

## Introduction

Perineurial cysts – also called Tarlov cysts (TC) – are infrequent radiological findings that are generally considered to be asymptomatic, so much so that their presence is frequently omitted from radiology reports. Epidemiological studies of patients undergoing lumbosacral magnetic resonance imaging (MRI) for different medical indications estimate the prevalence of TC to be 4%<sup>1</sup>. Recent studies however suggest their possible association with neurological symptoms such as pain, numbness and urogenital complaints<sup>2-3</sup>.

The aim of this study was to assess the clinical presentation of patients presenting with sacral TCs, objectively evaluate the extent of injury of the sacral innervation and explore the relationship between nerve injury, MRI changes and symptoms.

## Methods and Materials

- Consecutive patients with sacral TC, presenting with at least one symptom related to the pelvic area and undergoing neurophysiology testing, participated in a cross-sectional review of symptoms using validated questionnaires.
- Bladder, sexual and bowel symptoms were objectively assessed using the following questionnaires: the Urinary Symptom Profile (USP) to assess stress urinary incontinence (SUI), overactive bladder (OAB) and low stream symptoms, the Constipation Scoring System (CSS) and the Arizona Sexual Experience Scale (A-SEX) to identify sexual dysfunction.
- Findings of pelvic neurophysiology (pudendal sensory evoked potentials (SEPs), S2 and S3 dermatomal SEPs, external anal sphincter electromyography) (Figure 1) and urodynamics testing were collected retrospectively.
- Relationship between neurophysiology, MRI findings, and patients' symptoms were assessed using Fischer and ANOVA tests.

## Results

- Sixty-five females were included (mean age 51.2 ± 12.1 years). Most patients had multiple and bilateral cysts (n=56 (86%)), and median cyst diameter was 10 mm (range 3-34 mm).
- Thirty-seven patients (57%) had abnormal findings on neurophysiology. Twenty-five (38%) patients had one abnormal test, 10 (15%) had two abnormal tests, and two (3%) had three abnormal tests. There was no association between abnormal neurophysiology findings and age (p=0.13).

- No association was found between the presence of a cyst, its diameter or compression/deviation of associated nerve roots and abnormalities in respective dermatomal SEPs or clinical examination findings.

- Table 1 summarizes the association between neurophysiology and urogenital and bowel symptoms:

- A negative association was found between neurophysiology abnormalities and occurrence of urgency urinary incontinence (p=0.03), detrusor overactivity (p<0.01) and stress urinary incontinence (p=0.04).
- No association was found between uroflowmetry findings and neurophysiology findings, concomitant medication use, or the number of cysts.
- 22 patients underwent multichannel urodynamic study. A negative association was observed between detrusor overactivity and abnormal neurophysiology results (p<0.01).

## Discussion

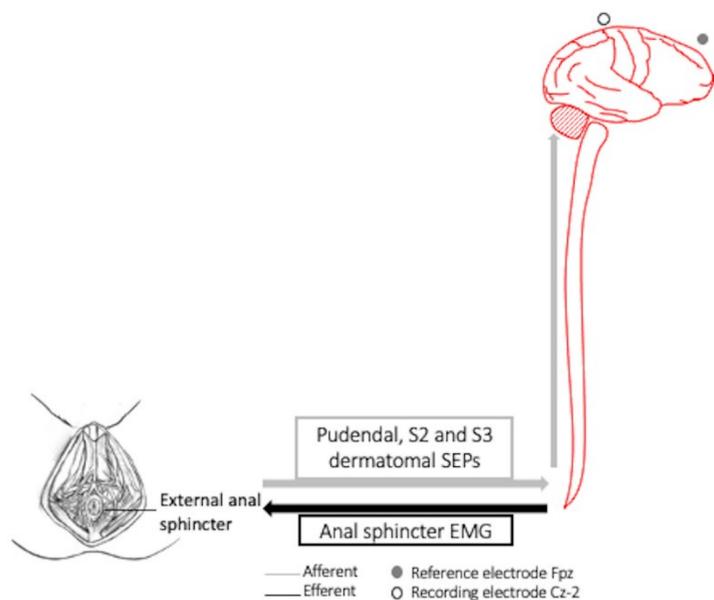
A high prevalence of storage symptoms was reported in our cohort (82%), however this study demonstrates a negative correlation between findings of sacral nerve root injury and reports of OAB symptoms, findings of detrusor overactivity on urodynamics, and SUI, which is consistent with the expected pattern of bladder dysfunction for lesions affecting the sacral nerve roots<sup>4</sup>.

No association could be established between abnormal neurophysiology findings and voiding dysfunction largely reported, possibly because TC mostly affected the sensory innervation and changes were more often seen unilaterally, and thus may not result in significant dysfunction of detrusor functions. Confounding factors such as medications, age and concomitant co-morbidities such as pelvic organ prolapse could have also contributed.

## Conclusions

- This study demonstrates objective neurological impairment of sacral root functions in patients with symptomatic sacral TC, particularly of the sensory innervation.
- Although women with TC report a high rate of bladder, sexual and bowel symptoms, urinary incontinence is unlikely to reflect TC-related nerve damage.

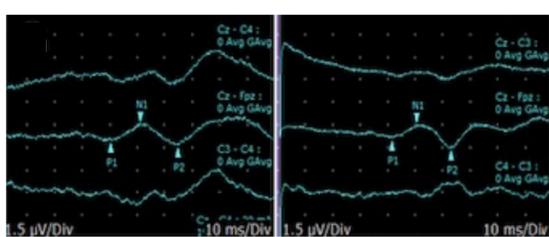
**Figure 1.** Schematic diagram depicting the pelvic neurophysiology studies performed



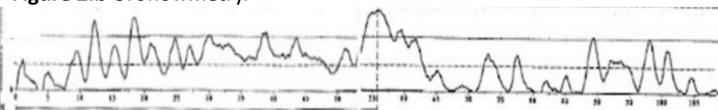
**Table 1.** Urogenital and bowel dysfunction in 65 women with Tarlov cysts and their relationship with pelvic neurophysiology findings

	All n=65	Pelvic neurophysiology findings		p
		Normal n=28	Abnormal n=37	
USP sub-score (n=53) – mean ± SD				
Stress Urinary Incontinence	2.6 ± 2.8	3.7±3.0	1.8±2.3	0.02
Overactive bladder	9.0 ± 5.1	11.3±5.3	7.4±4.2	<0.01
Low stream	2.2 ± 2.4	1.6±1.6	2.5 ± 2.6	0.17
Uroflowmetry (n=56) – n (%)				
Significant PVR	12 (21%)	5 (23%)	7 (22%)	1
Abnormal flow rate	14 (25%)	7 (30%)	7 (23%)	0.55
Urodynamic study(n=22) – n (%)				
Detrusor overactivity	4 (18%)	4 (57%)	0	<0.01
Impaired bladder filling sensations	9 (41%)	1 (14%)	8 (53%)	0.17
CSS score (n=49) – mean ± SD	11.3 ± 5.5	10.5 ± 4.9	12.0 ± 6.1	0.38
Sexual dysfunction (A-SEX) – n (%)	37 (80%)	18 (86%)	19 (76%)	0.49

**Figure 2.** Illustration with a case of a patient in its 60s with longstanding history of distal low back and left-sided buttock pain



**Figure 2.b** Uroflowmetry.



**Figure 2.c** Sacral spinal MRI showing cysts arising from left S3 and right S4 nerve roots

## Contact

Claire Hentzen  
Neuro-urology department  
Tenon Hospital, Paris, France  
Email: [claire.hentzen@aphp.fr](mailto:claire.hentzen@aphp.fr)

## References

1. Klepinowski T, Orbik W, Sagan L. Global incidence of spinal perineural Tarlov's cysts and their morphological characteristics: a meta-analysis of 13,266 subjects. *Surg Radiol Anat SRA*. 2021 Jan 16
2. Hulens M, Rasschaert R, Bruyninckx F, Dankaerts W, Stalmans I, De Mulder P, et al. Symptomatic Tarlov cysts are often overlooked: ten reasons why-a narrative review. *Eur Spine J Off Publ Eur Spine Soc Eur Spinal Deform Soc Eur Sect Cerv Spine Res Soc*. 2019 Oct;28(10):2237–48.
3. Marino D, Carluccio MA, Di Donato I, Sicurelli F, Chini E, Di Toro Mammarella L, et al. Tarlov cysts: clinical evaluation of an Italian cohort of patients. *Neurol Sci Off J Ital Neurol Soc Ital Soc Clin Neurophysiol*. 2013 Sep;34(9):1679–82.
4. Panicker JN, Fowler CJ, Kessler TM. Lower urinary tract dysfunction in the neurological patient: clinical assessment and management. *Lancet Neurol*. 2015 Jul;14(7):720–32.