Managing Disc Pathology

Non-invasive options for your patients

Dr. Timothy J. Burkhart, DC, BCIM

Agenda

1. **Anatomy and Physiology**
   - Design features of the disc
   - Nutrition of the disc
   - Nomenclature of pathology
2. **Conventional Management**
   - Conservative Options
   - Drugs
   - Surgery
3. **Innovative Approach**
   - Advanced therapies
   - Candidates for care
   - Research
4. **Implementation into Practice**
   - Case studies
   - Open discussion
   - Q & A

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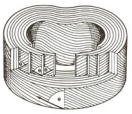
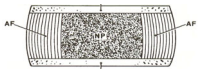
Anatomy and Physiology

Design features of the disc

- The essential components of the disc include the **annulus fibrosus** and **nucleus pulposus**.
- The AF consists of sheets of collagen, called **lamellae**, which are tightly packed together around the periphery of the disc.
- The NP is a hydrated gel located in the center of each disc. When compressed, this semi-fluid mass expands in a radial fashion

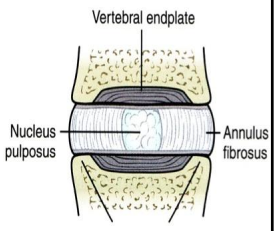




Anatomy and Physiology

Design features of the disc

- The third component of the intervertebral disc are the superior and inferior vertebral **endplates**.
- These are plates of cartilage that cover the inferior and superior aspects of the disc, and bind the disc to their respective vertebral bodies, via the fibers of Sharpe.



Anatomy and Physiology

Anatomy and Physiology

Design features of the disc

- Being collagen, the annulus fibrosus is sufficiently pliable that it can deform and thereby enable bending movements between vertebral bodies.
- However, herein lies the liability of the AF. If it buckles it loses its stiffness, and is less able to sustain compression loads.
- The nucleus pulposus prevents provides pressure to prevent this buckling. Co-operatively, the NP and AF maintain the stiffness of the disc against compression loading.

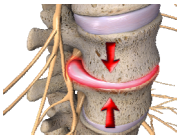
Nutrition of the Disc

- The intervertebral disc is the **motor unit or functional capacity of the spine**
- **No arteries enter the disc.** The discs receive a relatively poor blood supply, particularly in the lumbar spine.
- Cyclic loading and unloading of the disc allows for fluid transport or fluid exudation. This is essential for maintinaing proper disc mechanics and adequate disc nutrition.

(Johannesson 2004)

Nutrition of the Disc

- Nutrition to the disc is improved and aided by **movement**, for movement causes bulk flow of water into and out of the disc, and this bulk flow carries nutrients with it.
- The supply of metabolites to cells within the intervertebral disc is barely adequate for **normal** requirements and impaired metabolite transport is associated with disc degeneration.



Nachemson A 1982 Nutritional changes in the canine intervertebral disc after spinal fusion Clinical Ortho 243-258

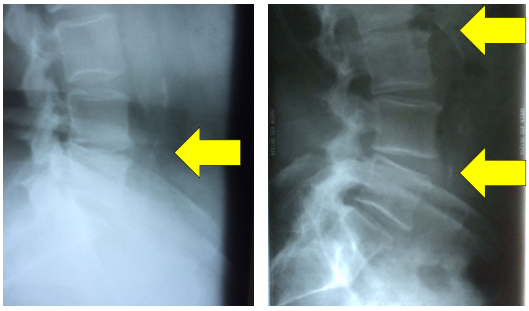
Nutrition of the Disc

Insufficient blood supply is suspected as a **significant causative factor** in intervertebral disc degeneration leading to lower back pain. Several studies indicate a strong correlation.

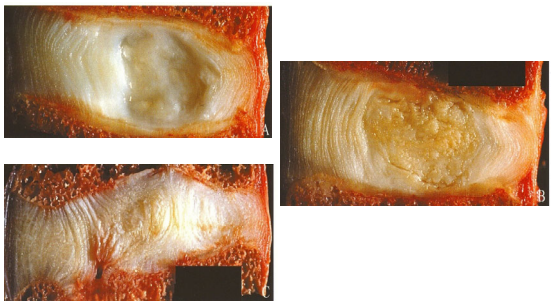
This can be demonstrated clearly when advanced aortic atherosclerosis or plaquing is present in the lumbar spine. presenting as calcified deposits in the posterior wall of the aorta has been well documented as preceding IVD deterioration.

Wang y, Videman T, Battié MC. ISSLS prize winner: Lumbar vertebral endplate lesions: associations with disc degeneration and back pain history. *SPINE*. 2012 Aug 1;37 (17):1490-96.
Kauppila LI, McAlindon T, Evans S, et al. Disc degeneration/back pain and calcification of the abdominal aorta. A 25-year follow-up study in Framingham, *SPINE*, 1997; 22:1642-47.
Kurunlahti M, Tervonen O, Vanharanta H, Ilkko E, Suramo I. Association of atherosclerosis with low back pain and the degree of disc degeneration. *SPINE*. 1999; 24:2080-84.

Nutrition of the Disc



Nomenclature of Pathology



Nomenclature of Pathology

Stages of Degeneration

- End Plate Disruption
- Annular Disruption
- Destabilized Nucleus
- Altered Diffusion of O2 and Nutrients
- Secretion of Proteolytic Enzymes
- Altered Load Bearing
- Disc Space Narrowing
- Formation of Osteophytes

Beattie P, PT, PhD, *Journal of Orthopaedic & Sports Physical Therapy*, 2008, Volume: 38 Issue: 6 Pages: 329-340 doi:10.2519/jospt.2008.2768

Nomenclature of Pathology

Normal

Spondylosis Deformans

Intervertebral Osteochondrosis

Nomenclature of Pathology

- For the general diagnosis of displacement of disc material, the single term that is most commonly used and creates less confusion is: **"Herniated Disc"**
- Herniated Disc is defined as a localized displacement of disc material beyond the normal margins of the intervertebral disc space.

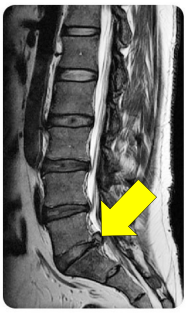
Nomenclature of Pathology

Focal Herniation
- Involves less than 25% of the disc circumference.

Broad Based Herniation
- Involves between 25% and 50% of the disc circumference.

Symmetrical Bulging Disc
- Circumferentially 50-100% beyond the disc circumference.

Nomenclature of Pathology



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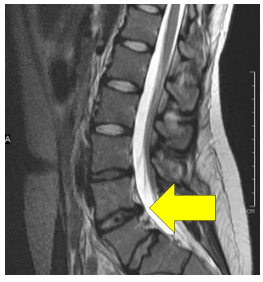

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Conventional Management

Incidence and Prevalence of Back Pain

- Global incidence of lower back is 9.4%, creating more disability than any other condition
- 80% of the population will experience back pain at some time in his/her life.
- The number of adults with chronic back pain has increased 64% from 2000-2007.

Hoy D, March L, Brooks P, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014;73(6):968–974.

Smith M, Davis MA, Stano M, Whedon JM. Aging baby boomers and the rising cost of chronic back pain: secular trend analysis of longitudinal Medical Expenditures Panel Survey data for years 2000 to 2007. J Manipulative Physiol Ther. 2013;36(1):2–11.

Conventional Management

Conservative Options

- Traditional management based on rest and home exercises **has not been successful**. Some studies indicate these measures actually promote or extend the period of disability.
- Pain management through steroidal injections and/or oral medication are not proven to provide better outcomes compared to alterative approaches such as **chiropractic**.

Malmivaara A, Häkkinen U, et al. The treatment of acute low back pain — bed rest, exercises, or ordinary activity? N Engl J Med 1995; 332:351-355. DOI: 10.1056/NEJM199502093320602.

Qaseem A, Wilt TJ, McLean RM, Forciea MA, for the Clinical Guidelines Committee of the American College of Physicians. Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians. Ann Intern Med. [Epub ahead of print 14 February 2017]166:514–530. doi: 10.7326/M16-2367.

Conventional Management

Current Guidelines

- According to the WHO, all six of the major international **clinical guidelines** released since 2016 prioritized non-medical approaches for patients with low back pain.
- Recommend **spinal manipulation,** massage, acupuncture, yoga, mindfulness, psychological therapies or multidisciplinary rehabilitation.

Traeger AC, Buchbinder R, Elshaug AG, Croft PR, Maher CG. Care for low back pain: can health systems deliver? *Bulletin of the World Health Organization* 2019;97:423-433. doi: http://dx.doi.org/10.2471/BLT.18.226050

Conventional Management

Are the Guidelines Followed?

- Meta-analysis indicates that clinical guidelines are not being followed.
- Research of the CareTrack system found 28% patients did not receive interventions for acute low back pain that were indicated by best practice guidelines.
- A similar study in the United States found a 32% discordant with clinical guidelines.

Runciman WB, Hunt TD, Hannaford NA, Hibbert PD, Westbrook JI, Coiera EW, et al. CareTrack: assessing the appropriateness of health care delivery in Australia. Med J Aust. 2012 Jul 16;197(2):100–5. http://dx.doi.org/10.5694/mja12.10510

McGlynn EA, Asch SM, Adams J, Keesey J, Hicks J, DeCristofaro A, et al. The quality of health care delivered to adults in the United States. N Engl J Med. 2003 Jun 26;348(26):2635–45. http://dx.doi.org/10.1056/NEJMsa022615

Drugs

Controversial at Best

- Pain management is controversial due to the risk of clinical dependency and addiction to opioids and/or anti-depressants medications
- Pharmacological management increases morbidity and mortality

Baber Z, Erdek MA. Failed back surgery syndrome: current perspectives. *J Pain Res*. 2016;9:979–987. Published 2016 Nov 7. doi:10.2147/JPR.S92776

Katz JA, Swerdloff MA, Brass SD, Argoff CE, Markman J, Backonja M, Katz N. Opioids for chronic noncancer pain: a position paper of the American Academy of Neurology. Neurology. 2015;84(14):1503–1505.

Drugs

Chiropractic care should be the leader in combating the opioid crisis globally.

- A Study performed in the State of New Hampshire found a **49% reduction** in opioid prescriptions filled by patients utilizing chiropractic care.
- This confirms the findings of studies performed of the Veterans Administration Hospital System and disability beneficiaries for Medicare in the United States.

American Academy of Pain Medicine (AAPM) 2019 Annual Meeting: Abstract 107. Presented March 08, 2019.

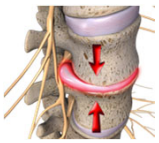
Whedon JM, Toler AWJ, Goehl JM, Kazal LA. Association between utilization of chiropractic services for treatment of low-back pain and use of prescription opioids. Journal of Alternative and Complementary Medicine 2018 June 24:6. https://doi.org/10.1089/acm.2017.0131.

Weeks WB, Goertz CM. Cross-sectional analysis of per capita supply of doctors of chiropractic and opioid use in younger medicare beneficiaries. Journal of Manipulative & Physiological Therapeutics 2016;39(4):263–6.

Lisi AJ, Corcoran KL, DeRycke EC, Bastian LA, Becker WC, Edmond SN, Goertz CM, Goulet JL, Haskell SG, Higgins DM, Kawecki T, Kerns RD, Mattocks K, Ramsey C, Ruser CB, Brandt CA. Opioid Use Among Veterans of Recent Wars Receiving Veterans Affairs Chiropractic Care. Pain Medicine 2018 Sep 1;19(suppl_1):S54-S60. doi: 10.1093/pm/pny114. PubMed PMID: 30203014.

Surgery

Surgery Statistics in America

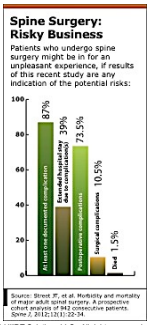


- Lumbar fusion increased 170% from 1998-2008 (77,682-210,407)
- Laminectomies increased 11.3% from 1998-2008 (92,390-107,790)
- There is only a 35% success rate with spinal fusion after the diagnosis of failed-back surgery syndrome

Rajaee SS, Bae HW, Kanim LE, Delamarter RB. Spinal fusion in the United States: analysis of trends from 1998 to 2008. Spine. 2012;37(1):67–76.

Arts MP, Kols NI, Onderwater SM, Peul WC. Clinical outcome of instrumented fusion for the treatment of failed back surgery syndrome: a case series of 100 patients. Acta Neurochir. 2012;154(7):1213–1217.

Surgery



Surgery

Discectomy or Fusion?

- Discectomy and fusion are utilized for disc regression, especially when radiculopathy is present.
- No clear advantage in long term outcomes.
- Recovery time is shorter for a discectomy. However, the re-operative rate is higher.

Tanavalee C, Limthongkul W, Yingsakmongkol W, Luksanapruksa P, Singhatanadgige W. A comparison between repeat discectomy versus fusion for the treatment of recurrent lumbar disc herniation: Systematic review and meta-analysis. J Clin Neurosci. 2019 May 27. pii: S0967-5868(18)32186-6.

Surgery

Discectomy or Fusion?

- Procedure type is selected based on perceived complications.
- No robust evidence of benefit for spinal fusion surgery compared with non-surgical care when spinal degeneration is present.
- Lateral stenosis and adhesion formation are correlated with poor outcomes and FBSS.

Baber Z, Erdek MA. Failed back surgery syndrome: current perspectives. *J Pain Res*. 2016;9:979–987. Published 2016 Nov 7. doi:10.2147/JPR.S92776
Harris IA, Traeger A, Stanford R, Maher CG, Buchbinder R. Lumbar spine fusion: what is the evidence? Intern Med J. 2018 Dec;48(12):1430–4. http://dx.doi.org/10.1111/imj.14120

Surgery

The Early Predictors of Lumbar Spine Surgery Study (2013)

- This study found the odds of surgery were greatly reduced for those whose first provider was a chiropractor.
- Data revealed 42.7 % of workers who first saw a surgeon had surgery, in contrast to only 1.5% of those who saw a chiropractor, as their first provider.

Keeney, et al. "Early Predictors of Lumbar Spine Surgery after Occupational Back Injury: Results from a Prospective Study of Workers in Washington State," SPINE (Phila Pa 1976). 2013 May 1;38(11):953-64.

Conventional Management

In Summary

- Rest and exercises are not effective
- Pharmacological management leads to addiction and increased mortality
- Surgery is not a long term solution
- We need to educate providers on a viable solution.

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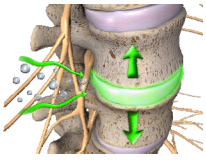
Innovative Approach

Treatment should be a comprehensive program, not just a table or technique.

Goals for addressing disc pathology are:

- Increase blood flow, improving nutrition to the disc.
- Decrease intradiscal pressure.
- Promote the regression of disc herniation.
- Reduce neurocompression.



Advanced Therapies

Advances in Disc Treatment

Advanced Therapies

Biomechanics of Decompression

1. Long axis vertebral distraction
2. Separation and gliding of the facet joints
3. Tensing, or stretching of spinal ligaments
4. Widening of the vertebral foramina
5. Stretching of the spinal musculature

Advanced Therapies

- **Decompression** technology addresses the **biomechanical** aspects of disc disease in a non-invasive method.
- Clinical studies have documented the ability to actually **lower the intradiscal pressure to negative levels!**
- Research has confirmed that **disc rehydration** can be achieved in degenerative discs.

Candidates for Care

The best candidates are patients who have any of the following conditions:

- Herniated disc
- Degenerative disc
- Facet syndrome
- Failed spinal surgery
- Failure to improve with at least 2 non-operative conservative treatment measures.

Contraindications

1. Meningitis, arachnoiditis, etc.
2. Spinal cancer
3. Bilateral signs
4. Rheumatoid Arthritis (RA)
5. Recent fractures or acute joint injury
6. Advanced Osteoporosis
7. Cardiac or respiratory insufficiency
8. Joint hyper-mobility
9. Active or pending spondylolisthesis vs. inactive
10. Certain vertebral fusions

Research

Effects of Vertebral Axial Decompression on Intradiscal Pressure, **Journal of Neurosurgery 1994**

Abstract:

The object of the study was to examine the effect of vertebral axial decompression on pressure in the nucleus pulposus of lumbar discs. Intradiscal pressure measurement was performed by connecting a cannula inserted into the patients L4/L5 disc space to a pressure transducer. Changes in intradiscal pressure were recorded at resting state and while controlled tension was applied by the equipment to a pelvic harness. Intradiscal pressure was decreased in the nucleus to below -100 mm HG.

G. Ramos MD, W Martin MD ; Journal of Neurosurgery 1994

Research

Outcome Study: Vertebral Axial Decompression Therapy for Pain Associated with Herniated Discs, Degenerated Discs, or Facet Syndrome

- Outcomes of decompression therapy for patients with a diagnosis of **herniated disc, degenerated disc, or facet syndrome**.
- **778 cases**
- Average time between the onset of symptoms and beginning of treatment was 40 months. Number of treatments averaged: 17 facet syndrome, 19 disc degeneration and 20 HNP.

Gose, et al; Journal of Neurological Research April 1998

Research

Outcome Study:

Treatment was considered a **success** when the original pain was reduced to 0 or 1.

Overall the treatment was successful 71% of the time.

- 73% - single herniated discs
- 72% - **multiple** herniated discs
- 68% - facet syndromes
- 68% - failed back surgery
- 53% - **extruded** herniated discs

Gose, et al; Journal of Neurological Research April 1998

Research

Prospective Case Series Study:
Protocols for Patients with Activity – Limiting Low Back Pain

- Study of 296 patients with low back pain and evidence of a degenerative and or herniated disc at 1 or more levels.
- All subjects must have reported a lack of favorable outcomes after at least 2 non-operative interventions.
- 8 Week course of treatment = 24 sessions:

  Week 1 – 4: 5 times per week @ 30 minute session

  Week 5 – 8: 1 time per week @ 30 minute session

Beattie PhD, PT; Nelson PhD, PT; Cammarata DC
Archives of Physical Medicine and Rehabilitation Medicine February 2008

Research

- Numeric pain rating scale and the Roland Morris Disability Questionnaire were completed at pre-intervention, discharge, 30 days, and 180 days.
- The majority of the patients, 79%, reported their symptoms of LBP were present for greater than 6 months. (Chronic)

Mean Pain Index Score

- Pre-intervention = 7.3
- Discharge = 5.0
- 30 Day = 4.7
- 180 Day = 4.3

RMDQ Scores

- Pre-intervention = 12.6
- Discharge = 7.0
- 30 Day = 6.0
- 180 Day = 5.7

Beattie PhD, PT; Nelson PhD, PT; Cammarata DC
Archives of Physical Medicine and Rehabilitation Medicine February 2008

Research

Disc Distraction Shows Evidence of Regenerative Potential in Degenerated Intervertebral Discs, **SPINE** 2006

Conclusion:

Disc repair fundamentally depends on the stage of disc degeneration.

This study with respect to previous reports, confirms that disc distraction **enhances hydration** in the degenerated disc and may improve disc nutrition via the vertebral endplates.

Thorsten Guehring, MD, et al; Department of Orthopedic Surgery, University of Heidelberg, Germany
SPINE Volume 31, Number 15, 2006

Research

Traction vs. Decompression

- Patients treated with **traction** compared to a control group that had **simulated traction** demonstrated **no significant differences** in outcome.
- Traditional traction does not produce spinal decompression.
- Decompression has been proven as an effective treatment for herniated and degenerative disc disease, by creating a negative intradiscal pressure.

Weber H., Traction therapy in sciatica. J Oslo City Hosp. 1973;23(10):167-176

Research

Long Term Effect Analysis of IDD Therapy in Low Back Pain: A Retrospective Clinical Pilot Study

- **Decompression** treatment rendered “good” to “excellent” relief in 86% of patients with herniated discs and 75% in patients with facet arthrosis.
- **Traction** yielded no “excellent” results in patients with herniated discs and only 50% “good” to “excellent” results with patients who were diagnosed with facet arthrosis.

Norman Shealy, MD, Phd, American Journal of Pain Management, Vol. 7 No. 2, April 1997

Research

DAVENPORT UNIVERSITY

Outcome Study Data

- Clinical assessments: 2011-2014
- 163 Randomly chosen patients
- 54% Women, 46% Men
- 50% of cases were LBP

Research

DAVENPORT UNIVERSITY

Outcome Study Data

- 91% success rate
- High patient satisfaction
- Measured outcomes
- Proven protocols

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Implementation into Practice

Best Practice Guidelines for Innovative Disc Management

1. Chiropractic manipulative therapy
2. Advanced therapies
3. Core strength rehabilitation
4. Nutritional recommendations
5. Patient Education

Case Studies

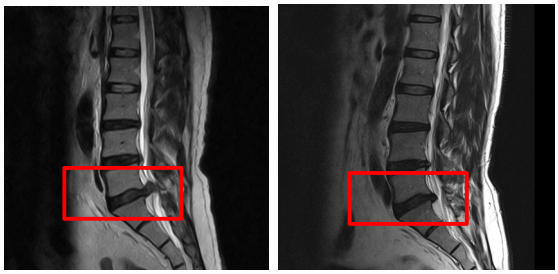
40 Year Old Male

Low back pain for 2 years with sciatica for 6 months.
Presented with severe pain, unable to stand or sit for more than 3 minutes with weak extensors of big toe with weak dorsiflexion of foot.

HillDT Decompression Therapy

- 22 sessions with the HillDT for 8 weeks.
- Pain started to reduce after 10-12 sessions of therapy.
- After 22 sessions remarkable improvement from his initial condition and pain free.

Case Studies



Case Studies

20 Year Old Female

Low back pain for 3 years with sciatica of the left leg.
Presented with severe pain, unable to play collegiate volleyball due to spasms and pain. Referred by orthopedic group for SDC due to non-response to injections and physiotherapy.

HillDT Decompression Therapy

- 24 sessions with the HillDT for 8 weeks.
- SLR Test and Braggard's Sign reduced with improved ROM
- Patient returned to orthopedist for follow-up MRI after 4 months. Increased hydration was noted with a good recovery.

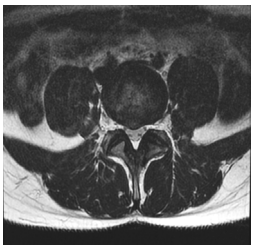
Case Studies

4/24/2018 Pre-MRI

8/16/2018 Post-MRI

Case Studies

4/24/2018 Pre-MRI
T2 L4 Axial Image



8/16/2018 Post-MRI
T2 L4 Axial Image

Case Studies

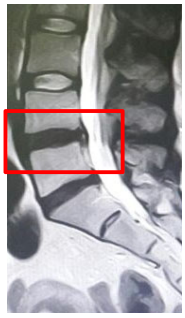
42 Year Old Female

Presented in wheelchair, unable to walk, with history of recurrent low back pain.
Failed discectomy at L5-S1 from 2 years prior.
L4-5 Disc prolapse with severe pain radiating to her right leg.

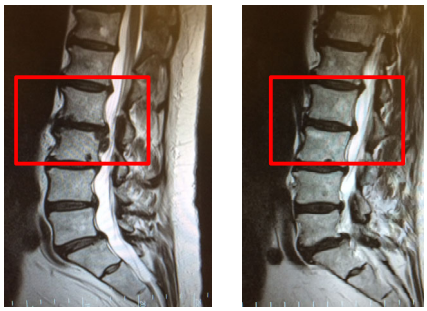
HillDT Decompression Therapy

- After 5 sessions no longer needed wheelchair.
- Pain went from 9 to zero in 10 sessions.
- She was able to walk and return to work after 12 sessions.
- After 20 sessions complete recovery.

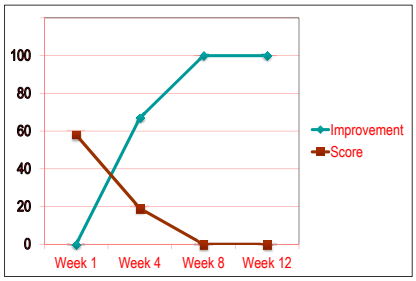
Case Studies



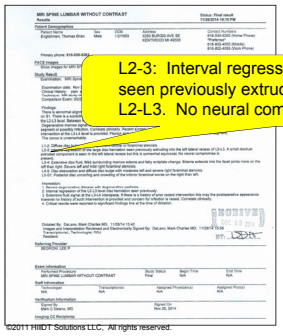
Case Studies



Case Studies

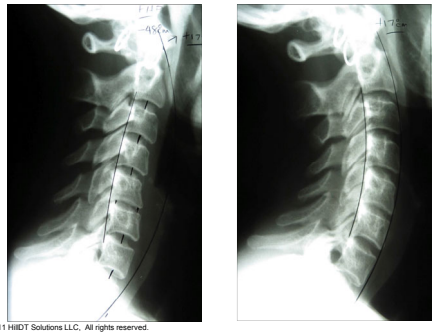


Case Studies

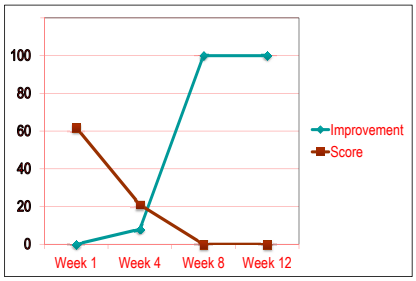


L2-3: Interval regression of the large disc herniation seen previously extruding into the left lateral recess of L2-L3. No neural compromise is present.

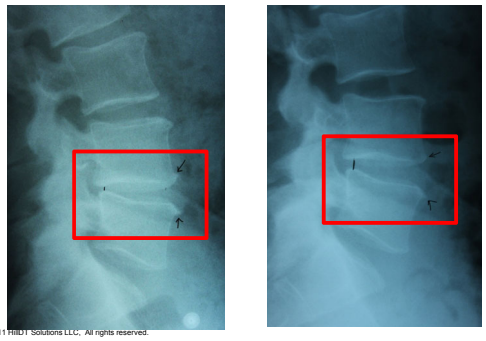
Case Studies



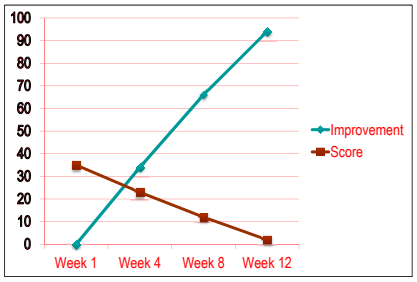
Case Studies



Case Studies

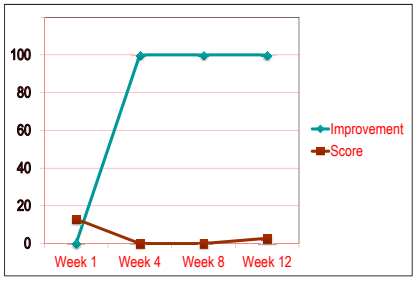


Case Studies



Case Studies

Case Studies



Open Discussion

Closing Thoughts

- The non-invasive approach to managing disc pathology has been shown to be safe, cost-effective, and generally attains successful outcomes.
- There is no overwhelming body of research that supports standard medical care for this patient population.
- Evidence-based practice and current guidelines support the utilization of chiropractic care for chronic and acute neck and back conditions.

Open Discussion

Closing Thoughts

- Chiropractic providers are uniquely qualified to manage this ever expanding patient population.
- Utilizing all of the tools available to the modern chiropractor, great results can be realized in clinical practice.
- Through collaboration with other professionals, chiropractors can be at the forefront of managing disc pathology.

Q & A

- Man v. Machine