Sports Medicine: Advanced Topics and Interventional Updates

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WA ACP 2023 Annual Chapter Meeting

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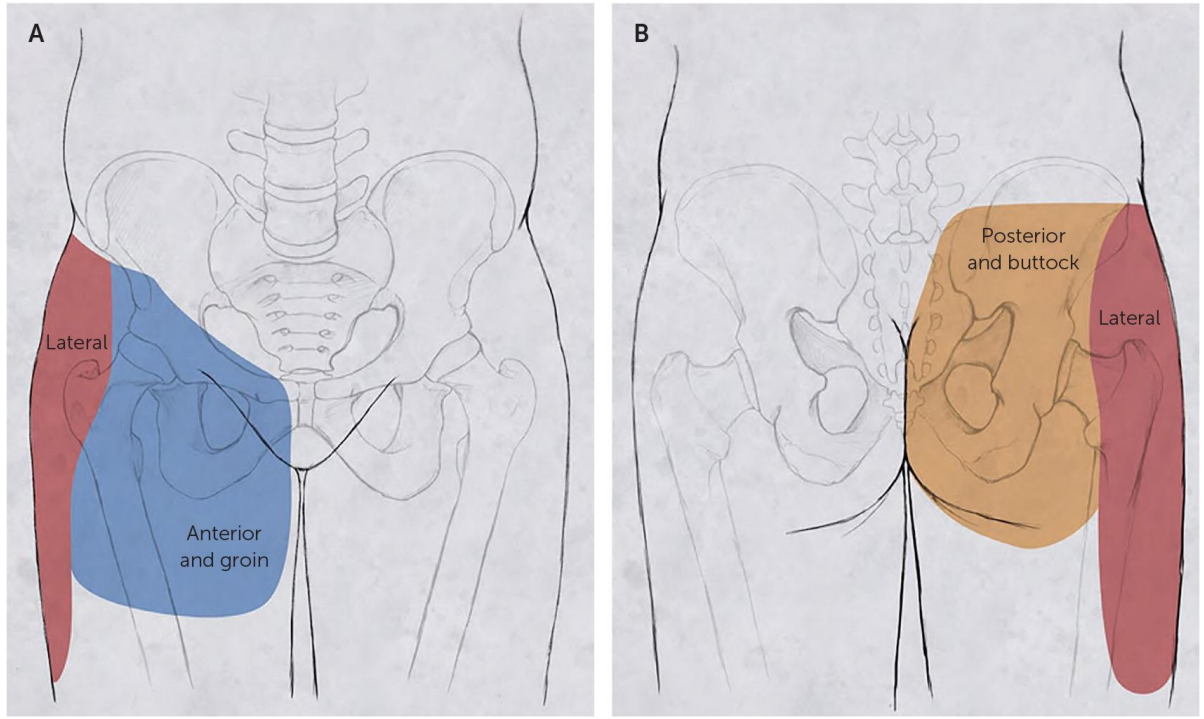
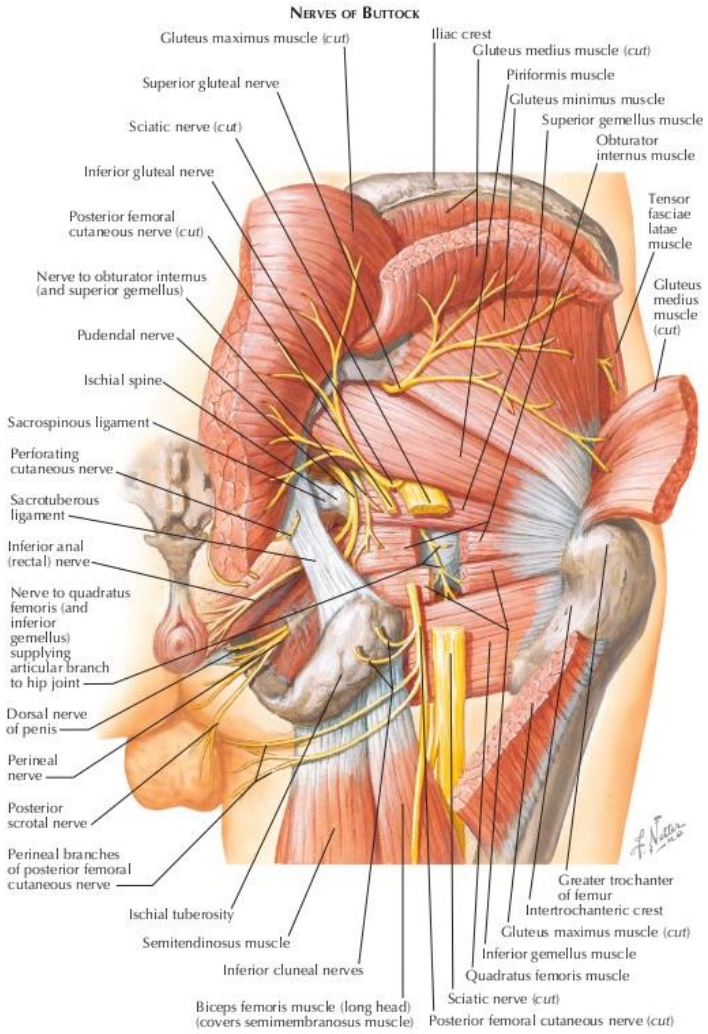
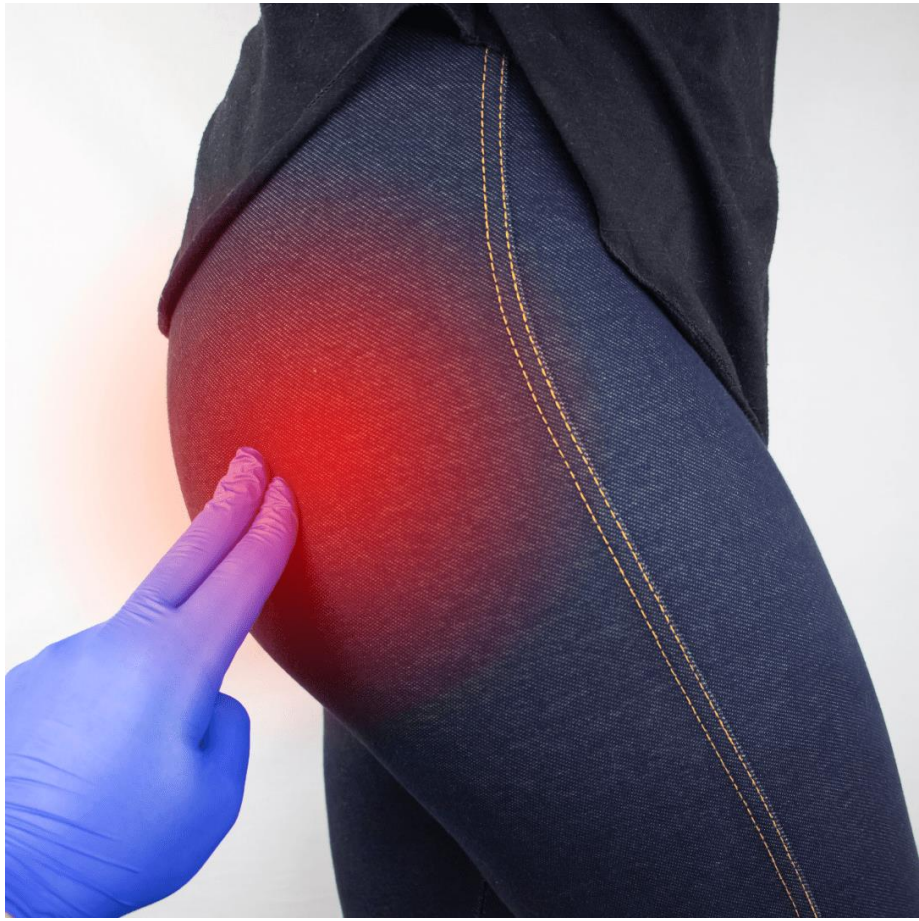
Chief Complaint: Pain in the Buttock





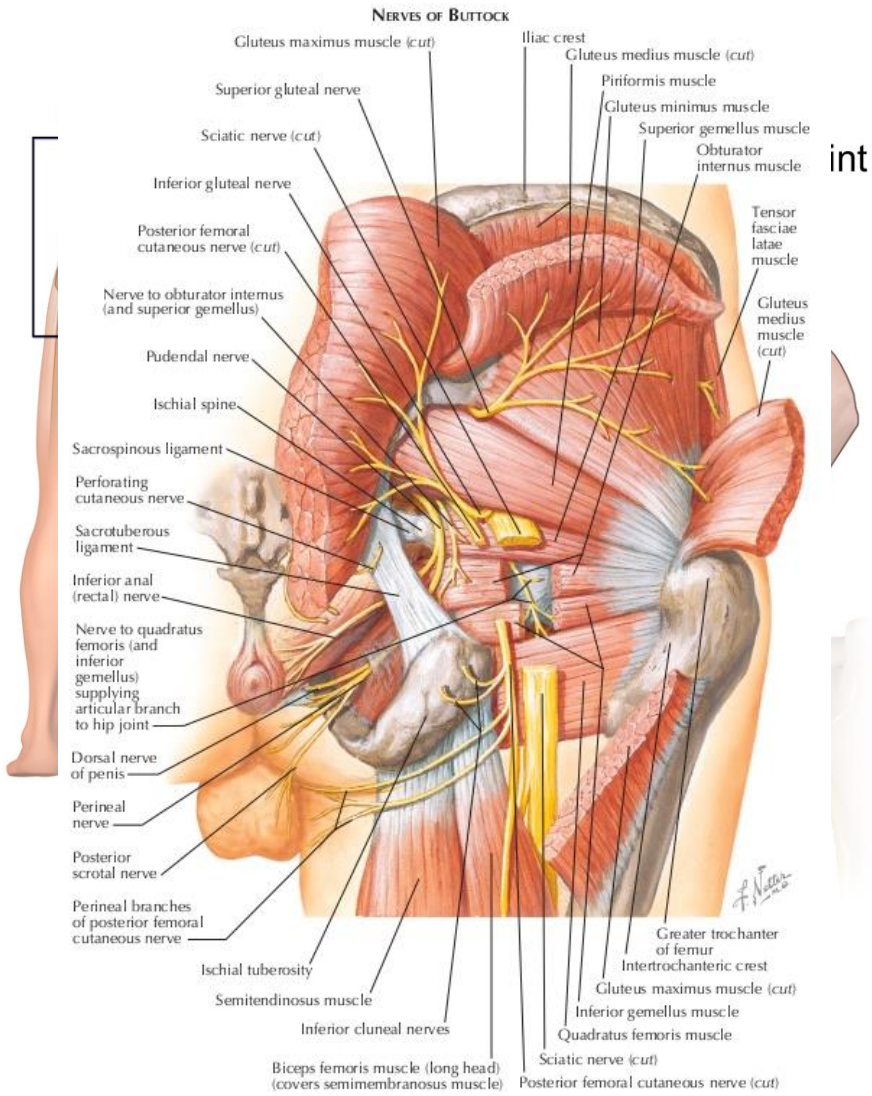
Case

- 72 yo female with 1 year hx increasing pain in right “hip”
- Deep, aching, nearly constant
- Wakes her from sleep
- Ranges from 5 to 8/10
- Provocation:
  - Transition from sit to stand
  - Prolonged standing (museums)
  - Doesn’t exercise much
- Relief:
  - Sitting down
  - Leaning on counters



Differential Diagnosis of Buttock Pain?

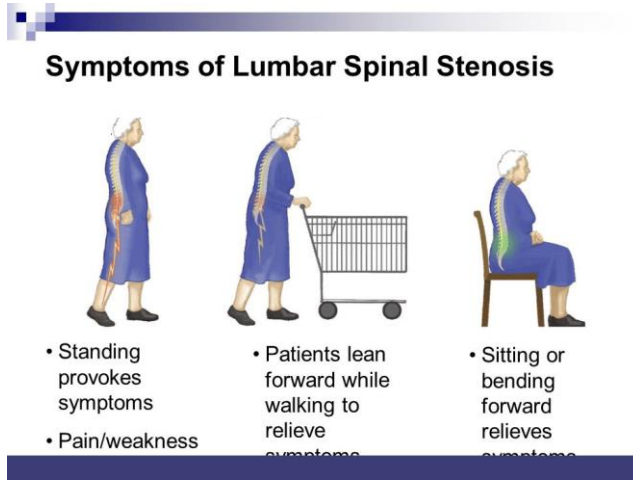
- Lumbar radiculopathy
- Sciatic nerve entrapment in the deep gluteal space
- Hamstring tendinopathy
  - Posterior femoral cutaneous nerve entrapment
- Sacroiliac (SI) joint
- NOT hip joint (usually)
- NOT gluteal tendinopathy



Lumbar Radiculopathy: Classic Vs. 'Sneaky' Sciatica

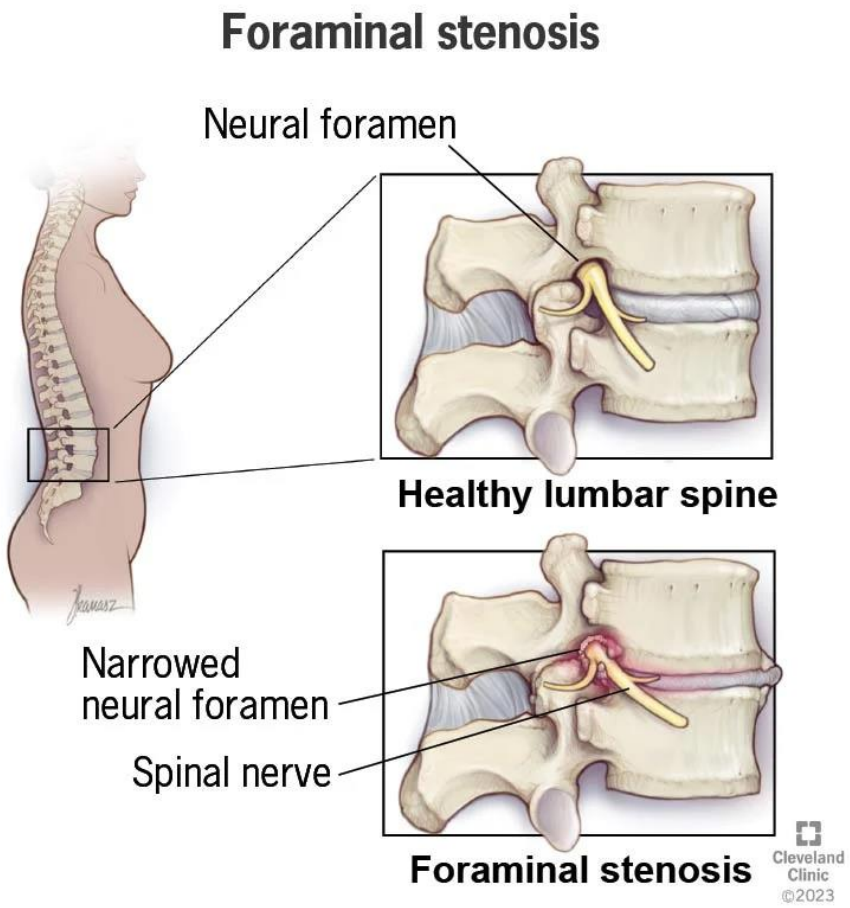
- Classic sciatica:
- Pain follows dermatome
- Easy to reproduce on exam:
  - Worse with lumbar flexion
  - + SLR

- Sneaky sciatica:
- Pain may be only in buttocks or spots along dermatome
- May not be reproducible on physical exam at all!
  - Not worse with lumbar flexion
  - Slouch with walking is typical
  - Neg SLR is common
- Mystery is in the history



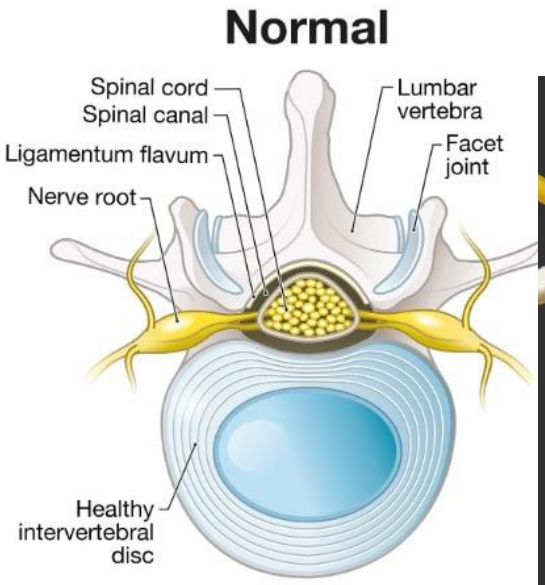
Foraminal Vs. Central Spinal Stenosis

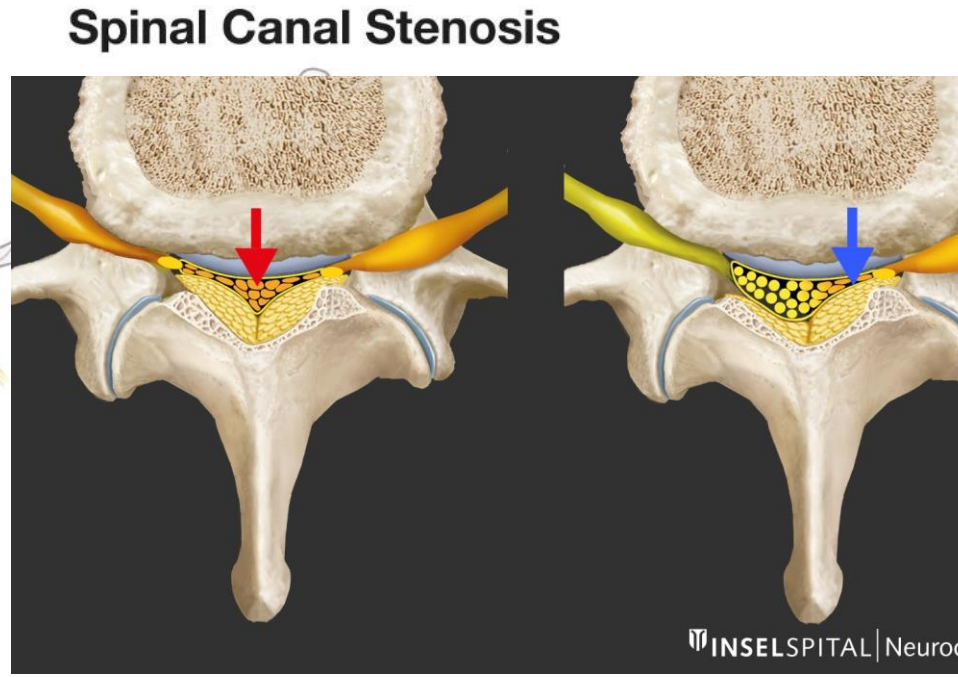
Classic Sciatica



https://my.clevelandclinic.org/health/diseases/24856-foraminal-stenosis

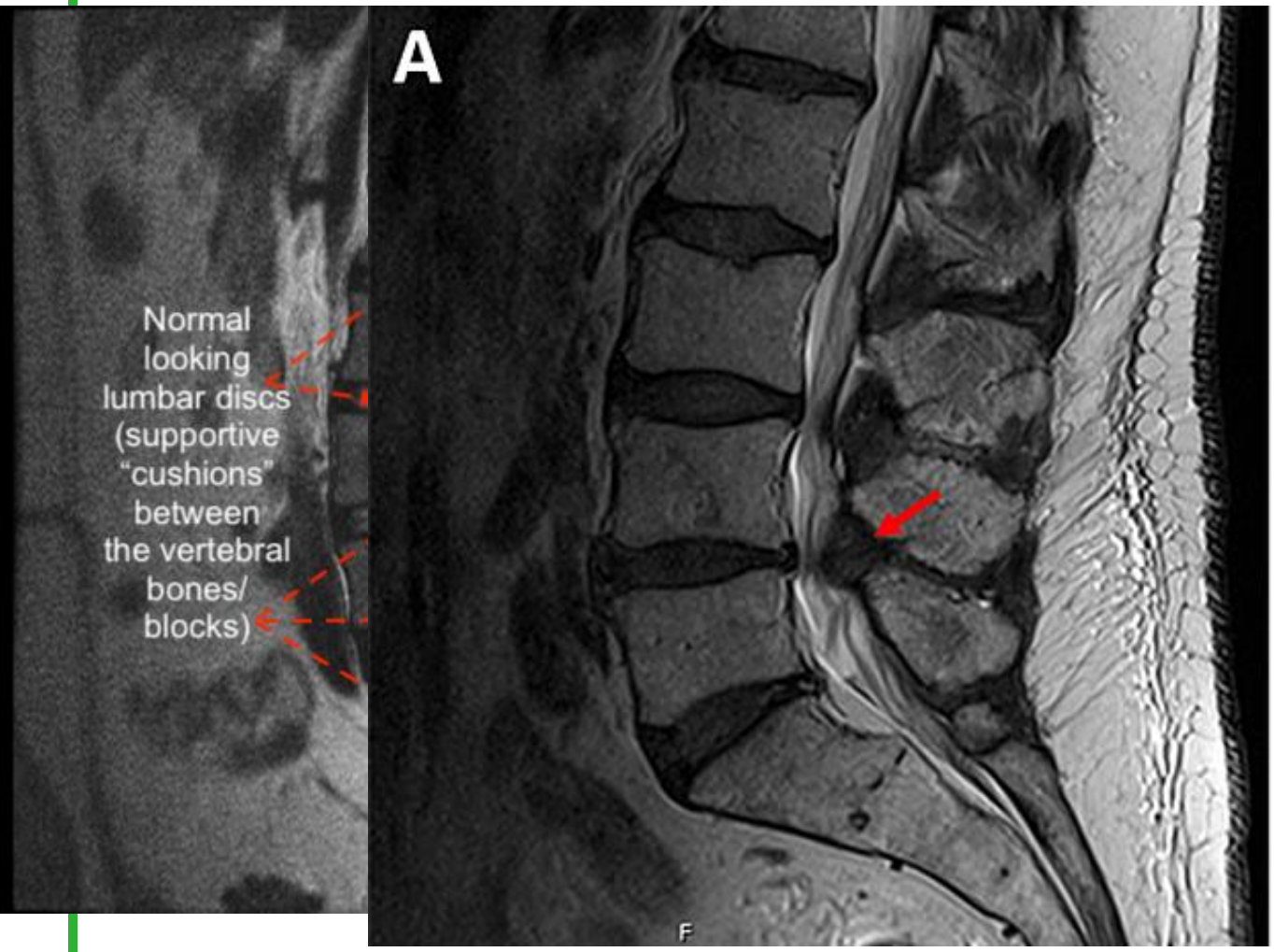
‘Sneaky’ Sciatica

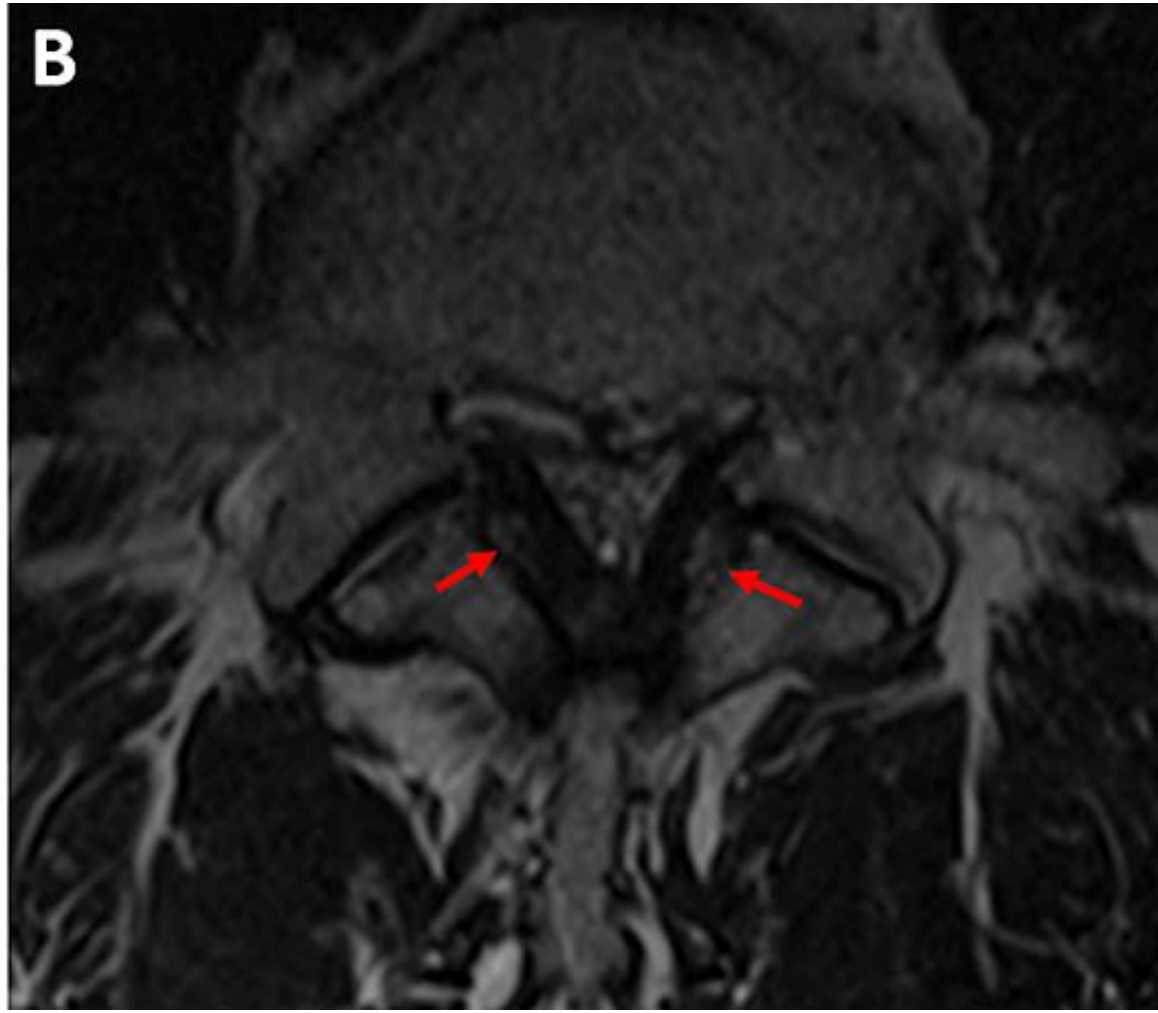




https://vancouverspinedoctor.com/wp-content/uploads/2023/01/lumbar-spinal-stenosis.jpeg

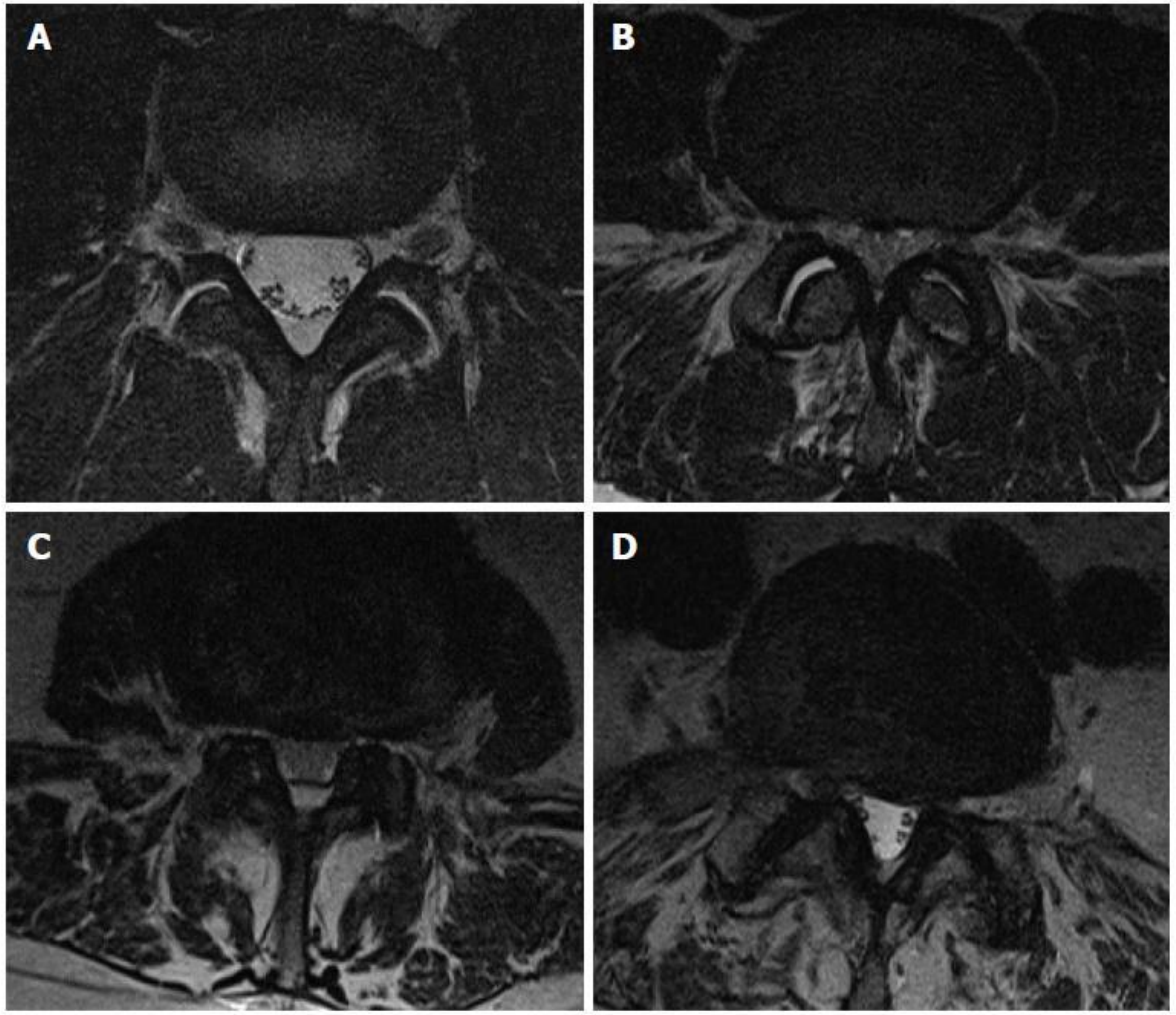
MRI Lumbar Spine: Ligamentum Flavum Hypertrophy





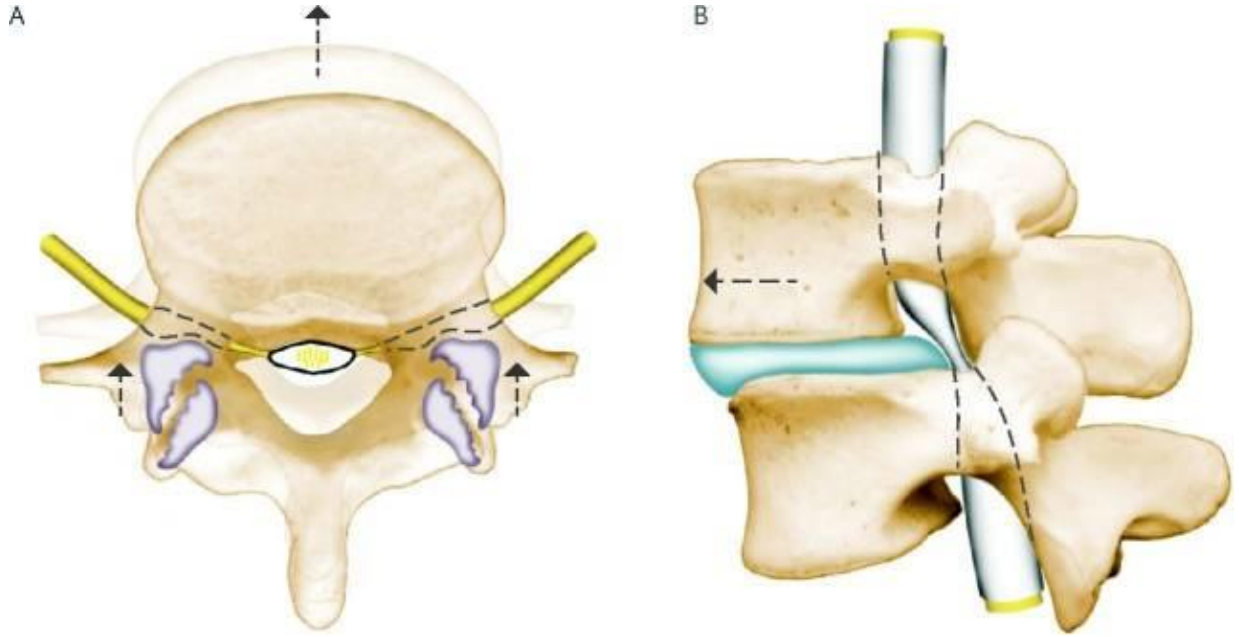
https://www.cnsneurosurgery.com.au/wp-content/uploads/2020/09/1.-Normal-lumbar-T2-sagittal.png

MRI Axial Views Allow Direct Nerve Visualization: Rad Reports Need Context



Multifactorial Narrowing: Disc Bulge, Ligamentum Flavum Hypertrophy, Facet Joint Cysts, Congenital Stenosis

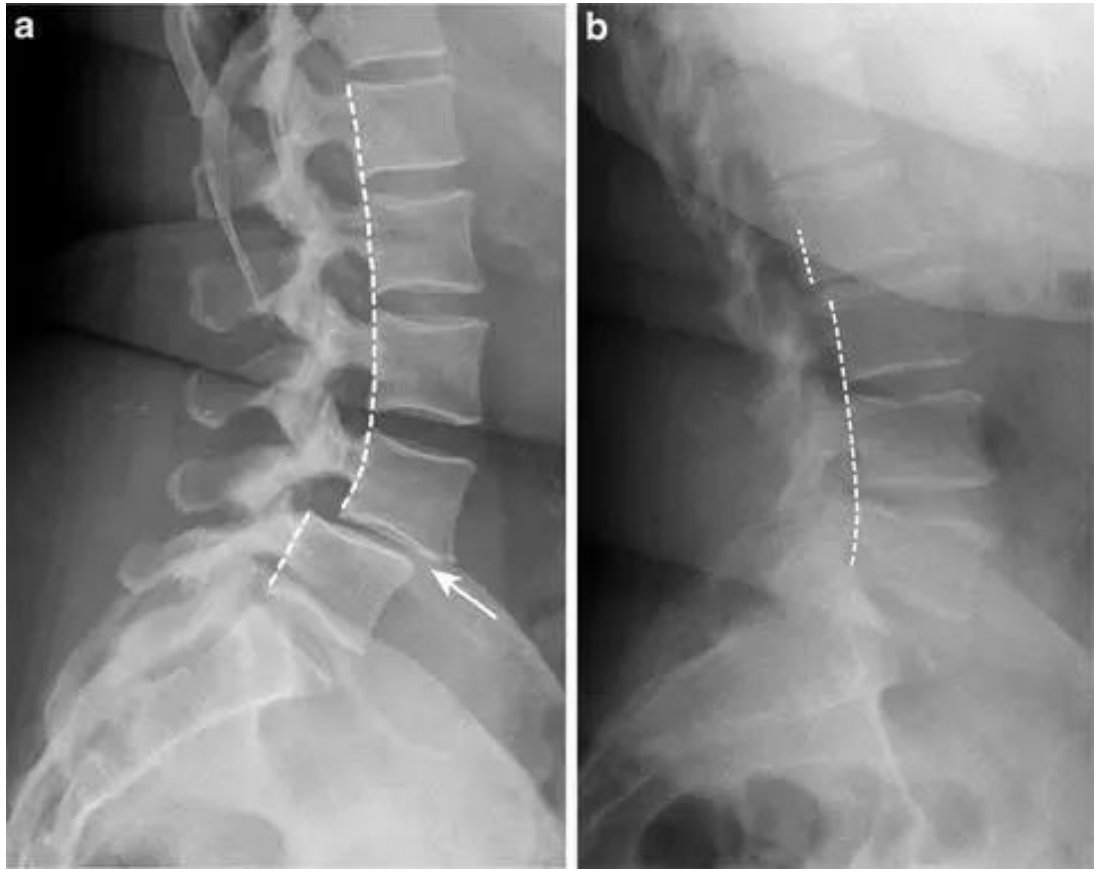
Spondylolisthesis



How to Approach Sciatica with Negative MRI?

- Recall that MRI is a static supine image and may miss causes of dynamic narrowing
- Order flexion-extension lateral views to evaluate for dynamic spondylolisthesis
- May be missed entirely if rely on supine imaging

- Flexion-extension xray



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Xray vs. MRI Comparison

Lumbar Central Spinal Stenosis Pearls

- 20% of those > 60 have LSS
- 80% of them are asymptomatic
- Symptoms:
  - Buttock, thigh, calf pain exacerbated by walking, standing or lumbar extension
  - Relief: sitting, lumbar flexion
  - Cramping, heaviness, spasms, N/T
  - Can walk further with flexed posture – 'shopping cart"
  - Neurogenic claudication = leg pain w/ walking
- Physical Exam – none are classic
  - "generally reveals few objective findings"(Devlin 2021)
  - High sensitivity:
    - no pain with lumbar flexion
  - High specificity:
    - improved walking tolerance on incline vs. level treadmill

Isaac 2019, Katz 2022

Nonoperative Treatment

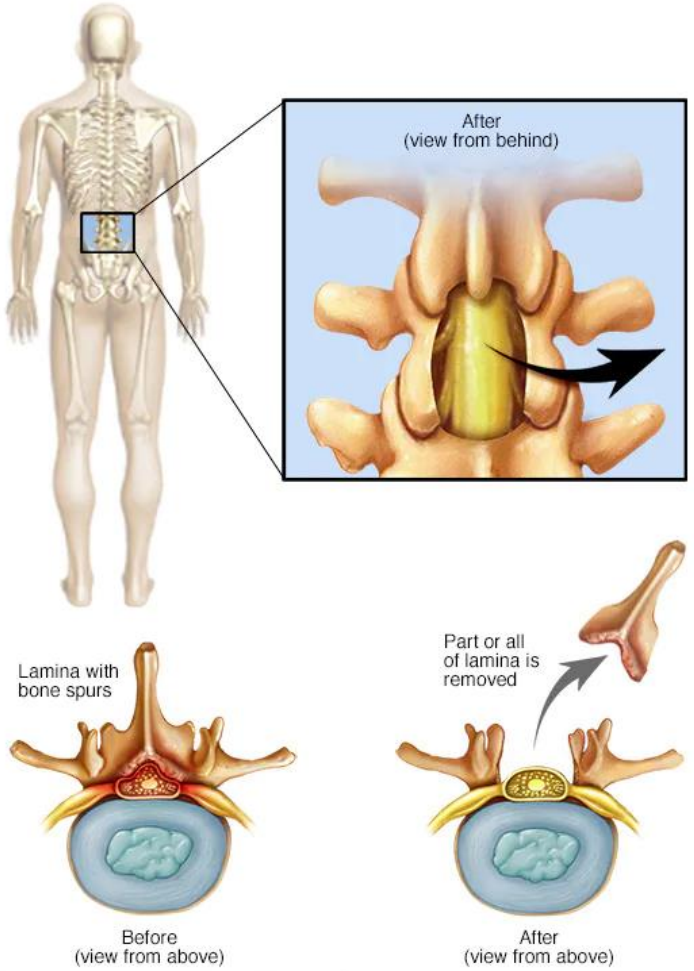
- Physical therapy –
  - 6 weeks of PT improved performance by MCID in 82% (vs 63% in self-directed program)
  - Build strength, endurance of muscles that hold spine in flexion
- Minimize dynamic stress thru spine
- Address weakness 2/2 deconditioning, pain avoidance
- Exercise w/ lumbar flexion:
  - Incline treadmill, exercise bike
  - Trekking poles, wheeled walker
  - Aquatic therapy
- NSAIDs, gabapentin
- Not beneficial:
  - acetaminophen
- Not studied:
  - duloxetine
- Epidurals: strong evidence for short-term relief: 2 weeks to 6 months
  - Use to enable more therapeutic exercise
  - Diagnostic support – with caveats

Isaac 2019, Katz 2022

Operative Treatment & Outcomes
Surgery is Better Now!

- Open laminectomy vs. newer minimally invasive, endoscopic approaches
- Open techniques depended on direct visualization and the need to remove more bone and disrupt soft tissue, muscle
- Can result in instability and need for further surgery.

Old Surgery: Open Laminectomy



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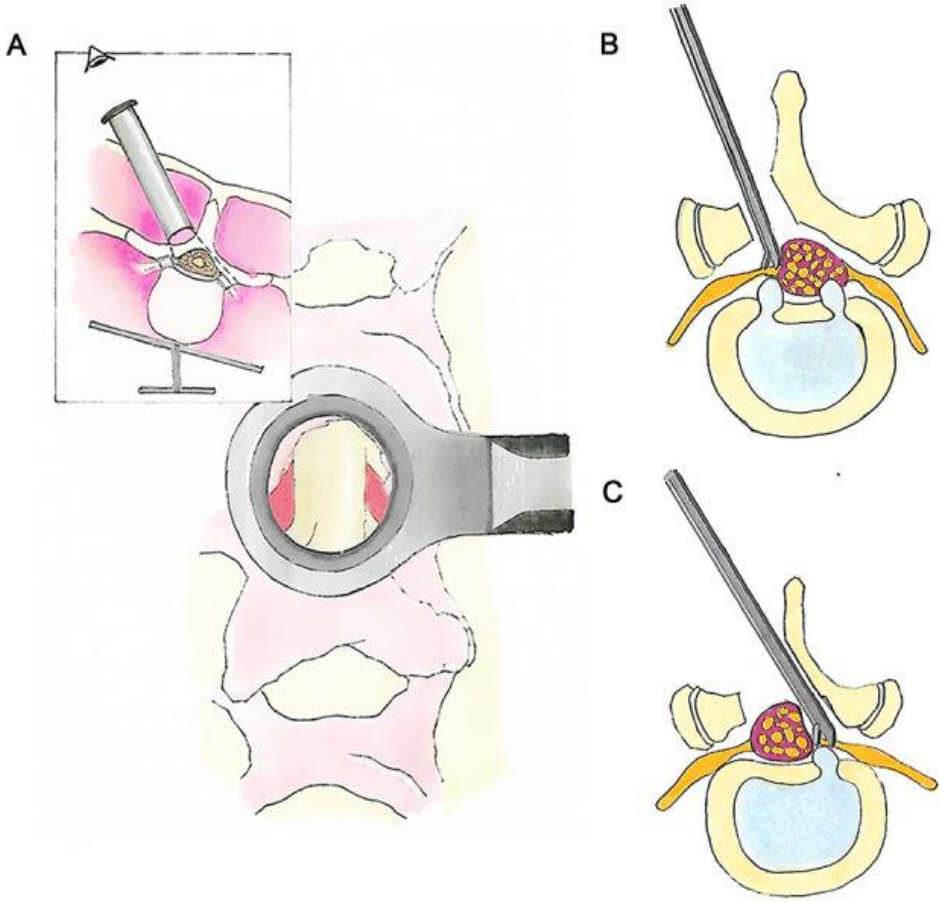
https://www.mayoclinic.org/-/media/kcms/gbs/patient-consumer/images/2015/08/03/14/31/mc

Endoscopic Spine Surgery: Microsurgical, Microscope-assisted Decompression

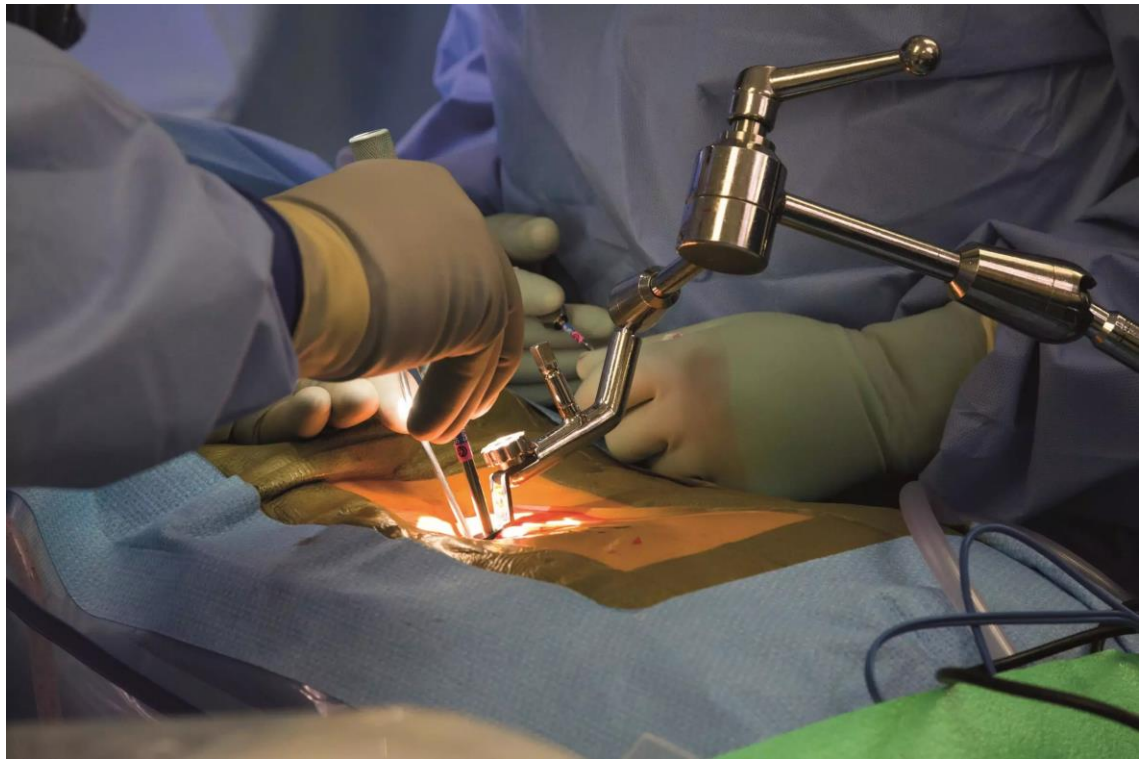
- Uses arthroscopic light source, camera and smaller surgical instruments
- First described in 1996
- Brief hospital stay or outpatient
- Immediate mobilization
- Return to deskwork typically within a couple weeks or less
- Complication rate 2.9 to 13.75%.
- Nerve injury 0 to 2.5% (Ruetten 2020)
- Outcomes research is limited by high crossover rate from nonop to op group and vice versa (43-57%) (Katz 2022)



Zhang 2021

Treatment: Minimally Invasive Decompression (With or Without Fusion for Spondylolisthesis)

- Personal experience (15 years): Low-risk and highly successful with quick recovery
- Outcomes vary significantly between surgeons
- Specialty is irrelevant: Orthopedic Spine Surgeon vs. Neurosurgeon
- Choose based on:
  - Reputation
  - Experience > 3 years
  - Outcomes
  - Patient-centered



Surgical Treatment of Spondylolisthesis

- RCT SPORT (Spine Patient Outcomes Research Trial), 324 patients, surgical vs. nonsurgical treatment in those w/ lumbar spinal stenosis and spondylolisthesis, NEJM 2007
- Greater improvements in SF-36 and ODI at 3 months, maintained thru 2 year follow-up.
- 74% vs. 24% of surgical patients noted major improvement in symptoms.
- 86% had grade 1 spondy, 14% with grade 2.
- 94% treated with decompression and fusion

Chan 2019

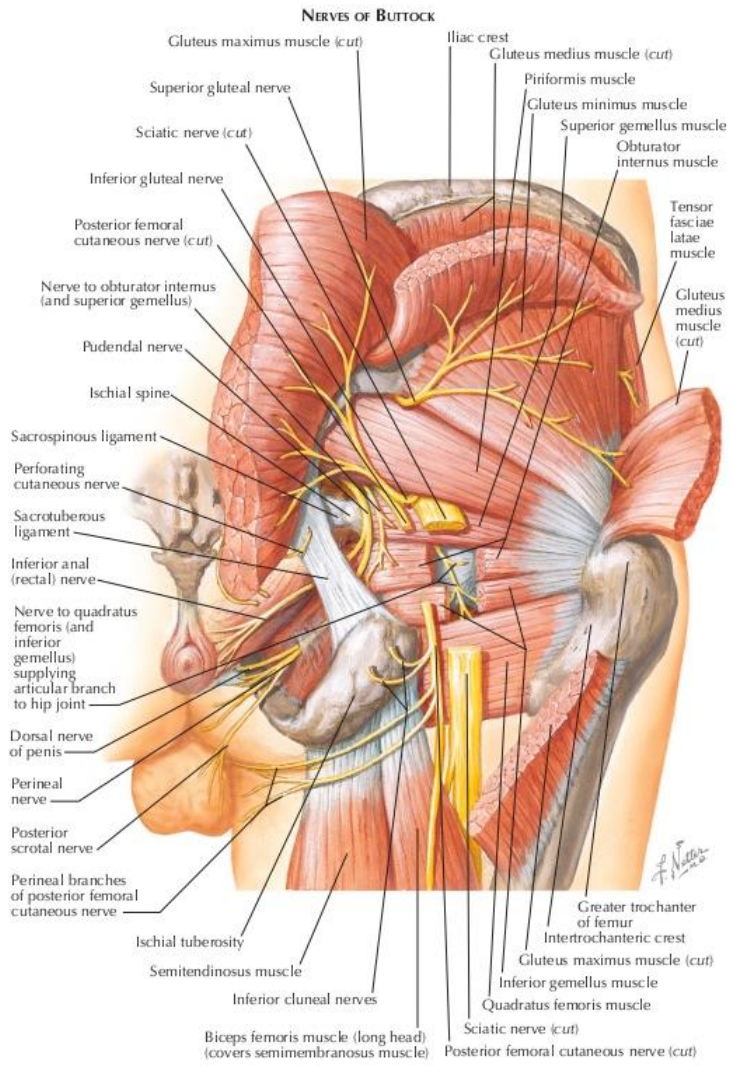
FAQs – Answers from HSS

- Three hundred sixty-six patients (104 TLIF (fusion), 147 decompression, 115 microdiscectomy) were included.
- (1) Will my back pain improve? Most patients report improvement by >50%. About 60% of TLIF, decompression, and microdiscectomy patients achieved MCID at ≥6 months.
- (2) Will my leg pain improve? Most patients report improvement by >50%. 56% of TLIF, 67% of decompression, and 70% of microdiscectomy patients achieved MCID at ≥6 months.
- (3) Will my activity level improve? Most patients report significant improvement. Sixty-six percent of TLIF, 55% of decompression, and 75% of microdiscectomy patients achieved MCID for SF-12 PCS.
- (4) Is there a chance I will get worse? Six percent after TLIF, 14% after decompression, and 5% after microdiscectomy.
- (5) Will I receive a significant amount of radiation? The radiation exposure is likely to be acceptable and nearly insignificant in terms of radiation-related risks.
- (6) What is the likelihood that I will have a complication? 17.3% (15.4% minor, 1.9% major) for TLIF, 10% (9.3% minor and 0.7% major) for decompression, and 1.7% (all minor) for microdiscectomy
- (7) Will I need another surgery? Six percent after TLIF, 16.3% after decompression, 13% after microdiscectomy.
- (8) How long will I stay in the hospital? Most patients get discharged on postoperative day one after TLIF and on the same day after decompression and microdiscectomy. (
- 9) When will I be able to return to work? >80% of patients return to work (average: 25 days after TLIF, 14 days after decompression, 11 days after microdiscectomy). (
- 10) Will I be able to drive again? >90% of patients return to driving (average: 22 days after TLIF, 11 days after decompression, 14 days after microdiscectomy).

Shahi 2023

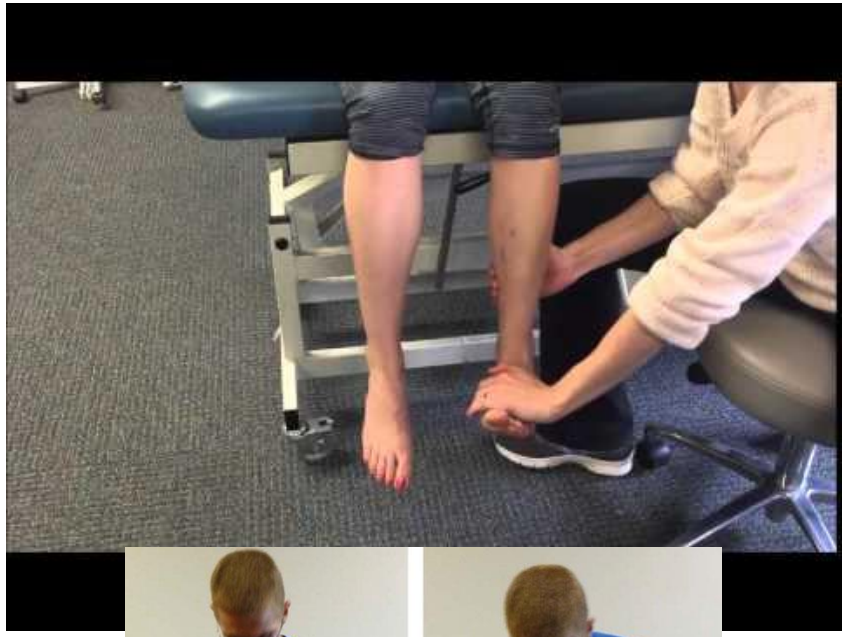
Sciatica with Negative MRI and Dynamic Xray = Sciatic Nerve Compression in Deep Gluteal Space (DGS)

- Pain typically in terrain of L5 or S1
- Worse with sitting, usually within < 15 minutes
- “Driving is the worst”
- Typically relieved by leaning to other buttock
- Better w/ standing, walking
- May be worse w/ squats, firing glutes
- Usually < 50 y.o.
- Multiple Variants, similar theme:
  - Sciatic
  - Posterior femoral cutaneous nerve
  - Pudendal nerve



Sciatic Nerve Compression in Deep Gluteal Space (DGS)

- Physical exam:
  - Seated ankle dorsiflexion weakness
  - May have + SLR
  - Dynamic genu valgum
  - Hip abduction weakness

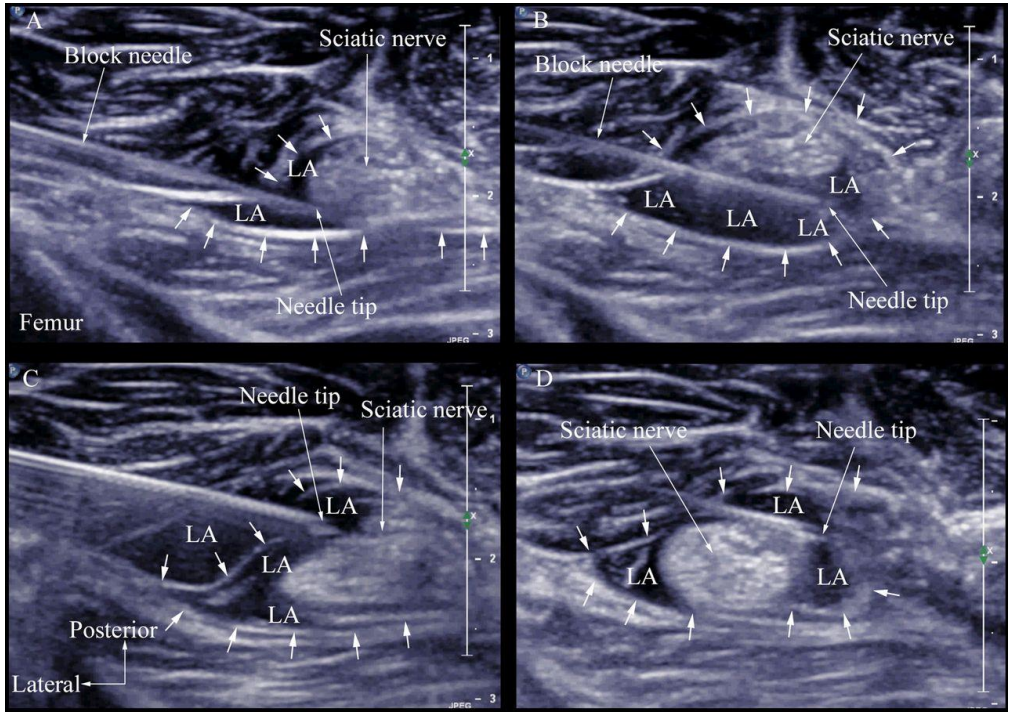


Sciatic Nerve Compression in DGS

- Can occur w/ SI joint dysfunction, hip weakness or in isolation.
- Treat w/ PT
  - Glute strength, control of dynamic genu valgum, fascial glides
  - SI joint stabilization
- Foam rolling

Ultrasound-Guided Nerve Hydrodissection

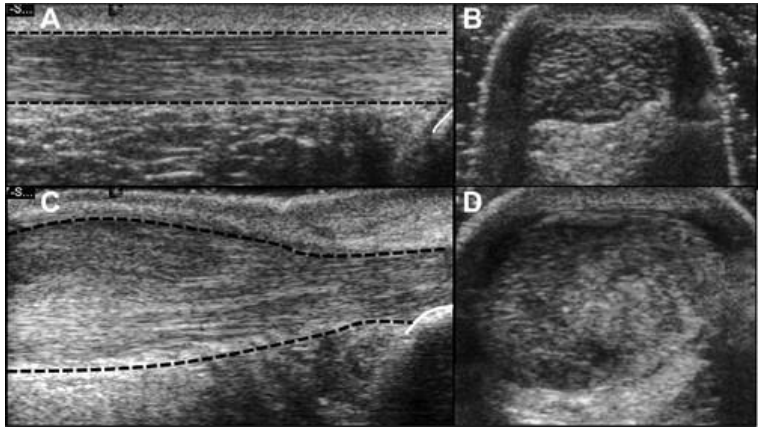
- Ultrasound-guided nerve hydrodissection:
  - Injection of isotonic fluids around compressed nerve at site of compression
  - Restore more normal nerve glide (Lam 2020)
  - Covered by insurance, increasingly available
  - P < 0.01 in carpal tunnel syndrome symptoms and function 6 months post-hydro in RCT (Wu 2019)
  - D5W and PRP comparable efficacy (Buntragulpoontawee 2021)
  - No adverse effects reported in any study (Gill 2022)

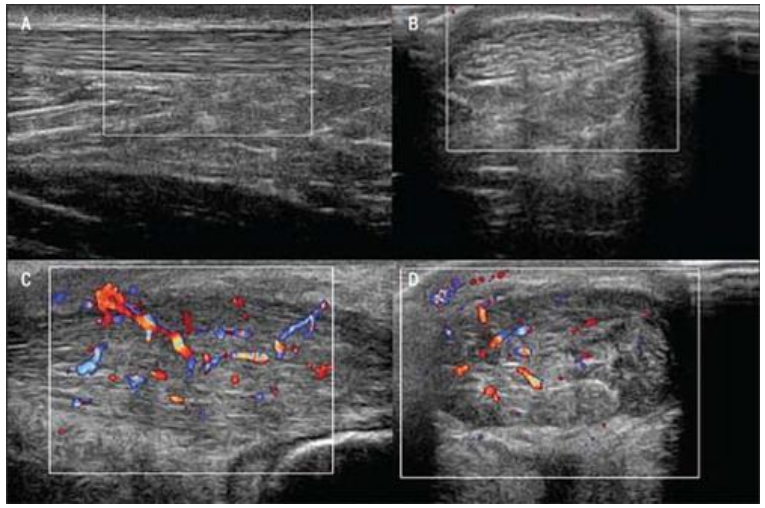


Karmaker 2021

Sports Medicine Updates: Treatment of Tendinopathies

- Tendinopathy, not tendonitis
- Structural degeneration with conditions that do not favor healing
- Treatment directed to decreasing pain and normalizing structure
- Home exercise
- Physical therapy – eccentric strengthening
- Nitroglycerin patch*
- Extracorporeal shockwave therapy (ESWT)*
- Platelet rich plasma (PRP)*
- Tenex*
- Surgery





Arya 2010, Docking 2015

Nitro Patch (glyceryl trinitrate)

- 3 small RCT: achilles, rotator cuff, lateral epicondylitis
- 5 to 10 mg/24hour patch worn for 24 hours, with significant improvement at 12 -24 weeks.
- Improved organization of extracellular collagen matrix, tendon healing (Assem 2014)
- Most effective when combined with therapeutic exercise
- Common side effects: headache, skin irritation. AE in 17-62%.
- Do not combine w/ PDEs, hypotension
- Caution w/ history of headaches

Scott 2023

Extracorporeal Shockwave Therapy (ESWT)

- Pressure waves result in mechanotransduction and hypothesized to reinitiate healing cascade
- Used in tendinopathies, stress fractures, nerve compression syndromes
- 15-20 minute treatments, weekly for 3-8 sessions
- No recovery time, no time away from activity
- May induce osteoprogenitor differentiation (used in stress fractures) and tenocyte proliferation
- Widely used in Europe

ESWT - Research

- Mixed evidence
  - 2014 systematic review: moderate evidence for glute, patellar and achilles tendinopathy
  - Meta-analysis of RCT n = 29: decreased pain at 3, 6, and beyond 12 months
- Different types of shockwave – focused vs. radial
- Not covered by insurance
- In Seattle, costs $150 for each of 3-8 sessions.
- Limited availability, variability in providers
  - Offered by 2 PT groups, 1 MD, several DPMs, 1 ND, 1 acupuncturist.

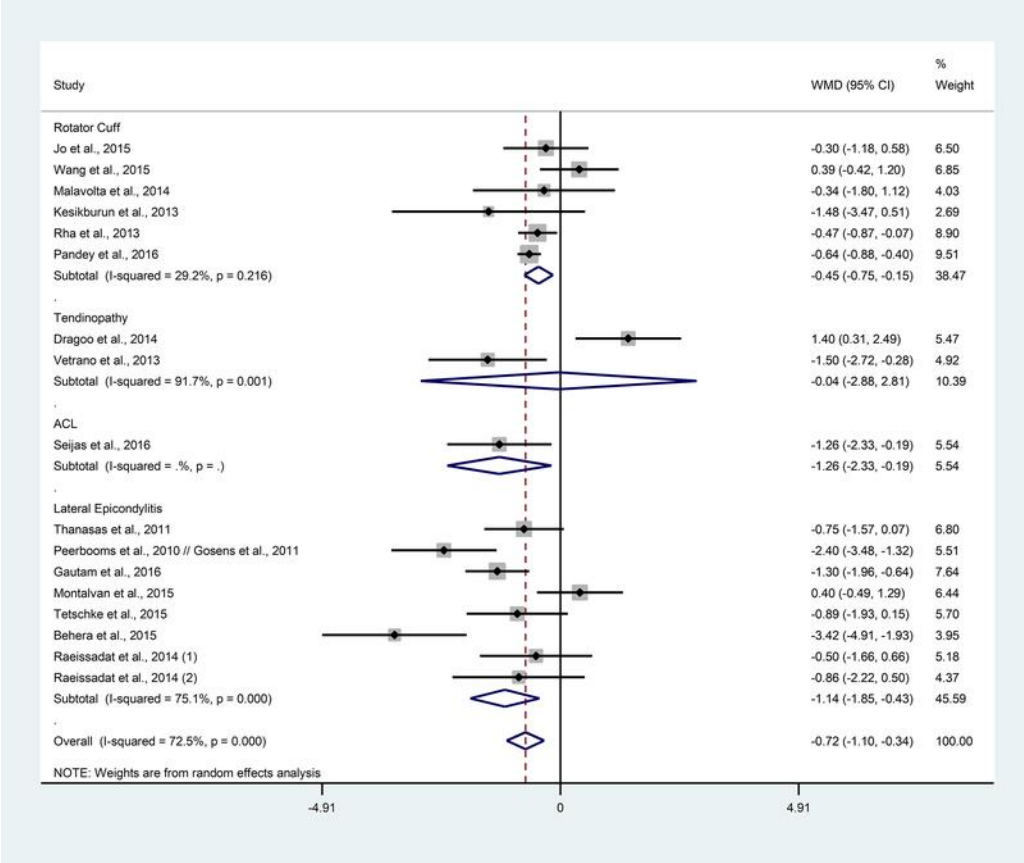
Platelet-Rich Plasma (PRP) for Tendinopathy

- Patient's blood is centrifuged to concentrate platelets by 3-5 times.
- Platelet-rich portion re-injected into the area of tendinopathy with ultrasound guidance
- Platelets release proteins that facilitate cell recruitment, morphogenesis and stimulate tendon healing (Hamid 2021)
- Pain typically increased for 3+ days.
- Variable preparation and protocols
  - Crutches up to 7 days, return to sport at 8 + weeks.
- Not covered by insurance: $950-$2000+

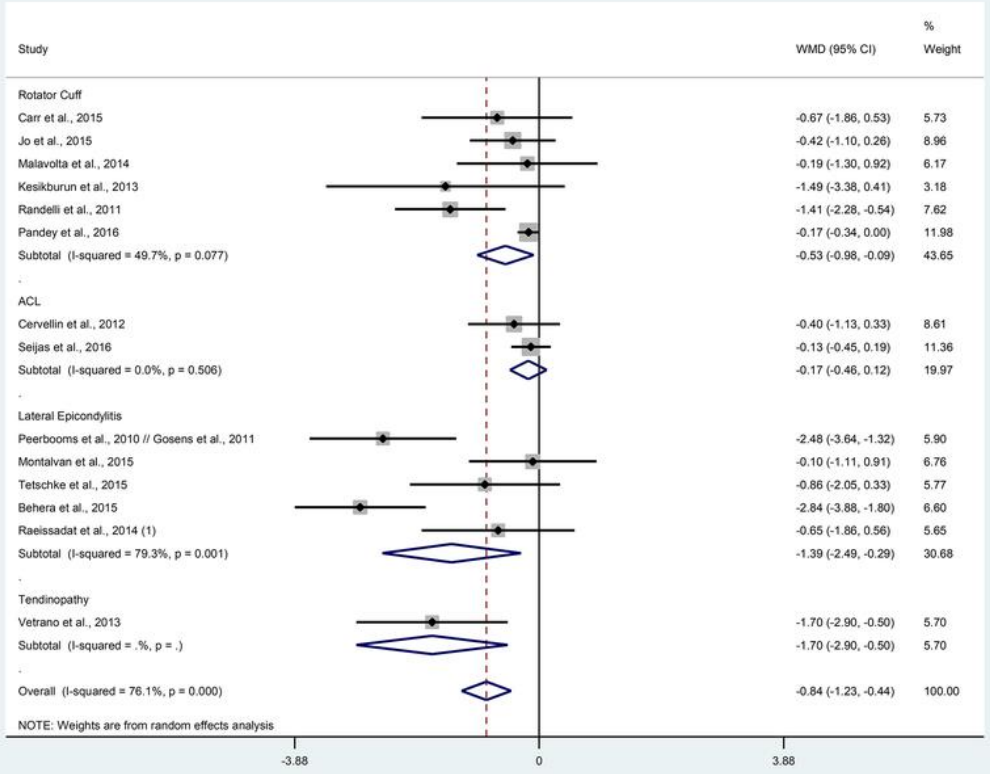
- Lots of research, w/ variable PRP prep, protocol (# of injections) and tendon targets (achilles, lateral epicondyle, patellar tendon, rotator cuff)
- Conclusion: mixed evidence
- Used heavily in clinical practice in all settings

Lu 2023, Masiello 2023

PRP Short- and Long-Term Outcomes: Rotator Cuff, ACL, Lateral Epicondylitis, Tendinopathy



Short-term

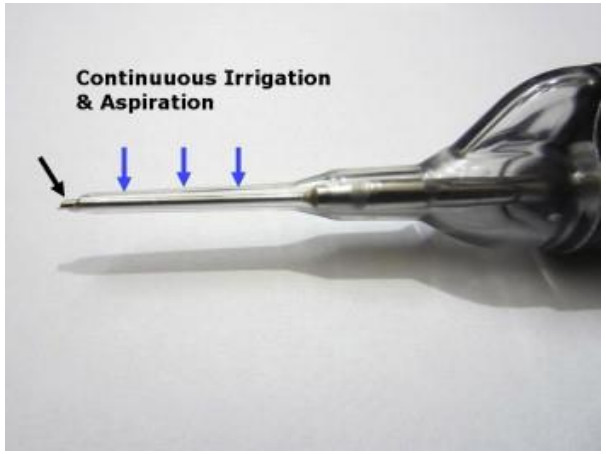


Long-term

Chen 2018, Systematic Review and Meta-Analysis, AJSM

Percutaneous Ultrasound-Guided Needle Tenotomy (PUNT)

- In-office procedure to debride and irrigate tendinotic tendon using “ultrasonic energy to produce low-amplitude, high-frequency longitudinal oscillations of an 18 G hollow-tip needle.”
- Local anesthesia, uls guidance.
- Targets area of tendinotic tissue and hypervascularity
- Recovery:
  - No submersion in water for 1 week
  - No lifting > 5 lbs x 6 weeks.
  - Deskjob in 2-3 days
  - Physical labor: 10-12 weeks

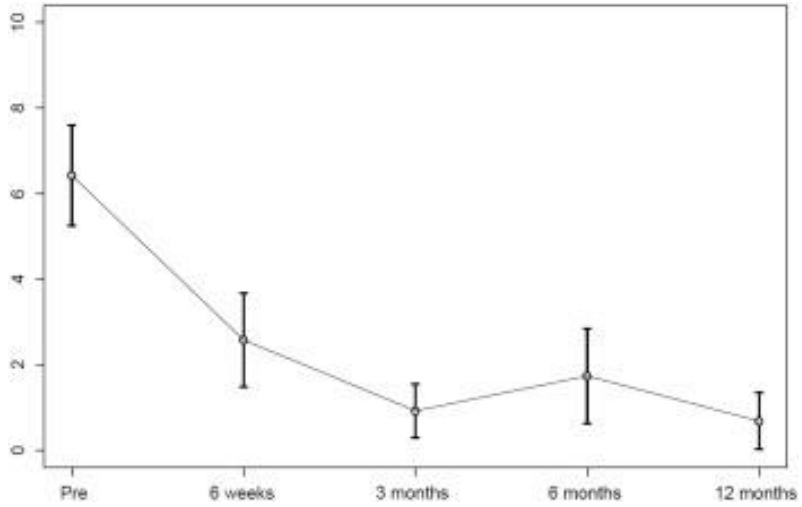


Barnes 2015

PUNT Outcomes

- Shomal Zadeh 2023 meta-analysis of PUNT for chronic tendinopathy and fasciopathy:
- 35 studies, 1876 tendons enrolled. 29 articles included.
- Marked improvement in pain and function at all follow-ups, 6 weeks and 3 months, persisting to 12 months
- Best improvement was after 3 months.
- Low complication rates.

VAS



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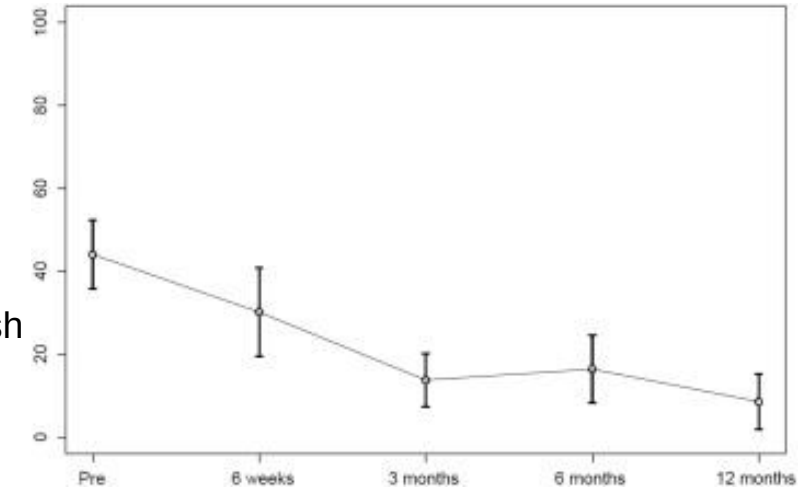
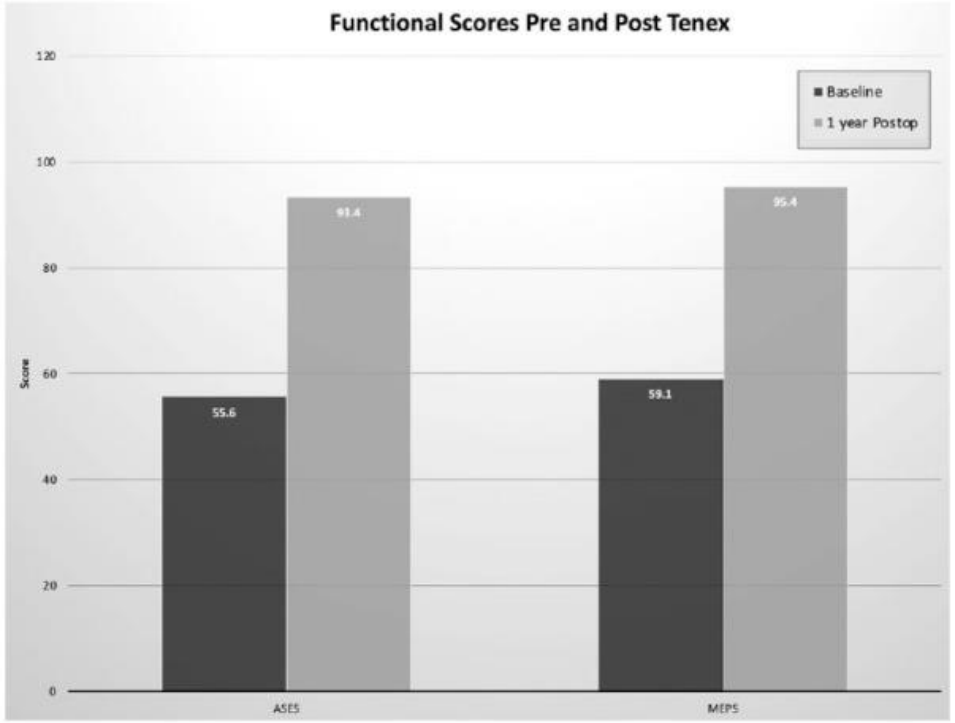
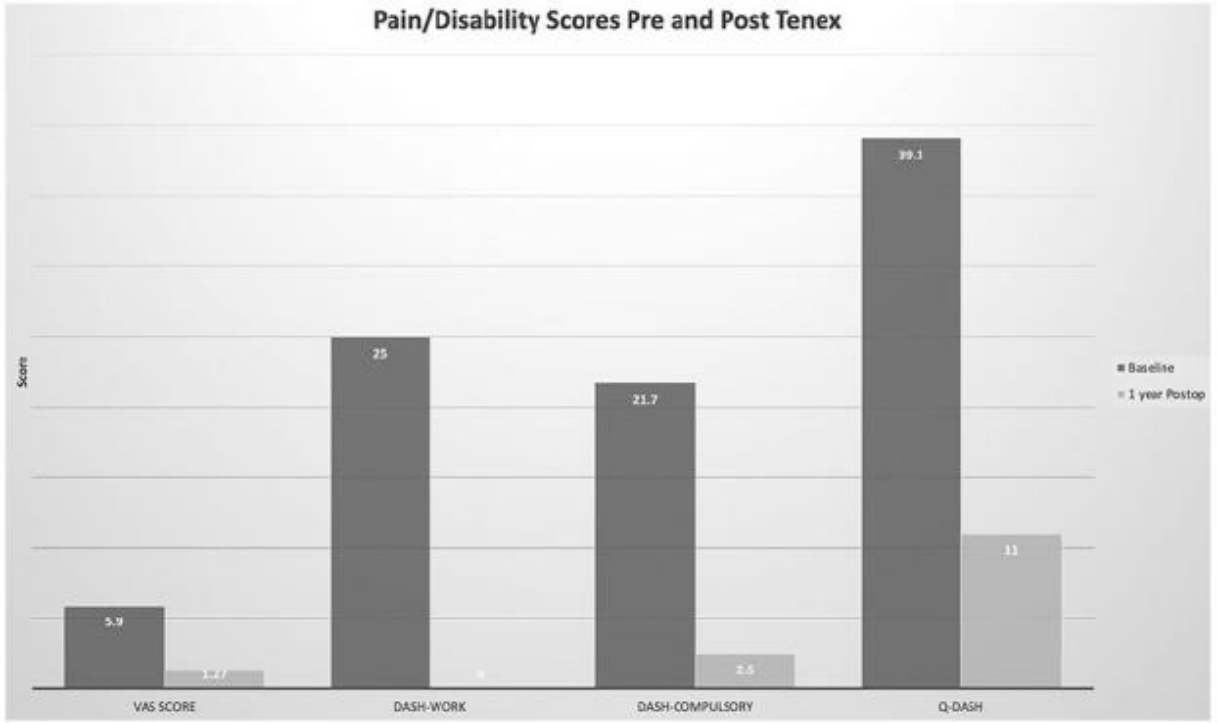


Barnes 2015

Vajapey 2021 systematic review: level 4 and higher





Vajapey 2021

7 studies: 5 on elbow, 1 achilles, 1 plantar fasciitis. Decrease pain, disability scores and improved functional scores for CET and PF
- more high-quality studies needed.
- no comparison group, small n, no long term follow-up, no follow up ultrasound.

Tendinopathy Take Aways

- Nitroglycerin patch is easy, but high rate of side effects
  - Headaches, skin reaction
- New interventions are widespread and growing in all settings, academic and private
- Should be done with ultrasound guidance
- ESWT is an appealing alternative for tendon, nerve conditions
  - No downtime/recovery period
  - But, not covered by insurance
  - Limited availability and familiarity
  - Expertise of provider is important
- PRP – cash pay, minimum 8 weeks away from sport if lower extremity
- Ultrasound-guided needle tenotomy is a potentially-covered alternative to PRP for tendinopathy
  - Both have an 8-12 week recovery period
- More high-quality research needed for all

References

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