

PELVIC FLOOR PHYSICAL THERAPY AND SPINA BIFIDA: WISHFUL THINKING OR POTENTIALLY HELPFUL?

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QUESTIONS TO DIVE INTO

- Why is this a hot topic?
- What is the pelvic floor and its innervation?
- What is pelvic floor physical therapy?
- What is the evidence for or against pelvic floor PT in patients without spina bifida?
- What is the evidence for or against pelvic floor PT in patients with spina bifida?
- What patients could theoretically benefit?
- What should we tell families when asked?



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Pelvic Floor Physical Therapy: How It Can Help

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SPEAKING OF HEALTH | WEDNESDAY, APRIL 6, 2022

Physical therapy benefits children with bowel, bladder issues



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Guidelines for the Care of People with Spina Bifida

Urology

Workgroup Members: David B. Joseph, MD, FACS, FAAP (Chair); Sharon Baillie, RN, CNC, MN; Michelle A. Baum, MD; Dominic C. Frimberger, MD; Rose Khavari, MD; Rosalia Misseri, MD, FAAP; Stacey T. Tanaka, MD, MS; Hadley Wood, MD; Elizabeth B. Yerkes, MD

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Pediatric bladder control

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Children's HealthSM offers a six-week biofeedback program for children and adolescent patients who are struggling with urinary incontinence, [urinary tract infection \(UTI\)](#), poor bladder emptying and/or [dysfunctional voiding](#)

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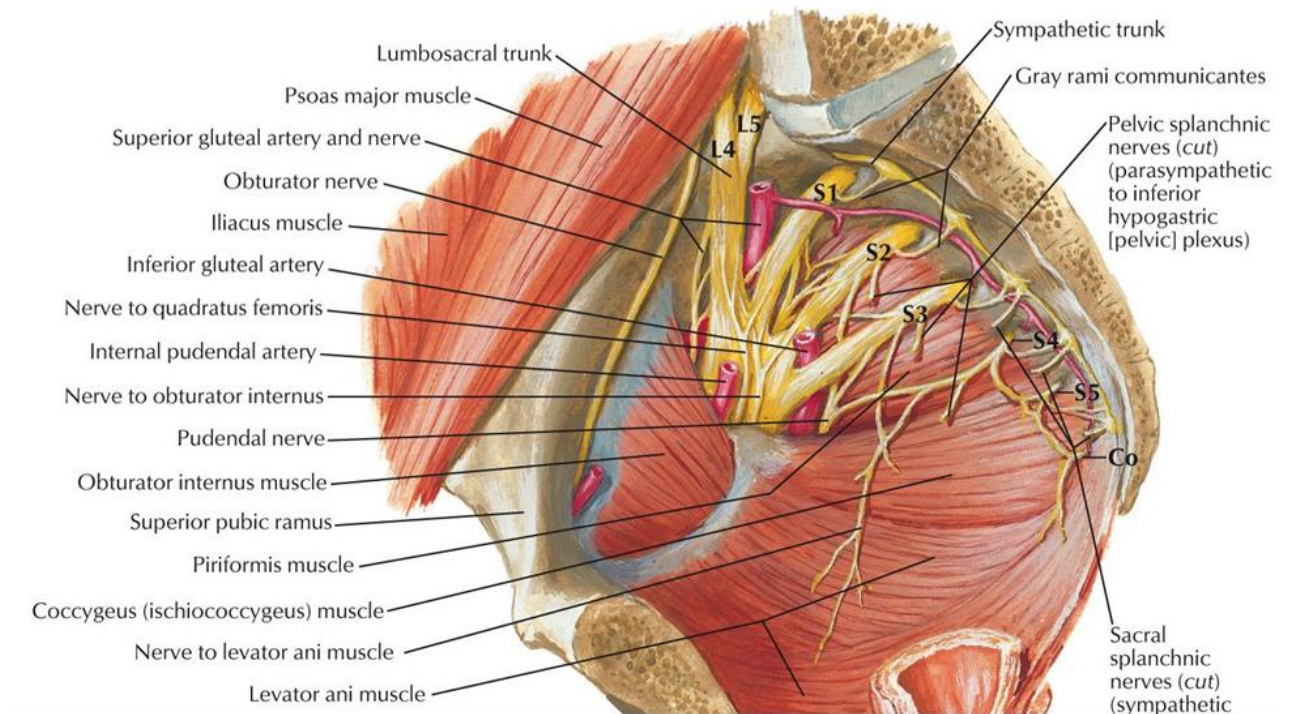
Pelvic Floor Rehabilitation

WHY IS THIS A HOT TOPIC?

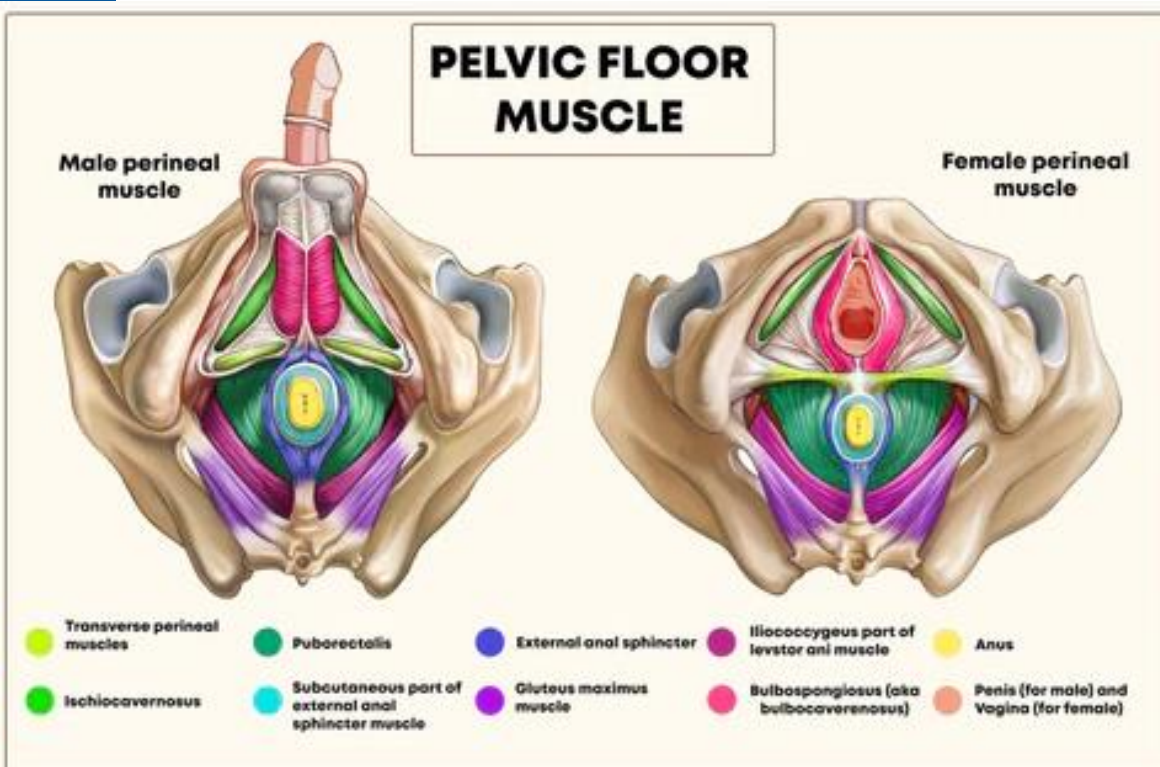
- PFPT is being promoted online by hospitals and clinics for incontinence, dysfunctional voiding, constipation, fecal accidents, pelvic pain.
 - Websites do not mention spina bifida patients
- It is non-invasive and attractive to families
 - Could PFPT help avoid medications and/or surgery?
- However – spina bifida is different
 - Neurogenic bladder/bowel due to denervation/dysfunction
- Is PFPT useful in patients with spina bifida or just wishful thinking due to extrapolation from non-neurogenic children?

WHAT IS THE PELVIC FLOOR AND IT'S INNERVATION?

The pelvic floor is a group of muscles that forms a hammock to support the pelvic structures



Innervation is S2-S4. Pudendal nerve is a major nerve.

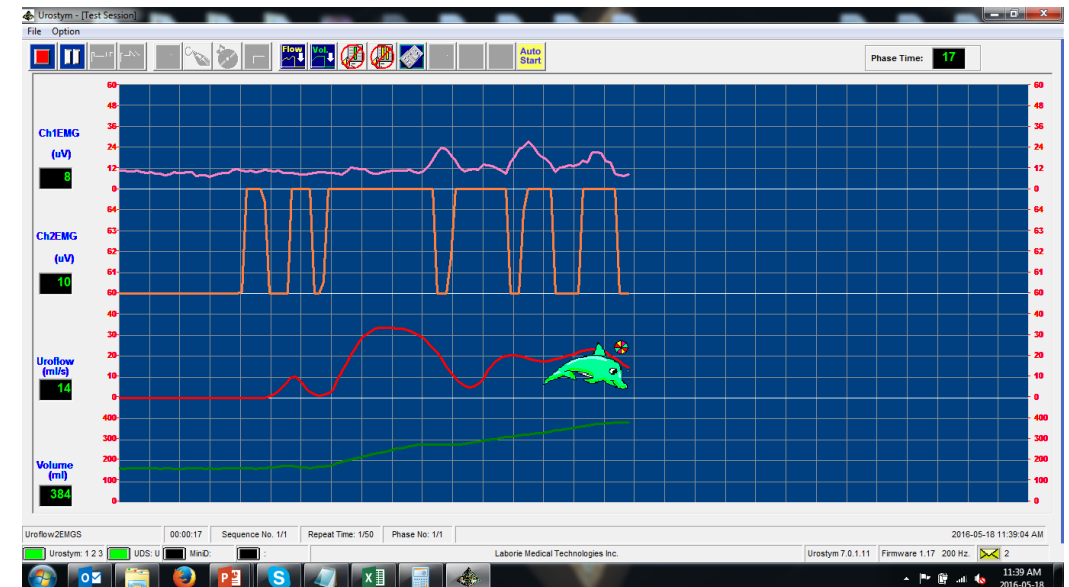
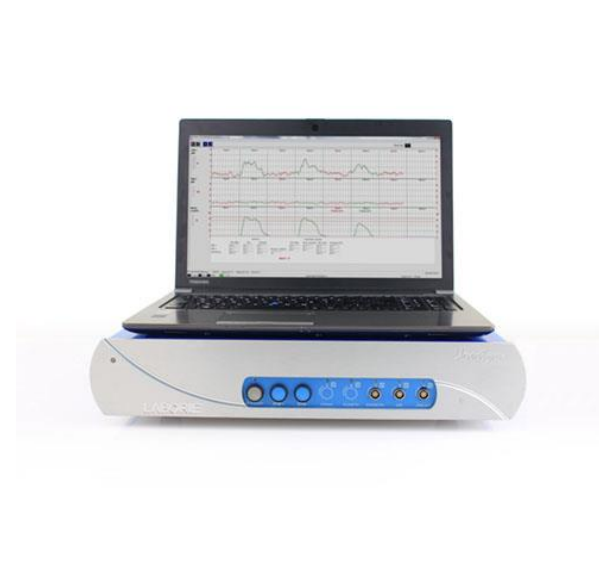


WHAT IS PELVIC FLOOR PHYSICAL THERAPY FOR CHILDREN?

- Starts with H&P, voiding diaries, etc
- Education on bladder and bowel function
- Timed voiding
- Good voiding posture and diaphragmatic breathing to relax
- Relaxation of sphincter/pelvic floor muscles with elimination
- Typically does not include Kegels for strengthening in children unless true pelvic floor weakness contributes to incontinence. Kegels done for awareness.
- Biofeedback in some cases; core strengthening in some cases
- “Urotherapy” is another term for much of this in children
- Typically does not include “myofascial release”, “massage therapy”, or “trigger point treatment” which is sometimes done for adults with high tone pain syndromes

WHAT IS BIOFEEDBACK FOR CHILDREN?

- Essentially a simple computer game where children learn to relax and contract pelvic floor muscles.
- Adhesive pads measure pelvic floor contractions
- Nurse or NP with patient helping guide session
- Our group does 6 sessions
- Uroflow and PVRs also typically part of it



WHAT IS THE EVIDENCE FOR PFFT WITHOUT NEUROGENIC BLADDER?

- Cochrane systematic review 2019
 - Authors found little high quality evidence
 - Urotherapy, PFFT, TENS, PTENS, behavioral
 - Conclude more well designed studies needed
- PLOS One meta-analysis 2023
 - Looked at wearable alarms (e.g. voiding watch) vs none
 - RR of 1.4 in favor of using wearable alarm
- Eur Child Adolesc Psychiatry 2018
 - No study had urotherapy vs no treatment analysis
 - Obtained remission rate with urotherapy vs remission rate with no treatment (from different studies)
 - 56% remission/year with urotherapy vs 15% with none
- Overall, not great data but some support



Conservative interventions for treating functional daytime urinary incontinence in children (Review)

RESEARCH ARTICLE

Alarm-assisted urotherapy for daytime urinary incontinence in children: A meta-analysis

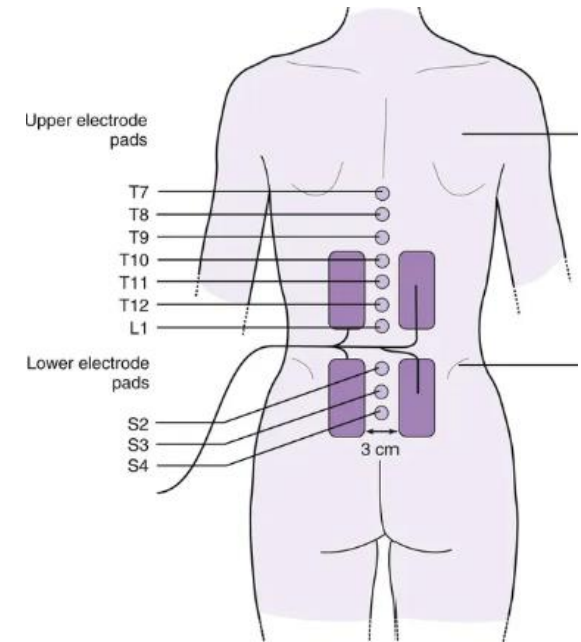
Liesbeth L. de Wall¹*, Antje J. Nieuwhof-Leppink², Renske Schappin³

Standard urotherapy as first-line intervention for daytime incontinence: a meta-analysis

S. K. Schäfer¹ · J. Niemczyk² · A. von Gontard² · M. Pospeschill¹ · N. Becker¹ · M. Equis¹

WHAT IS THE EVIDENCE FOR PFFT WITH SPINA BIFIDA?

- 2025 study Ayla et al from Turkey – a source of family questions?
 - Neurourol Urodyn. 2025 Feb;44(2):451-457.
- Methods
 - Randomized 28 patients 5-15 years to PFR vs PFR & TENS
 - Spina bifida with neurogenic detrusor overactivity patients
 - PFR = pelvic floor rehab
 - abdominal massage, strength/breathing/pelvic floor exercises
 - TENS = transcutaneous electrical nerve stimulation to S2-S4 dermatome
 - Outcomes: urodynamics measures, QOL, other questionnaires



Parameters		Group PFR (n = 14)	Group PFR + T (n = 14)	P- value
Gender ^a	Boy (n)	10 (71.4%)	8 (57.1%)	0.34
	Girl (n)	4 (28.6%)	6 (42.9%)	
Age ^b (years)		8.3 ± 2.70	7.86 ± 2.03	t = 0.55 p = 0.58
Neurological level ^a	Lumbosacral	2 (14.3%)	4 (28.6%)	p = 0.60
	Thoracolumbar	7 (50.0%)	5 (35.7%)	
	Lumbar	5 (35.7%)	5 (35.7%)	
Anticholinergic medicine ^a (n)		6 (42.9%)	5 (35.7%)	0.50
CIC use ^a (n)		9 (64.3%)	8 (57.1%)	0.50
Mobilization ^a (n)	Mobile with wheelchair	10 (71.4%)	7 (50.0%)	0.22
	Mobile with/without AFO	4 (28.6%)	7 (50.0%)	

- Results

Questionnaires		Before treatment	After treatment	P-value ^a
Group PFR (n = 14)	DVSS	19.21 ± 5.59	18.00 ± 5.88	0.00
	PIN-Q	9.71 ± 12.54	9.14 ± 12.31	0.12
	ICIQ-CLUTS	18.29 ± 4.51	17.07 ± 4.79	0.003
Group PFR + T (n = 14)	DVSS	17.86 ± 6.15	16.07 ± 6.55	0.01
	PIN-Q	16.50 ± 13.31	16.07 ± 13.00	0.33
	ICIQ-CLUTS	18.29 ± 0.99	16.71 ± 1.20	0.000

Parameters		Before treatment	After treatment	P-value ^a
Group PFR (n = 14)	Maximum bladder pPressure (cmH ₂ O)	75.75 ± 44.67	68.08 ± 40.34	0.21
	Bladder capacity (%)	34.88 ± 36.18	41.62 ± 15.20	0.49
	Residual urine (ml)	78.25 ± 55.98	45.50 ± 41.78	0.05
Group PFR + T (n = 14)	Maximum bladder pressure (cmH ₂ O)	82.14 ± 58.06	58.07 ± 39.87	0.01
	Bladder capacity (%)	50.37 ± 32.08	54.75 ± 24.69	0.25
	Residual urine (mL)	70.85 ± 80.29	57.53 ± 62.32	0.08

- Going from 19 to 18 on DVSS or ICIQ-CLUTS is not clinically meaningful. Still severe symptoms.
- Going from a maximum pressure of 82 to 58 cm H₂O is also not clinically meaningful.
- Conclusions: “Combining a PFR program with TENS and regular urodynamic monitoring can alleviate urinary symptoms and improve bladder dynamics in children with neurogenic bladder dysfunction”
- My thoughts: small study, conclusions are overreaching, presented more results in discussion (a no-no), data presented as means and not medians, t-tests used to compare questionnaire results

● Methods

- 40 patients randomized into 3 groups
 - Placebo TENS with anticholinergic (A)
 - TENS with placebo medication (B)
 - TENS with anticholinergic (C)
- Included “toilet trained” children with spina bifida age 4-15 with “abnormal” UDS
- Outcomes (a lot): UDS measures, surveys, visual analog scales, voiding diaries

	Group A (n=10)	Group B (n=14)	Group C (n=16)	P
Age	6.7±2.0	6.14±2.1	6.18±2.4	0.495
Sex (male: female)	5:5	11:3	12:4	0.275
Urinary incontinence	10	14	16	0.21
Urgency	1	3	5	0.55
Straining	3	2	3	0.812
Hesitancy	1	4	5	0.07
On CIC therapy	3	5	5	0.72
Fecal incontinence	2	4	4	0.817
Lower limb weakness	4	6	6	0.821
Hydrocephalus	3	5	6	0.614

Voiding diary	Group (n)	Mean±SD	P
Wet episodes/day	A (10)		
	Baseline	10.4±2	0.121
	Post	9.6±1.5	
	B (14)		
	Baseline	12.0±2.2	0.010
	Post	9.4±1.6	
	C (16)		
	Baseline	12.6±2.1	0.0001
	Post	8.2±1.8	
Wet days/week	A (10)		
	Baseline	6.4±0.9	0.153
	Post	5.7±1.5	
	B (14)		
	Baseline	6.4±1.0	0.088
	Post	5.8±1.0	
	C (16)		
	Baseline	6.5±0.6	0.0001
	Post	4.3±1.9	

Urodynamic parameters	Groups (n)	Mean±SD	P
Pdet max (H ₂ O)	A (10)		
	Baseline	57.0±21	0.032
	Post	48.8±16	
	B (14)		
	Baseline	48.5±6.9	0.014
	Post	38.4±12	
	C (16)		
	Baseline	56.6±11	0.0001
	Post	30.0±6.7	
Bladder capacity (ml)	A (10), EBC=255		
	Baseline	167.8±38	0.01
	Post	189.5±43	
	B (14), EBC=240		
	Baseline	151.7±50	0.61
	Post	160.0±43	
	C (16), EBC=245		
	Baseline	169.4±30	0.001
	Post	217.0±38	

- Conclude: “TENS is a noninvasive, nonpharmacological therapy which improves voiding and urodynamic parameters in NB secondary to SB.”
- My thoughts: small study, multiple comparisons and outcomes, was UDS review blinded?, were changes clinically meaningful?, “toilet trained”?
- Note: urodynamic interpretation has fair interrater reliability for most measures

2014 TENS LIKE STUDY FROM IRAN

● Methods

- Randomized, prospective
 - TENS like stimulation vs sham
- Age 3-13, “moderate to severe” urinary incontinence, on CIC
- Outcomes: UDS measures, voiding diary

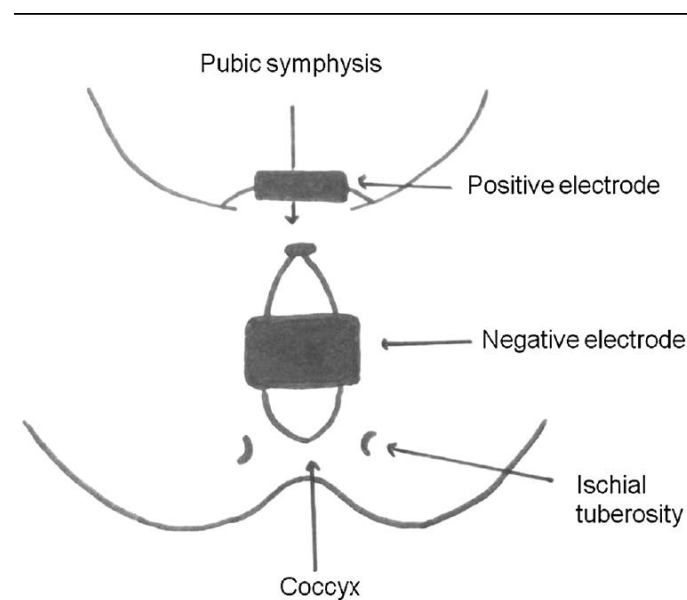


Fig. 1 Applying of positive and negative electrodes for FES

	Case ¹⁵	Control ¹⁵
Age (years)	5.9	7.5
Gender (%)		
Female	7 (46 %)	5 (34 %)
Male	8 (54 %)	10 (66 %)
MMC level no. (%)	5 (34 %)	4 (26 %)
Sacral		
Lower lumbar	7 (46 %)	6 (40 %)
Upper lumbar	3 (20 %)	5 (34 %)
Movement disorder no. (%)	4 (26 %)	3 (20 %)
Paraplegia		
Proximal weakness	2 (13 %)	3 (20 %)
Distal weakness	6 (40 %)	7 (46 %)
Normal	3 (20 %)	2 (13 %)
History of concurrent disability no. (%)	6 (40 %)	7 (46 %)
Club foot		
Hip disorder	4 (26 %)	2 (13 %)
Hydrocephalus	2 (13 %)	4 (26 %)

2014 TENS LIKE STUDY FROM IRAN

- Results
 - Several UDS measures different
 - Incontinence measures
- Conclude: “This type of electrical stimulation is safe, effective, reproducible, noninvasive, and cost-effective modality to improve urinary incontinence in children with history of MMC”
- My thoughts: small study, this has not been studied again or reproduced, how can DLPP increase but maximal detrusor pressure decrease?, was UDS review blinded?

Variables	Groups	Before FES therapy	6 mon. after FES therapy	<i>P</i> ^c value
Detrusor leak point pressure (cmH ₂ O)	Treatment	32 ± 10.7	55.6 ± 24.9	0.000
	control	33.5 ± 9	37 ± 11	0.261
	<i>P</i> ^{ab}	0.682	0.03	
Mean maximal bladder capacity (ml)	Treatment	183 ± 91	260 ± 87	0.01
	control	193 ± 78	204 ± 87	0.433
	<i>P</i> ^{ab}	0.765	0.110	
Mean maximal detrusor pressure (cmH ₂ O)	Treatment	59 ± 31	38 ± 16	0.004
	control	44 ± 22	50 ± 27	0.316
	<i>P</i> ^{ab}	0.145	0.158	
Mean detrusor compliance (ml/cmH ₂ O)	Treatment	6.7 ± 4.9	12.4 ± 5.7	0.002
	control	8.3 ± 4.7	10.2 ± 5.2	0.018
	<i>P</i> ^{ab}	0.386	0.286	
Daily incontinence score (range 0–3)	Treatment	2.7 ± 0.4	1.3 ± 0.9	0.000
	control	2.5 ± 0.5	2 ± 0.6	0.105
	<i>P</i> ^{ab}	0.438	0.02	
Frequency of pad changing (times/day)	Treatment	5.2 ± 1.6	2.4 ± 1.4	0.000
	control	4.3 ± 1.7	3.5 ± 1.6	0.005
	<i>P</i> ^{ab}	0.169	0.03	
Enuresis (night/week)	Treatment	4.1 ± 2.5	2.7 ± 0.9	0.02
	control	5.6 ± 2.7	4.5 ± 3.3	0.116
	<i>P</i> ^{ab}	0.191	0.205	

Transcutaneous Tibial Nerve Stimulation (TTNS) Treatment in Spina Bifida Pediatric Patients With Neurogenic Bladder

ClinicalTrials.gov ID ⓘ NCT06025734

Sponsor ⓘ University of Texas Southwestern Medical Center

Information provided by ⓘ Richard Adams, University of Texas Southwestern Medical Center (Responsible Party)

Last Update Posted ⓘ 2026-02-12

- A prospective pilot study at our institution
- I am involved with this study but have always been skeptical as theoretically I do not see how would help most patients
- 1 patient recruited over ~2 years



OLDER LITERATURE FROM ABOUT FECAL INCONTINENCE

- Treatment of fecal incontinence in children with spina bifida: comparison of biofeedback and behavior modification. Arch Phys Med Rehabil. 1986 Apr;67(4):218-24.
 - Take home: additional of biofeedback no better than behavioral modifications
- Biofeedback for neurogenic fecal incontinence: rectal sensation is a determinant of outcome. J Pediatr Gastroenterol Nutr. 1983 May;2(2):302-6. PMID:
 - Take home: those with rectal sensation/control may benefit from strengthening
- Behavioural and cognitive interventions with or without other treatments for the management of faecal incontinence in children. Cochrane Database Syst Rev. 2011 Dec 7;2011(12)
 - Take home: no good evidence that biofeedback improves outcomes over behavioral changes in “functional” constipation. Not enough studies for neurogenic bowel.

WHAT PATIENTS COULD THEORETICALLY BENEFIT?

- Data is not good for patients with or without neurogenic bladder
- In my opinion:
 - Patients who have some motor control over pelvic floor muscles may benefit. However, not proven.
 - Sacral level, ambulatory, possibly volitionally voiding already. We already do things like timed voiding in these patients.
 - Likely a small minority
- Downsides
 - Time intensive, cost to families, unproven, potentially avoid standard treatments

WHAT SHOULD WE TELL PATIENTS WHEN THEY ASK?

- I don't recall being asked by a family directly about PFFT yet.
- If there is no innervation to pelvic floor muscles from S2-S4, theoretically PFFT doesn't make much sense
- I would tell them what I learned making this talk.
 - PFFT = timed voiding, relaxation +/- strengthening exercises, biofeedback, deep breathing, core strengthening exercises
 - The data in children without neurogenic bladder is limited
 - The data in children with spina bifida is very limited and questionable quality
- PFFT should not replace standard therapy
 - CIC, medication, bowel elimination programs
- Unless better data published, I would not support hiring pelvic floor physical therapists in multidisciplinary spina bifida clinics
 - Interested families can seek out PFFT if desired outside

QUESTIONS?

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