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CASE STUDY

Sacral Neuromodulator Surgery vs. Physiotherapy

Is Skipping Physiotherapy a Risk Patients Should Take?

Case Study: A 24-year-old female patient underwent surgery for implantation of a neuromodulator to treat a hyperactive bladder. Physiotherapy was not offered as part of her initial management plan. After 1 year without improvement following the surgery, she decided to try physiotherapy. She was treated by physiotherapist Dr. Laira Ramos using the Active Perineal Rehabilitation protocol. The treatment lasted 16 weeks and consisted of 14 appointments. She had regained her quality of life, and the neuromodulator device had been turned off.

LAIRA RAMOS
2025

Contend

Clinical History:

Patient, female, 24 years old. Never pregnant. She sought physiotherapy on March 28, 2025, specifically for the management of overactive bladder symptoms, after approximately two years of treatment with no satisfactory improvement. The patient lives in Lisbon, Portugal, and all treatments were provided in the same city but at different clinics.

In January 2023, the patient developed a urinary tract infection (UTI) that persisted for approximately three months despite initial treatment with different antibiotics.

In March 2023, while still treating the urinary infection, she went to a specialized reference clinic. The medical team continued the antibiotic treatment, successfully resolving the infection. However, after the infection was determined, she began experiencing persistent urinary urgency and episodes of urinary incontinence.

At the same clinic, she started pharmacological treatment for an overactive bladder, but without results. She also underwent daily sessions of tibial nerve electrical stimulation lasting thirty minutes each. After two months of this therapy, there was still no improvement.

At that time, she had no control over her urinary continence and was leaking urine constantly, which led her to use diapers.

While still under care at the same clinic, she received intravesical injections, described as “vaccines,” aimed at addressing her bladder symptoms. These treatments did not produce any noticeable benefit.

In June 2023, she sought evaluation at another reference center after a lesion was discovered in her bladder. The lesion was treated with laser surgery; however, there was no clinical improvement following this intervention.

In August 2023, the patient traveled to Brazil to participate in an Erasmus exchange program, where she remained until December 2023, when she returned to Portugal. Throughout her stay abroad, she continued using diapers due to persistent urinary symptoms and was not undergoing any treatment during this period.

In April 2024, she returned to the initial reference clinic where she had previously been treated because her symptoms were severe, and she felt she could not continue living that way. She was still using diapers at that time. Following reassessment, the medical team decided to proceed with sacral neuromodulator implantation surgery as the next step in managing her condition. She underwent surgery in April 2024. Since the procedure, she has not perceived a significant improvement in her overactive bladder symptoms.

She came for a physiotherapy assessment at the end of March 2025, nearly one year after surgery. She has not experienced significant urine loss, reporting only occasional minor episodes of urinary leakage. Nevertheless, she remains unable to go longer than one hour without needing to urinate and wakes up at least three times per night to void, with some nights reaching up to eight episodes. Although her urinary continence has improved, she does not feel comfortable discontinuing the use of diapers because her overactive bladder symptoms remain very severe.

At her first physiotherapy appointment, she shared that her personal life, self-esteem, and confidence are significantly affected. She is afraid to go out with friends or family. She makes an effort to continue her studies at university, which is essentially the only activity she still maintains.

Anamnesis

Gynecological data

- Menarche at 11 years old.
- Began taking oral contraceptives at the age of 16. In 2024, her gynecologist recommended discontinuation, and she has not taken them since.
- Menstrual flow lasts 7 days with intense bleeding and mild pain during the first 2 days.
- Irregular cycles, with possible absence of menstruation for up to 2 months.
- Reports bladder pain during menstruation.
- MRI Abdomen and Pelvis – April 13, 2023*
    - Findings include fibro-adhesive changes in the vesico-uterine fold, with mild thickening of the bladder dome, without evidence of a definitive nodule suggestive of infiltrative endometriosis.
    - Additional fibro-adhesive changes in the vesico-uterine fold are noted, with spontaneously hyperintense nodules on MRI sequences, compatible with macroscopically accessible endometriosis on this imaging modality.

Obstetric data

- Never been pregnant.

Surgical history

- June 2023: Bladder intervention with laser.
- April 2024: Neuromodulator implantation.

Urinary system

Parameter	**28/03/2025**	**28/07/2025**
Daily water intake	1.5 L	1.5 L
Daytime urination frequency	Every 1 hour	Every 2–3h during daytime; Every 1–2h before bedtime
Nocturia	3 to 5 times/night	None
Straining to urinate	Yes	Yes
Ability to relax during urination	No	No
Sensation of bladder emptying	No	No
Preventive urination	No, due to urinating every 1h	Before leaving home*
Urgency	Yes	Only before bedtime
Urinary leakage episodes	One episode in August 2024, and in March 2025	None
Use of protective pads/diapers	Diapers all the time	Diapers when going out.*
Bother/discomfort (EVA scale)	10	8*

* The patient was advised to investigate the cause of the bladder discomfort, with endometriosis considered as a possibility.

** The patient has no urgency, but residual bladder discomfort makes her fear leakage. She has full control of voiding and, with her psychologist, is working on discontinuing diapers, since she managed without them during vacation.

The neuromodulator has been switched off since July 10, 2025.

Defecatory system

Parameter	**28/03/2025**	**25/07/2025**
Bowel movement frequency	3 times/day	No changes
Straining to evacuate	No, reports diarrhea	No changes
Ability to relax during evacuation	Yes	No changes
Sensation of complete bowel emptying	Yes	No changes
Fecal incontinence episodes	None	No changes

Pelvic organs

- No complaints.

Sexuality

On March 28, 2025 (first appointment), the patient was avoiding any social activities, maintaining only attendance at university. By July 25, 2025 (last appointment), she reported improved self-confidence, having gone on vacation with family and friends, resuming a social life, and starting a romantic relationship. She has not yet engaged in sexual intercourse, and she feels.

Physical Examination

The examination was performed with the patient in the dorsal decubitus position, knees bent, feet on the table, and legs apart. The assessment began with an inspection of the vulva to identify any skin alterations.

Pelvic floor muscle strength was assessed by bidigital palpation, with the index and middle fingers inserted into the vaginal canal and positioned toward the levator ani muscle along the midline. The patient was instructed to perform a maximal voluntary contraction of the pelvic floor muscles, and the strength was quantified using the Ortiz scale.

For analysis of electrical muscle activity, electromyography (EMG) was performed with a two-channel probe capable of simultaneously measuring activity on both sides of the deep pelvic floor muscles. The patient was instructed to perform a maximal voluntary contraction of the pelvic floor muscles, followed by a one-minute relaxation period to assess resting values. The recorded EMG measurements were expressed in microvolts.

For analysis of sensibility, electrical stimulation was performed using the same two-channel probe, which allowed stimulation of one side at a time in the deep pelvic floor muscles. The patient was instructed to indicate when she first perceived any sensation and, subsequently, the maximum intensity she could tolerate without pain. Stimulation was first applied to the right side, and then the same protocol was repeated on the left side. The intensity measurements were expressed in milliamperes. Two different stimulation parameters were applied: 70 Hz frequency and 100 µs pulse length, and 30 Hz frequency and 500 µs pulse length.

Observation: It is not possible to compare the pelvic floor muscle assessment with any evaluation performed before or after surgery, as none was conducted. The patient reported that she had never undergone a pelvic floor muscle assessment by the physiotherapist who followed her before the neuromodulator implantation surgery. The physiotherapy procedure consisted of a single appointment in which she only received instructions on how to place the electrodes to perform posterior tibial nerve stimulation before the surgery.

Force - Ortiz Scale		
Measurement	**Before**	**After**
Score	2	4

0 No perineal function detectable, not even upon palpation
1 No objective perineal function, recognizable only by palpation
2 Objective but weak perineal function, recognizable by palpation
3 Objective perineal function present, with no opposing resistance upon palpation
4 Objective perineal function present, with opposing resistance *not maintained* for more than 5 seconds during palpation
5 Objective perineal function present, with opposing resistance *maintained* for more than 5 seconds during palpation

Electrical activity (Electromyography EMG) – levator ani muscles				
Measurement	**Right Before**	**Left Before**	**Right After**	**Left After**
Relaxation (µV)	1	0	2	3
Minimum (µV)	1	0	0	0
Maximum (µV)	94	116	34	100

Sensibility (electrical stimulation) - levator ani muscles								
Measurement	**70 Hz 100 µs**				**30 Hz 500 µs**			
	Right Before	**Left Before**	**Right After**	**Left After**	**Right Before**	**Left Before**	**Right After**	**Left After**
First Sensation (mA)	28	19	15	15	14	11	10	10
Pain Threshold (mA)	36	33	30	30	20	14	25	25

The ability to voluntarily contract the pelvic floor muscles, even with a small degree of strength, together with the detection of activity in both sides of the levator ani muscle and the presence of sensibility, allowed the author to conclude, based on her clinical experience, that there was no nerve injury but rather muscle weakness and lack of body awareness.

In the pelvic floor muscle assessment, the patient presented a low strength grade measured by palpation, which explains the reported difficulty in holding urine for more than one hour and the constant use of diapers due to fear of incontinence episodes. By the end, she was completely secure regarding her urinary continence, able to maintain intervals of 2 to 3 hours between voiding, and no longer required the use of diapers.

Through EMG, performed with a two-channel probe, muscle activity was detected on both sides, although with a difference between them that remained until the end of treatment. An interesting point to highlight is that, at the end of treatment, the maximum muscle electrical activity was lower on both sides, clearly demonstrating that EMG readings are not directly proportional to muscle strength.

Analyzing with electrical stimulation, performed with a two-channel probe, at the beginning of treatment, the patient had different sensitivity thresholds, both for first sensation and pain, when comparing the right and left sides. By the end of treatment, sensitivity had normalized, with the patient showing the same parameters on both sides.

Note: Unfortunately, we do not yet have a gold-standard pelvic floor muscle assessment, nor a probe cable to measure superficial pelvic floor muscle function, nor to measure nerve activity using reflex response. This is part of the author's innovation project, which can be seen here: https://www.rpaeserie.com/en/inovacao.

Physiotherapy Treatment – Active Perineal Rehabilitation protocol

The patient was treated by physiotherapist Dr. Laira Ramos using the *Active Perineal Rehabilitation (APR)* protocol. At the first appointment, a complete assessment with anamnesis and physical examination was performed, as described in the previous section. No therapeutic intervention takes place before a detailed assessment.

The protocol is a scientifically validated method for global pelvic floor muscles (PFM) rehabilitation, addressing coordination, perception, strength, and function. It consists of 14 individualized sessions of about 50 minutes, including kinesiotherapy, electromyographic (EMG) biofeedback (BFB), electrical stimulation (STIM), and structured home exercise (HE) programs that also include the use of vaginal cones (VC).

Across all 14 sessions, treatment was carried out with a two-channel probe that performs EMG analysis and provides STIM on both sides of the levator ani muscles. **There is not yet a probe cable that allows stimulation and analysis of both sides of the superficial pelvic floor muscles.**

Each session is performed in an individual appointment with: • 10 min of electrical stimulation at 70 Hz, 100 µs for fast-twitch fibers • Kinesiotherapy with EMG biofeedback for fast-twitch fibers • 15 min of electrical stimulation at 30 Hz, 500 µs for slow-twitch fibers • Kinesiotherapy with EMG biofeedback for slow-twitch fibers • Home exercises guidance | Vaginal cones.

The protocol is adaptable. Not all patients require 14 sessions, since some may skip or repeat sessions according to progress and tolerance. The fundamental principle is to choose the exercise level that the patient can perform with some difficulty but without overload. Treatment is delivered in three phases: I- Awareness (1 to 4); II- Agility (5 to 8); III- Hypertrophy (9 to 14).

Kinesiotherapy is the foundation of treatment. As PFM is deep and not visible, exercises are guided by **EMG biofeedback**, which ensures that movements are performed correctly and allows faster and more effective results. EMG biofeedback is more precise than pressure. Training begins with simple isolated contractions and progresses to more complex exercises combined with trunk and hip movements, ending in standing, where dysfunctions are more evident. The difficulty and intensity of the kinesiotherapy exercises increase session by session.

Electrical stimulation promotes involuntary contractions that help the patient recognize correct movement. Feedback questions confirm perception of contraction and relaxation, closure and opening of the urethra, vagina, and anus, upward and downward movement of the pelvic floor, and absence of accessory muscle use. This sensory input creates movement memory that is reinforced by repetition and progression. Electrical stimulation also promotes neuronal changes and normalization of sensitivity. **Metabolic improvement by STIM is not sufficient for hypertrophy, which requires active and progressive exercise guided by kinesiotherapy.**

Home exercises are essential for adherence and continuity. The success of the protocol strongly depends on patient commitment, since adherence to home exercises directly reinforces the results obtained in the clinic. In phase one, patients learn awareness and relaxation strategies. In phase two, exercises are guided by two videos, one lasting 3 minutes and the other 6 minutes.

In phase three**, vaginal cones are recommended to promote hypertrophy**; they are considered the most effective strategy to maintain pelvic floor strength after physiotherapy treatment. Vaginal cones are contraindicated for patients unable to contract the pelvic floor muscles or for those with muscle hyperactivity, and a professional must guide their use.

PHASE I – DEVELOPMENT OF PELVIC FLOOR MUSCLE AWARENESS (COGNITIVE)

The treatment began with a focus on pelvic floor muscle awareness, which is always necessary and, in her case, essential due to weakness and lack of perception. During the first four weeks, she attended sessions 2, 3, and 4 of the APR protocol, with session 4 repeated twice. This stage aimed to teach her to contract and relax PFM correctly.

Treatment was carried out with a two-channel probe that performs EMG analysis and provides STIM on both sides of the levator ani muscles. Across four sessions (STIM for fast-twitch fibers, kinesiotherapy for fast-twitch fibers, STIM for slow-twitch fibers, and kinesiotherapy for slow-twitch fibers), she remained in the supine position with the head of the table elevated about 30°, legs extended, and a pillow under the knees. Both kinesiotherapy for fast and slow-twitch fibers consisted of isolated PFM contractions with verbal cues to consciously focus on the movement.

At home, she practiced awareness exercises, learning to relax the pelvic floor to urinate, defecate, and allow penetration when she started to have sex again. She was also taught the Knack technique, which involves contracting the pelvic floor muscles before any effort, such as coughing, sneezing, or lifting a weight. **In addition, she was instructed that when experiencing urinary urgency, contracting the pelvic floor muscles can inhibit detrusor overactivity and close the urethra, relieving the symptoms.**

PHASE II – DEVELOPMENT OF MUSCLE AGILITY (NEUROMUSCULAR)

This phase included six weekly appointments with sessions 5–8 of the APR protocol. Session 6 was repeated three times before moving forward, and then sessions 7 and 8 were completed.

Treatment still used the two-channel probe to provide STIM for stimulation and EMG for analysis of the levator ani. In these six sessions, STIM and kinesiotherapy for fast-twitch fibers and STIM for slow-twitch fibers were performed in the same position as in Phase I. The difference occurred during kinesiotherapy for slow-twitch fibers. In sessions 5 and 6, she performed pelvic floor contractions combined with trunk and hip movements in the lying down position, while in sessions 7 and 8, she exercised in a standing position.

Home practice included two PFM exercise videos (3 and 6 minutes). The three-minute video trained attention to avoid using accessory muscles, while the six-minute video added pelvic floor contractions with trunk and hip movements in standing.

PHASE III – MUSCLE HYPERTROPHY (METABOLIC)

With muscle coordination established, training advanced to hypertrophy. Vaginal cones were introduced for home practice to increase resistance progressively. She was seen every two weeks and performed sessions 9, 11, and 14. Treatment still used the two-channel probe to provide STIM for stimulation and EMG for analysis of the levator ani. In these three sessions, STIM and kinesiotherapy for fast-twitch fibers and STIM for slow-twitch fibers were performed in the same supine position as in Phase I. During kinesiotherapy for slow-twitch fibers, she exercised standing, performing PFM contractions with movements as squatting, walking, jumping, and stair climbing.

At home, the patient used vaginal cones during the shower as part of her routine, for 5–15 minutes, standing with small movements. She was instructed to start with the lightest cone. If it fell once, she could reinsert it; if it fell twice, she should end the shower and try again the next day. Once able to complete without effort, she should progress to heavier cones. Continued use was advised, as muscles lose strength without training. For active patients, cones may later be used during workouts once the shower routine is mastered.

Discussion

This case report describes a young patient with overactive bladder symptoms who, after failure of sacral neuromodulation surgery, achieved clinical recovery with structured pelvic floor muscle rehabilitation. This outcome reinforces the relevance of conservative interventions in the management of overactive bladder, even when introduced late in the therapeutic pathway.

The guidelines state that conservative measures, such as pelvic floor muscle training and behavioural modifications, should constitute the first-line treatment for overactive bladder, and neuromodulation and botulinum toxin are reserved for refractory cases (1,2). In this patient's trajectory, the neuromodulator was implanted before initiating pelvic floor muscle rehabilitation, illustrating an inversion of this sequence. The marked improvement after structured physiotherapy suggests that low-risk interventions should not be dismissed even after the failure of invasive therapies.

The Active Perineal Rehabilitation protocol (3) respects all stages of rehabilitation and organizes treatment into three phases: I- awareness, II- muscle agility training, III- muscle hypertrophy. The main objective of the protocol is a **comprehensive neuromuscular rehabilitation**, ensuring that the pelvic floor muscles can perform all their physiological functions effectively.

Cochrane systematic reviews confirm the efficacy of PFMT in treating urinary incontinence and overactive bladder symptoms (4). Although the addition of biofeedback shows only limited benefit for symptom reduction and quality of life (4), Dr. Ramos considers the use of biofeedback essential in clinical practice. In her experience, biofeedback makes treatment faster and more efficient by facilitating motor learning and improving patient engagement.

The main limitation of this report is its nature as a single case, which does not allow definitive conclusions about causality. Nevertheless, it clearly illustrates that supervised urogynecological physiotherapy should be indicated as a first-line treatment for urinary incontinence and overactive bladder. It is also important to highlight that this intervention remains relevant at any stage of the therapeutic pathway, even after invasive treatments have failed.

The author contacted the patient before the publication of this document, on August 22, 2025. She continues performing regular exercises with vaginal cones, as recommended. The neuromodulator remains switched off, and bladder discomfort has decreased.

Conclusion

This case highlights the importance of considering supervised urogynecological physiotherapy as a first-line treatment for overactive bladder and urinary incontinence, even in complex cases and after invasive procedures have failed. The patient, who showed no improvement after neuromodulator implantation, achieved recovery following 16 weeks of treatment with the Active Perineal Rehabilitation protocol. Although conclusions cannot be generalized from a single case, the outcome illustrates the potential of a structured and comprehensive physiotherapy approach to restore neuromuscular function and quality of life. This reinforces the need to integrate physiotherapy into therapeutic pathways before invasive interventions are proposed.

Note - Copyright

A full description of the protocol is available in the book of the same name, available at https://www.rpaeserie.com/en/livros. The protocol is protected by copyright, and no part of it may be reproduced or used, in whole or in part, without the author's prior permission.

References

1. Cameron AP, Chung DE, Dielubanza EJ, Enemchukwu E, Ginsberg DA, Helfand BT, et al. The AUA/SUFU Guideline on the Diagnosis and Treatment of Idiopathic Overactive Bladder. J Urol. 2024 July;212(1):11–20.

2. Al-Dossari R, Kalra M, Adkison J, Nguyen BM. Non-Surgical Management of Urinary Incontinence. J Am Board Fam Med. 2024 Sept 1;37(5):909–18.

3. Ramos, Laira. Reabilitação Perineal Ativa [Internet]. São Paulo: Edição de autor; 2014. 87 p. Available from: https://www.rpaeserie.com/livros

4. Fernandes ACN, Jorge CH, Weatherall M, Ribeiro IV, Wallace SA, Hay-Smith EJC. Pelvic floor muscle training with feedback or biofeedback for urinary incontinence in women - Fernandes, ACNL - 2025 | Cochrane Library. [cited 2025 Aug 18]; Available from: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD009252.pub2/full