Sacral Contributions to Sexual Pain

Irwin Goldstein, MD, IF (USA)
9:06 AM - 9:24 AM

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Disclosure

Speaker: Coloplast, Softwave TRT

Advisory Board/Consultant: Adamo, Cynosure, Endo, Freya, Initiator Pharma, Palatin, Softwave TRT

Research Grant: Palatin

Disclaimer

The research being presented may not be generalizable to all populations

The terms “women” and “female” are used in this presentation to refer to individuals with a vulva, although it is acknowledged that not everyone with this anatomy identifies with these terms

Sacral Contributions to Sexual Pain

History of sciatica:
Lower extremity vs Genito-pelvic/lower extremity

Neuroanatomy Sacral Afferent Nerves

Sacral Radiculopathy

Clinical Case

History of Lower extremity Sciatica

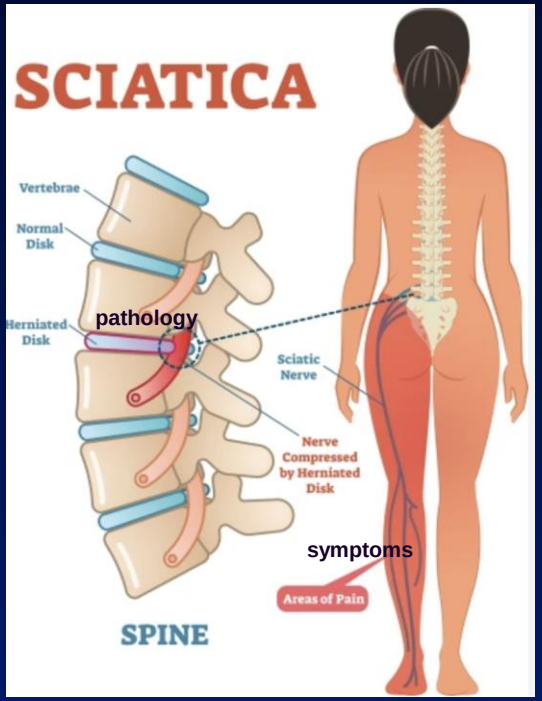
- **Lower Extremity Sciatica = condition where pathology (e.g. annular tear) in the lumbosacral region of the spine (L1 – S1)**

- **causes dysesthesia symptoms (e.g. pain) in a region (lower extremities) remote from the site of the pathology**

- **HISTORY: "Pain in sciatic distribution was known and recorded by ancient Greek and Roman physicians, but was commonly attributed to diseases of the hip joint."**

- **"It was not until Cotugno's experiments of 1764 (260 years ago) that leg pain was considered of 'nervous' origin and distinguished from pain of 'arthritic' origin."**

Symptoms remote from pathology site



Review

A brief history of sciatica

JMS Pearce*,[1]

[1]*Department of Neurology, Hull Royal Infirmary and Hull York Medical School, UK*

Study design: Historical review.
Objectives: Appraise history of concept of sciatica.
Setting: Europe.
Methods: Selected, original quotations and a historical review.
Results: Evolution of ideas from hip disorders, through interstitial neuritis.
Conclusion: Current concepts of discogenic sciatica.
Sponsorship: None.
Spinal Cord (2007) **45,** 592–596; doi:10.1038/sj.sc.3102080; published online 5 June 2007

History of Genito-pelvic/Lower extremity Sciatica

Prevalence of Sacral Spinal (Tarlov) Cysts in Persistent Genital Arousal Disorder

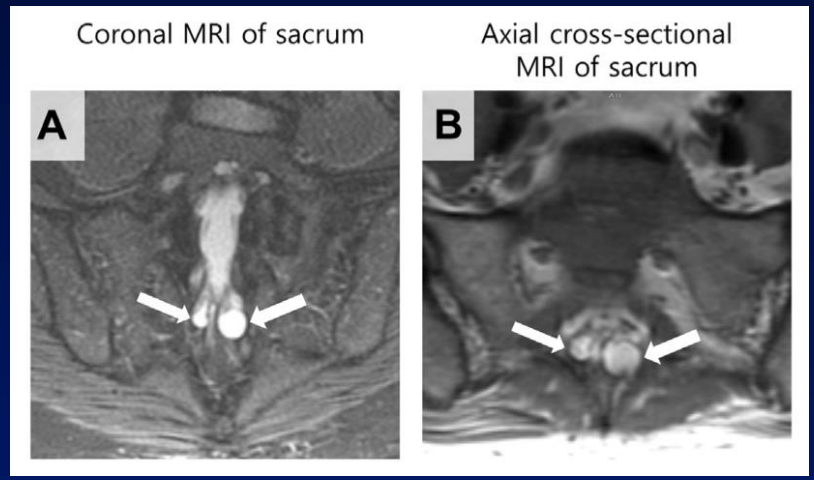
Barry R. Komisaruk, PhD*† and Huey-Jen Lee, MD†

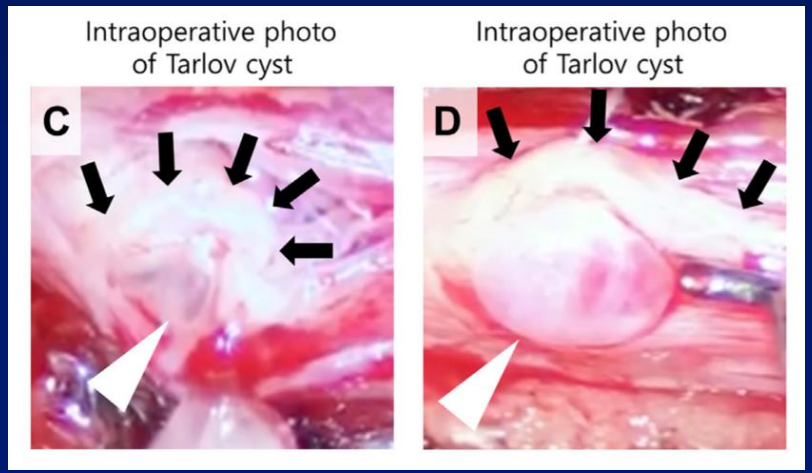
*Department of Psychology, Rutgers, The State University of New Jersey, Newark, NJ, USA; †Department of Radiology, University of Medicine and Dentistry of New Jersey, Newark, NJ, USA

248 YEARS LATER

Sacral Tarlov cysts

- Sacral cysts, first described by Tarlov in 1938, are occasionally found incidentally on lumbosacral spine MRI imaging
- Tarlov cysts form characteristically at the S2 and S3 dorsal root ganglia, ballooning out as a result of filling with cerebrospinal fluid
- S2 and S3 dorsal roots convey sensory pudendal and pelvic nerves, which innervate the external and internal genitalia could they generate the abnormal sensations characteristic of PGAD?





Goldstein I, Komisaruk BR, Pukall CF, et al. International Society for the Study of Women's Sexual Health (ISSWSH) Review of Epidemiology and Pathophysiology, and a Consensus Nomenclature and Process of Care for the Man- agement of Persistent Genital Arousal Disorder/Genito-Pelvic Dysesthesia (PGAD/GPD). J Sex Med 2021
Komisaruk BR and Lee H-J. Prevalence of sacral spinal (Tarlov) cysts in persistent genital arousal disorder. J Sex Med 2012;9:2047–2056.

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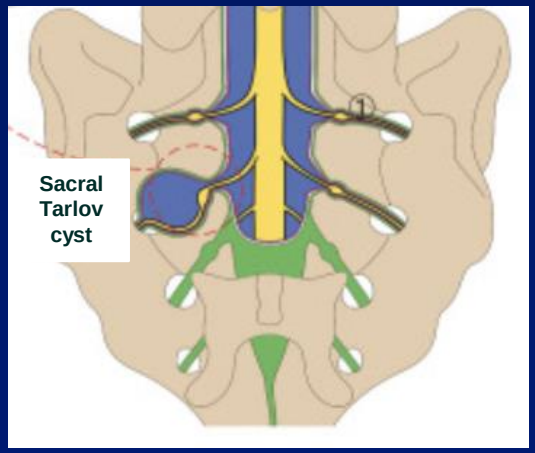
248 YEARS LATER

- Tarlov cysts were present in 12/18 (66.7%)
- Tarlov cysts large samples of the population observed for lumbosacral pain was 1.2–9.0%.

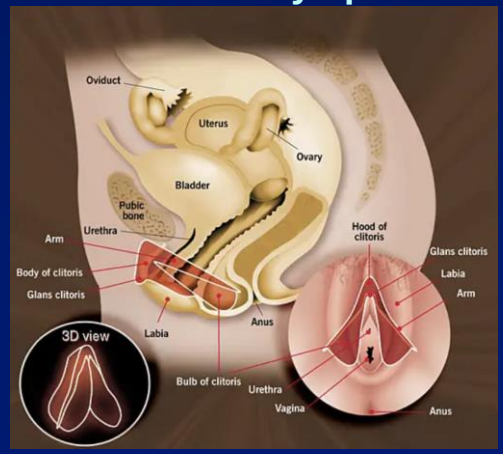
- **Pathology:** Tarlov cysts are sacral
- **Symptoms of PGAD/GPD:** located REMOTELY in the genital and/or pelvic/pudendal regions

- **Symptoms of PGAD/GPD most commonly experienced in clitoris**
- **also in other genito-pelvic regions (eg, mons pubis, vulva, vestibule, vagina, urethra, perineum, bladder, and/ or rectum)**

Location
Sacral Pathology



REMOTE Location
PGAD/GPD symptoms



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History of Genito-pelvic/Lower extremity Sciatica

Prevalence of Sacral Spinal (Tarlov) Cysts in Persistent Genital Arousal Disorder

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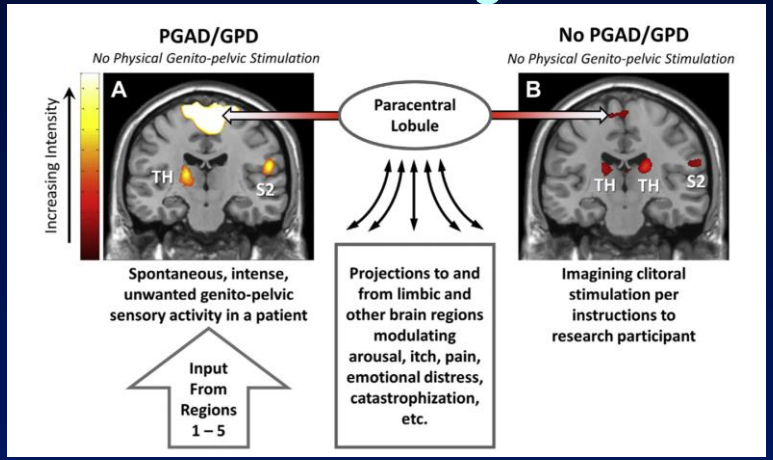
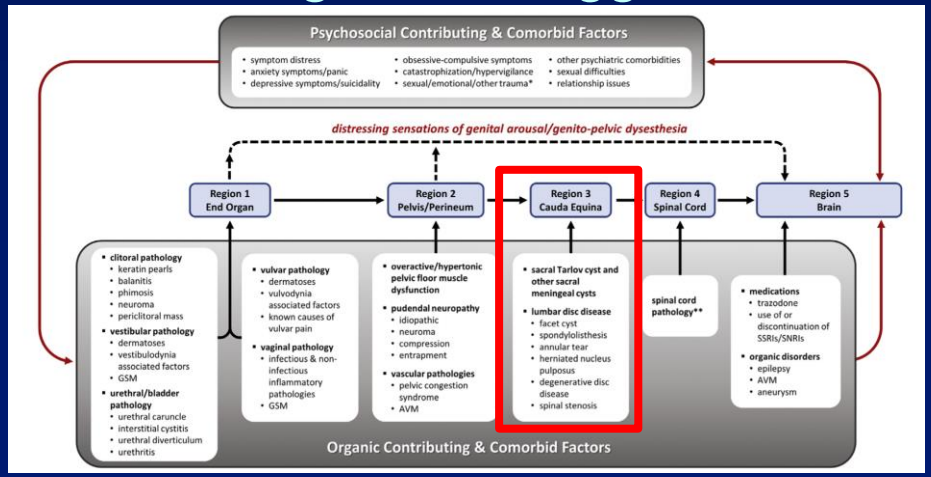
248 YEARS LATER

- **GENITO-PELVIC SCIATICA = condition where pathology (Tarlov cyst) in sacral region of spine (S1 – S4)**
- **causes symptoms (e.g. pain/PGAD) in a region (genito-pelvic region) REMOTE from site of pathology**

fMRI images



Regions of triggers



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TAKE HOME MESSAGES

1. **Lower extremity Sciatica is a condition where lower extremity symptoms** are REMOTE from the site of pathology (lumbosacral spine)

2. Lower extremity Sciatica recognized 260 years ago

3. 248 YEARS LATER/14 YEARS AGO: **Genito-pelvic/Lower extremity Sciatica is a condition where Genito-pelvic/Lower extremity symptoms** are REMOTE from the site of pathology (lumbosacral spine)

Sacral Contributions to Sexual Pain

History of sciatica:
Lower extremity vs Genito-pelvic/lower extremity

Neuroanatomy Sacral Afferent Nerves

Sacral Radiculopathy

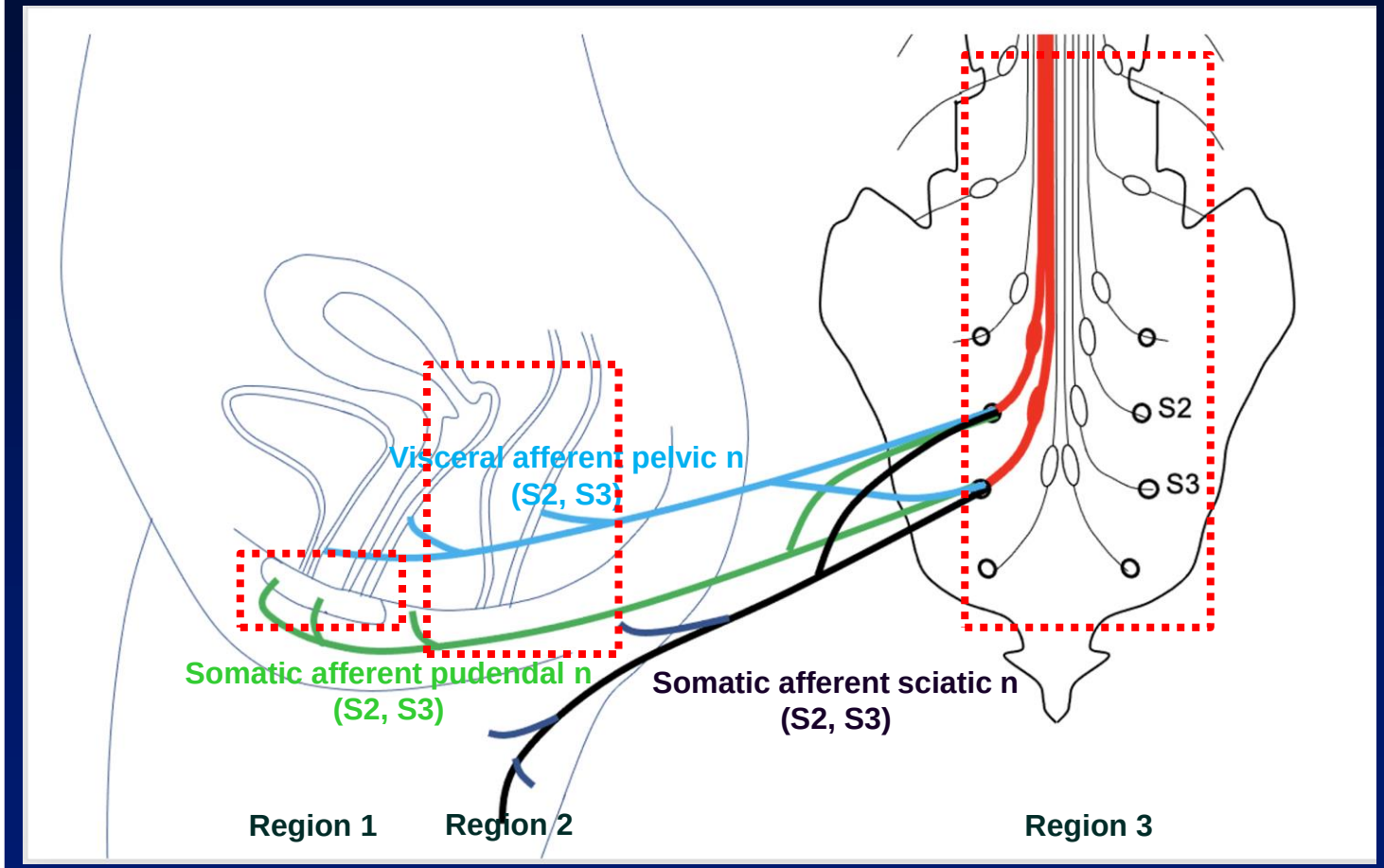
Clinical Case

Genito-pelvic organs/lower extremities
Sacral afferent (S2, S3) nerves

Somatic afferent pudendal nerve (S2, S3): clitoris, vulva, vestibule, perineum, perianal region

Visceral afferent pelvic nerve (S2, S3): clitoris, vestibule, urethra, bladder, umbilicus, vagina, rectum

Somatic afferent sciatic nerve (S2, S3): lower back, buttock, thigh, calf, foot



Courtesy Dr Barry Komisaruk

Genito-pelvic organs/lower extremities
Sacral afferent (S2, S3) nerves

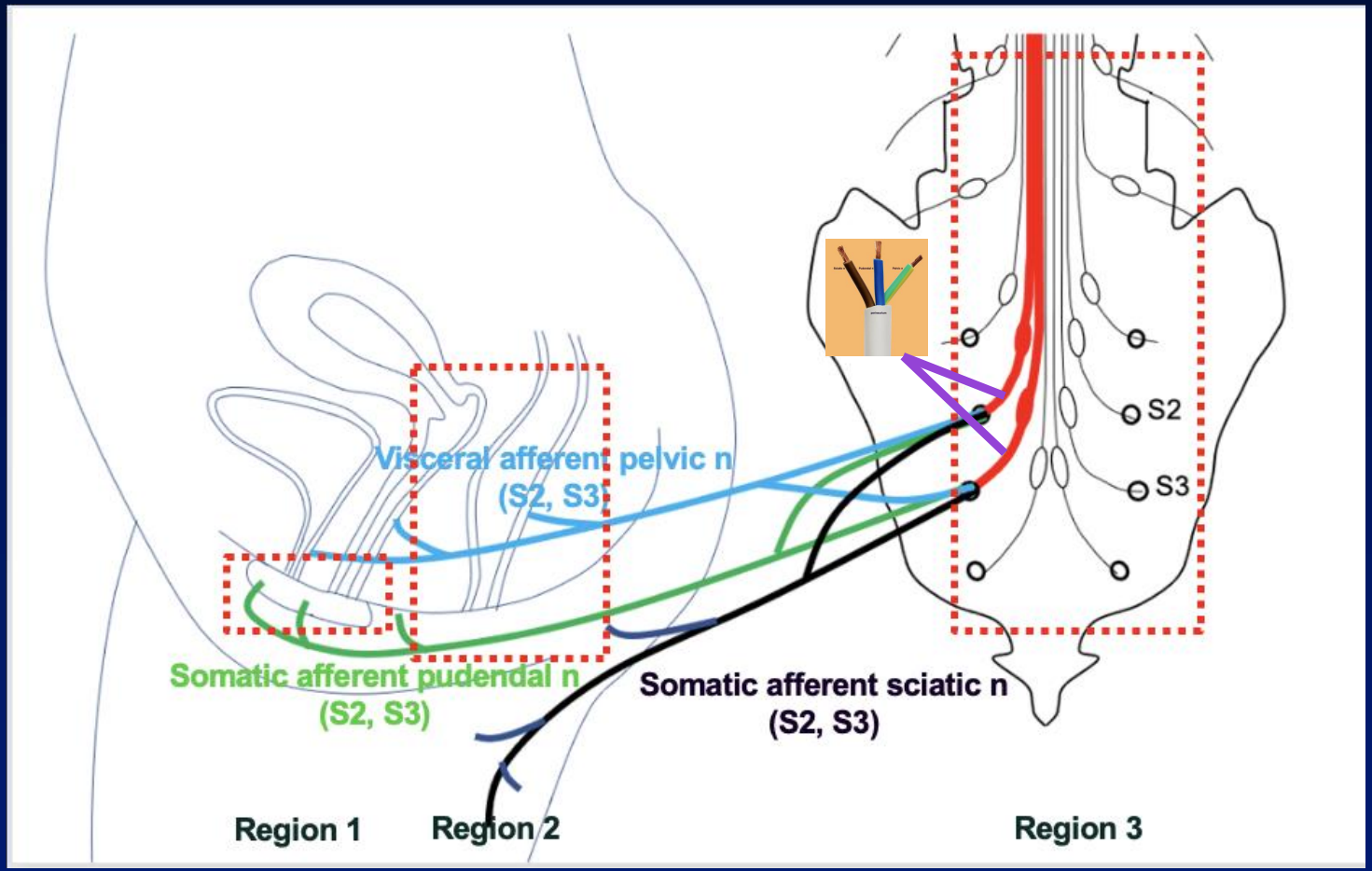
- Pudendal nerve
- Pelvic nerve
- Sciatic nerve

converge at the S2 and S3 foramina to enter cauda equina

like a cable

to form the S2-3 nerve roots

S2 S3 nerve root = cable of pelvic, pudendal, sciatic n



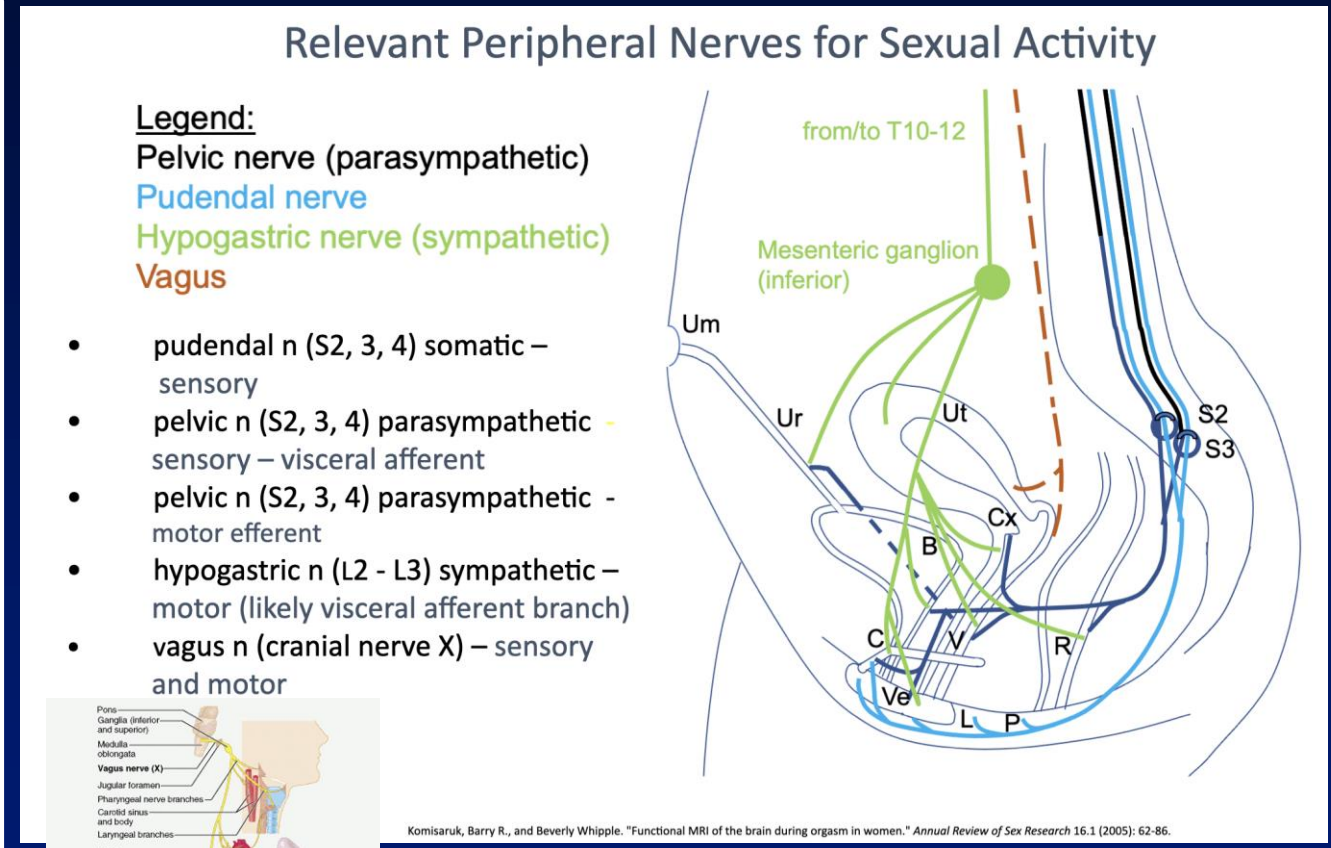
Courtesy Dr Barry Komisaruk

Other Genito-pelvic organs/lower extremities
NOT sacral afferent (S2, S3) nerves

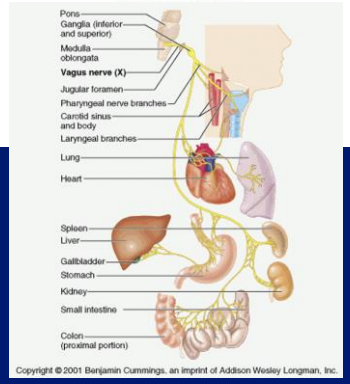
Hypogastric nerve (green)

Vagus nerve (red)

- **Hypogastric nerve (orange) conveys visceral sensations from cervix, uterus, prostate - sensory fibers synapse at T10-12 level of spinal cord**
- **Vagus nerve (cranial nerve 10) conveys visceral sensations from cervix, uterus, probably vagina).**
- **Vagus nerve fibers bypass spinal cord and enter the brain in the medulla oblongata; they are unaffected by lumbosacral disc disease**



Komisaruk, Barry R., and Beverly Whipple. "Functional MRI of the brain during orgasm in women." *Annual Review of Sex Research* 16.1 (2005): 62-86.

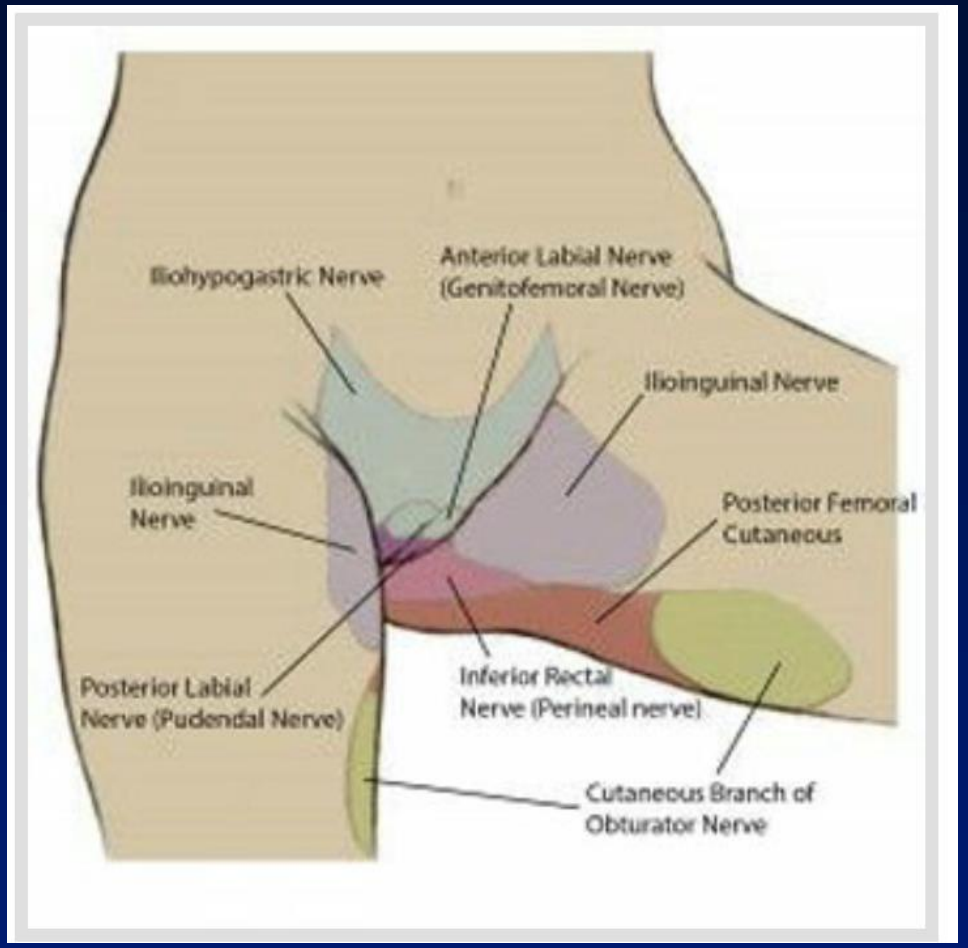


Courtesy Dr Barry Komisaruk

Other Genito-pelvic organs/lower extremities
NOT sacral afferent (S2, S3) nerves

- **Genital branch of the genitofemoral nerve (L1, L2)**
- **supplies sensation to the labia majora and mons pubis**

- **Ilioinguinal nerve (L1)**
- **supplies sensation to the labia majora and mons pubis**



Courtesy Dr Barry Komisaruk

TAKE HOME MESSAGES

1. Three genito-pelvic/lower extremity sensory sacral nerves:

- **Pudendal (S2, S3)**
- **Pelvic (S2, S3)**
- **Sciatic (S2, S3)**

2. In the cauda equina, just entering sacral foramina, three sensory sacral nerves merge like a cable to form S2, S3 sacral nerve roots

3. Other sensory genito-pelvic nerves include: 1) hypogastric n (T10-12, visceral afferent), 2) vagus n (cranial n 10, visceral afferent), 3) genital branch of genitofemoral n (L1-2, somatic afferent), 4) ilioinguinal n (L1, somatic afferent)

Sacral Contributions to Sexual Pain

History of sciatica:
Lower extremity vs Genito-pelvic/lower extremity

Neuroanatomy Sacral Afferent Nerves

Sacral Radiculopathy

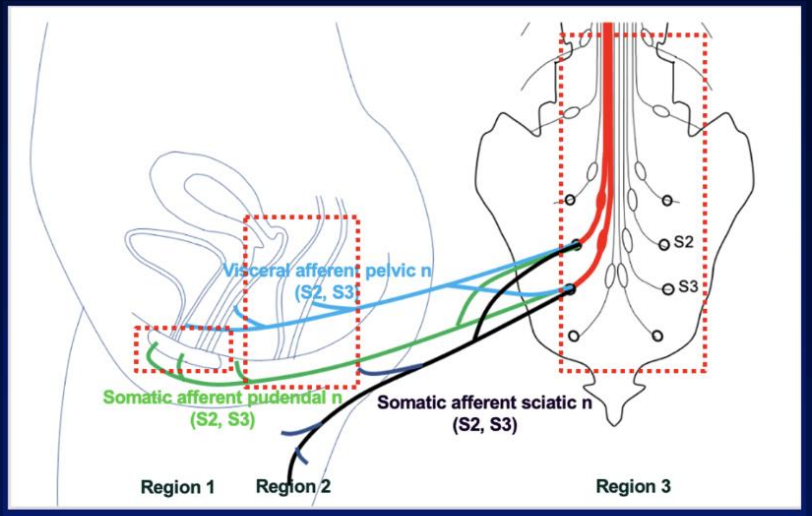
Clinical Case

Sacral Radiculopathy

Inflammatory irritation of the S2,S3 nerve roots in the cauda equina that are formed by the convergence of the pudendal, pelvic and sciatic nerves

and

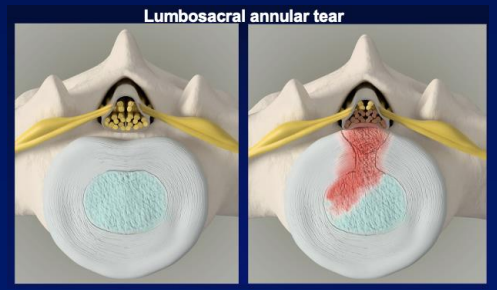
Clinical symptoms that REMOTELY involve the sensory fields of these pudendal, pelvic and sciatic nerves

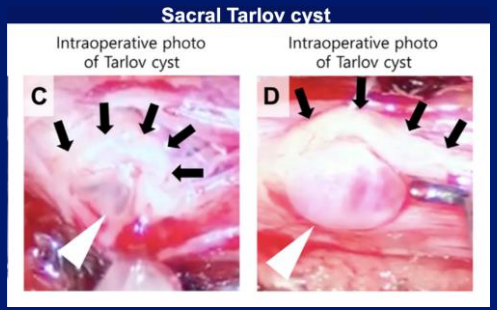


REMOTE Symptom location | **Cauda equina pathology location**

Symptoms of abnormal sensations in genito-pelvic organs/lower extremities (dysesthesias):

- pain
- arousal
- itch
- tickle
- pressure
- engorgement
- throbbing
- heat
- "electric shocks"
- "broken glass"
- pins and needles
- feeling of wetness
- etc

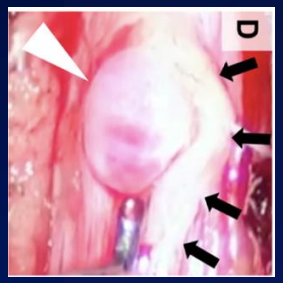


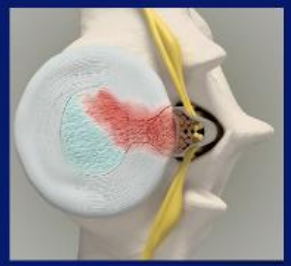


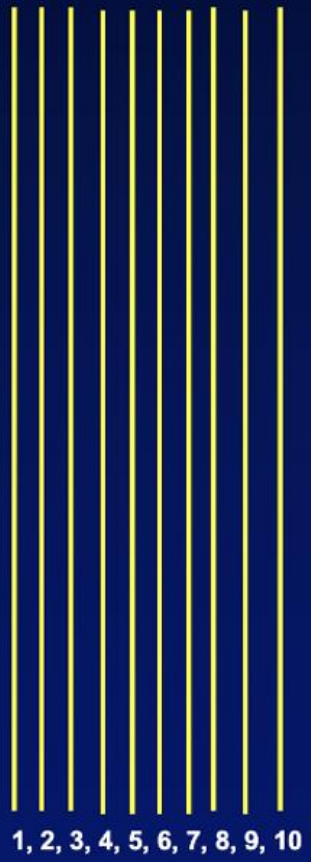
Choll W Kim, Irwin Goldstein, Barry R Komisaruk, Sue W Goldstein, Noel N Kim, Rose Hartzell-Cushanick, Maria Uloko, Alyssa Yee, Lumbar endoscopic spine surgery for persistent genital arousal disorder/genitopelvic dysesthesia resulting from lumbosacral annular tear–induced sacral radiculopathy, *The Journal of Sexual Medicine*, Volume 20, Issue 2, February 2023, Pages 210–223,

LISTEN TO HISTORY OF SENSORY FIELD INVOLVEMENT

Compression of various sacral nerve root fibers leads to various different symptoms involving pelvic n, pudendal n and sciatic n







1 = visceral afferent n (pelvic n branch) from clitoris
2 = dorsal n (pudendal n branch) from clitoris
3 = visceral afferent n (pelvic n branch) from vestibule
4 = vestibular n (pudendal n branch) from vestibule
5 = labial n (pudendal n branch) from vulva
6 = perineal n (pudendal n branch) from perineum
7 = inf hemmorhoidal n (pudendal n branch) from anus
8 = visceral afferent n (pelvic n branch) from vagina
9 = visceral afferent n (pelvic n branch) from cervix
10 = sup cluneal n (sciatic n branch) from buttoc

Sacral Pathology

Sacral Nerve Root

REMOTE Symptom location

Choll W Kim, Irwin Goldstein, Barry R Komisaruk, Sue W Goldstein, Noel N Kim, Rose Hartzell-Cushanick, Maria Uloko, Alyssa Yee, Lumbar endoscopic spine surgery for persistent genital arousal disorder/genitopelvic dysesthesia resulting from lumbosacral annular tear–induced sacral radiculopathy, *The Journal of Sexual Medicine*, Volume 20, Issue 2, February 2023, Pages 210–223,

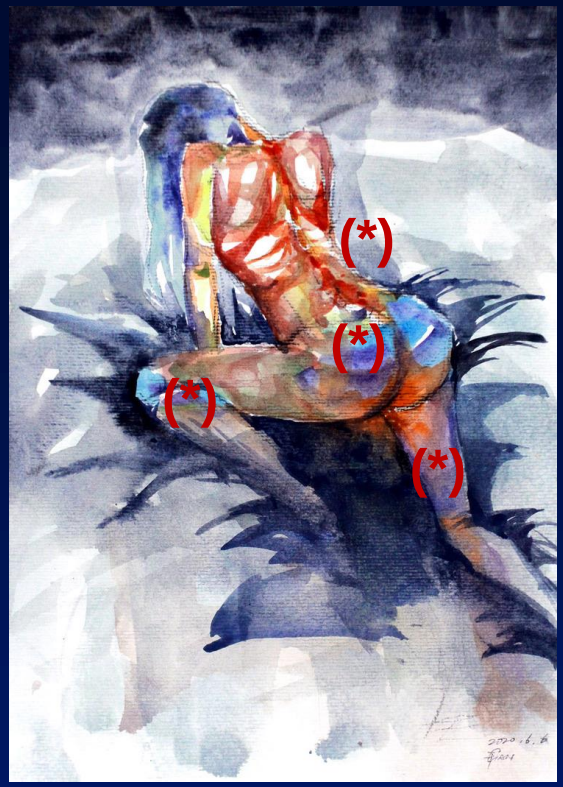
LISTEN TO HISTORY OF SENSORY FIELD INVOLVEMENT

22 yo gymnast with EDS: PGAD since age 18, spontaneous orgasms at age 19

Pudendal nerve *: Burning, itching, electric shocks in her vulva, clitoris, perineum regions

Pelvic nerve *: radiating to umbilicus; vagina is consistently lubricated - she cannot control it with her mind.

Sciatic nerve *: pain radiating to lower back and down back of her legs and in her inner thighs



TAKE HOME MESSAGES

1. Sacral radiculopathy: Inflammatory irritation of the S2,S3 nerve roots in cauda equina that are formed by convergence of **pudendal, pelvic and sciatic nerves**
and clinical symptoms that REMOTELY involve sensory fields of **pudendal, pelvic and sciatic nerves**

2. Most common cauda equina pathologies: **Lumbosacral annular tear (L1-S1). Sacral Tarlov cyst (S1-S4)**

3. **Listen to history of sensory field involvement of the various sensory nerves**

Sacral Contributions to Sexual Pain

History of sciatica:
Lower extremity vs Genito-pelvic/lower extremity

Neuroanatomy Sacral Afferent Nerves

Sacral Radiculopathy

Clinical Case

Clinical Case - LM

LM 70 yo woman with sexual pain located left labia described as labia-twisted pliers. Clitoris is very tender.

Rectum feel like hot rod insertion, vagina feels raw and dry. Feels like vagina lining is missing or has been scraped clean. Severe entry pain.

Lower extremity numbness, weakness and proprioception deficits.

She needs a wheelchair and a cane and constantly lives daily with symptoms 6/10.

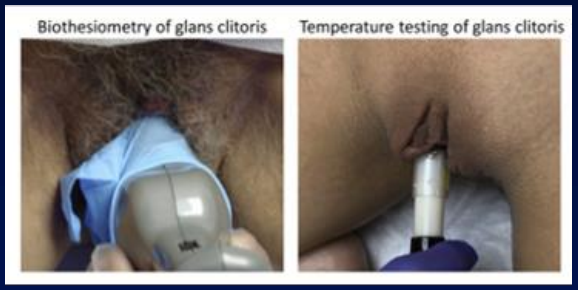
Symptoms triggered by walking, sitting up straight, standing, wearing pants, pressure.

Clinical Case - LM

Neurogenital tests all abnormal – Region 3 pathology

Quantitative sensory testing – integrity somatic afferent pudendal n

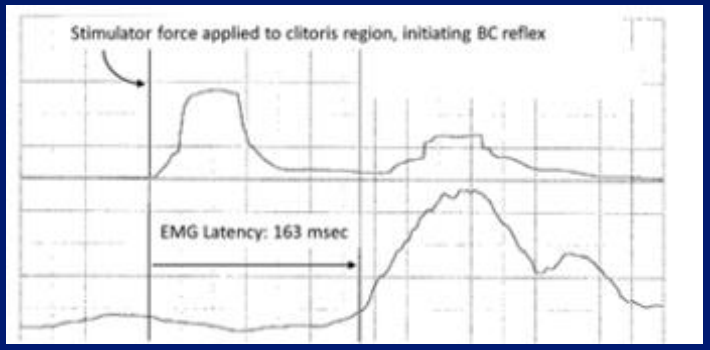
QST	Finger	Glans	R Labia	L Labia
Vibration	5 lt little finger	22	12	12
Cold	24	24	21	19
Heat	28	28	28	30



Sacral dermatome testing – integrity of somatic afferent sciatic n

Dermatome	S4 - Gluteal	S3 - Gluteal	S2 - Gluteal	S1 - Gluteal	S2 - Thigh	S1 - Thigh	S2 - Calf	S1 - Calf	S1, S2 - Heel	L3, L4 - Medial Arch	L4, L5 - Medial Sole	S1, S2 - Lateral Sole
Left	15	44	43	50	25	48	50	50	50	26	42	42
Right	38	42	37	50	43	50	36	50	40	30	25	25

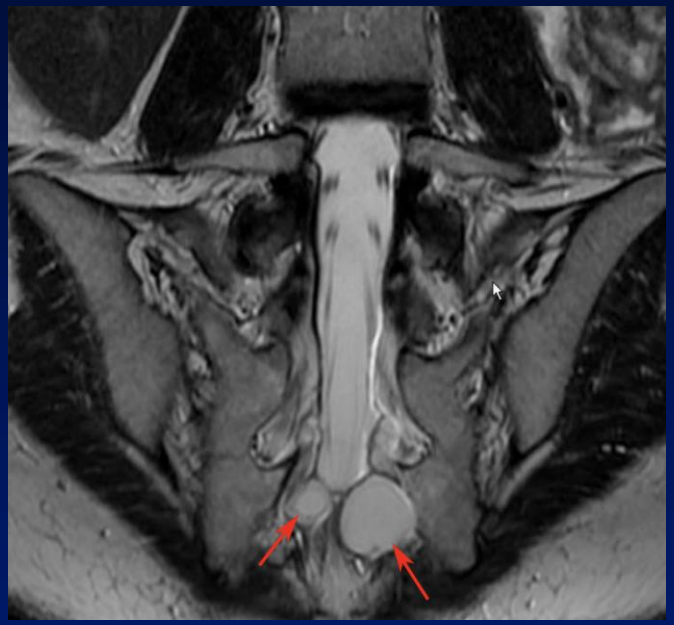
Bulbocavernosus reflex – integrity of somatic afferent and efferent reflex pathway



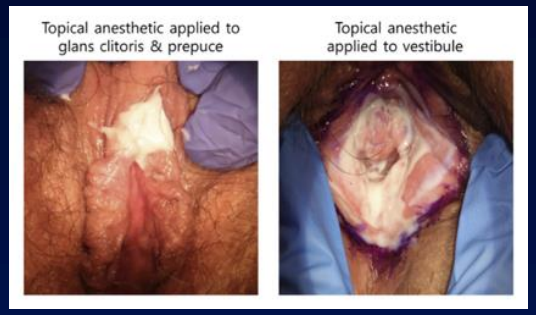
No testing for integrity of visceral afferent pelvic n

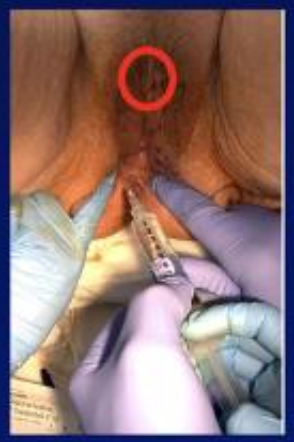
Choll W Kim, Irwin Goldstein, Barry R Komisaruk, Sue W Goldstein, Noel N Kim, Rose Hartzell-Cushanick, Maria Uloko, Alyssa Yee, Lumbar endoscopic spine surgery for persistent genital arousal disorder/genitopelvic dysesthesia resulting from lumbosacral annular tear–induced sacral radiculopathy, *The Journal of Sexual Medicine*, Volume 20, Issue 2, February 2023, Pages 210–223,

Clinical Case - LM

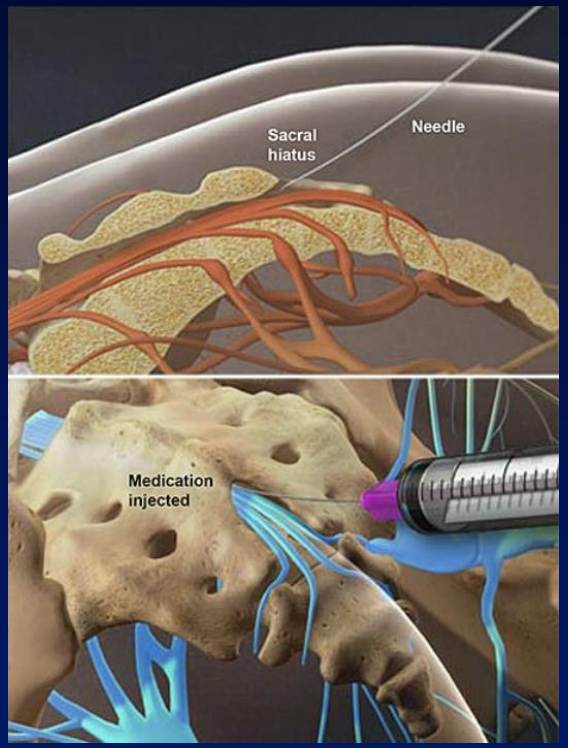


Sacral MRI with Tarlov cyst protocol: Sacral Tarlov Cysts





Regional Anesthesia Tests are negative –symptoms persist despite numbing



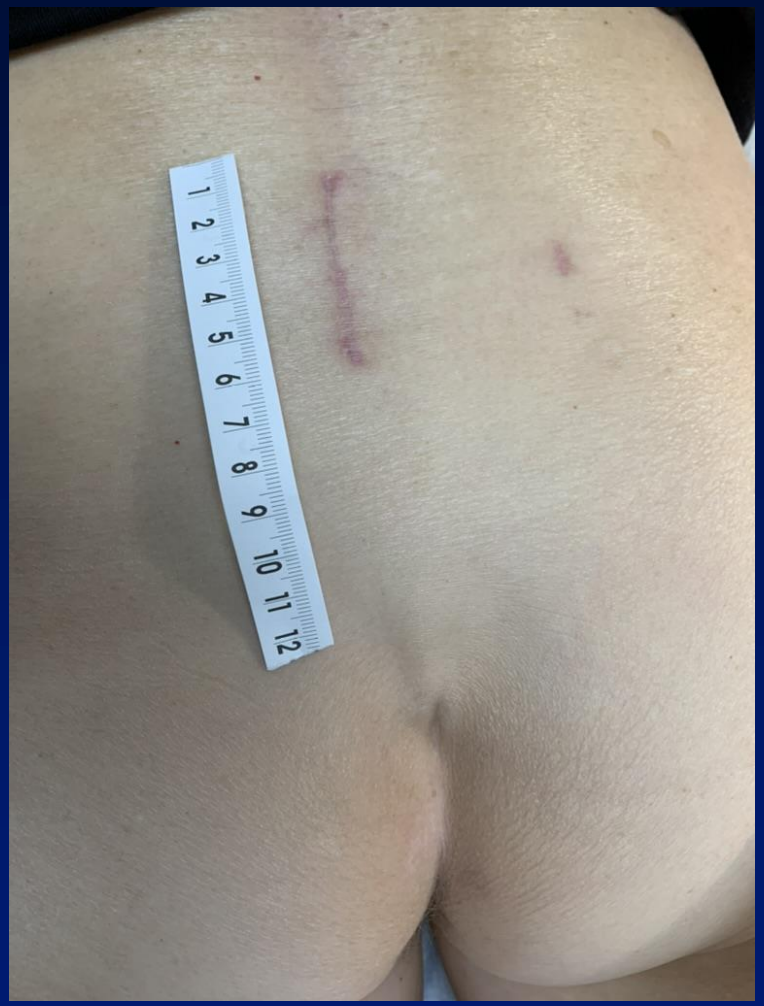
Clinically significant symptom improvement after caudal epidural (8-9/10 to 1-2/10)

Choll W Kim, Irwin Goldstein, Barry R Komisaruk, Sue W Goldstein, Noel N Kim, Rose Hartzell-Cushanick, Maria Uloko, Alyssa Yee, Lumbar endoscopic spine surgery for persistent genital arousal disorder/genitopelvic dysesthesia resulting from lumbosacral annular tear–induced sacral radiculopathy, *The Journal of Sexual Medicine*, Volume 20, Issue 2, February 2023, Pages 210–223,

Clinical Case - LM

Sept 2023 - incision and imbrication of Tarlov cysts - 5 months post-op

Post-op scar



Pre-op and post-op sacral dermatome testing

Dermatome	S4 - Gluteal	S3 - Gluteal	S2 - Gluteal	S1 - Gluteal	S2 - Thigh	S1 - Thigh	S2 - Calf	S1 - Calf	S1, S2 - Heel	L3, L4 - Medial Arch	L4, L5 - Medial Sole	S1, S2 - Lateral Sole
Left	15	44	43	50	25	48	50	50	50	26	42	42
Right	38	42	37	50	43	50	36	50	40	30	25	25

Dermatome	Finger	Deltoid	Bicep	Tricep	Brachial plexus
Control	5				

Dermatome	S4 - Gluteal	S3 - Gluteal	S2 - Gluteal	S1 - Gluteal	S2 - Thigh	S1 - Thigh	S2 - Calf	S1 - Calf	S1, S2 - Heel	L3, L4 - Medial Arch	L4, L5 - Medial Sole	S1, S2 - Lateral Sole
Left	19	13	18	16	14	17	14	14	12	12	18	17
Right	16	15	12	13	12	16	14	14	14	14	15	9

Post-op function

Post-op - I can walk, cross my legs, I do not need a wheelchair or a cane, I have no more labial pain. I can have intercourse without pain. I can have intense orgasms.

TAKE HOME MESSAGES

1. Genito-pelvic/lower extremity sciatica symptoms CAN BE CAUSED BY REMOTE cauda equina pathologies – annular tears, Tarlov cysts
2. Non-invasive neurogenital tests assess the integrity of pudendal and sciatic nerves
3. Sacral MRI (with Tarlov cyst protocol) to assess for sacral Tarlov cysts
4. Negative regional anesthesia tests for Region 1, 2
5. Caudal epidural or transforaminal epidural spinal injection (TFESI) procedures are associated with risk – clinically significant response required prior to surgical intervention
6. Successful treatments for sacral radiculopathy have been reported to successfully treat sacral pain conditions and genito-pelvic/lower extremity sciatica symptoms