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Grand Rounds
Pre-Game Warm-Up

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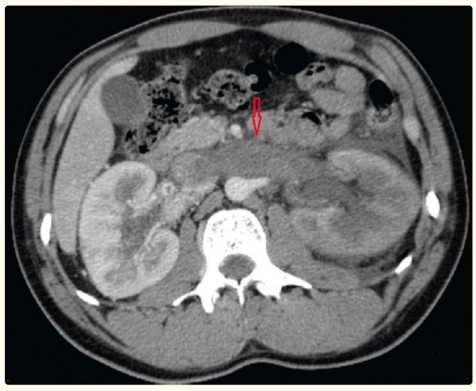
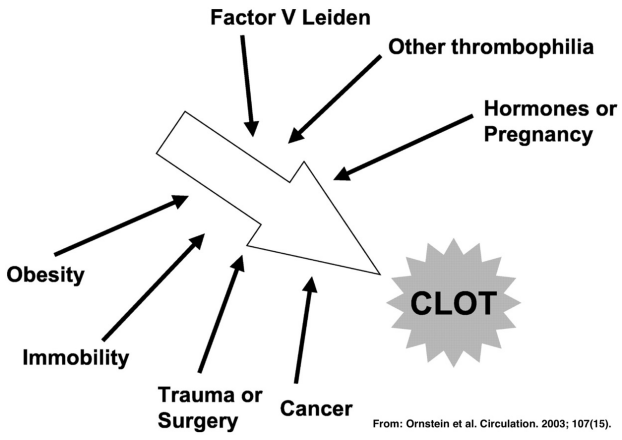


Figure 1

Dilatation of the left renal vein and filling defect extending to vena cava inferior compatible with renal vein thrombosis



From: Ornstein et al. Circulation. 2003; 107(15).

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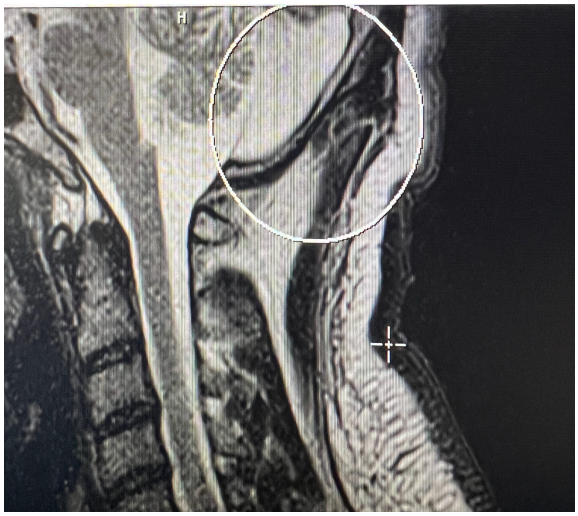

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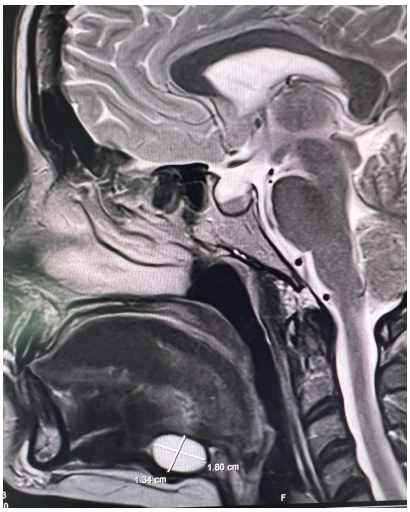

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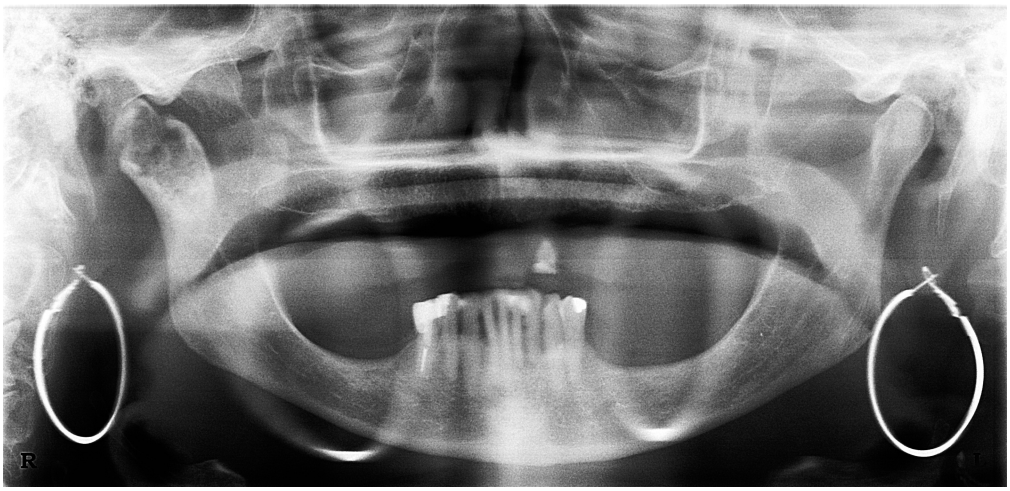

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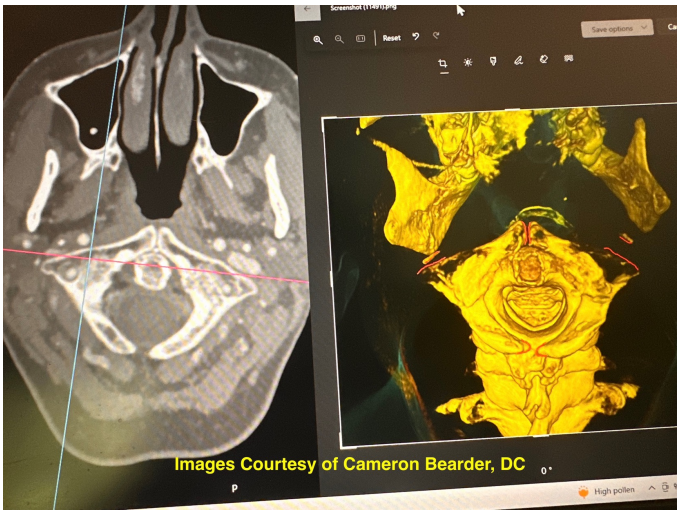

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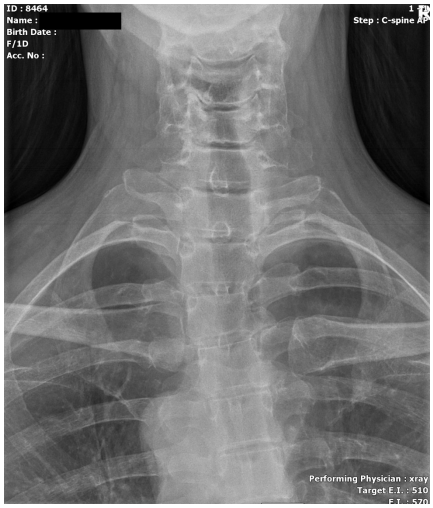

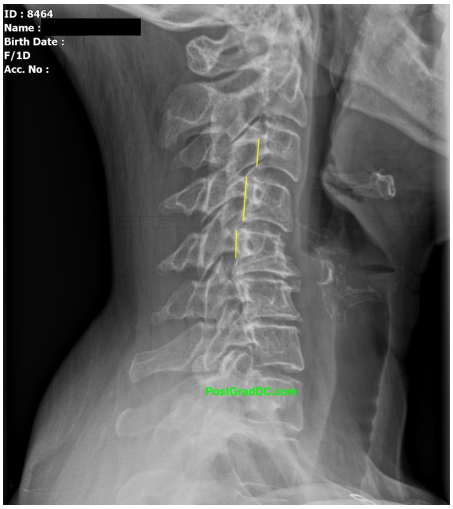

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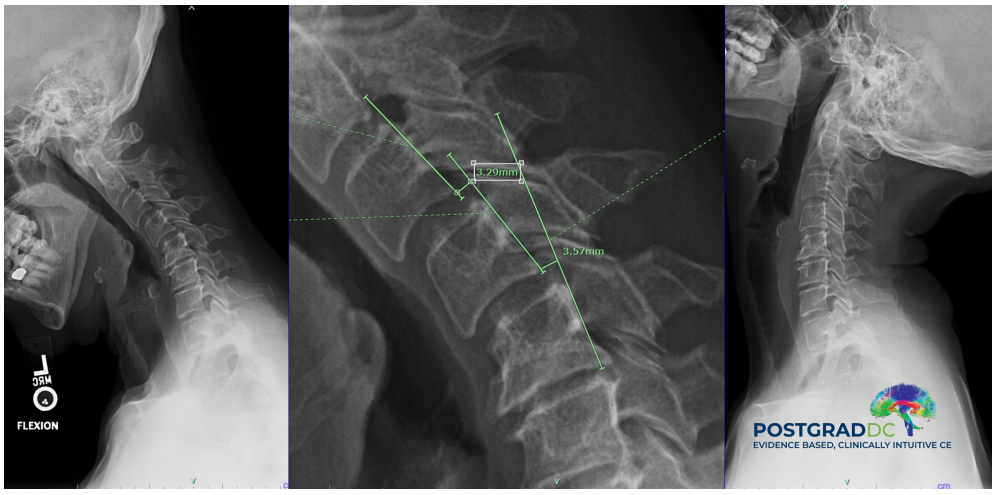

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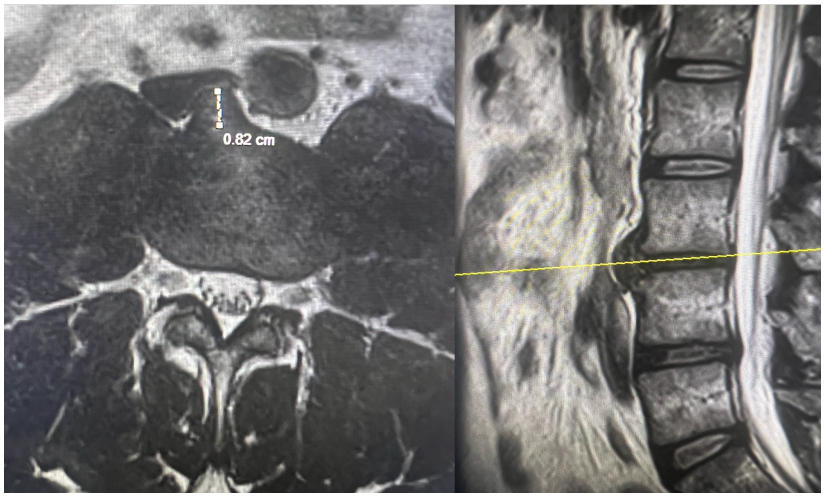

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Grand Rounds:
IVD Protrusions and Extrusions

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Clinician
- Active Practice >38 years
- Diplomate, American Board of Chiropractic Orthopedists
- Diplomate, International Academy of Neuromusculoskeletal Medicine

Publications
- Over 31 Peer-Reviewed chiropractic journal articles.
- Many Contributions to NCMIC Examiner and Podcast

Educator
- Post-Grad. > 24 years
- NCMIC Speakers' Bureau for>10 years
- Northeast College of Health Sciences
- **PostGradDC**

Editorial
- Editorial Reviewer for journals *Spine*, *Annals of Internal Medicine*, and *Clinical Anatomy*
- Former Managing Editor of *Journal of Chiropractic Orthopedists*

Honors
- Academy of Chiropractic Orthopedists Distinguished Service and Fellow Awards
- American College of Chiropractic Orthopedists Outstanding Achievement Award

Community
- Lower Cape Fear Hospice, Board Member
- Founder, Past-President Wilmington Autism Society
- Optimists Club – Safety Officer

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Purpose…Time + Effort = Favorable Outcomes

Study

Implement

Succeed

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Class Outline

- Cases for Consideration
- Prevalence in the Asymptomatic Population
- Imaging
- Nomenclature
- Dynamic Stenosis
- Chiropractic Care
- Complications of Surgery

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Some Cases to Consider

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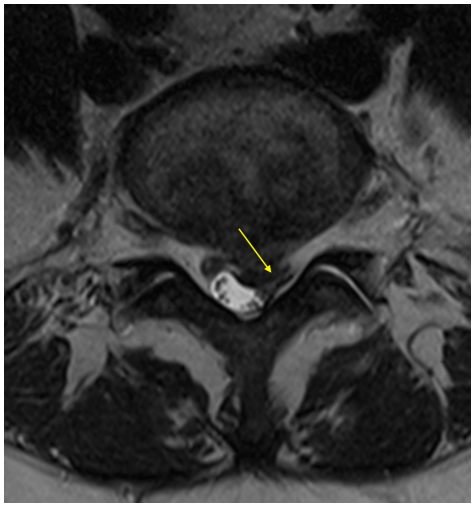
Case Presentation #1



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IVD Resorption

Case Reports

Journal of INTERNATIONAL MEDICAL RESEARCH

Spontaneous regression of a large sequestered lumbar disc herniation: a case report and literature review

Journal of International Medical Research
49(11) 1–9
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Chengxiang Hu[1,2], Baocheng Lin[1], Zhixing Li[1], Xiaozhuan Chen[1] and Kun Gao[3]

Abstract

Lumbar disc herniation is a common disorder in adults that is accompanied by lower back and radicular pain. A 32-year-old man visited our clinic with 1-week history of persistent lower back pain and weakness in his right big toe. Magnetic resonance imaging (MRI) of his lumbar spine revealed herniated discs at L3/L4, L5/S1 and L4/L5, where a right-sided intraspinal mass lesion deep to the L4 vertebral body was causing compression of the nerve root. The patient underwent conservative treatment and reported no symptoms referrable to his back or leg 4 months later. Follow-up MRI showed no herniation of the nucleus pulposus at the L4/L5 level or lesion deep to the vertebral body of L4, whereas no changes had occurred to the status of the herniated L3/L4 and L5/S1 discs. The present case and a literature review show that a sequestered lumbar disc herniation can regress within a relatively short timeframe without surgery. The authors emphasise the utility of conservative therapy for patients who do not have a definitive surgical indication.

Keywords

Disc herniation, spontaneous regression, lower back pain, lumbar spine, intraspinal mass lesion, conservative therapy

Date received: 21 May 2021; accepted: 22 October 2021

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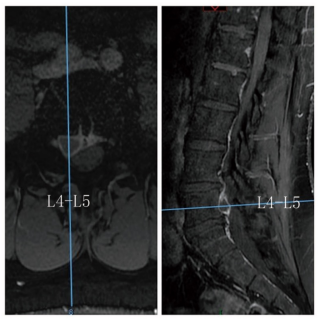

Figure 2. Post-gadolinium T1-weighted sagittal (left) and axial (right) rim enhancement magnetic resonance image obtained 4 days after the initial images shown in Figure 1, showing a large nucleus pulposus herniation at the L4/L5 level (arrows).

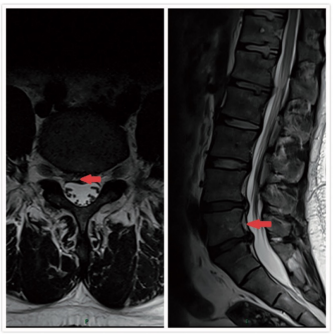

Figure 3. T2-weighted sagittal (left) and axial (right) magnetic resonance images showing the absence of the nucleus pulposus herniation (arrows) 4 months after the initial visit.

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IVD Resorption

Case Reports

Journal of INTERNATIONAL MEDICAL RESEARCH

Spontaneous regression of a large sequestered lumbar disc herniation: a case report and literature review

Journal of International Medical Research
49(11) 1–9
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Chengxiang Hu[1,2], Baocheng Lin[1], Zhixing Li[1], Xiaozhuan Chen[1] and Kun Gao[3]

- Virri et al. 44 found that sequestrated disc material contained more macrophages and involved a more intense inflammatory reaction than an extruded disc.
- Autio et al. 36 found a higher incidence of disc regression in patients of 41 to 50 years.
- Komori et al. 1 concluded that the migration of a herniated disc facilitated the resorption of a herniated nucleus pulposus because of greater vascular supply.
- Autio et al.36 suggested that the thickness of the region of enhancement on the baseline MRI is the best predictor of the regression of disc herniation, with greater thickness being positively associated with absorption of the herniated nucleus pulposus.

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Case Presentation #2

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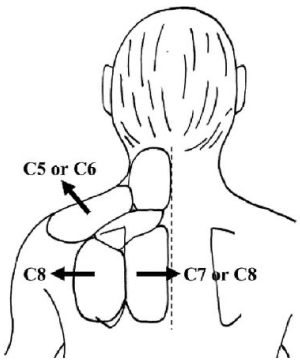
Clinical Manfestations

Cervical Roots as Origin of Pain in the Neck or Scapular Regions
Tanaka et al. *Spine*. Volume 31(17), 1 August 2006, pp E568-E573

- A prospective study was conducted to determine whether the pain in the neck or scapular regions in patients with cervical radiculopathy originates from the compressed root and whether the site of the pain is useful for diagnosing the level.
- It was confirmed through this study that scapular region pain is generally the initial symptom in radiculopathy and can persist alone before the arm or finger symptoms develop.
- Pain in the scapular region can originate directly in the compressed root, and the site of the pain is valuable for determining the localization of the involved root.



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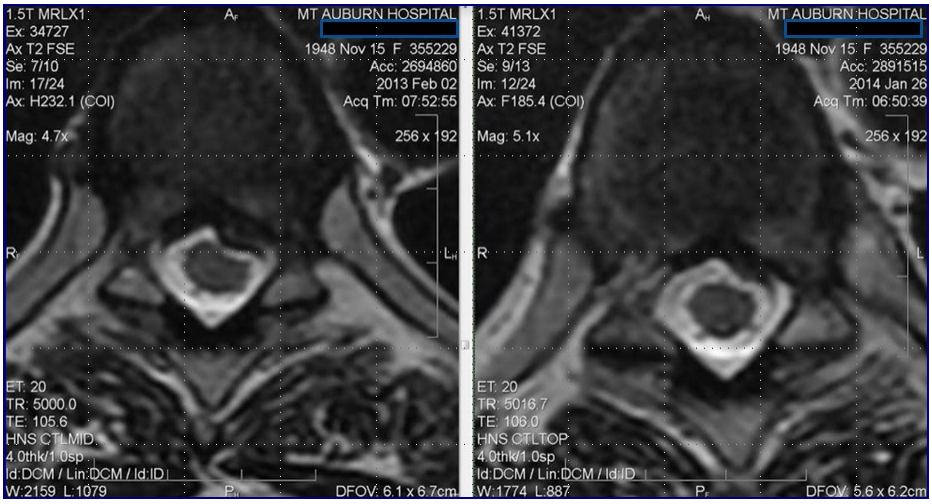
Case Presentation #3



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Prevalence in the Asymptomatic Population

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Prevalence in the Asymptomatic Population

The New England
Journal of Medicine
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Volume 331 JULY 14, 1994 Number 2

MAGNETIC RESONANCE IMAGING OF THE LUMBAR SPINE IN PEOPLE WITHOUT BACK PAIN

Maureen C. Jensen, M.D., Michael N. Brant-Zawadzki, M.D., Nancy Obuchowski, Ph.D., Michael T. Modic, M.D., Dennis Malkasian, M.D., Ph.D., and Jeffrey S. Ross, M.D.

- 36% of 98 asymptomatic subjects had normal discs at all levels.
- 52% of the subjects have a bulge at at least one level.
- 27% had a protrusion.
- 1% had an extrusion.
- 38% had one abnormality at more than one intervertebral disc.

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Prevalence in the Asymptomatic Population

ORIGINAL RESEARCH
SPINE

Systematic Literature Review of Imaging Features of Spinal Degeneration in Asymptomatic Populations

W. Brinjikji, P.H. Luetmer, B. Comstock, B.W. Bresnahan, L.E. Chen, R.A. Deyo, S. Halabi, J.A. Turner, A.L. Avins, K. James, J.T. Wald, D.F. Kallmes, and J.G. Jarvik

ABSTRACT

BACKGROUND AND PURPOSE: Degenerative changes are commonly found in spine imaging but often occur in pain-free individuals as well as those with back pain. We sought to estimate the prevalence, by age, of common degenerative spine conditions by performing a systematic review studying the prevalence of spine degeneration on imaging in asymptomatic individuals.

MATERIALS AND METHODS: We performed a systematic review of articles reporting the prevalence of imaging findings (CT or MR imaging) in asymptomatic individuals from published English literature through April 2014. Two reviewers evaluated each manuscript. We selected age groupings by decade (20, 30, 40, 50, 60, 70, 80 years), determining age-specific prevalence estimates. For each imaging finding, we fit a generalized linear mixed-effects model for the age-specific prevalence estimate clustering in the study, adjusting for the midpoint of the reported age interval.

RESULTS: Thirty-three articles reporting imaging findings for 3110 asymptomatic individuals met our study inclusion criteria. The prevalence of disk degeneration in asymptomatic individuals increased from 37% of 20-year-old individuals to 96% of 80-year-old individuals. Disk bulge prevalence increased from 30% of those 20 years of age to 84% of those 80 years of age. Disk protrusion prevalence increased from 29% of those 20 years of age to 43% of those 80 years of age. The prevalence of annular fissure increased from 9% of those 20 years of age to 29% of those 80 years of age.

CONCLUSIONS: Imaging findings of spine degeneration are present in high proportions of asymptomatic individuals, increasing with age. Many imaging-based degenerative features are likely part of normal aging and unassociated with pain. These imaging findings must be interpreted in the context of the patient's clinical condition.

Low back pain has a high prevalence in industrialized countries, affecting up to two-thirds of adults at some point in their lifetime.[1] Back pain is associated with high health care costs and has substantial economic consequences due to loss of productivity from back pain–associated disability.[2] Advanced imaging (MR imaging and CT) is increasingly used in the evaluation of patients with low back pain.[3] Findings such as disk degeneration, facet hypertrophy, and disk protrusion are often interpreted as causes of back pain, triggering both medical and surgical interventions, which are sometimes unsuccessful in alleviating the patient's symptoms.[4] Prior studies have demonstrated that imaging findings of spinal degeneration associated with back pain are also present in a large proportion of asymptomatic individuals.[5–7]

Given the large number of adults who undergo advanced imaging to help determine the etiology of their back pain, it is important to know the prevalence of imaging findings of degenerative disease in asymptomatic populations. Such information will help both clinical providers and patients interpret the importance of degenerative findings noted in radiology reports. The aim of this study was to systematically review the literature to determine the age-specific prevalence of various imaging findings often associated with degenerative spine disease in asymptomatic individuals. We studied the age-specific prevalence of the following im-

Received August 5, 2014; accepted after revision October 5.

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This work was supported by National Institutes of Health grant UH3 AR066795-01.

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AJNR Am J Neuroradiol 36:811–16 Apr 2015 www.ajnr.org 811

Table 2: Age-specific prevalence estimates of degenerative spine imaging findings in asymptomatic patients[a]

	Age (yr)						
Imaging Finding	20	30	40	50	60	70	80
Disk degeneration	37%	52%	68%	80%	88%	93%	96%
Disk signal loss	17%	33%	54%	73%	86%	94%	97%
Disk height loss	24%	34%	45%	56%	67%	76%	84%
Disk bulge	30%	40%	50%	60%	69%	77%	84%
Disk protrusion	29%	31%	33%	36%	38%	40%	43%
Annular fissure	19%	20%	22%	23%	25%	27%	29%
Facet degeneration	4%	9%	18%	32%	50%	69%	83%
Spondylolisthesis	3%	5%	8%	14%	23%	35%	50%

[a] Prevalence rates estimated with a generalized linear mixed-effects model for the age-specific prevalence estimate (binomial outcome) clustering on study and adjusting for the midpoint of each reported age interval of the study.

From: Brinjikji et al. AJNR 36:811-16.

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Prevalence in the Asymptomatic Population

ORIGINAL RESEARCH
SPINE

MRI Findings of Disc Degeneration are More Prevalent in Adults with Low Back Pain than in Asymptomatic Controls: A Systematic Review and Meta-Analysis

W. Brinjikji, F.E. Diehn, J.G. Jarvik, C.M. Carr, D.F. Kallmes, M.H. Murad, and P.H. Luetmer

Outcomes

Outcome	No. of Studies	OR (95% CI)	Prevalence Asymptomatic	Prevalence Symptomatic	*P* Value[a]	I^2 (%)
Annular fissure	6	1.79 (0.97–3.31)	11.3% (9.0%–14.2%)	20.1% (17.7%–22.8%)	.06	59
High-intensity zone	4	2.10 (0.73–6.02)	9.5% (6.7%–13.4%)	10.4% (8.0%–13.4%)	.17	72
Central spinal canal stenosis	2	20.58 (0.05–798.77)	14.0% (10.4%–18.6%)	59.5% (54.9%–63.9%)	.32	94
Disc bulge	3	7.54 (1.28–44.56)	5.9% (3.8%–8.9%)	43.2% (38.2%–48.2%)	.03	90
Disc degeneration	12	2.24 (1.21–4.15)	34.4% (31.5%–37.5%)	57.4% (54.8%–59.8%)	.01	89
Disc extrusion	4	4.38 (1.98–9.68)	1.8% (0.1%–3.7%)	7.1% (5.4%–9.4%)	<.01	0
Disc protrusion	9	2.65 (1.52–4.62)	19.1% (16.5%–22.3%)	42.2% (39.3%–45.1%)	.00	62
Modic changes	5	1.62 (0.48–5.41)	12.1% (9.6%–15.2%)	23.2% (21.7%–27.3%)	.43	65
Modic 1 changes	2	4.01 (1.10–14.55)	3.2% (0.7%–9.4%)	6.7% (4.2%–10.4%)	.04	0
Spondylolisthesis	4	1.59 (0.78–3.24)	3.2% (1.8%–5.8%)	6.2% (4.4%–8.7%)	.20	0
Spondylolysis	2	5.06 (1.65–15.53)	1.8% (0.0%–5.3%)	9.4% (6.6%–12.4%)	<.01	0

[a] *P* values are computed from the meta-analysis of ORs. Prevalence data are provided for reference but are not meant for statistical comparison.

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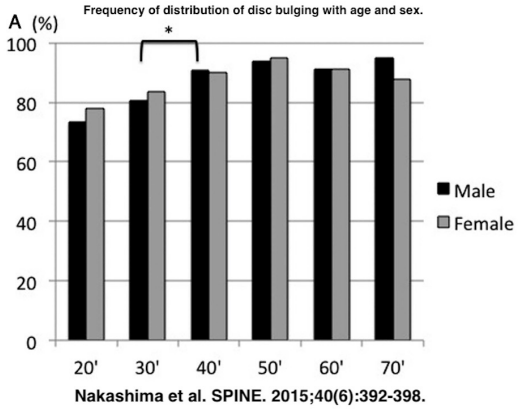
Prevalence in the Asymptomatic Population

Spine
DIAGNOSTICS
SPINE Volume 40, Number 6, pp 392-398

Abnormal Findings on Magnetic Resonance Images of the Cervical Spines in 1211 Asymptomatic Subjects

Hiroaki Nakashima, MD,* Yasutsugu Yukawa, MD,† Kota Suda, MD,‡ Masatsune Yamagata, MD,§ Takayoshi Ueta, MD,¶ and Fumihiko Kato, MD†

Study Design. Cross-sectional study.
Objective. The purpose of this study was to determine the prevalence and distribution of abnormal findings on cervical spine magnetic resonance image (MRI).
Summary of Background Data. Neurological symptoms and abnormal findings on MR images are keys to diagnose the spinal diseases. To determine the significance of MRI abnormalities, we must take into account the (1) frequency and (2) spectrum of structural abnormalities, which may be asymptomatic. However, no large-scale study has documented abnormal findings of the cervical spine on MR image in asymptomatic subjects.
Methods. MR images were analyzed for the anteroposterior spinal cord diameter, disc bulging diameter, and axial cross-sectional area of the spinal cord in 1211 healthy volunteers. The age of healthy volunteers prospectively enrolled in this study ranged from 20 to 70 years, with approximately 100 individuals per decade, per sex. These data were used to determine the spectrum and degree of disc bulging, spinal cord compression (SCC), and increased signal intensity changes in the spinal cord.
Results. Most subjects presented with disc bulging (87.6%), which significantly increased with age in terms of frequency, severity, and number of levels. Even most subjects in their 20s had bulging discs, with 73.3% and 78.0% of males and females, respectively. In contrast, few asymptomatic subjects were diagnosed with SCC (5.3%) or increased signal intensity (2.3%). These numbers increased with age, particularly after age 50 years. SCC mainly involved 1 level (58%) or 2 levels (38%), and predominantly occurred at C5–C6 (41%) and C6–C7 (27%).
Conclusion. Disc bulging was frequently observed in asymptomatic subjects, even including those in their 20s. The number of patients with minor disc bulging increased from age 20 to 50 years. In contrast, the frequency of SCC and increased signal intensity increased after age 50 years, and this was accompanied by increased severity of disc bulging.
Key words: magnetic resonance image (MRI), abnormal findings, asymptomatic, cervical, disc degeneration, disc bulging, spinal cord compression, increased signal intensity, cervical myelopathy, aging, cross-sectional study.
Level of Evidence: 2
Spine 2015;40:392–398



Nakashima et al. SPINE. 2015;40(6):392-398.

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Prevalence in the Asymptomatic Population

Spine
DIAGNOSTICS
SPINE Volume 40, Number 6, pp 392-398

Abnormal Findings on Magnetic Resonance Images of the Cervical Spines in 1211 Asymptomatic Subjects

Hiroaki Nakashima, MD,* Yasutsugu Yukawa, MD,† Kota Suda, MD,‡ Masatsune Yamagata, MD,§ Takayoshi Ueta, MD,¶ and Fumihiko Kato, MD†

Of 1,230 healthy volunteers:

- 87.6% of asymptomatic subjects presented with disc bulging.
- 73.3% of males in their 20s had bulging discs.
- 78% of females in their 20s had bulging discs.
- 5.3% of asymptomatic subjects were diagnosed with spinal cord compression.
- 2.3% of asymptomatic subjects had increased signal intensity within the spinal cord.

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Imaging

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Imaging

Variant 3: **Subacute or chronic low back pain with or without radiculopathy. Surgery or intervention candidate with persistent or progressive symptoms during or following 6 weeks of optimal medical management. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI lumbar spine without IV contrast	Usually Appropriate	O
Radiography lumbar spine	May Be Appropriate	☢☢☢
MRI lumbar spine without and with IV contrast	May Be Appropriate	O
Bone scan whole body with SPECT or SPECT/CT complete spine	May Be Appropriate	☢☢☢
CT lumbar spine without IV contrast	May Be Appropriate	☢☢☢
CT myelography lumbar spine	May Be Appropriate	☢☢☢☢
MRI lumbar spine with IV contrast	Usually Not Appropriate	O
CT lumbar spine with IV contrast	Usually Not Appropriate	☢☢☢
Discography and post-discography CT lumbar spine	Usually Not Appropriate	☢☢☢
CT lumbar spine without and with IV contrast	Usually Not Appropriate	☢☢☢☢
FDG-PET/CT whole body	Usually Not Appropriate	☢☢☢☢

Variant 4: **Low back pain with suspected cauda equina syndrome. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRI lumbar spine without and with IV contrast	Usually Appropriate	O
MRI lumbar spine without IV contrast	Usually Appropriate	O
CT lumbar spine without IV contrast	May Be Appropriate	☢☢☢
CT myelography lumbar spine	May Be Appropriate	☢☢☢☢
Radiography lumbar spine	Usually Not Appropriate	☢☢☢
MRI lumbar spine with IV contrast	Usually Not Appropriate	O
Bone scan whole body with SPECT or SPECT/CT complete spine	Usually Not Appropriate	☢☢☢
CT lumbar spine with IV contrast	Usually Not Appropriate	☢☢☢
Discography and post-discography CT lumbar spine	Usually Not Appropriate	☢☢☢
CT lumbar spine without and with IV contrast	Usually Not Appropriate	☢☢☢☢
FDG-PET/CT whole body	Usually Not Appropriate	☢☢☢☢

ACR Appropriateness Criteria® 2 Low Back Pain

Variant 3: Subacute or chronic low back pain with or without radiculopathy. Surgery or intervention candidate with persistent or progressive symptoms during or following 6 weeks of optimal medical management. Initial imaging.

In the absence of red flags, first-line treatment for chronic LBP remains conservative therapy with both pharmacologic and nonpharmacologic (eg, exercise, remaining active) therapy [19]. However, patients presenting with subacute or chronic LBP, with or without radiculopathy, who have failed 6 weeks of conservative therapy should be imaged if they are believed to be candidates for surgery or intervention or if diagnostic uncertainty remains. The goal of imaging is to identify potential actionable pain generators that could be targeted for intervention or surgery. MRI of the lumbar spine has become the initial imaging modality of choice in these patients.

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IVD Herniation Nomenclature

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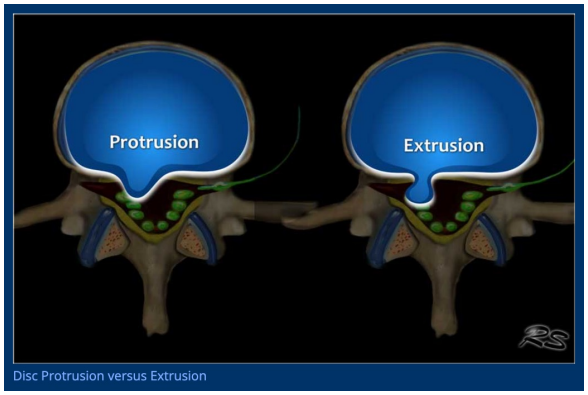
IVD Herniation Nomenclature



From: https://radiologyassistant.nl/neuroradiology/spine/lumbar-disc-nomenclature-2-0

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Dynamic Stenosis

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Dynamic Stenosis

Morphologic Changes in the Cervical Neural Foramen due to Flexion and Extension: In Vivo Imaging Study.

Kitagawa et.al. Spine. 29(24):2821-2825, December 15, 2004.

Conclusions. The present results are consistent with those of previous in vitro studies and may explain the clinical observation that cervical extension aggravates symptoms in patients with cervical radiculopathy and that flexion often relieves them.

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Upright MRI

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Upright MRI

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Upright MRI

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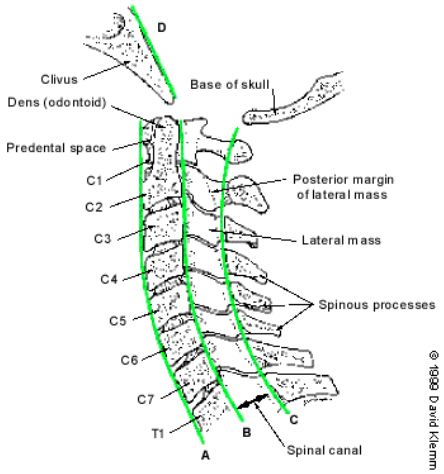
"MRI Vision"



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Degenerative Cervical Myelopathy (DCM)

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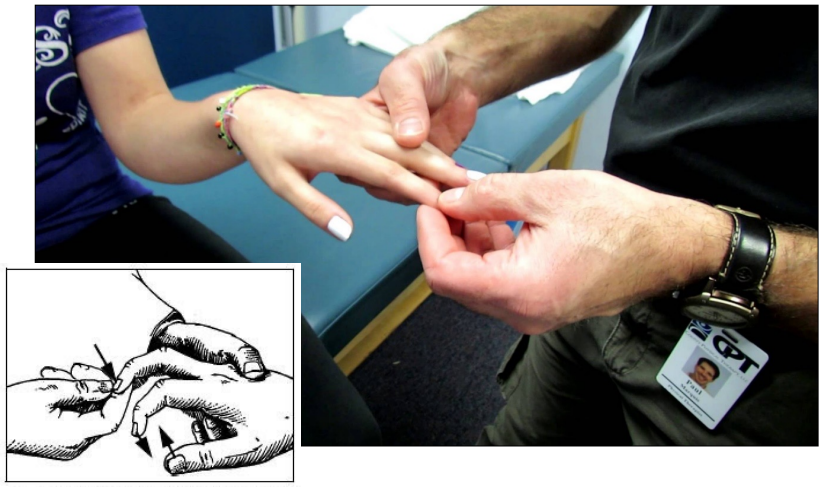
Hoffman's Sign



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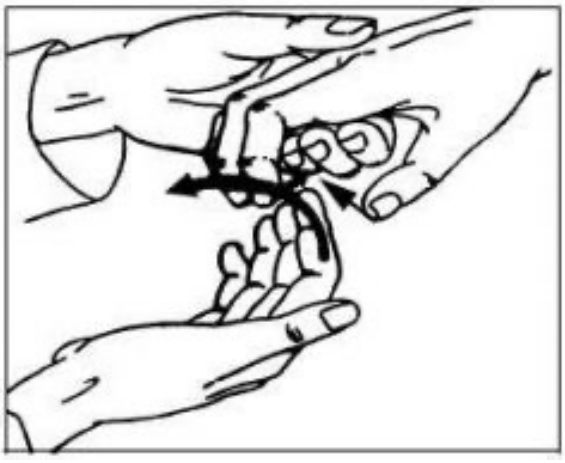
Tromner Sign



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Chiropractic Care

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Should you adjust that herniated disc? Thoughts from a chiropractor/molecular scientist

W. Mark Erwin, DC, PhD[1,2]

Low back pain accounts for the most years lost to disability of any malady worldwide but most cases of disc herniation (DH) and degenerative disc disease (DDD) resolve with conservative methods. Numerous tissue sources of pain affecting the degenerative/herniated disc have been identified, with changes secondary to the influence of inflammation figuring prominently among them. Due to the proven linkage of inflammation to the pain and progression of disc degeneration, anti-inflammatory/anti-catabolic and

Les douleurs lombaires sont responsables du plus grand nombre d'années perdues pour cause d'invalidité, toutes pathologies confondues, mais la plupart des cas de hernie discale (HD) et de discopathie dégénérative (DD) sont résolus par des méthodes conventionnelles. De nombreuses sources tissulaires de douleur affectant le disque dégénératif/herniaire ont été identifiées, les changements secondaires à l'influence de l'inflammation figurant en bonne place parmi elles. En raison du lien avéré entre l'inflammation et la douleur et la

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World Neurosurg. 2021 May:149:e108-e115. doi: 10.1016/j.wneu.2021.02.067. Epub 2021 Feb 23.

Malpractice Litigation Involving Chiropractic Spinal Manipulation

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Affiliations + expand

PMID: 33631389 DOI: 10.1016/j.wneu.2021.02.067

Abstract

Objective: To evaluate the relationship between chiropractic spinal manipulation and medical malpractice using a legal database.

Methods: The legal database VerdictSearch was queried using the terms "chiropractor" OR "spinal manipulation" under the classification of "Medical Malpractice" between 1988 and 2018. Cases with chiropractors as defendants were identified. Relevant medicolegal characteristics were obtained, including legal outcome (plaintiff/defense verdict, settlement), payment amount, nature of plaintiff claim, and type and location of alleged injury.

Results: Forty-eight cases involving chiropractic management in the United States were reported. Of these, 93.8% (n = 45) featured allegations involving spinal manipulation. The defense (practitioner) was victorious in 70.8% (n = 34) of cases, with a plaintiff (patient) victory in 20.8% (n = 10) (mean payment $658,487 ± $697,045) and settlement in 8.3% (n = 4) (mean payment $596,667 ± $402,534). Overaggressive manipulation was the most frequent allegation (33.3%; 16 cases). A majority of cases alleged neurological injury of the spine as the reason for litigation (66.7%, 32 cases) with 87.5% (28/32) requiring surgery. C5-C6 disc herniation was the most frequently alleged injury (32.4%, 11/34, 83.3% requiring surgery) followed by C6-C7 herniation (26.5%, 9/34, 88.9% requiring surgery). Claims also alleged 7 cases of stroke (14.6%) and 2 rib fractures (4.2%) from manipulation therapy.

Conclusions: Litigation claims following chiropractic care predominately alleged neurological injury with consequent surgical management. Plaintiffs primarily alleged overaggressive treatment, though a majority of trials ended in defensive verdicts. Ongoing analysis of malpractice provides a unique lens through which to view this complicated topic.

Eur Spine J. 2018 Jul;27(7):1526-1537. doi: 10.1007/s00586-017-5325-y. Epub 2017 Oct 16.

Chiropractic care and risk for acute lumbar disc herniation: a population-based self-controlled case series study

Cesar A Hincapié [1,2,3], George A Tomlinson [4], Pierre Côté [5,6], Y Raja Rampersaud [7], Alejandro R Jadad [8,9], J David Cassidy [10]

Affiliations + expand

PMID: 29038870 DOI: 10.1007/s00586-017-5325-y

Abstract

Purpose: Chiropractic care is popular for low back pain, but may increase the risk for acute lumbar disc herniation (LDH). Low back pain is a common early (prodromal) symptom of LDH and commonly precedes LDH diagnosis. Our objective was to investigate the association between chiropractic care and acute LDH with early surgical intervention, and contrast this with the association between primary care physician (PCP) care and acute LDH with early surgery.

Methods: Using a self-controlled case series design and population-based healthcare databases in Ontario, Canada, we investigated all adults with acute LDH requiring emergency department (ED) visit and early surgical intervention from April 1994 to December 2004. The relative incidence of acute LDH with early surgery in exposed periods after chiropractic visits relative to unexposed periods was estimated within individuals, and compared with the relative incidence of acute LDH with early surgery following PCP visits.

Results: 195 cases of acute LDH with early surgery (within 8 weeks) were identified in a population of more than 100 million person-years. Strong positive associations were found between acute LDH and both chiropractic and PCP visits. The risk for acute LDH with early surgery associated with chiropractic visits was no higher than the risk associated with PCP visits.

Conclusions: Both chiropractic and primary medical care were associated with an increased risk for acute LDH requiring ED visit and early surgery. Our analysis suggests that patients with prodromal back pain from a developing disc herniation likely seek healthcare from both chiropractors and PCPs before full clinical expression of acute LDH. We found no evidence of excess risk for acute LDH with early surgery associated with chiropractic compared with primary medical care.

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Chiropractic Care

Review > J Manipulative Physiol Ther. Nov-Dec 1996;19(9):597-606.

Magnetic resonance imaging and clinical follow-up: study of 27 patients receiving chiropractic care for cervical and lumbar disc herniations

D J BenEliyahu

Conclusion: This prospective case series suggests that chiropractic care may be a safe and helpful modality for the treatment of cervical and lumbar disc herniations. A random, controlled, clinical trial is called for to further substantiate the role of chiropractic care for the nonoperative clinical management of intervertebral disc herniation.

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James Demetrious, DC, DABCO

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Chiropractic Care

Review > J Manipulative Physiol Ther. 2004 Mar-Apr;27(3):197-210.
doi: 10.1016/j.jmpt.2003.12.023.

Safety of spinal manipulation in the treatment of lumbar disk herniations: a systematic review and risk assessment

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Affiliations + expand

PMID: 15129202 DOI: 10.1016/j.jmpt.2003.12.023

Abstract

Objective: To provide a qualitative systematic review of the risk of spinal manipulation in the treatment of lumbar disk herniations (LDH) and to estimate the risk of spinal manipulation causing a severe adverse reaction in a patient presenting with LDH.

Data sources: Relevant case reports, review articles, surveys, and investigations regarding treatment of lumbar disk herniations with spinal manipulation and adverse effects and associated risks were found with a search of the literature.

Data synthesis: Prospective/retrospective studies and review papers were graded according to quality, and results and conclusions were tabulated. From the data published, an estimate of the risk of spinal manipulation causing a clinically worsened disk herniation or cauda equina syndrome (CES) in patients presenting with LDH was calculated. This was compared with estimates of the safety of nonsteroidal anti-inflammatory drugs (NSAIDs) and surgery in the treatment of LDH.

Results: An estimate of the risk of spinal manipulation causing a clinically worsened disk herniation or CES in a patient presenting with LDH is calculated from published data to be less than 1 in 3.7 million.

Conclusion: The apparent safety of spinal manipulation, especially when compared with other "medically accepted" treatments for LDH, should stimulate its use in the conservative treatment plan of LDH.

Cureus Open Access Case Report DOI: 10.7759/cureus.40941

Non-surgical Restoration of L3/L4 Disc Herniation

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Review began 06/20/2023
Review ended 06/20/2023
Published 06/25/2023

Abstract

We report the case of a 52-year-old Asian man presenting with severe lower back pain and bilateral radiculopathy due to acute L3/L4 disc extrusion, causing severe spinal canal stenosis and bilateral L4 nerve root compression. Following a ten-week conservative management plan consisting of high-velocity, low-amplitude spinal manipulation, adjunctive therapies, and home exercise, the patient experienced significant pain relief, functional improvement, and near resolution of deficits. A six-month follow-up MRI revealed the resolution of the L3/L4 disc extrusion, and the patient remained asymptomatic at nine months. This case highlights the potential for spontaneous resorption of a lumbar disc herniation and symptomatic improvement with conservative management, including chiropractic treatment. A favorable natural course of a disc herniation should be considered when deciding between early surgical intervention and conservative management, warranting further prospective studies to evaluate the effectiveness of chiropractic treatment and the role of spontaneous regression in symptomatic lumbar disc herniation.

Categories: Radiology, Osteopathic Medicine, Integrative/Complementary Medicine
Keywords: chiropractic, north american spine society, disc regression, lumbar disc resorption, chiropractor

Introduction

Lumbar disc herniations are ubiquitous musculoskeletal conditions routinely encountered in chiropractic practice [1-5]. Although the pathophysiological mechanisms underlying nerve root compression and indications for surgical intervention are well established, the processes by which conservative modalities provide symptomatic relief and facilitate disc resorption remain unclear.

Complications can arise from overtreatment of disc herniations, which are known to often resolve spontaneously over time without therapeutic intervention. However, the natural course tends to vary and is difficult to predict accurately. The guidelines promulgated by the North American Spine Society outline the clinical assessment and management of disc herniation with lumbar radiculopathy, recommending non-operative treatment as first-line therapy [6]. Strict adherence to these guidelines can reduce the risk of overtreatment. Existing pathophysiological models that explain the manifestations of symptomatic disc disease are imperfect and frequently yield erroneous prognoses. These guidelines translate the research into reasoned contemporary recommendations for clinical practice. Strict compliance with key recommendations is fundamental for remaining up-to-date and circumventing excessive intervention.

This case report provides an instructive example of the resolution of radiculopathy and disc resorption with conservative management. The idea of avoiding overtreatment for lumbar disc herniation with radiculopathy is now widely accepted. In the face of numerous contradictory beliefs pertaining to discogenic back pain, this case report aimed to convey an evidence-informed approach to the diagnosis and management of symptomatic disc herniation.

Case Presentation

A 52-year-old Asian man presented with a one-month history of severe sharp lower back pain radiating to the posterior thighs and calves bilaterally following a volleyball game. He reported that the pain started immediately during a forceful jump and had been worsening since and rated 8/10 at the worst. The pain was aggravated by bending, sitting, and walking and was relieved only by lying supine. He had difficulty sleeping due to pain and reported disabilities in daily activities and work. He denied having any prior episodes of low back pain or sciatica. His medical and surgical histories were unremarkable.

Upon examination, his posture was antalgic during flexion. The lumbar spine range of motion (ROM) was restricted in all directions due to pain. Palpation revealed tenderness over the L3/L4 spinous processes and paraspinal musculature. Neurological testing showed a reduced right patellar reflex (0/5) and left patellar reflex (0/5). Manual muscle testing revealed bilateral L5 myotome weakness (4/5), whereas the S1 myotome was normal bilaterally (5/5). The straight leg raise was limited to 30° ROM bilaterally due to hamstring tightness and reproduced concordant pain and paresthesia radiating to the thighs and calves, being greater in the right leg than in the left. The perianal sensory loss was not observed. The results of the remaining physical examinations were normal.

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Journal of Clinical Medicine MDPI

Review

Non-Surgical Approaches to the Management of Lumbar Disc Herniation Associated with Radiculopathy: A Narrative Review

Ahmed M. El Melhat [1,2], Ahmed S. A. Youssef [3], Moustafa R. Zebdawi [2], Maya A. Hafez [2], Lamia H. Khalil [2] and Deed E. Harrison [4,*]

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Abstract: Lumbar disc herniation associated with radiculopathy (LDHR) is among the most frequent causes of spine-related disorders. This condition is triggered by irritation of the nerve root caused by a herniated disc. Many non-surgical and surgical approaches are available for managing this prevalent disorder. Non-surgical treatment approaches are considered the preferred initial management methods as they are proven to be efficient in reducing both pain and disability in the absence of any red flags. The methodology employed in this review involves an extensive exploration of recent clinical research, focusing on various non-surgical approaches for LDHR. By exploring the effectiveness and patient-related outcomes of various conservative approaches, including physical therapy modalities and alternative therapies, therapists gain valuable insights that can inform clinical decision-making, ultimately contributing to enhanced patient care and improved outcomes in the treatment of LDHR. The objective of this article is to introduce advanced and new treatment techniques, supplementing existing knowledge on various conservative treatments. It provides a comprehensive overview of the current therapeutic landscape, thereby suggesting pathways for future research to fill the gaps in knowledge. Specific to our detailed review, we identified the following interventions to yield moderate evidence (Level B) of effectiveness for the conservative treatment of LDHR: patient education and self-management, McKenzie method, mobilization and manipulation, exercise therapy, traction (short-term outcomes), neural mobilization, and epidural injections. Two interventions were identified to have weak evidence of effectiveness (Level C): traction for long-term outcomes and dry needling. Three interventions were identified to have conflicting or no evidence (Level D) of effectiveness: electro-diagnostic-based management, laser and ultrasound, and electrotherapy.

Keywords: lumbar disc herniation; discogenic pain; lumbar radiculopathy; conservative management; spinal decompression; extension traction

Citation: El Melhat, A.M.; Youssef, A.S.A.; Zebdawi, M.R.; Hafez, M.A.; Khalil, L.H.; Harrison, D.E. Non-Surgical Approaches to the Management of Lumbar Disc Herniation Associated with Radiculopathy: A Narrative Review. *J. Clin. Med.* **2024**, *13*, 974. https://doi.org/10.3390/jcm13040974

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1. Introduction

Low-back pain (LBP) is a broad category of musculoskeletal disorders regarded as one of the primary causes of disability in the general population, with a lifetime incidence of 65–85% of individuals worldwide [1,2]. One of the specific causes of LBP is lumbar intervertebral disc disorders with nerve root irritation. Most individuals affected fall within the age range of 30 to 50 years, with a higher prevalence in men than in women [3].

The intervertebral disc is formed by an inner nucleus pulposus (NP), an outer annulus fibrosus (AF), and the cartilaginous endplates that attach the disc to its vertebrae [4]. The

J. Clin. Med. **2024**, *13*, 974. https://doi.org/10.3390/jcm13040974 https://www.mdpi.com/journal/jcm

Open access Original research

BMJ Open

Association between chiropractic spinal manipulation and lumbar discectomy in adults with lumbar disc herniation and radiculopathy: retrospective cohort study using United States' data

Robert James Trager [1,2] Clinton J Daniels [3] Jaime A Perez,[4] Regina M Casselberry,[4] Jeffery A Dusek[1,5]

To cite: Trager RJ, Daniels CJ, Perez JA, *et al.* Association between chiropractic spinal manipulation and lumbar discectomy in adults with lumbar disc herniation and radiculopathy: retrospective cohort study using United States' data. *BMJ Open* 2022;**12**:e068262. doi:10.1136/bmjopen-2022-068262

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Accepted 30 November 2022

ABSTRACT

Objectives Chiropractic spinal manipulative therapy (CSMT) and lumbar discectomy are both used for lumbar disc herniation (LDH) and lumbosacral radiculopathy (LSR); however, limited research has examined the relationship between these therapies. We hypothesised that adults receiving CSMT for newly diagnosed LDH or LSR would have reduced odds of lumbar discectomy over 1-year and 2-year follow-up compared with those receiving other care.

Design Retrospective cohort study.

Setting 101 million patient US health records network (TriNetX), queried on 24 October 2022, yielding data from 2012 query.

Participants Adults age 18–49 with newly diagnosed LDH/LSR (first date of diagnosis) were included. Exclusions were prior lumbar surgery, absolute indications for surgery, trauma, spondylolisthesis and scoliosis. Propensity score matching controlled for variables associated with the likelihood of discectomy (eg, demographics, medications).

Interventions Patients were divided into cohorts according to receipt of CSMT.

Primary and secondary outcome measures ORs for lumbar discectomy; calculated by dividing odds in the CSMT cohort by odds in the cohort receiving other care.

Results After matching, there were 5785 patients per cohort (mean age 36.9±8.2). The ORs (95% CI) for discectomy were significantly reduced in the CSMT cohort compared with the cohort receiving other care over 1-year (0.69 (0.52 to 0.90), p=0.006) and 2-year follow-up (0.77 (0.60 to 0.99), p=0.040). E-value sensitivity analysis estimated the strength in terms of risk ratio an unmeasured confounding variable would need to account for study results, yielding point estimates for each follow-up (1 year: 2.26; 2 years: 1.92), which no variables in the literature reached.

Conclusions Our findings suggest receiving CSMT compared with other care for newly diagnosed LDH/LSR is associated with significantly reduced odds of discectomy over 2-year follow-up. Given socioeconomic variables were unavailable and an observational design precludes inferring causality, the efficacy of CSMT for LDH/LSR should be examined via randomised controlled trial to eliminate residual confounding.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study was based on an a priori protocol developed by a multidisciplinary research team with the intention of reducing bias.
⇒ This study included patients with newly diagnosed lumbar disc herniation or lumbosacral radiculopathy and excluded those with absolute indications for surgery to make cohorts more comparable.
⇒ While an extensive propensity matching model was used to control for confounding variables, several variables were unavailable in the dataset including those relating to socioeconomic status, examination and imaging findings, pain severity and impact, catastrophising, self-efficacy and disability.
⇒ While this study examined a large population, only large, academically affiliated healthcare organisations in the US were included, thus results may not be broadly generalisable.
⇒ As this study is observational, a randomised controlled trial would be needed to eliminate possible residual confounding.

For numbered affiliations see end of article.

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INTRODUCTION

A lumbar disc herniation (LDH) is a focal displacement of intervertebral disc material beyond the normal limit of the disc margin,[1] which may compress one or more nerve roots, causing lumbosacral radiculopathy (LSR). The clinical features of LSR include radicular (radiating) lower extremity pain, predictable sensory disturbances, weakness and/or diminished muscle stretch reflexes.[2] LDH and LSR are common reasons for patients to receive chiropractic care or undergo surgery to remove LDH material, a procedure called discectomy. However, limited research has

BMJ Trager RJ, *et al. BMJ Open* 2022;**12**:e068262. doi:10.1136/bmjopen-2022-068262 1

Chiropractic Care

Musculoskeletal Radiology: Long-Term Lumbar Multifidus Muscle Atrophy Changes Documented With Magnetic Resonance Imaging: A Case Series Woodham et al.

Long-Term Lumbar Multifidus Muscle Atrophy Changes Documented With Magnetic Resonance Imaging: A Case Series

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Radiology Case. 2014 May; 8(5):27-34 :: DOI: 10.3941/jrcr.v8i5.1401

ABSTRACT

A retrospective case series of three patients with chronic low back pain who received baseline MRI scans revealing multifidus muscle atrophy with fatty replacement is provided. Each patient received spinal manipulative therapy, and two were compliant with low back exercises targeting the multifidus. A follow-up scan performed >1 year later was compared to the baseline scan revealing a decrease in atrophy with fatty replacement in the two patients who performed multifidus-focused low back exercises (15% and 39% on the left and 7% and 32% on the right respectively), and an increase in the patient who underwent spinal manipulation alone (41% and 53%). Interestingly, the decrease in atrophy in the two patients that performed the exercises correlated to functional improvements. Though limited, these results highlight the utility of MRI in quantifying positive and negative long-term changes in multifidus atrophy, which may be an indicator of recovery in chronic low back pain patients.

FIGURES

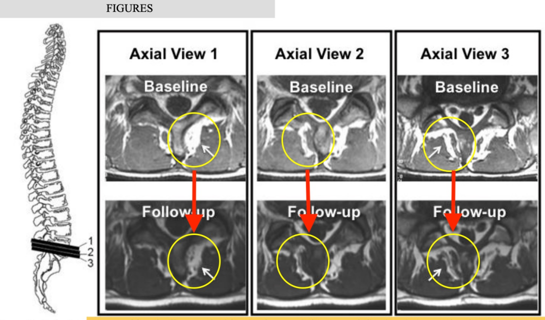

Figure 2: Patient 1: 30 year old male diagnosed with a lumbar sprain/strain, and disc herniations at levels L3-L4, L5-S1, and muscle spasming. FINDINGS: Baseline MRI transverse sequences revealed posterior disc protrusion at the L5-S1 level w/ a focal herniation on the left contacting the S1 nerve root; midline disc protrusion at L3-L4 level; disc degeneration L3-S1 in addition to LMM atrophy (asymmetric multifidus muscle atrophy at L5-S1 avg. approx. 32.4% on the left and 23.4% on the right). The follow-up MRI transverse sequences were performed 44 months post baseline at a different facility revealing decreased LMM atrophy [asymmetric multifidus muscle atrophy at L5-S1 avg. approx. 27.5% on the left (15% decrease) and 21.8% on the right (7% decrease)] compared to baseline MRI. White arrows indicate areas of highest lumbar multifidus fatty atrophy decrease between baseline and follow up. TECHNIQUE: Baseline MRI: 1.5T scanner, transverse non-contrast T1-weighted sequences, TR: 627.0 and TE: 15.0. Follow-up MRI: 1.5T scanner, transverse non-contrast T1-weighted sequences, TR: 450.0 and TE: 10.0.

Radiology Case. 2014 May; 8(5):27-34 31

HVLA – Chiropractic Spinal Adjustment

Relationship of Modic Changes, Disk Herniation Morphology, and Axial Location to Outcomes in Symptomatic Cervical Disk Herniation Patients Treated With High-Velocity, Low-Amplitude Spinal Manipulation: A Prospective Study

Michel Kressig, MChiroMed,[a,b] Cynthia K. Peterson, RN, DC, MMedEd,[b] Kyle McChurch, DC,[a] Christof Schmid, DC,[c] Serafin Leemann, DC,[c] Bernard Anklin, DC,[c] and B. Kim Humphreys, DC, PhD[b]

ABSTRACT

Objective: The purpose of this study was to evaluate whether cervical disk herniation (CDH) location, morphology, or Modic changes (MCs) are related to treatment outcomes.
Methods: Magnetic resonance imaging (MRI) and outcome data from 44 patients with CDH treated with spinal manipulative therapy were evaluated. MRI scans were assessed for CDH axial location, morphology, and MCs. Pain (0-10 for neck and arm) and Neck Disability Index (NDI) data were collected at baseline; 2 weeks; 1, 3, and 6 months; and 1 year. The Patient's Global Impression of Change data were collected at all time points and dichotomized into "improved," yes or no. Fischer's exact test compared the proportion improved with MRI abnormalities. Numerical rating scale and NDI scores were compared with MRI abnormalities at baseline and change scores at all time points using the *t* test or Mann-Whitney *U* test.
Results: Patients who were Modic positive had higher baseline NDI scores ($P = .02$); 77.8% of patients who were Modic positive and 53.3% of patients who were Modic negative reported improvement at 2 weeks ($P = .21$). Fifty percent of Modic I and 83.3% of Modic II patients were improved at 2 weeks ($P = .07$). At 3 months and 1 year, all patients with MCs were improved. Patients who were Modic positive had higher NRS and NDI change scores. Patients with central herniations were more likely to improve only at the 2-week time point ($P = .022$).
Conclusions: Although patients who were Modic positive had higher baseline NDI scores, the proportion of these patients improved was higher for all time points up to 6 months. Patients with Modic I changes did worse than patients with Modic II changes at only 2 weeks. (J Manipulative Physiol Ther 2016;39:565-575)
Key Indexing Terms: *Cervical Spine; Disk Herniation; Chiropractic Manipulation; MRI; Outcomes; Modic Changes*

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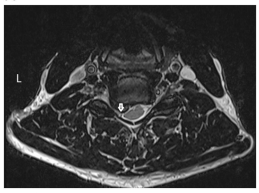

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Chiropractic Care

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Early Predictors of Lumbar Spine Surgery after Occupational Back Injury: Results from a Prospective Study of Workers in Washington State

Benjamin J. Keeney, PhD,[#] Deborah Fulton-Kehoe, PhD, MPH,[†] Judith A. Turner, PhD,[|^] Thomas M. Wickizer, PhD,[‡] Kwun Chuen Gary Chan, PhD,[◇˙] and Gary M. Franklin, MD, MPH[†¶]

42.7% of workers who first saw a surgeon had surgery, in contrast to only 1.5% of those who saw a chiropractor.

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HVLA – Chiropractic Spinal Adjustment

SPINAL NEWS
International
Issue 24 July 2012

Managing cervical spondylotic myelopathy

The management of cervical spondylotic myelopathy remains controversial and the topic is the focus of a session at this year's IMAST. The moderator of the session, K Daniel Riew, Mildred B Simon professor of Orthopedic Surgery, chief of Cervical Spine Surgery, Washington University Orthopedics, St Louis, USA, talked to *Spinal News International* about these controversies and the dangers of bad surgery

Conservative treatment for cervical spondylotic myelopathy is often initiated on the basis of clinician preference. Which conservative treatments do you prefer to use?

I use anti-inflammatories, neck immobilisation with a collar, and observation.

The *BMJ* recently ran a debate on cervical spinal manipulation for mechanical neck pain in which one side[1] argued that the practice should be abandoned

The *BMJ* recently ran a debate on cervical spinal manipulation for mechanical neck pain in which one side[1] argued that the practice should be abandoned because its risks outweighed its benefits. What is your view?

Most patients can receive spinal manipulation. If they have severe spinal cord compression, then I do not recommend it. However, I have seen thousands of patients who have undergone chiropractic spinal manipulation and I can count on one hand the number of patients who have been harmed by it—there are many more patients who have been harmed by bad spinal operations.

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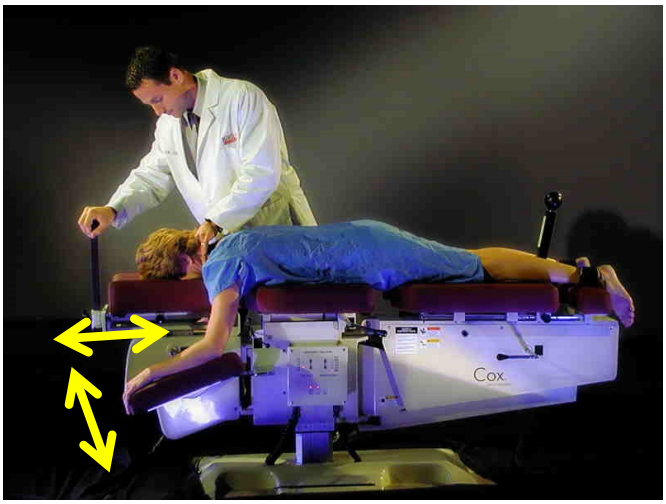
Cox Technic



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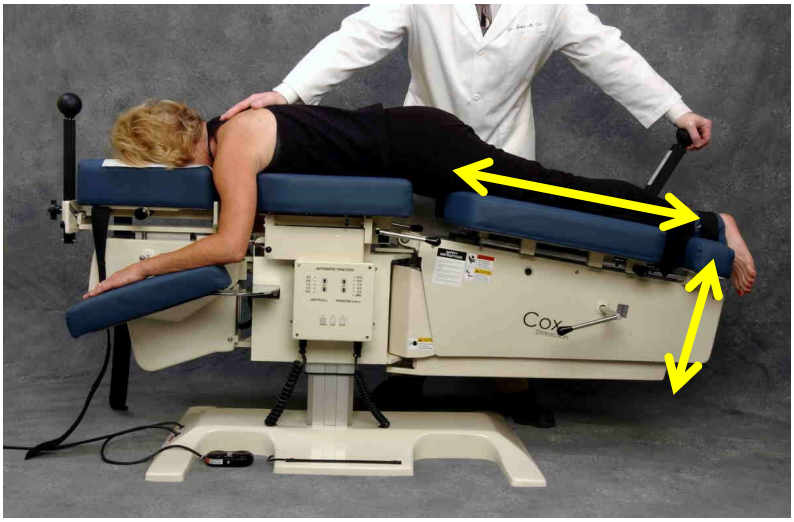

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Intermittent Decompression - Chattanooga Triton DTS

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Intermittent Decompression - Chattanooga Triton DTS

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Saunders/Chattanooga

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Intermittent Traction

Effects of segmental traction therapy on lumbar disc herniation in patients with acute low back pain measured by magnetic resonance imaging: A single arm clinical trial

Cite

Article type: Research Article

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Abstract: BACKGROUND: Low Back Pain (LBP) is considered as one of the most frequent disorders, which about 80% of adults experience in their lives. Lumbar disc herniation (LDH) is a cause for acute LBP. Among conservative treatments, traction is frequently used by clinicians to manage LBP resulting from LDH. However, there is still a lack of consensus about its efficacy. OBJECTIVE: The purpose of this study was to evaluate the effects of segmental traction therapy on lumbar discs herniation, pain, lumbar range of motion (ROM), and back extensor muscles endurance in patients with acute LBP induced by LDH. METHODS: Fifteen patients with acute LBP diagnosed by LDH participated in the present study. Participants undertook 15 sessions of segmental traction therapy along with conventional physiotherapy, 5 times a week for 3 weeks. Lumbar herniated mass size was measured before and after the treatment protocol using magnetic resonance imaging. Furthermore, pain, lumbar ROM and back muscle endurance were evaluated before and after the procedure using clinical outcome measures. RESULTS: Following the treatment protocol, herniated mass size and patients' pain were reduced significantly. In addition, lumbar flexion ROM showed a significant improvement. However, no significant change was observed for back extensor muscle endurance after the treatment procedure. CONCLUSION: The result of the present study showed segmental traction therapy might play an important role in the treatment of acute LBP stimulated by LDH.

Keywords: Low back pain, physical therapy modalities, traction, inter-vertebral disc herniation, magnetic resonance imaging

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Intermittent Traction

Non-surgical Spinal Decompression: Patient Reported Outcomes Across Multiple Clinics

Shannon Schueren, Gina Ariza Medina, Nathan D. Schilaty

USFHealth

INTRODUCTION

- Non-surgical spinal decompression (NSSD) is a therapeutic modality utilized in treatment of intervertebral disc (IVD) disorders as a non-invasive alternative to surgical interventions
- Little information is available on clinical outcomes and utilization associated with NSSD, leaving a significant gap in understanding its efficacy, safety profile, patient satisfaction rates, and long-term effects on diverse populations
- **OBJECTIVE:** Assess utilization and patient reported outcomes of NSSD across multiple clinics. This will provide valuable insights into real-world practices and impact of NSSD on patient care and satisfaction.

Figure 1. DRX9000 Spinal Decompression is a NSSD device designed to provide relief for patients suffering from low back pain, particularly those with IVD disorders.

METHODS

CONTACT
- A total of **86 clinics** that utilize NSSD were contacted to participate in the study, representing a diverse array of healthcare settings. The aim was to compile a rich dataset comprising detailed patient chart notes, demographic information, specifics of NSSD treatment protocols implemented within each clinic, as well as comprehensive pain and functional outcome assessments.

REVISION
- Chart notes were thoroughly reviewed by designated study personnel to extract pertinent data essential for subsequent analysis
- Following review, identified relevant data points were entered into REDCap platform to ensure accurate documentation
- Demographic information and treatment-related data were methodically tabulated and formatted to facilitate comprehensive examination and interpretation in line with the study objectives

STATISTICAL ANALYSIS
- Data analysis was conducted using JMPPro 17, a statistical software for data examination and interpretation
- Statistical tests employed were Chi-square tests, Fisher's Exact, Odds Ratio, and Matched Pairs t-test, enabling a thorough assessment of dataset
- Data significance was set a priori at p<0.05

RESULTS

- 239 patient chart notes were obtained across 4 private chiropractic clinics.

FEMALES	42.3%
MALES	57.7%
CRITERIA	**MEAN (SD)**
Age	53.4 (16.8)
Height (cm)	172.1 (12.0)
Weight (kg)	84. (22.3)

Table 1: Demographics. Mean height, weight, and age are reported alongside ratio of female to male patients

Treatment Characteristics	Mean (SD)
Time (min)	27.6 (2.4)
Total # of Sessions	23.9 (11.7)
Frequency (per week)	2.6 (0.9)
Force (N)	365.6 (141.5)

Table 2: Treatment Specifications. Mean time, number of sessions, frequency and maximum force across all clinics involved in study are shown. The average duration of treatment was 8+ weeks.

Length of Pain	Population %
0-3 months (acute)	38.2
3-6 months (sub-acute)	11.1
6-12 months (chronic)	12.0
1-5 years (chronic)	19.6
5+ years (chronic)	19.1

Table 3: Length of Current Pain. Percentage of study population presenting with acute, sub-acute, or chronic pain pre-NSSD.

- Pain was reduced by **-4.4** (confidence interval of 95%: -4.0, -4.7; **Fig. 2**), (p<0.001).

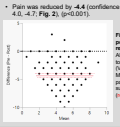

Figure 2: Pre- to post-NSSD treatment reported pain. Bland-Altman analysis of pre- to post-NSSD pain (Visual Analog Scale). Mean difference in pain (solid red line) is surrounded by 95% CI (red dashed line).

Activity of Daily Living (% affected)	Odds Ratio	95% Confidence Lower, Upper	Chi-Squared	p-value
Walking (48.3%)	5.2	1.9, 14.2	93.9	<0.001
Household Chores (30.0%)	15.3	5.0, 46.4	49	<0.001
Sex (11.6%)	68.5	8.1, 580.8	21.2	<0.001
Bathing (14.6%)	33.9	7.0, 164.4	24.5	<0.001
Dressing (19.1%)	22.9	4.8, 109.9	36.4	<0.001
Sitting/Standing (81.4%)	11.5	3.5, 38.1	113.3	<0.001
Eating (3.7%)	-	-	4	0.045
Using the Bathroom (9.7%)	-	-	18	<0.001

Table 4: Odds Ratio (improvement in ADLs). This table provides an overview of odds ratios for improvement in ADLs among patients who underwent NSSD. Dark green highlights indicate the most frequently reported ADL affected pre-NSSD, and red represents statistical significance change from pre- to post-NSSD.

	Myotome		Dermatome		Reflex	
Nerve Root	% affected	p-value	% affected	p-value	% affected	p-value
T12	0.4	0.5747	0	-		
L1	2.6	-	0.7	0.001		
L2	5.2	-	1.5	-		
L3	4.9	0.7518	3.0	<0.001		
L4	16.9	<0.001	15.0	<0.001	23.2	<0.001
L5	32.2	<0.001	21.0	<0.001	17.1	<0.001
S1	10.5	<0.001	12.0	0.003	24.7	<0.001

Table 5: Probability of improvement in peripheral neurological symptoms following NSSD. Probabilities of improvement in various neurological symptoms from pre- to post-NSSD as reported by providers. Green highlights indicate most frequently affected neurological sign. Red represents statistically significant change from pre to post treatment.

- Pre-NSSD MRI was available for 139 patient records (81.3%) and disc herniation was observed in 36.3% of images
- Pain was most frequently reported as centralized (43.4%) or radiating (53.9%) compared to peripheral (30.0%), and more commonly occurred on the left if peripheral or radiating (44.3%).

DISCUSSION

- Level of diagnosis was most often at **L4** (24.0%) affecting **L5** nerve root. Sitting/standing was most affected ADL.
- Treatment utilizing NSSD is effective in reducing patient-reported LBP and improving ADLs affected by low back pain. These findings indicate the importance of exploring its mechanisms and refining its application in clinical settings.
- Further evaluation regarding NSSD efficacy will be undertaken, signifying a commitment to ongoing research and improvement in patient care, ensuring access to effective therapeutic approaches.

NSSD decreases low back pain (-4.4) and improves functional outcomes, including activities of daily living.

ACKNOWLEDGEMENTS

The authors acknowledge funding from Florida High-Tech Corridor, Excite Medical, Inc., and Florida Department of State Center for Neuromusculoskeletal Research. In addition, a special thanks to Excite Medical for coordinating between clinics and the research team.

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Complications of Surgery

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Complications of Surgery

RSNA Education Exhibits

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Complications of Spinal Instrumentation

Phillip M. Young, Thomas H. Berquist, Laura W. Bancroft, Jeffrey J. Peterson

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Recipient of a Certificate of Merit award for an education exhibit at the 2005 RSNA Annual Meeting. Received April 5, 2006; revision requested August 9; revision received September 29 and accepted October 10. All authors have no financial relationships to disclose.
- **Address correspondence to** P.M.Y. (e-mail: young.phillip@mayo.edu).

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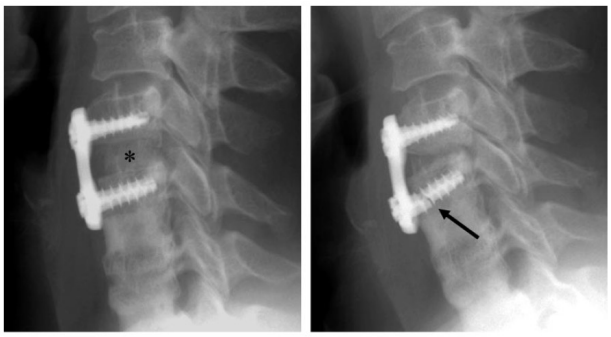
Complications of Surgery

- Radiography has long been the standard method for evaluation of the fusion construct (Figs 6, 7).
- The assessment of fusion may be difficult, but, typically, signs of bridging bone should occur by 6–9 months after surgery.
- Ray (8) defined six criteria for assessing the solidity of fusion at radiography (Table).
- These criteria have not been externally validated, but they have gained clinical acceptance and are useful for interpreting postoperative radiographs.



a. b.

Figure 7. Resorption of nonunited graft material and hardware fracture. **(a)** Initial postoperative lateral radiograph demonstrates anterior plate and screw fixation of C4 to C5 with an interverte-bral bone graft (*). Note the excellent graft incorporation at the levels of previous anterior fusion (C5 to C6 and C6 to C7); hardware was removed from those levels during surgical fusion of C4 to C5. **(b)** Extension radiograph obtained at 13-month follow-up demonstrates resorption of the graft material and fracture of the inferior screw (arrow).

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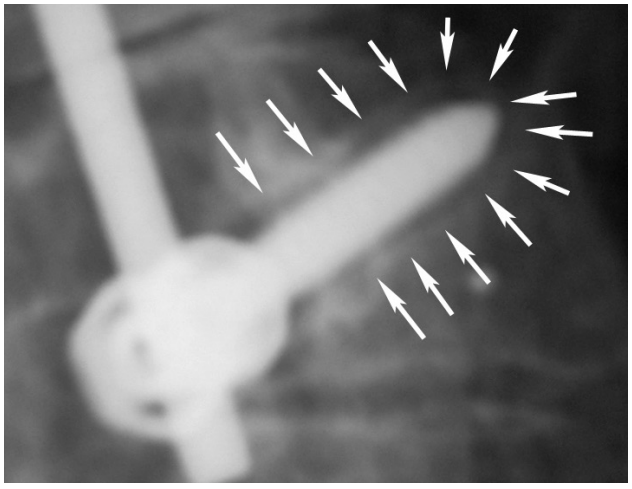
Complications of Surgery

- In addition to postoperative radiography, **multidetector CT with multiplanar reformatting of image data can be extremely useful for presurgical planning; it has the capability to provide exquisitely detailed depiction of hardware and graft materials** (Fig 8).



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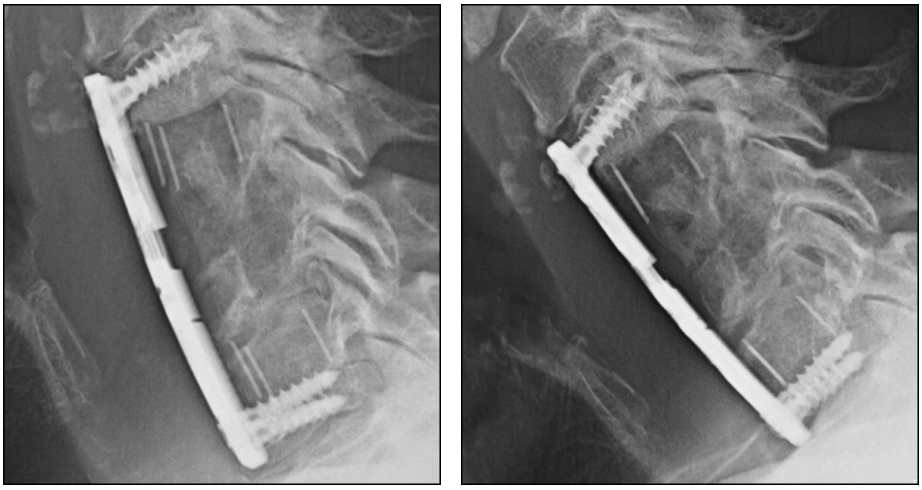
Complications of Surgery



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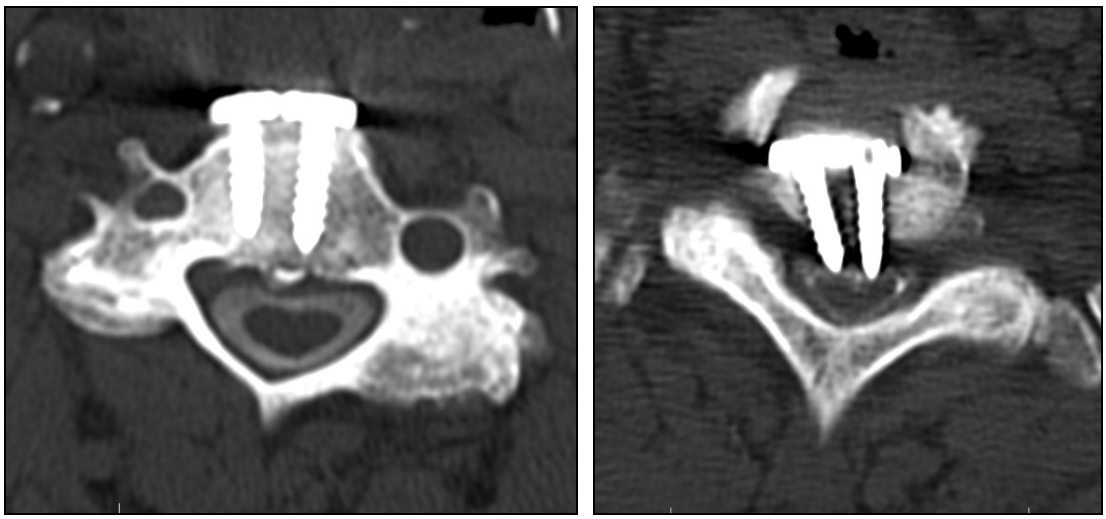
Complications of Surgery



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Complications of Surgery

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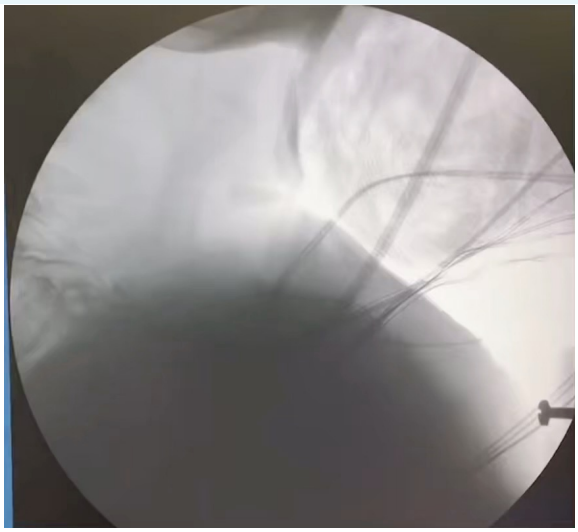

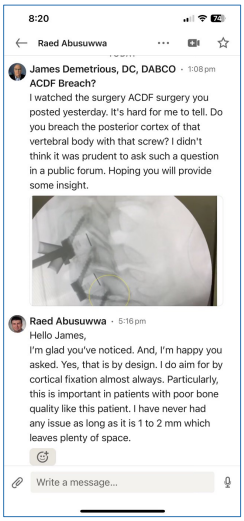

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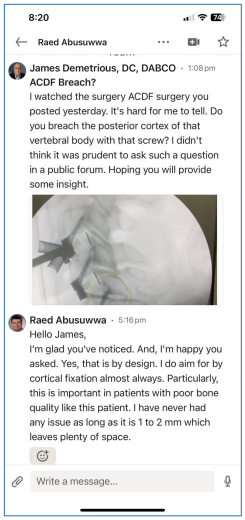

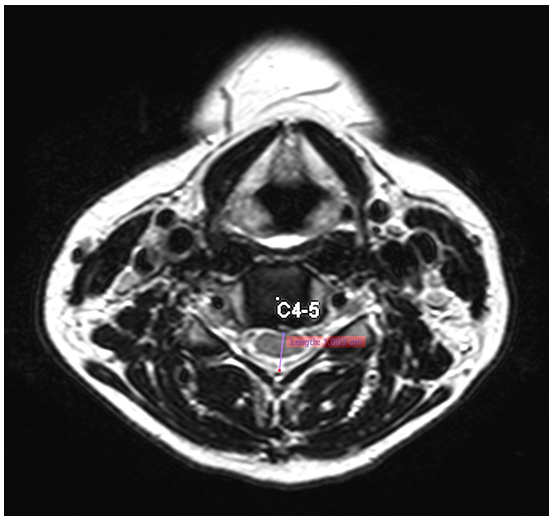

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Complications of Surgery

Failure in Cervical Spinal Fusion and Current Management Modalities

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Semin Plast Surg 2021;35:10–13.

- Failed fusion in the cervical spine is a multifactorial problem stemming from a combination of patient and surgical factors.
- Surgical risks for failed fusion include the number of segments fused, anterior versus posterior approach for fusion, the type of bone graft, and the instrumentation utilized.
- Many symptomatic cases of failed fusion (pseudarthrosis) result in pain, neurological deficits, or loosened hardware necessitating a revision surgery consisting of extending the prior construct and utilizing additional allografts or autografts to augment the fusion.
- Given the relatively mobile nature of the cervical spine, pseudoarthrosis (either known or anticipated) must be recognized by the spine surgeon, and steps should be considered to optimize the likelihood of future fusion.
- This consists of both performing a rigid fixation and using appropriate bone graft to enhance the environment for arthrodesis.

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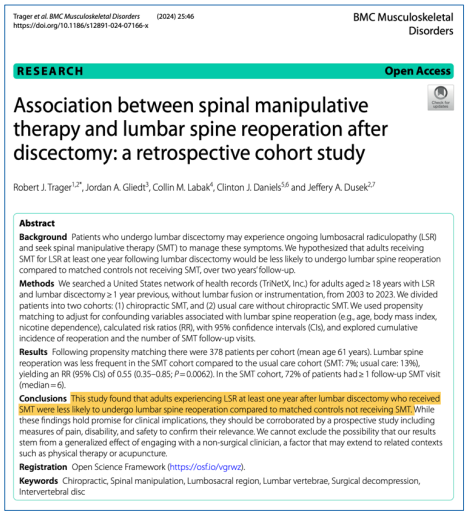
Benefits of Post-Surgical Chiropractic Care…



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https://doi.org/10.1186/s12891-024-07166-x

BMC Musculoskeletal Disorders

RESEARCH Open Access

Association between spinal manipulative therapy and lumbar spine reoperation after discectomy: a retrospective cohort study

Robert J. Trager[1,2*], Jordan A. Gliedt[3], Collin M. Labak[4], Clinton J. Daniels[5,6] and Jeffery A. Dusek[2,7]

Abstract

Background Patients who undergo lumbar discectomy may experience ongoing lumbosacral radiculopathy (LSR) and seek spinal manipulative therapy (SMT) to manage these symptoms. We hypothesized that adults receiving SMT for LSR at least one year following lumbar discectomy would be less likely to undergo lumbar spine reoperation compared to matched controls not receiving SMT, over two years' follow-up.

Methods We searched a United States network of health records (TriNetX, Inc.) for adults aged ≥ 18 years with LSR and lumbar discectomy ≥ 1 year previous, without lumbar fusion or instrumentation, from 2003 to 2023. We divided patients into two cohorts: (1) chiropractic SMT, and (2) usual care without chiropractic SMT. We used propensity matching to adjust for confounding variables associated with lumbar spine reoperation (e.g., age, body mass index, nicotine dependence), calculated risk ratios (RR), with 95% confidence intervals (CIs), and explored cumulative incidence of reoperation and the number of SMT follow-up visits.

Results Following propensity matching there were 378 patients per cohort (mean age 61 years). Lumbar spine reoperation was less frequent in the SMT cohort compared to the usual care cohort (SMT: 7%; usual care: 13%), yielding an RR (95% CIs) of 0.55 (0.35–0.85; $P = 0.0062$). In the SMT cohort, 72% of patients had ≥ 1 follow-up SMT visit (median = 6).

Conclusions This study found that adults experiencing LSR at least one year after lumbar discectomy who received SMT were less likely to undergo lumbar spine reoperation compared to matched controls not receiving SMT. While these findings hold promise for clinical implications, they should be corroborated by a prospective study including measures of pain, disability, and safety to confirm their relevance. We cannot exclude the possibility that our results stem from a generalized effect of engaging with a non-surgical clinician, a factor that may extend to related contexts such as physical therapy or acupuncture.

Registration Open Science Framework (https://osf.io/vgrwz).

Keywords Chiropractic, Spinal manipulation, Lumbosacral region, Lumbar vertebrae, Surgical decompression, Intervertebral disc

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Questions?

- Is it safe to perform HVLA Chiropractic Adjustments?
- What are indications and contraindications of chiropractic care in this cohort?
- What are the treatment parameter you use for intermittent traction?
- Do you recommend home traction devices or inversion tables?
- When do you consider surgical consultation?
- Thoughts?

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Thank you!

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Upcoming Grand Rounds Schedule

The First Tuesday of the Month at 8PM EST

Upcoming Rounds

- **October 1, 2024 – The Post-Surgical IVD**
- **Additional live qualifying CAD classes will be available at the end of the year.**

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