



A Pain In The Back:

An Analysis of Vertebrogenic Back Pain

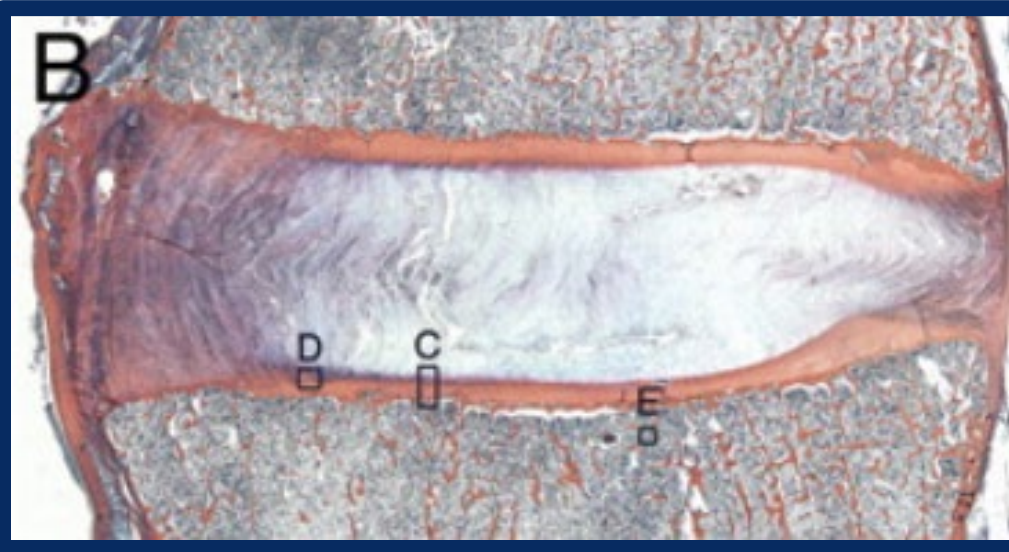
Objectives

- Discuss the Anatomy of the Vertebral End Plate
- Review MRI Imaging
- Review Signs/Symptoms of Vertebrogenic Pain
- Discuss the Intrasept Procedure

Disclosures

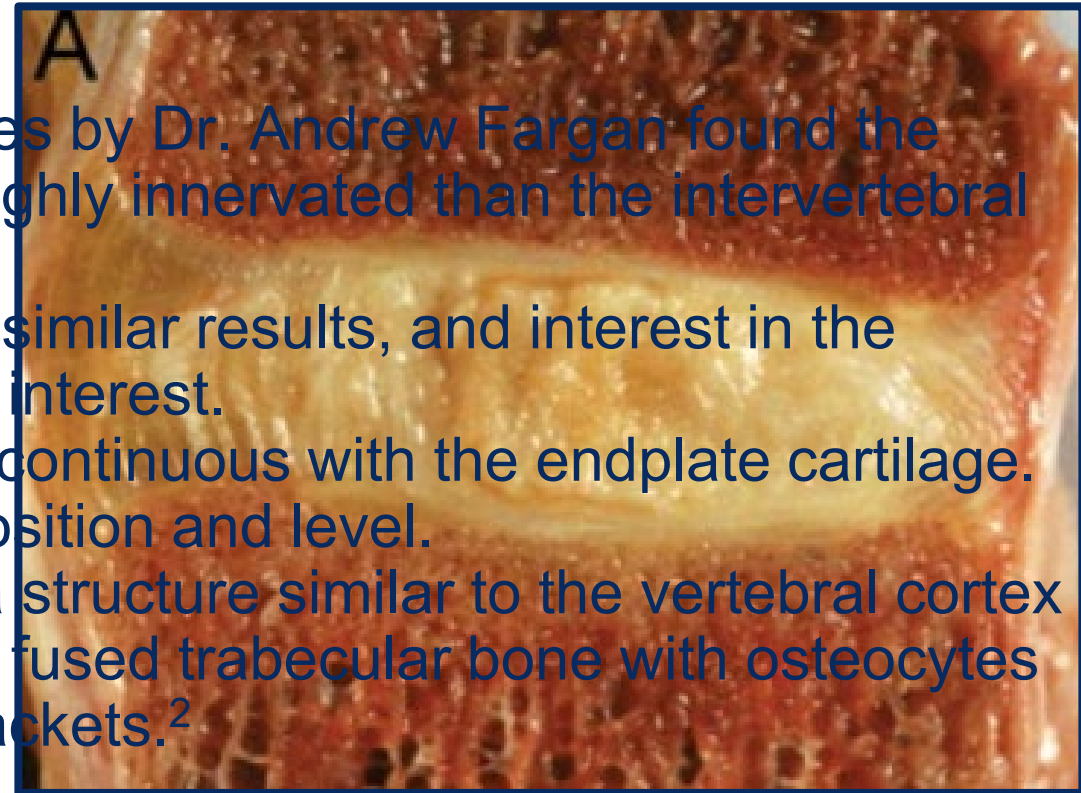
☐ None

What



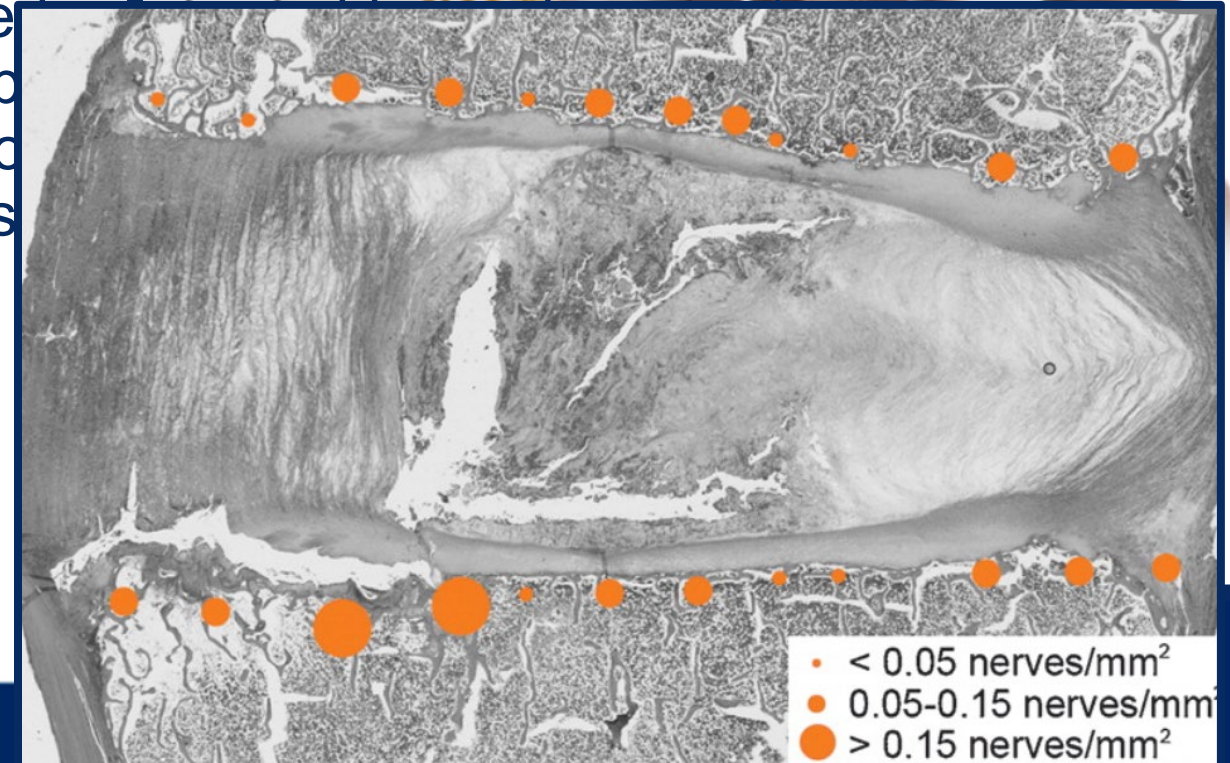
n?

- Vertebral endplates are thought to come from degenerated or
- The endplate is a layer of bone that separates the intervertebral disc
- In 2001, studies by Dr. Andrew Fargan found the endplates of the lumbar spine to be more highly innervated than the intervertebral disc.¹
- Subsequent cadaveric studies have shown similar results, and interest in the vertebrae being a pain source gained more interest.
- Peripherally the annulus fibrosus becomes continuous with the endplate cartilage. The thickness of the cartilage varies with position and level.
- The bony component of the end plate has a structure similar to the vertebral cortex and resembles a thickened, porous layer of fused trabecular bone with osteocytes entombed within saucer-shaped lamellar packets.²



What is vertebrogenic back pain

- End plate subchondral bone is innervated which reach the bone marrow along with through the posterior basivertebral foramen
- According to the immunohistochemical analysis, nerve fibers that are rich in nociceptors and substance P, and calcitonin gene-related
- The end plate innervation is increased
- Biomechanically, the end plate is subjected to forces of daily living as the trunk muscles contract
- These forces cause the endplate to suffer failure.



What is vertebrogenic back pain?

- Because the lumbar spine carries significant forces and the disks don't have a dedicated blood supply, the end plates must balance the need to being strong and prevent vertebral fracture while being porous to facilitate transport between disk cells and vertebral capillaries. Consequently, end plates are particularly susceptible to damage.²
- The damaged endplates cause increased communication between the nucleus pulposus and bone marrow leading to the release of inflammatory mediators and chronic inflammation, notable as Modic changes (MCs) in magnetic resonance imaging (MRI).³

Modic Changes

Type 1 - vertebral endplate disruption, fissuring, degeneration, and active inflammation

Type 2 - fatty infiltration of the bone marrow

Type 3 - chronic changes with calcification of the endplate and bone marrow

Modic changes

T1

Modic 1



Hypodense

Modic 2



Hyperdense

Modic 3



Hypodense

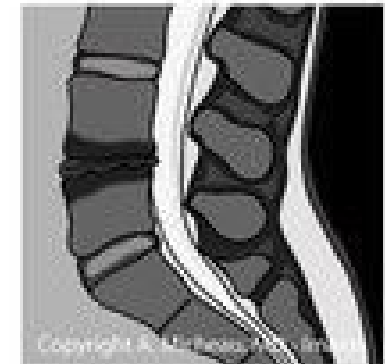
T2



Hyperdense

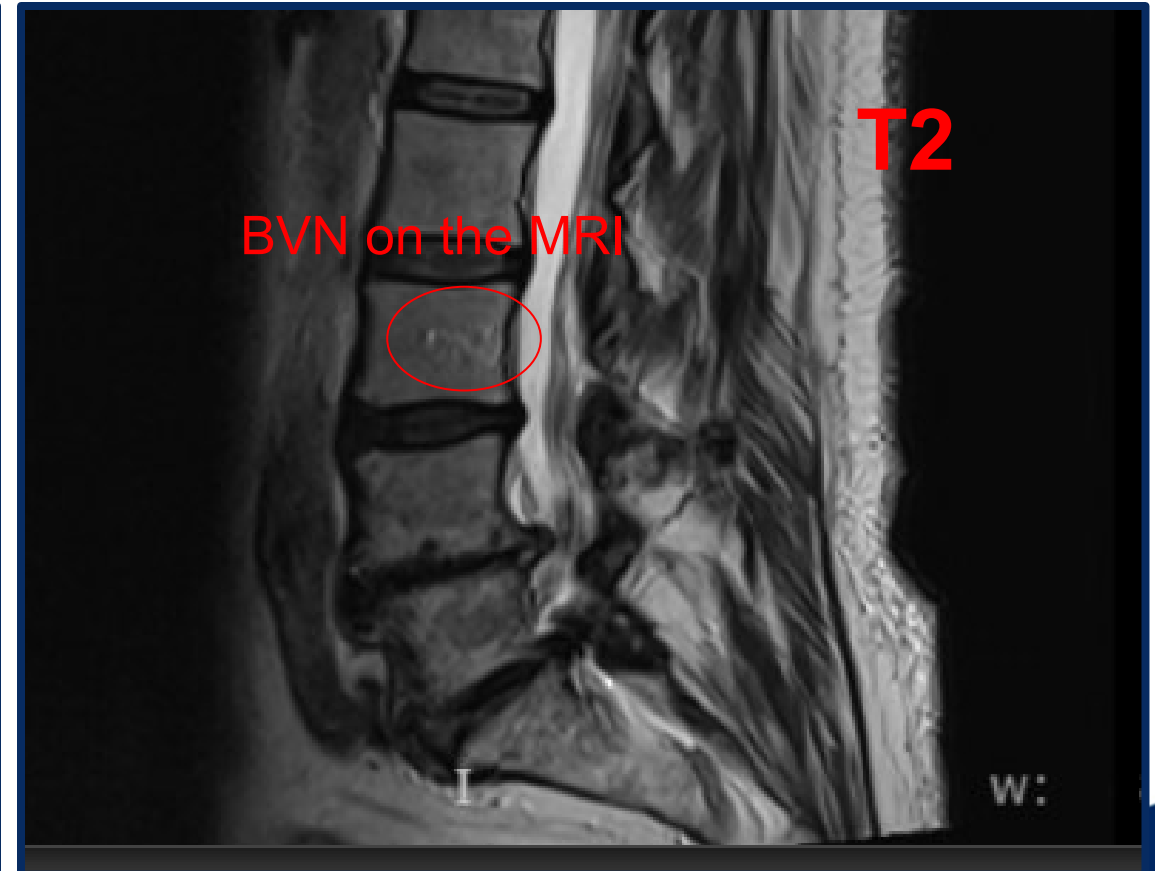


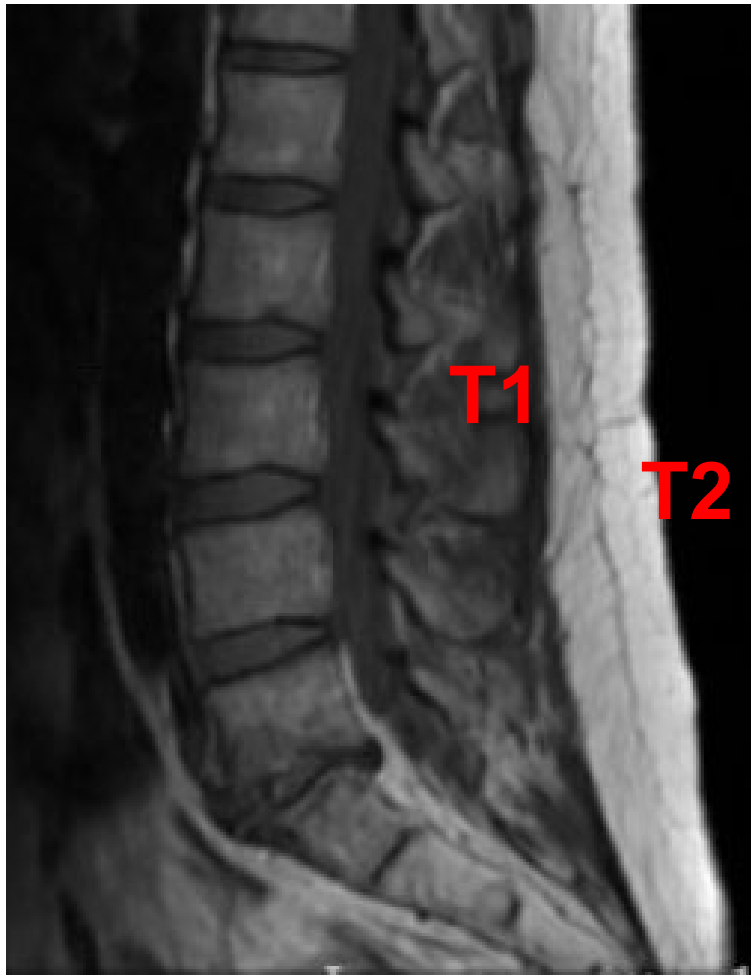
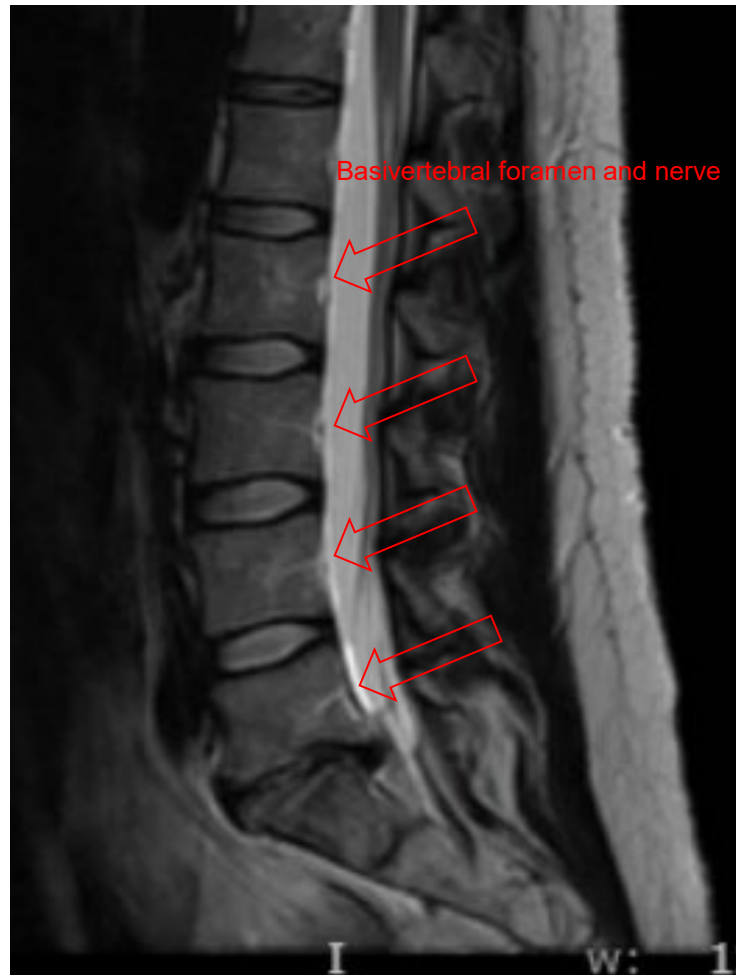
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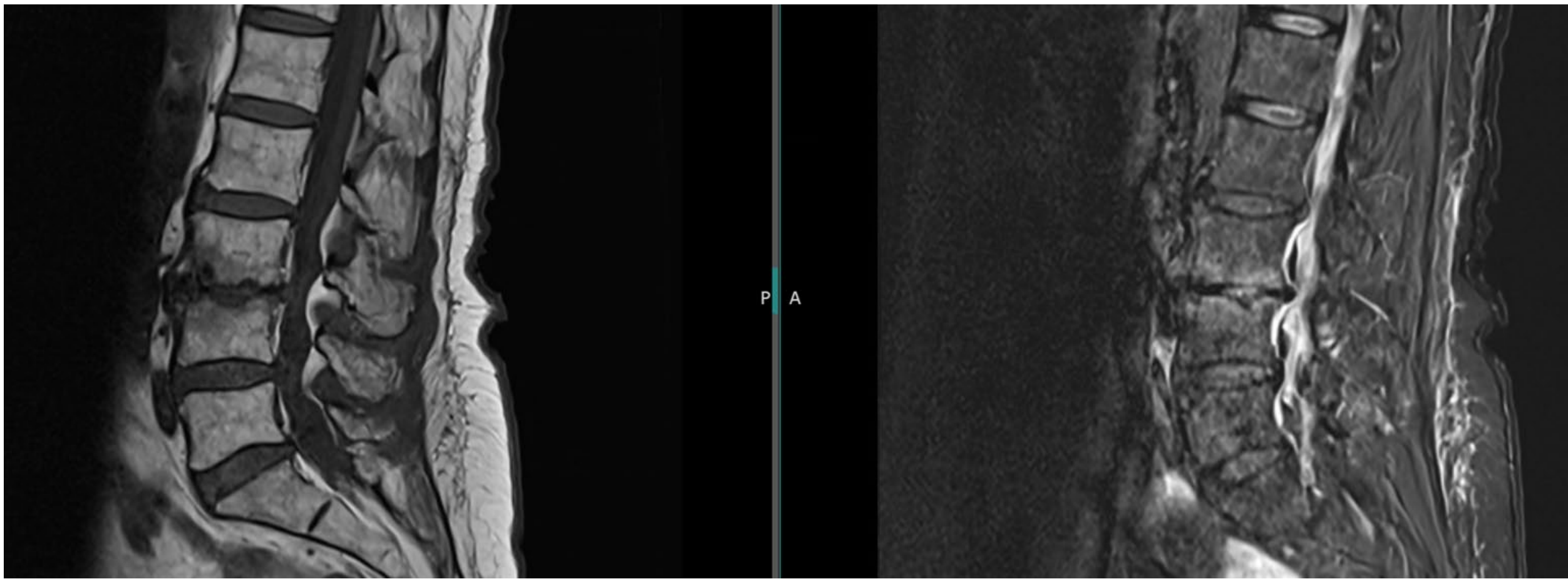
Hypodense

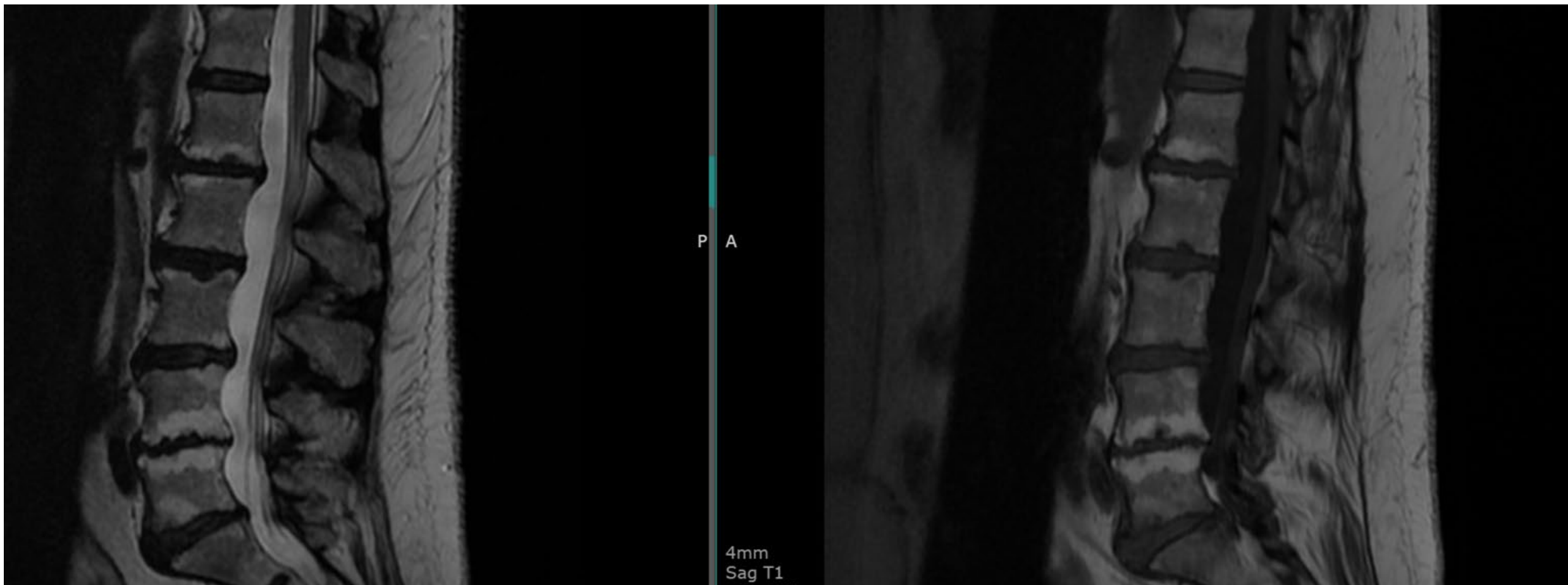
66 y.o. Female





37 y.o. Male





How Do Patients Present?

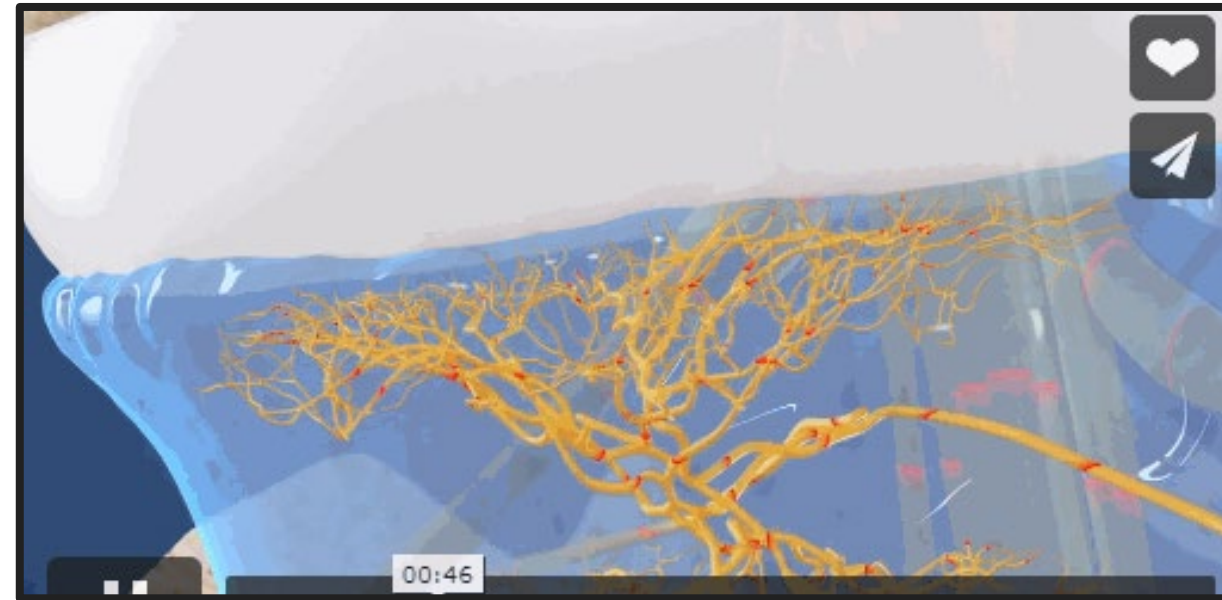
- Patients will present with “anterior column pain”
- Chronic axial low back pain that is worse with prolonged sitting, prolonged standing, bending/lifting, doing activities that require slight amounts of prolonged flexion (doing dishes, vacuuming, gardening).
- Better with laying down

How Do You Treat It?

- For years we had no real treatment for vertebrogenic / discogenic pain.
- Conservative therapy consists of weight loss, strengthening the back, using a back brace, traction / inversion table, medications, and steroid injections.
- Now we can offer Basivertebral Nerve Ablation as an option.

Basivertebral Nerve Ablation

- The ablation target is the root of the basivertebral nerve
- The procedure consists of placing an electrode into the vertebral body via a unipedicular approach.
- Under fluoroscopic guidance, an introducer cannula is advanced through the pedicle until the trocar just breaches the posterior vertebral wall. The introducer trocar is exchanged with a smaller plastic cannula/curved nitinol stylet assembly, which facilitates the creation of a curved path from the posterior wall to the target located at the terminus of the BVN, located near the center of the vertebral body. Then the curved nitinol stylet is removed and an RF probe is introduced positioned at the terminus of the BVN.⁴
- After confirmation via fluoroscopy, ablation is completed at 85°C for 15 minutes. This creates roughly 1 cm spherical lesion in each vertebral body.

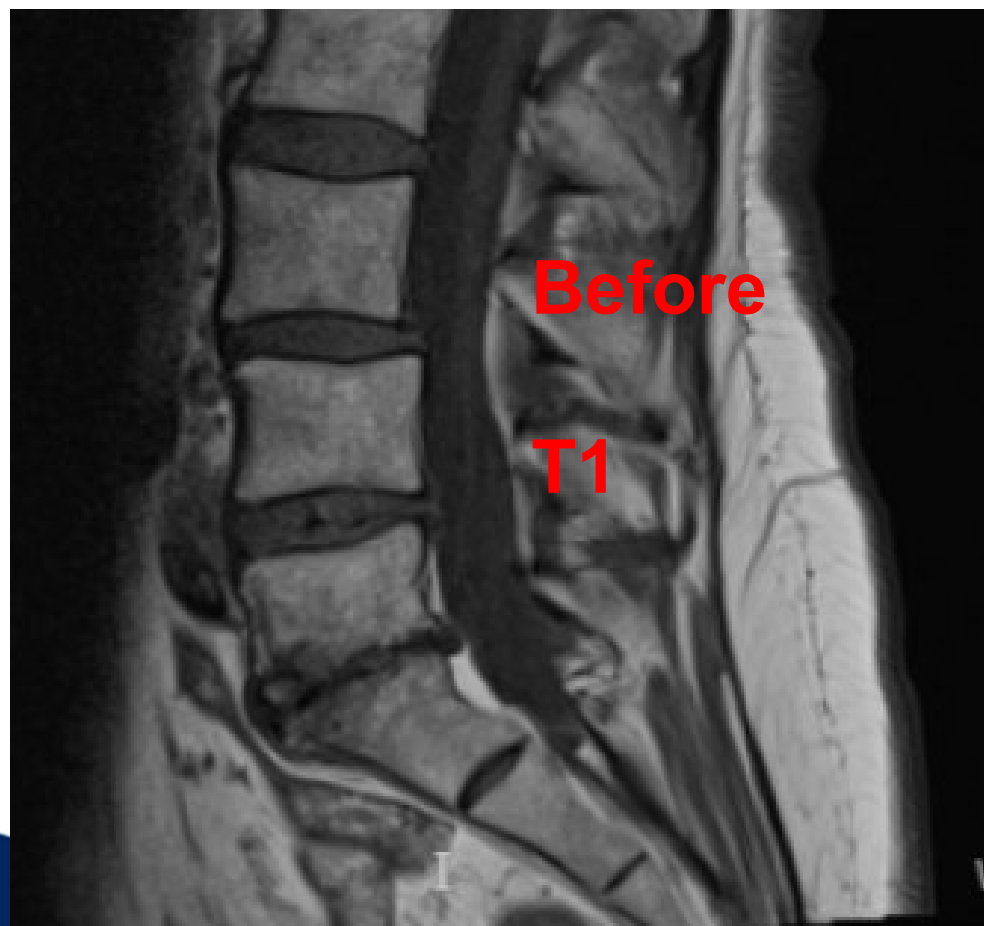
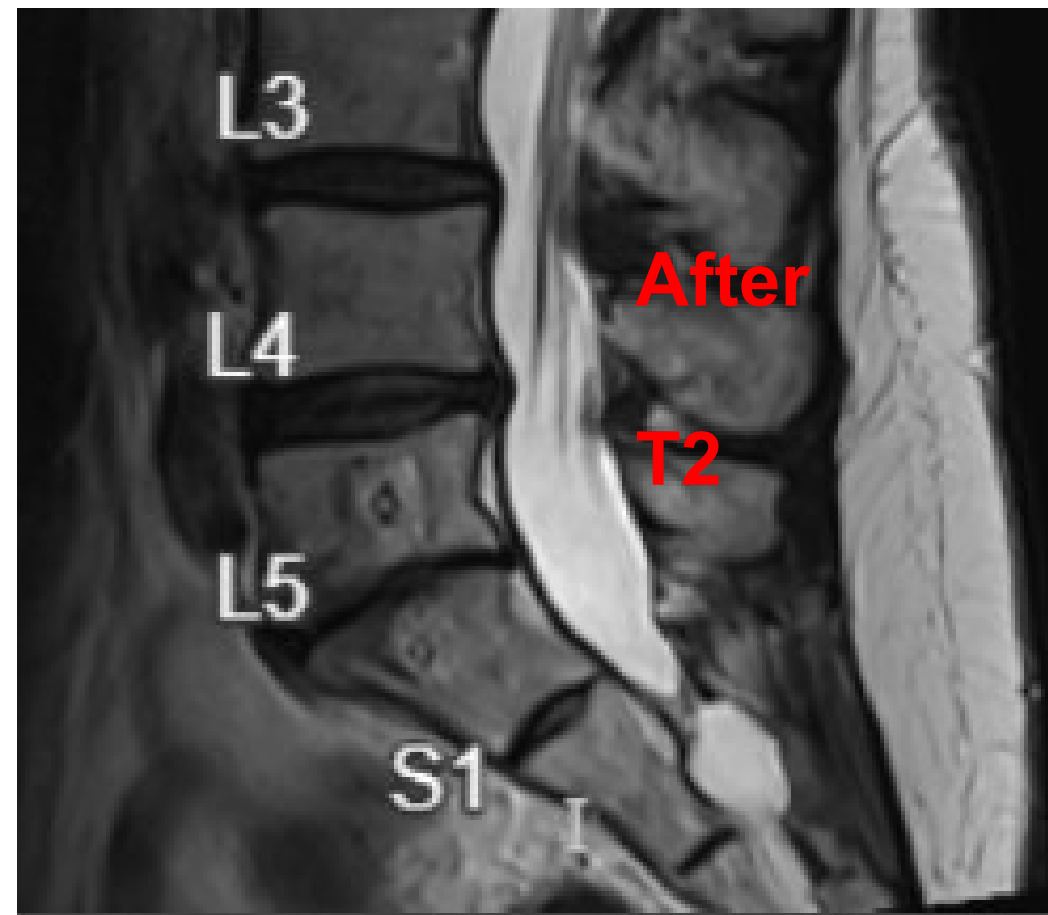


Video is property of Relieva Medsystems

Indications for Treatment With Basivertebral Nerve Ablation

- Chronic low back pain of at least 6 months duration; and
- Failure to respond to at least 6 months of conservative care; and
- MRI demonstrated Modic Type 1 or Type 2 changes at one or more vertebrae from L3 to S1 documented by at least one of the following:
 - Modic Type 1 and/or Modic Type 2
 - Endplate changes, inflammation, edema, disruption, and/or fissuring
 - Fibrovascular bone marrow changes (hypointensive signal for Modic Type 1)
 - Fatty bone marrow replacement (hyperintensive signal for Modic Type 2)

69 y.o. Female



Basivertebral Nerve A

- There are several good studies, but this is the one I like because it looked at sustainability. Company funded but great results and well designed
- 5 year follow up on the original patients from their prospective randomized double-blinded sham controlled study. Mean follow up was 6.4 years.

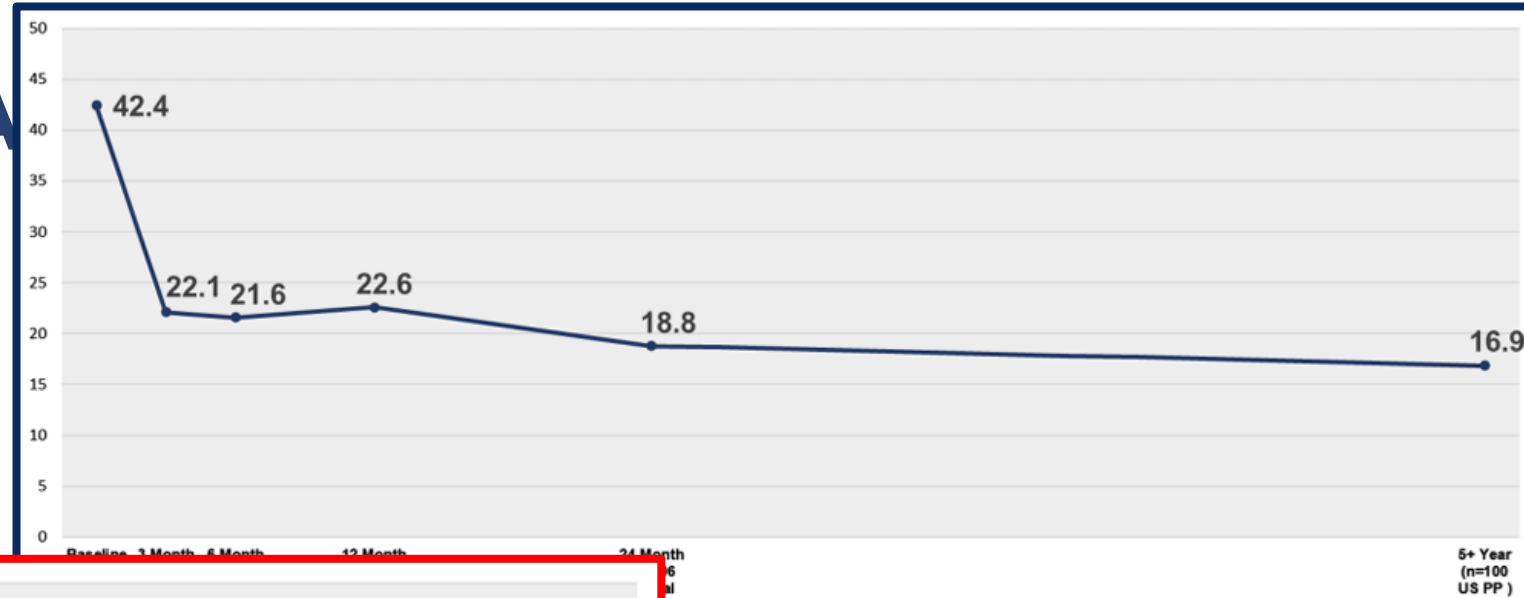
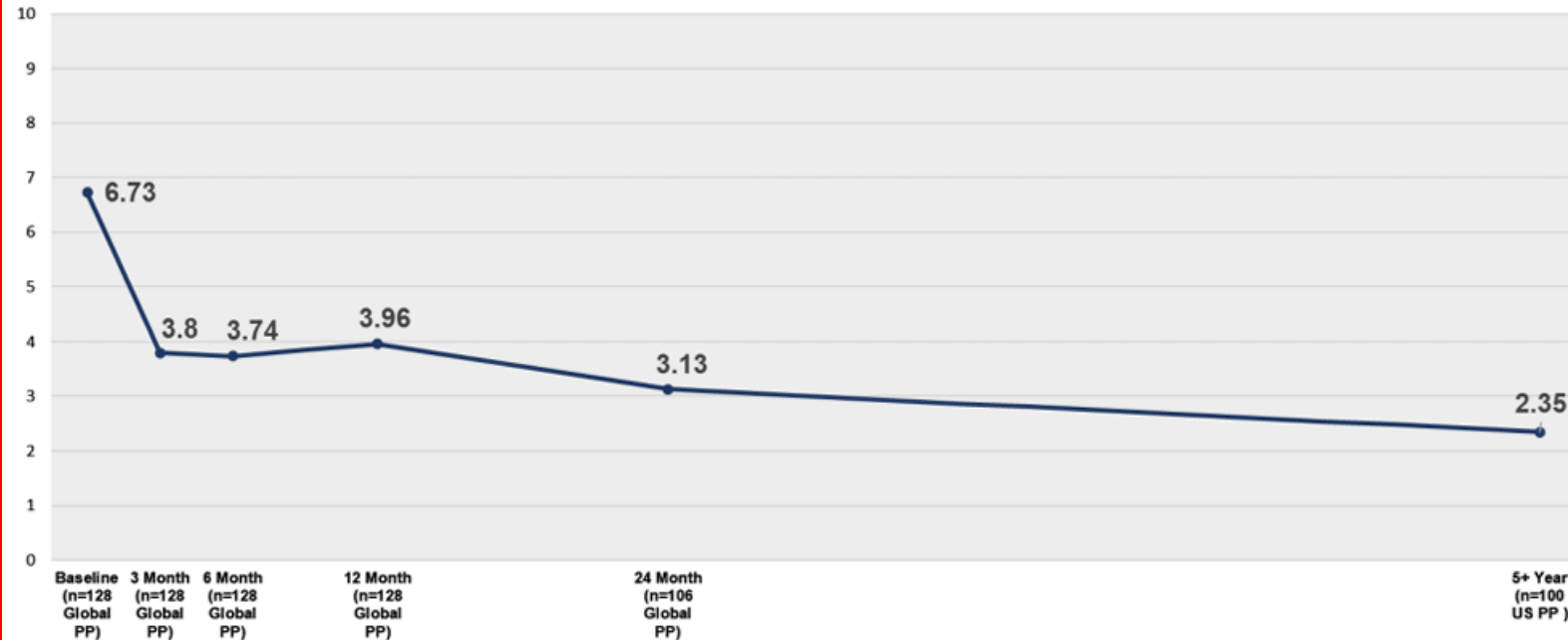


Fig. 5 Mean VAS over time. Differences in VAS from baseline are statistically significant in US PP patients treated with BVN ablation at a minimum follow-up of 5 years ($p < 0.001$)

are statistically significant in US PP patients treated with BVN ablation at a mini-

endplates are a significant cause of vertebrogenic chronic low back pain biomarker for these patients. Prior data from the treatment arm of a sham-improvements at 2 years following ablation of the basivertebral nerve (BVN).

successfully with BVN ablation. Patient-reported outcomes of ODI, VAS, were collected at a minimum of 5-years following BVN ablation. Primary between the postablation and baseline values were made using an analysis

5%) were available for review with a mean follow-up of 6.4 years (5.4– to 16.86 at 5-year follow-up, a reduction of 25.95 points ($p < 0.001$). Mean eline of 6.74, $p < 0.001$). In total, 66% of patients reported a > 50% reduction and 34% of patients reported complete pain resolution. Composite responder point VAS for function and pain at 5 years was 75%.

ablation exhibit sustained clinical improvements in function and pain with owing treatment. BVN ablation is a durable, minimally invasive treatment

References

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3. Nwosu M, Agyeman WY, Bisht A, Gopinath A, Cheema AH, Chaludiya K, Khalid M, Yu AK. The Effectiveness of Intraosseous Basivertebral Nerve Ablation in the Treatment of Nonradiating Vertebrogenic Pain: A Systematic Review. Cureus. 2023 Apr 4;15(4):e37114. doi: 10.7759/cureus.37114. PMID: 37034146; PMCID: PMC10075185.
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Questions?

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