

Rapid MRI confirmed reduction of lumbar disc herniation following an accelerated nonsurgical spinal decompression protocol in an 18y female: A case report

JD Dudum and Bryan Gatterman

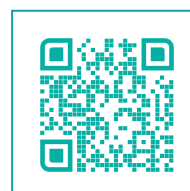
Objective: Lumbar disc herniation (LDH) is a major contributor to chronic low back pain and lower extremity radiculopathy, posing significant disability burden globally. Nonsurgical spinal decompression (NSD) therapy has demonstrated efficacy in reducing disc herniation size in prior research; however, the minimum time required to achieve measurable MRI-confirmed disc reduction following an intensive NSD protocol has not been previously reported. This case report presents MRI-confirmed disc herniation reduction at the L5-S1 level following only 18 days of accelerated NSD therapy in a young female patient with a two-year history of failed conservative and interventional treatment, highlighting a potentially accelerated pathway to structural disc improvement.

Clinical Features: An 18-year-old female presented with a greater than two-year history of low back pain, left leg numbness, and sciatica radiating to the left calf, rated 8/10 on the Visual Analog Scale (VAS). She had failed epidural steroid injection and was scheduled for spinal surgery. Pre-treatment MRI taken 4 months prior to her appointment confirmed a disc protrusion at L5-S1. The patient's condition progressively worsened including functional limitations such as the inability to walk more than five minutes.

Intervention and Outcome: The patient underwent an accelerated NSD protocol of decompression sessions combined with cold laser therapy, electrical muscle stimulation (EMS), and cryotherapy over an 18-day period. Post-treatment MRI, obtained 18 days after the initiation of treatment, demonstrated a 26.5% reduction in the Herniation Index at L5-S1. The patient reported complete resolution of pain (0/10 VAS) and was walking greater than 20,000 steps per day at discharge.

Conclusion: This case documents structural disc reduction and alleviation of symptoms after 18 days of an accelerated NSD protocol. The findings suggest that high-frequency NSD therapy may substantially accelerate disc size reduction, even in cases of prolonged chronicity and failed prior intervention. Further controlled investigation is warranted to evaluate the disc resorption timeline in NSD management of low back pain.

Indexing Terms: Chiropractic; Low Back Pain; MRI; Lumbar Disc Herniation; Spinal Decompression; Radiculopathy; Herniation Index; Sciatica.



... the patient progressed to walking greater than 20,000 steps per day. Resolution of left leg numbness and sciatic symptoms was reported ...'

Introduction

Low back pain (LBP) remains the leading cause of disability worldwide, affecting more than half a billion people globally and projected to exceed 800 million by 2050. (1) The economic and societal burden is substantial, with direct spine-related healthcare costs in the United States estimated at US\$315 billion annually, with surgical procedures accounting for most expenditures. (2) Lumbar disc herniation (LDH) is among the most common structural aetiologies of LBP and lower extremity radiculopathy, and it disproportionately affects younger populations whose functional demands and long-term disability risk are greatest.

Standard management of LDH includes pharmacological therapy, physical rehabilitation, epidural steroid injections, and surgical discectomy. While surgery provides short-term relief in severe cases, 5 to 40% of patients develop failed back surgery syndrome in the years following lumbar surgery, with estimated annual treatment costs ranging from US\$18,195 to US\$21,402 per patient. (3, 4) Given this risk, identifying effective nonsurgical alternatives capable of producing measurable structural disc improvement is a high clinical priority.

Nonsurgical spinal decompression (NSD) therapy is a computer-controlled motorised traction system designed to apply segmental distraction forces to the lumbar spine, creating negative intradiscal pressure (-100 to -600 mmHg) within the nucleus pulposus. (9) This negative pressure gradient is theorised to facilitate retraction of herniated disc material, reduce nerve root compression, and promote disc rehydration through improved nutrient diffusion. (9, 10) Several randomised controlled trials and case series have demonstrated the effectiveness of NSD therapy in reducing pain, improving function, and producing MRI-confirmed reductions in disc herniation size. (11 - 14)

Our prior published case series documented MRI-confirmed herniation index reductions ranging from 9.4% to 78% following eight weeks of NSD therapy combined with Chiropractic care in four patients with LBP and radiculopathy. (14) A critical unanswered question is the minimum treatment duration required to achieve measurable structural disc reduction, and whether an accelerated, high-frequency NSD protocol can compress the resorption timeline beyond what is observed with standard conservative management.

This case report describes an 18-year-old female with a greater than two-year history of chronic LBP, left leg numbness, and sciatica who had failed epidural steroid injection and was scheduled for surgical intervention.

The patient

An 18-year-old female presented with a chief complaint of low back pain, left leg numbness, and sciatica radiating to the left calf. The patient had experienced these symptoms for greater than two years with progressive functional decline and no sustained relief from prior interventions. The patient's clinical condition progressively worsened. Pain intensity increased, and ambulation tolerance declined further. She rated her pain intensity at 8/10 on the Visual Analog Scale (VAS) at initial presentation. Her quality of life was severely compromised, with

functional limitations including the inability to walk more than five minutes continuously. The patient was unable to participate in normal daily activities commensurate with her age.

Prior treatment history included an epidural steroid injection at the L5-S1 level, which provided no sustained improvement. Given the failure of conservative and interventional management, the patient had been recommended for lumbar spinal surgery.

Pre-treatment MRI of the lumbar spine confirmed a disc protrusion at the L5-S1 intervertebral level. The pre-treatment AP dimension measured 11.3 mm, yielding a pre-treatment Herniation Index of 471.5. The patient consented to participation in this case report; all identifying information has been de-identified in accordance with patient privacy standards.

The patient underwent the accelerated NSD protocol, consisting of twice-daily decompression sessions combined with cold laser therapy, EMS, and cryotherapy over 18 consecutive days. This technique is discussed in the section on 'NSD Treatment Protocol'. Compliance with the protocol was complete for the full treatment course.

Follow-up MRI of the lumbar spine was obtained 18 days following the initiation of treatment. Radiological review confirmed a measurable reduction in disc herniation size at L5-S1. The post-treatment AP dimension measured of 10.97 mm, indicating a post-treatment Herniation Index of 346.44, representing a 26.5% reduction from baseline.

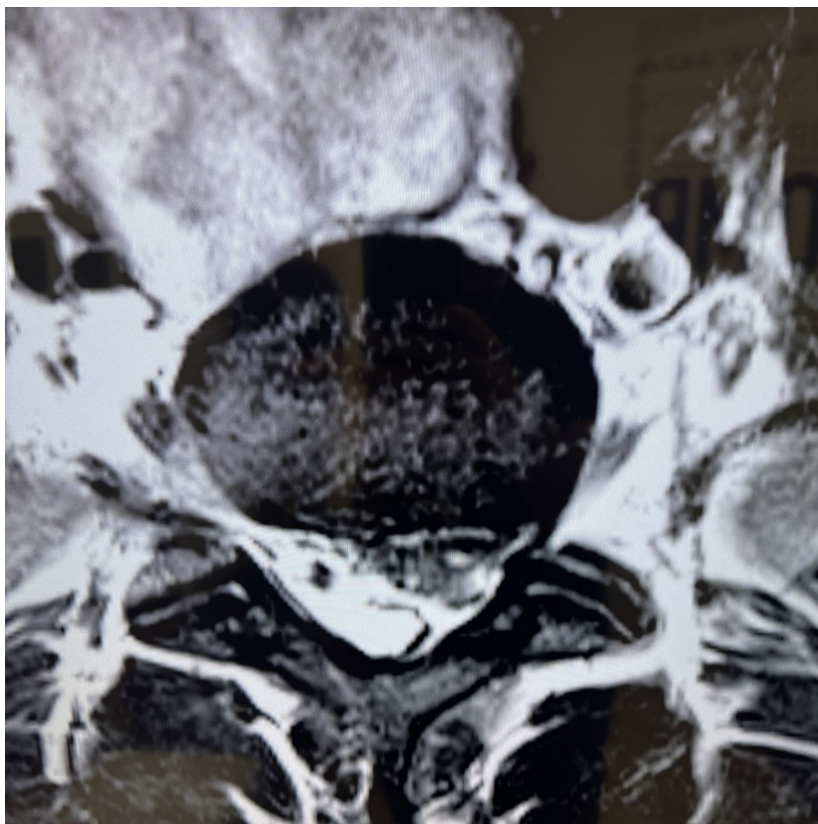


Figure 1: Pre-treatment axial MRI image at the L5-S1 intervertebral disc level demonstrating the disc protrusion. Posterior disc protrusion with encroachment on the spinal canal is noted, consistent with the patient's clinical presentation of low back pain, left leg numbness, and sciatica radiating to the left calf.

Clinically, the patient reported complete resolution of pain at discharge, rating pain intensity 0/10 on the VAS, a reduction of 8 points from baseline.

Functional recovery was dramatic: the patient progressed from an inability to walk more than five minutes to walking greater than 20,000 steps per day. Resolution of left leg numbness and sciatic symptoms was reported. The patient avoided spinal surgery.

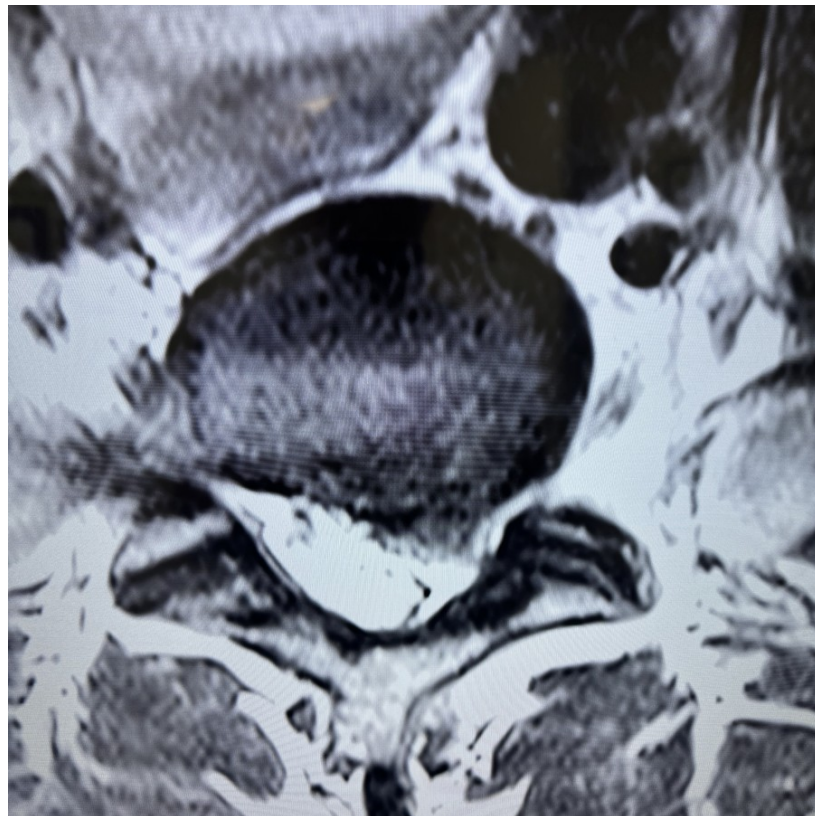


Figure 2: Post-treatment axial MRI image at the L5-S1 intervertebral disc level demonstrating reduction in disc protrusion size following 18 days of accelerated nonsurgical spinal decompression therapy. Reduced posterior disc protrusion and improved visualisation of the spinal canal are noted compared to Figure 1.

Imaging protocol

To evaluate the change in the herniated disc following NSD therapy, magnetic resonance imaging (MRI) was performed 4 months prior to the initiation of treatment and repeated 18 days following the commencement of therapy. MRI of the lumbar spine was performed utilising a 1.5 T magnet. Standard imaging with sagittal T1, T2, and STIR sequences along with an axial T2 sequence were obtained. The type of herniation was categorised as a protrusion.

Disc herniation size was quantified using the herniation index methodology (HI) described in our previously published research. (14) The HI was calculated utilising the axial image demonstrating the greatest degree of distortion of the posterior intervertebral disc margin. The calculation involved multiplying the maximal anteroposterior (AP) dimension of the intervertebral disc herniation by the width of the herniated disc material and then dividing this value by the product of the sagittal diameter of the spinal canal and the width of the spinal canal at the same axial level, multiplied by 1,000.

$$\text{HI Formula: (AP distance} \times \text{Width distance) / (AP sagittal canal distance} \times \text{Width sagittal canal distance)} \times 1000 = \text{Herniation Index (HI)}$$

All MRI measurements and HI calculations were performed by a spinal radiologist. The measurements were obtained 3 times and averaged to obtain a final value. See Table 1 for the values obtained in this patient.

Table 1: The values used to calculate the HI.

Measurement	Pre-treatment	Post-treatment (Day 18)	Change
AP dimension of herniation (mm)	11.3	10.97	-2.9%
Width of herniation (mm)	25.1	19.07	-24%
AP sagittal canal diameter (mm)	18.7	19.17	+2.5%
Width of spinal canal (mm)	32.17	31.5	-2.1%
Herniation Index (HI)	471.48	346.44	-26.5%

NSD treatment protocol

The accelerated NSD treatment protocol in this case consisted of twice-daily decompression sessions administered in 13 sessions delivered over an 18-day period. Two (2) to 3 sessions were clustered on treatment days, spaced 30 minutes to 3 hours apart, based on patient scheduling. Each session included 20 to 30 minutes of active spinal decompression on a computerised motorised traction table. At the initiation of each session, the patient was positioned supine on the decompression table and fitted with adjustable body harnesses. The computerised algorithm gently applied distraction force to the lumbar spine; as paraspinal musculature resisted the applied tension, sensors detected resistance and modulated tension until relaxation occurred before reapplying the decompression force.

The ratio of hold to rest time was 1:1, with oscillation ranging from 10 - 50% decrease between hold and rest phases. Each session was supplemented with adjunctive therapies including cold laser therapy, electrical muscle stimulation (EMS), and cryotherapy (ice application). No Chiropractic spinal manipulation was performed during the acute treatment phase. The treating clinician supervised all sessions.

Discussion

The primary finding of this case report is MRI-confirmed structural disc herniation reduction at L5-S1 after 18 days of an accelerated NSD protocol. The patient had experienced disc herniation related symptoms for greater than two years with progressive functional decline and no sustained relief from prior interventions. This change in the disc herniation and patient symptoms has important implications for the understanding of how NSD therapy may mechanistically influence the disc resorption process, and for the clinical management of young patients with chronic LDH who have failed conventional and interventional treatment.

Several biomechanical mechanisms may explain why an intensive, twice-daily NSD protocol could accelerate disc size reduction beyond what is achievable with standard conservative care. NSD therapy generates significant negative intradiscal pressure (-100 to -600 mmHg) within the nucleus pulposus, a magnitude of decompressive force that exceeds conventional traction and that cannot be replicated by rest, physical therapy, or injection alone. (9)

This negative pressure gradient is theorised to facilitate mechanical retraction of herniated disc material, restoration of disc height, and enhanced diffusion of oxygen and nutrients into avascular disc tissue, thereby promoting biological remodelling. (9, 10) The twice-daily administration of these decompressive forces in this case doubled the mechanical stimulus compared to standard once-daily protocols, potentially amplifying both mechanical retraction and biological rehydration effects.

The biological mechanisms underlying disc resorption, including macrophage-mediated phagocytosis, neovascularisation, inflammatory cascade activation, and matrix protease activity, are relevant to the accelerated response observed in this case. (5, 6) It is well established in the resorption literature that protrusion-type herniations, in which the annulus fibrosus remains intact, demonstrate lower spontaneous resorption rates compared to extrusion and sequestration types, as intact annular containment limits contact between disc material and the epidural venous plexus necessary to trigger immune-mediated degradation. (8)

The change in the disc protrusion in this patient suggests that the mechanical decompressive forces generated by the twice-daily NSD protocol, rather than immune-mediated biological resorption alone, may be the primary driver of the observed structural change, potentially through direct mechanical retraction of contained disc material and restoration of negative intradiscal pressure gradients. This proposed mechanism warrants direct investigation in future controlled studies.

The chronicity of this patient's presentation adds additional significance to the rapidity of the observed response. The patient had been symptomatic for greater than two years, a duration associated with structural disc changes, neurological sensitisation, and reduced likelihood of spontaneous resorption in the epidemiological literature. (5) The patient's symptoms were progressively becoming worse prior to NSD intervention. Despite this unfavourable chronicity profile, and despite prior failure of epidural steroid injection, the patient achieved complete pain resolution and dramatic functional restoration within 18 days of the commencing treatment.

This outcome challenges the clinical assumption that prolonged symptom duration predicts resistance to conservative disc intervention and suggests that the intensity of the NSD protocol may be a more important determinant of outcome than chronicity alone.

The results are consistent with and extend the findings of our previously published case series, in which four patients with LBP and radiculopathy achieved herniation index reductions ranging from 9.4% to 78% following eight weeks of standard-frequency NSD therapy combined with chiropractic care, with all four patients achieving complete pain resolution. (14) The present case demonstrates that comparable or superior structural and clinical outcomes may be achievable in a fraction of the treatment duration when a high-frequency protocol is employed, at least in select patients. The 26.5% reduction in HI at 18 days compares favourably with the eight-week outcomes reported in our prior series and with findings from other published NSD studies demonstrating disc reduction following standard protocols. (11 - 14)

Additional published NSD research is consistent with the clinical improvements observed here. Amjad et al. demonstrated that NSD combined with routine physical therapy produced superior reductions in pain intensity and functional disability compared to physical therapy alone in patients with lumbar radiculopathy. (11) Gaowgzeh et al. found NSD combined with core stabilisation significantly outperformed core stabilisation alone in patients with lumbar disc prolapse. (12) The present case extends this literature by documenting the potential of an accelerated NSD protocol to produce rapid structural disc change in a clinically complex, previously treatment-resistant patient.

Several limitations of this case report merit acknowledgment. As a single case, the findings cannot be generalised, and the absence of a control condition precludes attribution of disc reduction solely to the NSD protocol. The possibility that some degree of spontaneous regression contributed to the observed structural change is unlikely, since the patient presented with greater than two years of chronicity. The MRI measurements are subject to the inherent limitations of HI calculation methodology, including inter-reader variability, and the use of different magnets and the imaging protocols of different facilities. Prospective controlled trials comparing accelerated versus standard-frequency NSD protocols with serial MRI monitoring are needed to confirm these preliminary findings.

Conclusion

This case report documents MRI-confirmed 26.5% reduction in lumbar disc herniation at L5-S1 following 18 days of accelerated nonsurgical spinal decompression therapy in an 18-year-old female with greater than two years of chronic LBP, sciatica, and radiculopathy who had failed epidural steroid injection and was facing spinal surgery.

As of the initiation of the NSD treatment, the patient's condition was progressively becoming worse. The 18-day treatment period for measurable disc reduction is significant when considering the timeline reported in the spontaneous resorption literature.

This study extends our prior published case series by suggesting that high-frequency NSD protocols may substantially accelerate the disc reduction process. The patient achieved complete pain resolution and returned to full functional activity, avoiding surgery.

These findings support the continued investigation of accelerated NSD protocols as a time-efficient, nonsurgical intervention for LDH, particularly in younger patients with chronic, treatment-resistant disc pathology. Prospective controlled trials with serial MRI assessment are warranted to confirm whether intensive NSD frequency is a determinant of the rate of structural disc improvement.

Bryan Gatterman

DC, DACBR

Life Chiropractic College West, Hayward
Private practice of Chiropractic Radiology
Castro Valley, CA

JD Dudum

DC

Private practice of Chiropractic
Walnut Creek, CA
jrdudum2@gmail.com

Cite: Dudum JD, Gatterman B. Rapid MRI confirmed reduction of lumbar disc herniation following an accelerated nonsurgical spinal decompression protocol in an 18y female: A case report. *Asia-Pac Chiropr J*. 2026;7.2. <https://www.apcj.site/DudumLxDisc.pdf>

References

1. Global Burden of Disease Collaborator Network. Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. *Lancet Rheumatol*. 2023;5(6):e316–e329. [https://doi.org/10.1016/s2665-9913\(23\)00098-x](https://doi.org/10.1016/s2665-9913(23)00098-x)
2. Yelin E, Weinstein S, King T. The burden of musculoskeletal diseases in the United States. *Semin Arthritis Rheum*. 2016;46(3):259–260. <https://doi.org/10.1016/j.semarthrit.2016.07.013>
3. Stanton EW, Chang KE, Formanek B, Buser Z, Wang J. The incidence of failed back surgery syndrome varies between clinical setting and procedure type. *J Clin Neurosci*. 2022;103:56–61. <https://doi.org/10.1016/j.jocn.2022.06.027>
4. Hollingworth W, Turner JA, Welton NJ, Comstock BA, Deyo RA. Costs and cost-effectiveness of spinal cord stimulation (SCS) for failed back surgery syndrome. *Spine*. 2011;36(24):2076–2083. <https://doi.org/10.1097/BRS.0b013e31822a867c>
5. Chiu CC, Chuang TY, Chang KH, Wu CH, Lin PW, Hsu WY. The probability of spontaneous regression of lumbar herniated disc: a systematic review. *Clin Rehabil*. 2015;29(2):184–195.
6. Zhong M, Liu JT, Jiang H, et al. Incidence of spontaneous resorption of lumbar disc herniation: a meta-analysis. *Pain Physician*. 2017;20(1):E45–E52.
7. Farrag A, Koura HA, Darwish H. Spontaneous resorption of herniated lumbar disk: observational retrospective study in 9 patients. *World Neurosurg*. 2019;122:e1252–e1257. <https://doi.org/10.1016/j.wneu.2018.11.104>
8. Han Z, Yin H, Liu J, et al. Prevalence, clinical predictors, and mechanisms of resorption in lumbar disc herniation: a systematic review. *Orthop Rev*. 2023;15:96437. <https://doi.org/10.52965/001c.96437>

9. Ramos G, Martin W. Effects of vertebral axial decompression on intradiscal pressure. J Neurosurg. 1994;81(3):350-353. <https://doi.org/10.3171/jns.1994.81.3.0350>
10. Apfel CC, Cakmakkaya OS, Martin W, et al. Restoration of disk height through non-surgical spinal decompression is associated with decreased discogenic low back pain: a retrospective cohort study. BMC Musculoskelet Disord. 2010;11:155. <https://doi.org/10.1186/1471-2474-11-155>
11. Amjad F, Mohseni-Bandpei MA, Gilani SA, Ahmad A, Hanif A. Effects of non-surgical decompression therapy in addition to routine physical therapy on pain, range of motion, endurance, functional disability and quality of life versus routine physical therapy alone in patients with lumbar radiculopathy; a randomized controlled trial. BMC Musculoskelet Disord. 2022;23(1):255. <https://doi.org/10.1186/s12891-022-05196-x>
12. Gaowgzeh RAM, Chevidikunnan MF, BinMulayh EA, Khan F. Effect of spinal decompression therapy and core stabilization exercises in management of lumbar disc prolapse: A single blind randomized controlled trial. J Back Musculoskelet Rehabil. 2020;33(2):225-231. <https://doi.org/10.3233/bmr-171099>
13. Choi E, Gil HY, Ju J, Han WK, Nahm FS, Lee PB. Effect of nonsurgical spinal decompression on intensity of pain and herniated disc volume in subacute lumbar herniated disc. Int J Clin Pract. 2022;2022:6343837. <https://doi.org/10.1155/2022/6343837>
14. Dudum J, Gatterman B. Reduction of the size of a lumbar disc herniation using non-surgical spinal decompression combined with chiropractic care. J Contemp Chiropr. 2024;7(1):146-155.
15. Hornung AL, Barajas JN, Rudisill SS, et al. Prediction of lumbar disc herniation resorption in symptomatic patients: a prospective, multi-imaging and clinical phenotype study. Spine J. 2023;23(2):247-260.