Fluid intake
- Urine output:
 - ✓ frequency
 - ✓ volume

Radiologic study

- bladder ultrasound has also been helpful in determining bladder wall thickness in this population, which may be predictive of poor urodynamic parameters, such as high detrusor pressure
- Abdominal radiographs allow visualization of the colonic stool load, as well as the sacrum

Radiologic study

VCUG



- This 10-year-old girl with recurrent UTIs has spasm of the sphincter during voiding, with narrowing in the distal urethra, demonstrated on this voiding cystourethrogram (arrow).
- Note the grade II/V right-sided reflux

Bladder trabeculation and/or “sphincter spasm” on VCUG

Noninvasive urodynamic testing

Noninvasive urodynamic testing (uroflowmetry or flow EMG) can help to differentiate the patient's specific type of voiding dysfunction through examination of the flow rate and pattern.

Invasive urodynamic study

Indications:

- Any suspicion of a neurologic condition
- Diurnal incontinence with no associated pathology
- Fecal and urinary incontinence at any age
- Persistent voiding difficulties long after a UTI has been treated
- Recurrent UTI despite continuous antibiotics
- Bladder trabeculation and/or “sphincter spasm” on VCUG
- Persistent LUT symptoms while on anticholinergics
- Recurrence of symptoms after the cessation of successful medical therapy

Criteria for the diagnosis of constipation








- The International Children's Continence Society (ICCS) provided guidelines for the diagnosis of constipation in children with LUTSs in 2006.1 They recommended use of either Rome II criteria or the PACCT Group criteria
- Constipation, defined by <3 bowel movements per week, is present in approximately 10% of children

Criteria for the diagnosis of constipation

TABLE 55.1 Diagnostic criteria for functional constipation

	Rome II ⁵¹	Rome III ²	PACCT ⁵²
Age	Infant to 16 years	Developmental age of ≥ 4 years	Not specified
Duration of symptoms	Not specified	≥ 2 months	≥ 8 weeks
No. of symptoms/exam findings to meet criteria	At least 2	At least 2	At least 2
Diagnostic criteria	<ol style="list-style-type: none"> 1. Majority of stools scybalous, pebble-like, hard 2. Firm stools ≤ 2 times/week 3. No metabolic, endocrine, structural disease 	<ol style="list-style-type: none"> 1. ≤ 2 defecations per week 2. At least 1 episode of fecal incontinence per week 3. Stool retentive posturing 4. Hard or painful bowel movements 5. Large-diameter stools that could obstruct the toilet 6. Large fecal mass in rectum 	<ol style="list-style-type: none"> 1. < 3 defecations per week 2. > 1 episode of fecal incontinence per week 3. Large fecal mass in rectum or palpable in abdomen 4. Large-diameter stools that could obstruct the toilet 5. Stool retentive posturing 6. Hard or painful bowel movements

Bristol stool chart

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on its surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely liquid

The Bristol stool scale source, this form is now owned by the ROME foundation.

Gastroenterological referring

TABLE 55.2 Findings on history and/or physical exam in children with constipation that should prompt referral to gastroenterology

Constipation red flags	
History	Physical
Failure to thrive	Absent/brisk lower limb reflexes
Delayed passage of meconium >24 hours	Mouth ulcers
Abnormal bowel habits since birth	Blood/mucous mixed with stool
Sensitive to cold, fatigue, dry skin, pallor	Perianal skin tags or fistulas
Change in bowel pattern with cow's milk	Associated hypotonia
Weight loss	Tight empty rectum
Vomiting	Pilonidal dimple covered by a tuft of hair

Normal bowel movements

TABLE 55.3 Normal frequency of bowel movements in infants and children

Age	Bowel movements per week (mean \pm 2 SD)	Mean number of bowel movements per day
0–3 months breastfed	5–40	2.9
0–3 months formula fed	5–28	2.0
6–12 months	5–28	1.8
1–3 years	4–21	1.4
>3 years	3–14	1.0

Source: Adapted from Fontana M et al. Acta Paediatr Scand 1987;78:682

Constipation management

- ▶ Behavioral Therapy
- ▶ Diet:
- ✓ Fiber
- ✓ Probiotics
- ▶ Laxative Therapy
- ▶ Osmotic Agents
- ▶ Bulking Agents
- ▶ Stimulant and Lubrication Laxatives
- ▶ Enemas

Constipation management

TABLE 55.5 Bulking, stimulant, and lubricant laxatives

Agent	Mechanism of action	Therapeutic effect	Dose	Side effects
Psyllium husk	Bulking agent	Increases stool frequency and improves consistency	0.85–1.7 g once daily to tid (<6 years) 1.7 g daily to tid (6–11 years) 3.4 g daily to tid (>12 years)	Gas, bloating
Senna	Stimulant laxative	Stimulation of nerve endings in colonic mucosa	Dosage form (8.6 mg tablet) ½–1 tablet once daily (2–6 years) 1–2 tablet daily or bid (6–12 years) 2 tablets daily (>12 years)	Abdominal pain, diarrhea
Mineral oil	Lubricant	Lubricates and softens stool	15–30 mL/year of age up to 240 mL daily for disimpaction Maintenance 1–3 mL/kg/day Not recommended for infants of <1 year of age	Lipoid pneumonia if aspirated, staining of undergarments, abdominal cramps

Pharmacotherapy


- Solifenacin
- Propiverine
- Tolterodine

Summary of recommendations

8. Anticholinergics:

- a. Solifenacin: May increase the mean and maximum voided volumes in children with OAB, but it may not be different from placebo in improving incontinence or number of daily voids (off-label use) (GRADE level: Low).
- b. Propiverine: May increase mean voided volumes and modestly reduce daily frequency compared to placebo in children with OAB (GRADE level: Moderate).
- c. Tolterodine extended-release may result in a small decrease in urge incontinence in children with OAB (average 1.4 incontinence episodes per week) when compared to placebo (off-label use) (GRADE level: Moderate).
- d. We found no evidence of difference between oxybutynin and cognitive therapy in cure rate of incontinence in children with OAB (GRADE level: Low).

Treatment

- Bladder re-training/urotherapy
 - Biofeedback
 - Pelvic floor physiotherapy
 - Neuromodulation
 - Pharmacotherapy
- 

Bladder re-training/urotherapy

The urotherapy approach focuses on behavioral management, and includes:

- timed voiding (programmed urination, every 2---3 h during the day)
- regulation of fluid intake (water intake, one glass every 2---3 h (five to six times a day))
- elimination of caffeine from the diet (carbonated or artificially-flavored drinks)
- instructions on proper toileting posture (positioning on the toilet, with relaxation of the pelvic muscles, which can be pro-moted by foot support on a stand)
- treatment of constipation (if necessary) (recommending a high-fiber diet and use of laxatives)
- diaphragmatic breathing exercises

Bladder re-training/urotherapy

1. Urotherapy/bladder re-training with timer to assist scheduled voiding is recommended over the same treatment without timer (GRADE level: Moderate).
2. Face-to-face (group or individual) bladder re-training and video instructions are equally effective (GRADE level: Low to moderate).



Bladder re-training/urotherapy

- ▶ According to the ICCS recommendations, all children with diurnal urinary incontinence should receive standard urotherapy as **the first line of treatment** and only those with a refractory condition should be submitted to further investigation and application of specific urotherapy components.
- ▶ It is worth mentioning that the application of standard urotherapy as a first line of treatment **reduces the costs** for health services and responsible for the child/adolescent, since it does not depend on specific equipment and materials but on the **professional's educational abilities**.




Bladder re-training/urotherapy

- ▶ A European study showed a symptom reduction of approximately 40% in children with diurnal urinary incontinence, only with the application of standard urotherapy.
- ▶ Urotherapy benefits up to 90% of children with LUT symptoms due to voiding dysfunction (Canadian Urological Association guideline for the treatment of bladder dysfunction in children)



Bladder re-training/urotherapy

- ▶ The observed result, which showed that groups receiving standard **urotherapy plus** components of **specific urotherapy or drug therapy** had a higher rate of symptom reduction, was expected.
 - ▶ Previous studies have described similar results with the use of **biofeedback in children** with dysfunctional voiding.
- 




Bladder re-training/urotherapy

- ▶ The descriptive analysis of the **uroflowmetry parameters** shows the improvement of parameters with the standard urotherapy application.
- ▶ Other authors have previously demonstrated the uroflowmetry curve normalization, reduction of bladder capacity (initially increased), and post-voiding residue, through water intake encouragement and voiding interval control.



Bladder re-training/urotherapy

- ▶ when treatment aims at **bowel function improvement**, the child would show a reduction in pelvic muscle tension and, consequently, a **better pattern of bladder emptying**.
- 



Bladder re-training/urotherapy

➤ Finally, the **professional's role** in the context of primary care is emphasized. The application of urotherapy by such a professional would reduce waiting for specialized services, optimizing care for complex or refractory cases.

Biofeedback

Pelvic floor muscle re-education

- ▶ Surface electrodes placed perianally or rectal/vaginal probe with computer screen.
- ▶ Manual and verbal feedback from PT





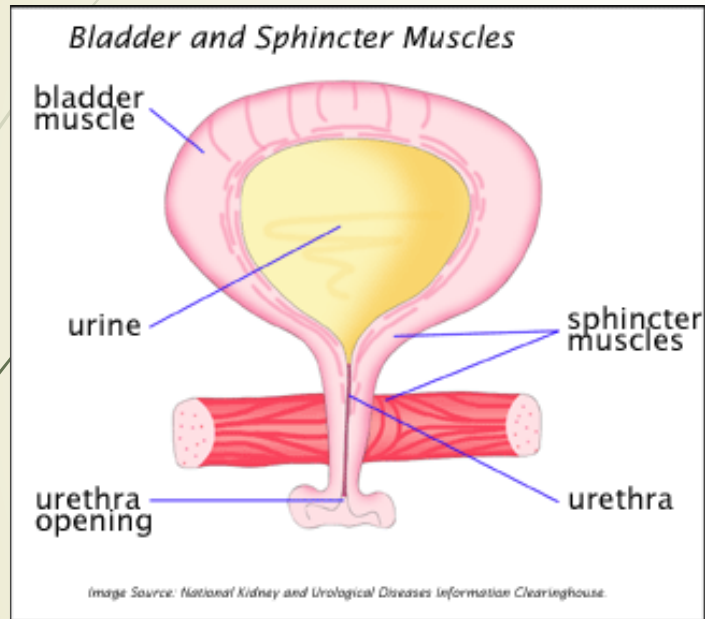
Biofeedback

- ▶ 3. In children with underactive bladder, addition of biofeedback to standard urotherapy is beneficial (GRADE level: High).
- ▶ 4. Biofeedback in children with other types of BBD is not associated with improved outcomes (GRADE level: Low).

Pelvic floor physiotherapy

- ▶ 5. Addition of pelvic floor muscle physiotherapy to urotherapy has a beneficial effect on resolution of daytime incontinence in children with dysfunctional voiding (GRADE level: Moderate).

Pelvic Floor Muscle Exercises (Kegels)



“Squeeze like you’re trying to hold back gas”

Exercise 1 (long hold for strength)

42

► Step 1

Sit, stand tall, lie on your back or kneel on your hands and knees

► Step 2

Imagine what muscles you would tighten to stop yourself from passing wind or to 'hold on' from passing urine. If you can't feel a distinct tightening of these muscles, ask for some help from a [women's health physiotherapist](#) who can help you to get started.

• STEP 3

TIGHTEN THEM AROUND YOUR FRONT PASSAGE, VAGINA AND BACK PASSAGE AS STRONGLY AS POSSIBLE AND HOLD FOR **THREE TO FIVE SECONDS**. BY DOING THIS, YOU SHOULD FEEL YOUR PELVIC FLOOR MUSCLES '**LIFT UP**' INSIDE YOU AND FEEL A DEFINITE 'LET GO' AS THE MUSCLES RELAX. IF YOU CAN HOLD LONGER, THEN DO SO. REMEMBER, THE SQUEEZE MUST STAY **STRONG** AND YOU SHOULD FEEL A **DEFINITE 'LET GO'**. REPEAT UP TO **TEN TIMES** OR UNTIL YOU FEEL YOUR PELVIC FLOOR MUSCLES FATIGUE.

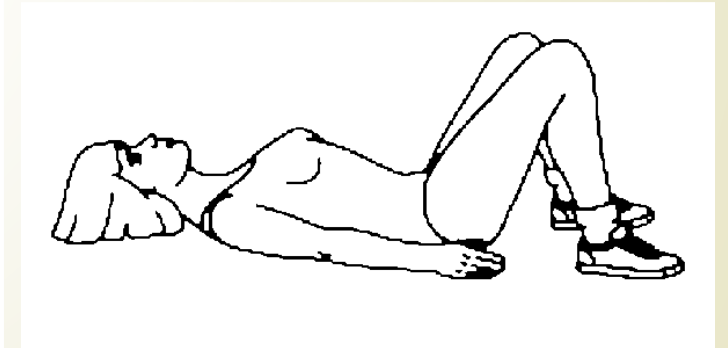
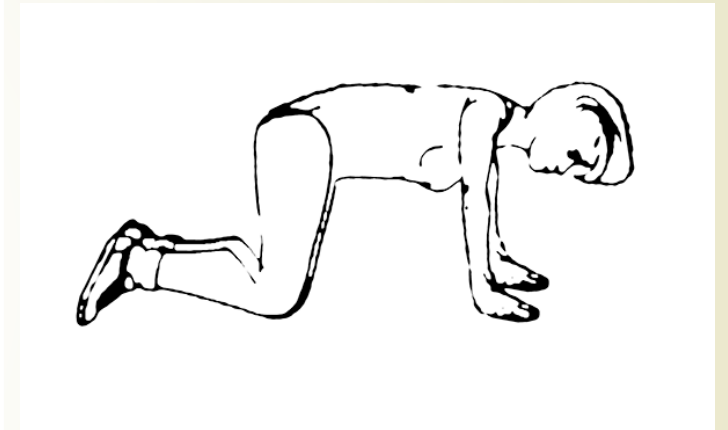
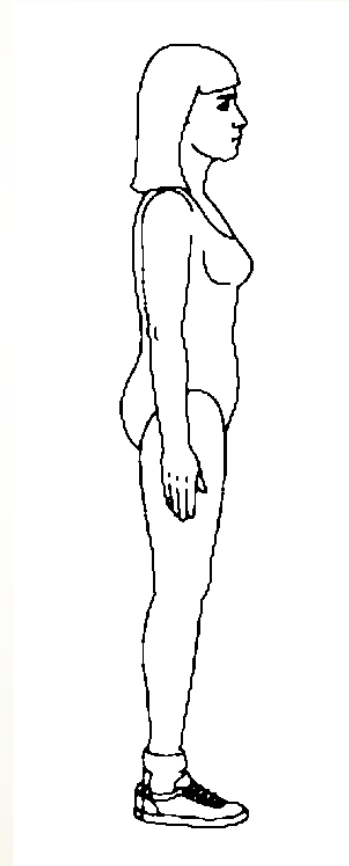
• REST FOR A FEW SECONDS IN BETWEEN EACH SQUEEZE.





Exercise 1 (long hold for strength)

- ▶ Steps one to three count as one exercise set. Do **three sets per day** in **different positions**. Do your pelvic floor exercises every day **for the rest of your life**.



Exercise 2 (quick squeeze for power)

- Squeeze and lift your pelvic floor muscles **as strongly and as quickly as possible**. Do not try to hold on to the contraction, **just squeeze and let go**.
- **Rest** for a few seconds in between each squeeze. Repeat this **10 to 20 times** or until you feel your pelvic floor muscles fatigue. Do this exercise **three times a day**.

Box 2. Possible permanent changes to the pelvic floor muscles due to strength training.³²

- lift of the pelvic floor to a higher anatomical location inside the pelvis
- increase of the cross-sectional area of the muscles (hypertrophy)
- increase 'stiffness' of the connective tissue within and around the pelvic floor muscles
- reduce the levator hiatus area

The above changes may lead to an automatic function of the pelvic floor with less opening of the levator hiatus and less downward movement of the pelvic floor during an increase in intra-abdominal pressure.

Pelvic Floor Rehabilitation

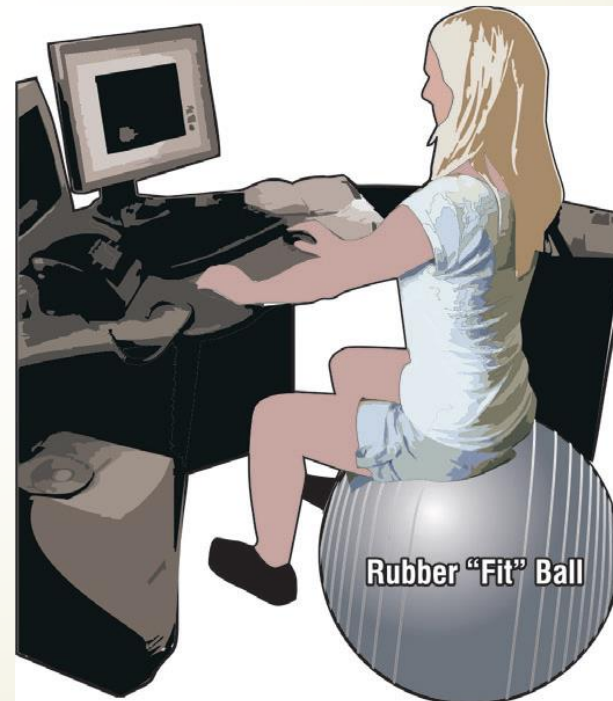
according to the Integral Theory

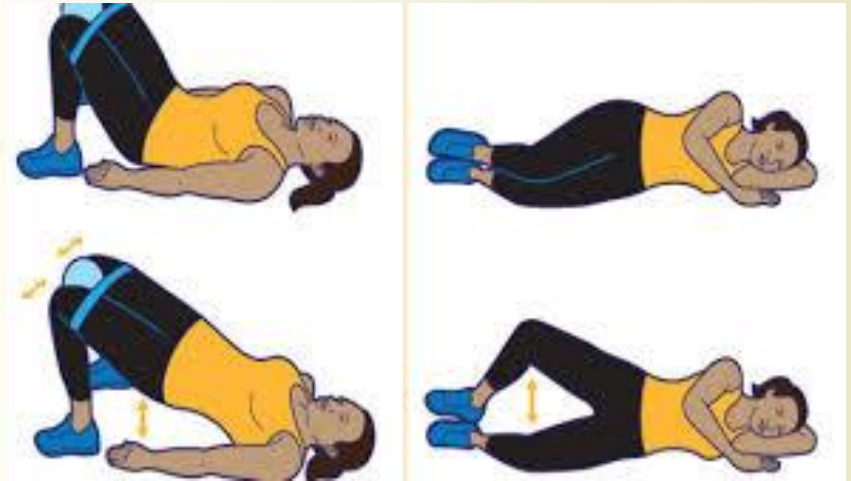
- ▶ The Integral Theory System for pelvic floor rehabilitation (PFR) differs from traditional methods :
- ▶ It introduces special techniques to strengthen the **3 directional** muscle forces, and their ligamentous insertions.
- ▶ It is designed to seamlessly fit into a **patient's daily routine**.
- ▶ It is emphasized that the urethral closure induced by Kegel-type muscle contractions differs radically from **natural urethral closure**.

*Towards a more **time efficient method** for pelvic floor rehabilitation – use of a “fit ball”*

- It was evident from radiological studies (Petros & Ulmsten 1993), that the organ and muscle movements observed during Kegel exercises, were radically different from those observed during coughing and straining, in that widely different muscles and ligaments were involved.

► **Fig.** The patient sits on a rubber ball instead of a chair. The **act of balancing** enforces correct posture, and slow twitch contracture of the abdominal, pelvic, and thigh muscles.





Functional PFM exercises with Swiss ball. **a**, **b** In sitting position _____ muscles for 10 s then the pelvis was lifted off on the floor and relaxed

Everyday Activities That Help Strengthen The Core

- Jumping on a Trampoline
- Tug Of War
- Tunnel Crawling
- Riding a Bike
- Swimming
- Skating

Pediatric Core Strengthening Exercises

Core Strengthening Exercises for kids



Core Strengthening exercises for kids



Neuromodulation

- ✓ Parasacral transcutaneous electrical nerve stimulation (TENS)
- ✓ Posterior tibial transcutaneous electrical stimulation (PTTENS)
- ✓ Interferential pelvic transcutaneous electrical nerve stimulation



Parasacral transcutaneous electrical nerve stimulation (TENS)

- ▶ 6. Parasacral transcutaneous electrical nerve stimulation (PS-TENS)
- ▶ TENS may be useful in management of refractory urge incontinence in the short-term by reducing the number of wet days (GRADE level: Low).



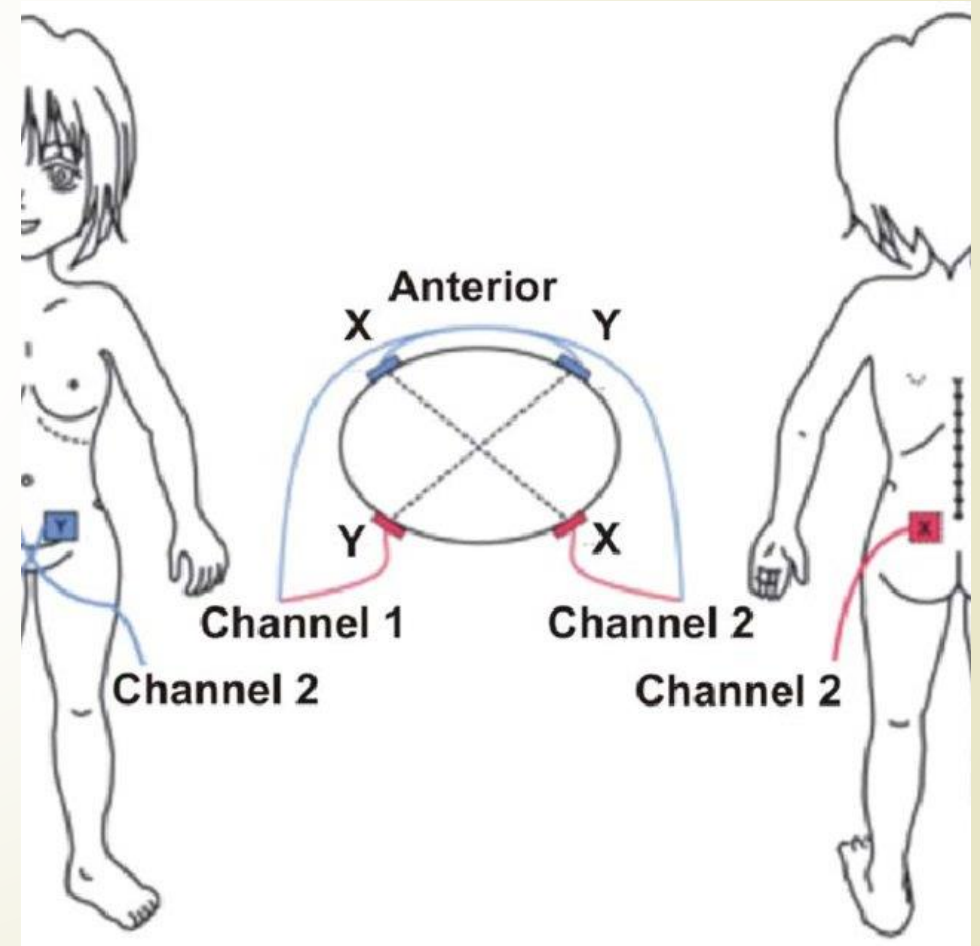
Posterior tibial transcutaneous electrical stimulation (PTTENS)

- ▶ A small RCT compared PTTENS with sham treatment in 20 patients with refractory overactive bladder. The study showed increase in mean voided volumes (MD change 84.2 cc) but no change in bladder capacity, post void residual and clinical variables as measured by a non validated symptom score (Boudaoud 2015). *Grade Level: Low*
- ▶ In one study of 37 children with refractory overactive bladder PTTENS was compared to sham TENS. The authors reported subjective improvement with no quantifiable measures (Patidar 2015). It showed a favorable response at 3 months towards TENS as 14/21 had full response as opposed to 0/16 in the control group. *GRADE Level Very Low.*



Interferential pelvic transcutaneous electrical nerve stimulation

- 7. Interferential transcutaneous electrical nerve stimulation may increase the voiding frequency and improve uroflowmetric parameters (e.g., PVR) in children with underactive bladder in the short-term. However, there is no evidence it is more effective than urotherapy in the long-term management (GRADE level: High).



Conclusion

- THE **CONSERVATIVE MANAGEMENT**, INCLUDES MAINLY BLADDER RETRAINING AND PFR (BIOFEEDBACK, ELECTRICAL STIMULATION, AND PELVIC FLOOR EXERCISES), CONSIDERED **AS A FIRST-LINE OPTION IN THE INITIAL MANAGEMENT. PELVIC FLOOR MUSCLE TRAINING** (PFMT) IS THE CORE OF THE PFR.
- THE **PHARMACOLOGIC THERAPY** SHOULD BE USED IN ADDITION TO PFR, MAINLY IN THE TREATMENT OF URGE URINARY INCONTINENCE.
- BUT, INDEPENDENTLY OF THESE CONCLUSIONS, I SUGGEST TO ORGANIZE IN EVERY HOSPITAL OR REHABILITATION DEPARTMENT A TEAM DEVOTED TO CONSERVATIVE MANAGEMENT OF PELVIC FLOOR DYSFUNCTIONS, NOTABLY URINARY INCONTINENCE.

References

- ▶ Docimo, S. G., editor. | Canning, Douglas, editor. | El-Khoury, Antoine E., editor. | Salle, Joao Luiz Pippi, editor., et al. (Sixth edition). "The Kelalis-King-Belman textbook of clinical pediatric urology / [edited by] Steven G. Docimo, Douglas Canning, Antoine Khoury, Joao Luiz Pippi Salle." (LCC RJ466 (ebook) | LCC RJ466 (print) | NLM WS 320 | DDC 618.92/6--dc23).
- ▶ Ladi-Seyedian S, Kajbafzadeh AM, Sharifi-Rad L, et al. Management of non-neuropathic underactive bladder in children with voiding dysfunction by animated biofeedback: A randomized clinical trial. *Urology* 2015;85:205-10. <https://doi.org/10.1016/j.urology.2014.09.025>
- ▶ Kajbafzadeh A, Sharifi-Rad L, Ladi-Seyedian S, et al. Transcutaneous interferential electrical stimulation for the management of non-neuropathic underactive bladder in children: A randomized clinical trial. *BJU Int* 2016;117:793-800.
- ▶ Afshar K, Dos Santos J, Blasi A-S, et al. Canadian Urological Association guideline for the treatment of bladder dysfunction in children. *Can Urol Assoc J* 2021;15(2):13-8. <http://dx.doi.org/10.5489/cuaj.6975> <https://doi.org/10.1111/bju.13207>
- ▶ Santos JD, Lopes RI, Koyle MA. Bladder and bowel dysfunction in children: An update on the diagnosis and treatment of a common, but underdiagnosed pediatric problem. *Can Urol Assoc J* 2017;11:S64-S72. <https://doi.org/10.5489/cuaj.4411>
- ▶ Assis GM, Silva CP, Martins G. Urotherapy in the treatment of children and adolescents with bladder and bowel dysfunction: a systematic review. *J Pediatr (Rio J)*. 2019;95:628---41.

Thank you for your attention

