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Image and Art Gallery

Independent Research - Case Study

Abstracts and Literature Review – Low Back Pain / Radiculopathy

Announcements

Aurora Borealis

Beautiful Aurora Borealis, taken January 2008

North of Whitehorse, Yukon Territories, Canada

Courtesy Dr. S. Bacso

Independent Research - Case Study

Co-Morbid Multi Level Lumbar Disc Disease Remission Following Lumbar Traction: A Case Report

A Brief Review of Lumbar Disc Disease and "Sciatica" Epidemiology

By Bruce Gundersen, DC, FACO

Background

"Sciatica" is a common symptom that affects as many as 40% of the adult population at some time. However, clinically significant sciatica is much less common and occurs in only 4-6% of the population. Exactly how often the symptom is caused by lumbar disk herniation is uncertain; it is known that herniation can occur independent of symptoms. Among the factors associated with its occurrence are age, gender, occupation, cigarette smoking, and exposure to vehicular vibration. The contribution of other factors such as height, weight, and genetics is less certain. The majority of patients with sciatica appear to recover. Approximately 20% of patients with sciatica caused by lumbar herniation have a strong indication for surgical intervention. In the remainder, indications are based primarily on pain rather than functionally significant neurologic deficits.

Because pain is the principle indication, there are wide variations in the rates of surgical intervention between countries, and, even within countries, there are significant regional variations. These variations appear to be driven less by specific medical factors, findings and signs but more by gender, occupation, income, education, and the surgeon's preference. Although the contribution of sciatica to low back pain disability remains uncertain, disability caused by low back pain and sciatica appears to be increasing at a rate disproportionate to population growth. To what degree surgery now contributes to that disability is uncertain, but limited information suggests that it may be substantial. (The preceding are excerpts from PubMed).

Comment: In the presence of neurologic signs such as reflex changes, sensory aberrations, and inequality of muscle strength or girth mensuration, sciatica is only a subjective symptom in a complex of the disc disease syndrome.

Here is an outcome study reviewed recently that demonstrates effective, non-operative outcomes:

"Non-operative treatment of herniated lumbar intervertebral disc with radiculopathy - An outcome study." By Saal JA, and Saal JS.

***Source*:** San Francisco Spine Institute, Seton Medical Center, California.

Abstract

The functional outcome of patients with lumbar herniated nucleus pulposus without significant stenosis was analyzed in a retrospective cohort study. Inclusion criteria were as follows: 1) a chief complaint of leg pain,

primarily; 2) a positive straight leg raising (SLR) at less than 60 degrees reproducing the leg pain; 3) a computed tomography (CT) scan demonstrating a herniated nucleus pulposus without significant stenosis by a radiologist's reading, which was also confirmed by the authors; 4) a positive electromyogram (EMG) demonstrating evidence of radiculopathy; and 5) response to a follow-up questionnaire. All patients had undergone an aggressive physical rehabilitation program consisting of back school and stabilization exercise training. Of a total of 347 consecutively identified patients, 64 patients with an average follow-up time of 31.1 months met the inclusion criteria and constituted the study population.

Patients were sent questionnaires that inquired about activity level, pain level, work status, and further medical care. The patients with neurologic loss, extruded discs, and those seeking a second opinion regarding surgery were identified and sub-grouped. Results for the total group included 90% good or excellent outcome with a 92% return to work rate. For the sub-groups with extruded discs and second opinions, 87% and 83% had good or excellent outcomes, respectively, all (100%) of who returned to work. Sick leave time for these subgroups was 2.9 months (+/- 1.4 months) and 3.4 months (+/- 1.7 months), respectively. These results compared favorably with previously published surgical studies.

This is a reasonable current study showing non-operative methods have relatively equivalent outcomes for radiculopathy.

The following case fits into a similar category even with a co morbidity of pelvic fracture.

CASE REPORT

This seventy-year-old female presented with a history of a fall three months ago causing multiple pelvic fractures. Confinement and physical therapy modalities were ordered and compliance was high resulting in fracture stabilization. Residual left leg pain stimulated additional workup for suspected lumbar radiculopathy. Initial intake presentment showed 12-point systems review unremarkable for this discussion with no indicate of any co-morbid situations other than the resolving pelvic fractures; but included low back and leg pain radiating to the calf, no inequity in circumferential measurements in the thigh or calf, no reflex changes, sensory aberration noted in the left calf, minimal weakness measured in the left thigh flexors leg extensors and big toe dorsiflexors.

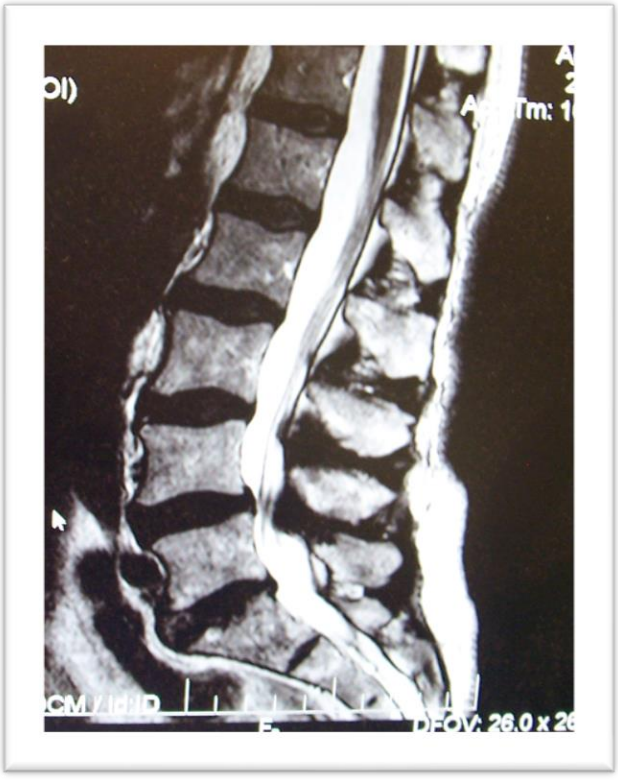

Figure 1 – This T2 weighted MRI sagittal image show herniation and cord compression at L4/5 and L5/S1, with broad-based bulging.

Imaging was hand delivered to the intake experience showing lumbar disc disease at multiple levels; some of which may be producing the leg signs and symptoms. The intake scores of the various tools were as follows: Low Back Oswestry was 56; Quadruple Visual Analogue Pain Scale was 82; Activities Discomfort scale was 48.

The patient was subjected to daily applications of computerized, intermittent axial distraction; interferential electrical stimulation and specific spinal manipulation using activator methods; 6 sessions per week for 3 weeks at which time outcomes were re-measured as follows: Low Back Oswestry was 34; Quadruple Visual Analogue Pain Scale was 34; Activities Discomfort scale was 20. At that time, monitored exercise rehabilitation was added to the treatment regimen and frequency was modified to 2 per week for two weeks at which time patient was released as PRN. One follow-up visit occurred with no report of symptoms and no plan for additional treatment at that time.

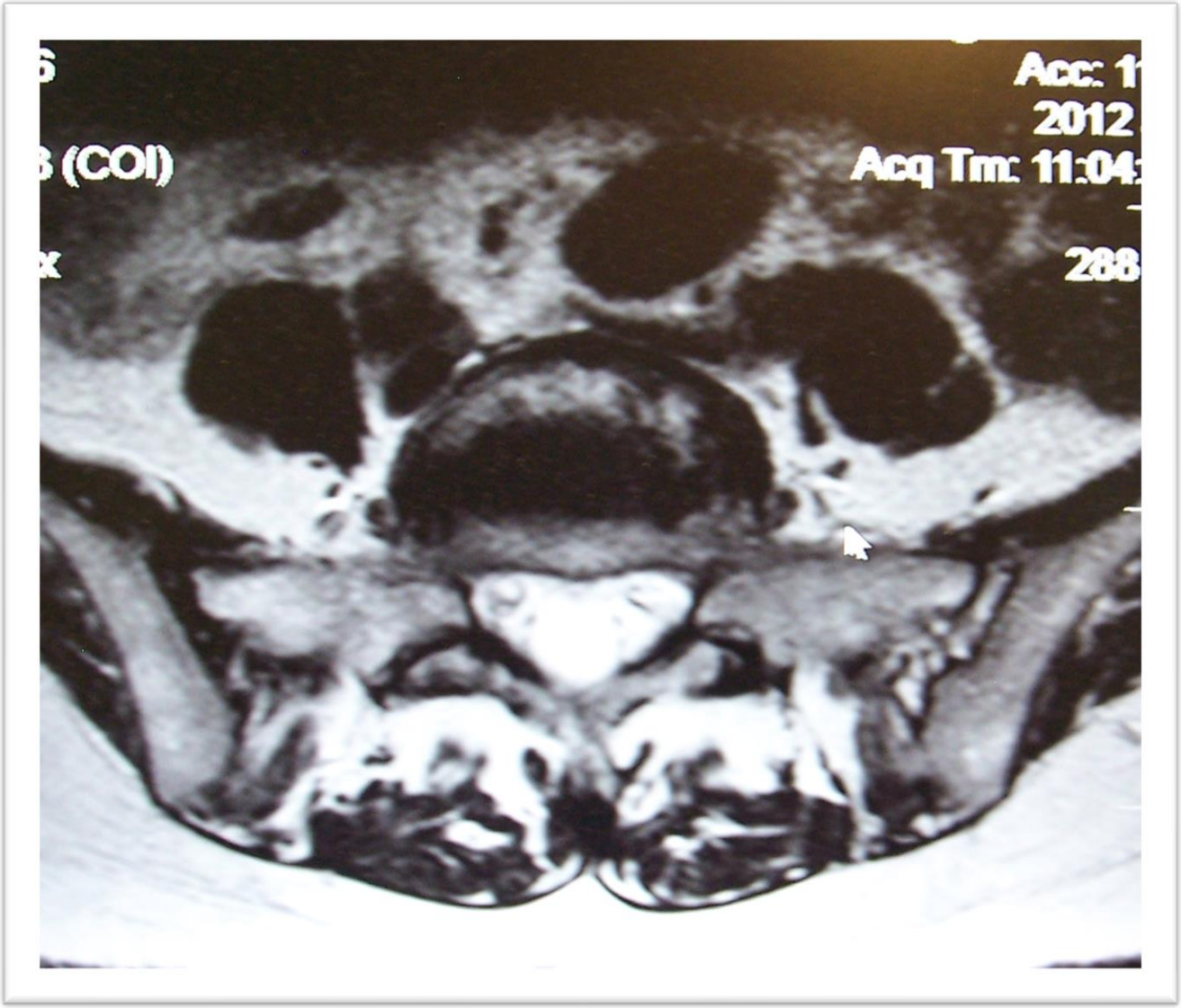

Figure 2 – T1 weighted MRI transverse image demonstrating compression at L5/S1 level with broad bulging of the disc which is asymmetric with more on the left. The white arrow is an artifact.

Discussion

Non-operative modalities applied to this patient where high compliance was a factor provided remission of symptoms within five weeks of treatment initiation. This may be largely due to the compliance of the patient and the patient attitude but is in line with previous studies regarding the same modality of treatment for lumbar radiculopathy.

The co-morbidity of the resolving pelvic fractures is not the only concurrent disorder. There is another finding on the imaging provided that is of major interest to the clinician. Although it is subtle, there is first degree forward slippage of L4 on L5. This, in and of itself, may be asymptomatic but combined with the disc bulge at L4-5 may contribute to the left leg symptoms.

General References for this Topic:

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Abstracts & Literature Review

The Efficacy of Systematic Active Conservative Treatment for Patients with Severe Sciatica

Hanne B. Albert, PT, MPH, PhD, and Claus Manniche, MD, PhD, Med Sci

Spine 2012; 37: 531-542

JACO Editorial Reviewer: Jaroslaw P. Grod, D.C., FCCS(C)

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Authors' Abstract:

Study Design: Prospective single-blind, randomized, clinical, controlled trial.

Objective: To evaluate the efficacy of active conservative treatment and to compare two active conservative treatment programs for patients with severe sciatica.

Summary of Background Data: Reviews have demonstrated little or no efficacy for passive conservative treatment modalities in patients suffering from sciatica. The results for surgery are conflicting. Cohort studies have shown excellent results for active treatment modalities in patients with sciatica.

Methods: One hundred eighty-one consecutive patients with radicular pain below the knee were examined at the baseline, at 8 weeks, and at one-year after the treatment. Participants were randomized into 2 groups: (1) symptom-guided exercises + information + advice to stay active; and, (2) sham exercises + information + advice to stay active. Symptom-guided exercises consisted of a variety of back-related exercises given in accordance with a written algorithm in which symptoms or response to exercises determined the exercises given (http://www.sygehuslillebaelt.dk/wm345075, click exercises). Sham exercises were optional, designed to increase general blood circulation, and had no targeted effect on the back. The information was comprehensive and included anatomy, pathogenesis, and how discs heal without surgery. The advice included encouragement to stay as active as possible but to reduce activity if leg pain increased. The use of medication was optional, but only paracetamol and non-steroidal anti-inflammatory drugs were recommended.

Results: A mean of 4.8 treatment sessions were provided. All patients experienced statistically significant and clinically important improvements in global assessment, functional status, pain, vocational status, and clinical findings. The symptom-guided exercise group improved significantly more than the sham exercise group in most outcomes.

Conclusion: Active conservative treatment was effective for patients who had symptoms and clinical findings that would normally qualify them for surgery. Although participating patients had greater faith in the sham exercises before treatment, the symptom-guided exercises were superior for most outcomes.

Key words: Herniated disc, sciatica, randomized trial, active conservative treatment, exercise therapy. Spine 2012; 37: 531-542.

Background

Sciatica generally refers to pain, weakness, numbness, or tingling in the leg. The cause is pressure on the sciatic nerve. Sciatica is a symptom of another medical problem, not a medical condition on its own. The common causes of sciatica include: herniated disc, injury to the pelvis, piriformis syndrome and tumor. The point prevalence of low back pain is 30% and lifetime prevalence is 80%. The prevalence of sciatica due to nerve root compression has been estimated to be 4-5%. The natural history of sciatica due to herniated discs is favorable since the herniations are usually reabsorbed within several months. Both conservative care and surgical intervention show a similar long term efficacy.

The purpose of this study was to evaluate the efficacy of active conservative treatment and to compare 2 active conservative treatment programs for patients with severe sciatica.

Methods

One hundred eighty-one consecutive patients with radicular pain below the knee were examined at the baseline, at 8 weeks, and at 1 year after the treatment. Participants were randomized into 2 groups:

(1) Symptom-guided exercises + information + advice to stay active, and
(2) Sham exercises + information + advice to stay active.

Symptom-guided exercises consisted of a variety of back-related exercises given in accordance with a written algorithm in which symptoms or response to exercises determined the exercises given. Sham exercises were optional, designed to increase general blood circulation, and had no targeted effect on the back. The use of medication was optional, but only paracetamol and non-steroidal anti-inflammatory drugs were recommended.

Results

Approximately 4.8 treatment sessions were provided. What is interesting is that ALL patients experienced statistically significant and clinically important improvements in global assessment, functional status, pain, vocational status, and clinical findings. The symptom-guided exercise group improved significantly more than the sham exercise group in most outcomes.

Conclusions

Those patients who had symptoms and clinical findings that would make them a surgical candidate found that active conservative treatment was effective. In the end the symptom-guided exercises were better for most outcomes.

Clinical Relevance

This study is a reminder to all health care providers that active conservative treatment is an extremely viable option and should be considered before surgery.

JACO Editorial Summary:

- The article was written by authors from the Back Research Centre of the University of Southern Denmark.
- This paper provides a profound message to surgeons and to chiropractors who are non-surgical spinal specialists.
- Active conservative treatment works.
- Bed rest is meant for sleeping only.
- The natural history of sciatica is favorable and self-limiting.
- The key items in active treatment are providing patients with the necessary information and advice to stay active and treatment modalities in which the patient is an active participant, physically as well as taking responsibility in the treatment process.
- Minimal research has attempted to identify the most efficacious conservative treatment. Studies that compare the efficacy of conservative treatment regimens for sciatica are rare.
- Primary and secondary outcome measures used in this study are valid and reliable.
- Non-stratified randomization was performed by a research assistant using the random number generator program Minimizer. This adds to the strength of the study. The authors admit that blinding was impossible due to the design of the study.
- Appropriate algorithms (flow charts) and tables were provided to assist in understanding the study.

Summary

Certain segments of health care argue that surgery provides patients with herniated discs (causing sciatica) much quicker easement of pain and return to function. This study dispels this myth. 74% of the symptom-guided exercise group and 60% of the sham exercise group were back at work, and many had been working throughout the treatment period after only 8 weeks of treatment. Although there is improvement also due to the natural healing it appears that it was given a “helping hand” by active care. Perhaps many surgeries have been avoided due to the low tech and non-invasive approach.

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Abstracts & Literature Review

Three-Dimensional Magnetic Resonance Rendering Imaging of Lumbosacral Radiculography in the Diagnosis of Symptomatic Extraforaminal Disc Herniation With or Without Foraminal Extension

Woo Mok Byun, MD, Han Won Jang, MD, and Sang Woo Kim, MD

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JACO Editorial Reviewer: Charmaine Korporaal, M.Tech: Chiropractic, CCSP, CCFC, ICSSD

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Authors' Abstract:

Study Design: Retrospective analysis of lumbosacral radiculography using 3-dimensional (3D) magnetic resonance (MR) rendering in patients with extraforaminal disc herniation.

Objective: To investigate the significance of lumbosacral radiculography as depicted by 3D MR rendering in the diagnosis of symptomatic extraforaminal disc herniation with or without foraminal extension.

Summary of Background Data: Given that accurate evaluation of the extraforaminal zones on routine axial and sagittal images is difficult, extraforaminal disc herniations tend to be sometimes overlooked. In addition, oblique coronal images along intervertebral foramina and MR myelography may not clearly demonstrate a detailed full view of nerve root changes. Furthermore, the detection of the morphologic changes of the nerve root is very important for the diagnosis of symptomatic extraforaminal disc herniation. Thus, a useful method for evaluating the nerve root in order to diagnose symptomatic extraforaminal disc herniation is required.

Methods: Twenty-four patients with extraforaminal and combined (extraforaminal with foraminal) lumbar disc herniations were included in this study. Conventional spin-echo sequence and 3D coronal fast-field echo sequences with selective water excitation by using the principles of the selective excitation technique (Proset imaging) were acquired. Indentation and swelling of the nerve roots and dorsal root ganglion (DRG) in the symptomatic sides and levels were evaluated on the basis of 3D MR rendering images of the lumbar spine. The tilting angle of the nerve root in the symptomatic side was compared with those in the asymptomatic contralateral side again on the basis of the 3D MR rendering images.

Results: Dorsal root ganglion indentation without swelling of the nerve roots was found in 7 patients whereas that with swelling of the nerve roots was observed in 6 patients. Swelling of the entire segment of

the nerve from nerve root to spinal nerve (n = 9) or only the spinal nerve (n = 2) was observed in 11 patients. Compared with the contralateral nerve root, 7 patients exhibited a tilting angle abnormality of the ipsilateral nerve root.

Conclusion: Based on lumbosacral radiculography through 3D MR rendering, important findings related to the diagnosis of symptomatic extraforaminal disc herniation include swelling of DRG and/or nerve roots and DRG indentation. Ultimately, 3D MR lumbosacral radiculography is a very useful method in the diagnosis of the symptomatic extraforaminal disc herniation.

Background

It is accepted that foraminal and extraforaminal disc protrusion with or without encroachment of the lumbar spinal nerves is difficult to assess on MRI images; particularly in patients that have spinal deformities (e.g. scoliosis). This often results in misdiagnosis and potential patient mismanagement. Therefore provocative transforaminal epidural injection methods have been utilized to supplement MRI images. These are however invasive and thus research into the effectiveness of 3D high-spatial resolution diffusion-weighted MR neurography is now underway. It has been found that the presence of nerve root compression/increased T2 signal intensity of the lumbosacral nerve plexus elements and sciatic nerve could be observed in all patients with sciatica. However, since no mention of possible swelling of the nerve root caused by disc herniation was made; the purpose of this study was to investigate whether 3D MR rendering for morphologic information in patients with lumbosacral radiculography could aid in the diagnosis of symptomatic extraforaminal disc herniation.

Methods

Definitions:

- *Extraforaminal disc herniation*: Disc herniation lateral to the foramen without a foraminal component.
- *Combined herniation*: A disc with extraforaminal herniation extending into the vertebral foramen.
- *Dorsal Root Ganglion (DRG)*: The spindle shaped nerve root in the extraforaminal or foraminal zones.
- *Spinal nerve*: The nerve root in the extraforaminal zone beyond the DRG (dorsal root ganglion).
- *Nerve root*: The nerve between theca sac and the DRG (dorsal root ganglion).

The study included 24 patients (11 men and 13 women; 48-73 years with an average of 53.9 years), all of whom had been diagnosed (at surgery, n=14; or by provocative nerve root injection, n=10) with extraforaminal or combined lumbar disc herniations.

All patients completed a pre-post visual analogue scale, indicating whether there was any change of their unilaterally radiating pain. MRI was performed with a 1.5-T scanner using a spine array coil. With respect to spinecho sequences, axial and sagittal T1 and turbo T2-weighted images and 3D coronal fast-field echo sequences with selective water excitation were obtained. The imaging planes were centered on L3 parallel to the longitudinal axis of the lumbar spine. The whole-imaging slab had an AP thickness of 4cm, covering the intervertebral foramina region and extraforaminal zone. Imaging parameters and image processing particulars

are available in the publication. Morphologic changes (indentation and swelling at the symptomatic levels and side) of the DRG and nerve roots were evaluated on 3D lumbar MR rendering images.

Positive findings required two radiologists to agree that size was larger than the normal contralateral side. Additionally, focal eccentricity of discs, displacement of nerve roots and the loss of paraspinal fat plane surrounding the nerve roots were noted.

Results

The visual analogue scale scores after surgical treatment were diminished, which contrasts with reproduction on injection of contrast medium during selective nerve root block.

Main points:

i. Purely extraforaminal or combined herniation was found in 18 and 6 patients, respectively.
ii. The L5-S1 disc was involved in 19 herniations, whereas the L4-L5 disc was involved in 5 herniations.
iii. DRG indentation without swelling of the nerve roots was found in 7 patients, whereas that with swelling of the nerve roots and spinal nerves was seen in 6 patients. Swelling of the entire segment of the nerve from nerve root to spinal nerve (n = 9) or only the spinal nerve (n = 2) was observed in 11 patients.

The most common finding on 3D MR radiculography in patients with extraforaminal disc herniation was swelling (n = 17), this was coupled with an excellent agreement with respect to the recognition of indentation, swelling, and tilting angle (0.87). Focal eccentricity of the disc contour was seen in 20 patients (83%), whereas epidural fat obliteration surrounding the nerve root/DRG was seen partially or completely in 18 patients (75%). The nerve roots were displaced in two patients.

Conclusions

In terms of the study, the following limitations were noted as being related to the small number of patients and the fact that there was no control group (limiting sensitivity, specificity, and diagnostic accuracy measures of the 3D MR radiculography). A follow-up repeat study for evaluation of difference in the 3D MR radiculography when pain is present and when it is not (i.e., pre-post treatment) was not performed. Lastly, the application of 3D MR radiculography for diagnostic information of symptomatic foraminal stenosis was not performed and thus further study regarding this is needed.

As a result of the above findings and within the context of the limitations, it was found that 3D MR lumbosacral radiculography (Proset imaging) revealed an excellent full view of the nerve roots and the study concluded that lumbosacral radiculography by 3D MR rendering is a very useful method for obtaining diagnostic information related to symptomatic extraforaminal disc herniation.

Clinical Relevance

- Central canal and foraminal disc herniation can be easily diagnosed using conventional axial MR images, whereas extraforaminal herniated discs are not.
- Focal eccentricity of the disc contour and obliteration of the epidural fat surrounding the nerve roots on axial images were commonly found; however, the evaluation of morphologic changes in the nerve root or DRG for the purpose of diagnosing symptomatic disc herniation on axial images was challenging in conventional axial, sagittal, and oblique coronal images.
- Detection of the morphologic changes in the nerve root as diagnostic information for symptomatic extraforaminal disc herniation is very important. Therefore using Proset, morphologic changes of the nerve roots or DRG of symptomatic extraforaminal disc herniation showed DRG indentation without swelling of the nerve roots in 7 patients, whereas DRG indentation with swelling of the nerve roots and spinal nerves was seen in 6 patients; swelling of the entire segment of the nerve from nerve root to spinal nerve (n = 9) and only the spinal nerve (n = 2).
- The most common 3D MR radiculography with respect to symptomatic extraforaminal disc herniation was swelling of the spinal nerves and nerve roots.

JACO Editorial Summary

- Detection of the morphologic changes of the nerve root is important for diagnosis of symptomatic extraforaminal disc herniation.
- The common findings on 3D MR radiculography in the symptomatic extraforaminal disc herniation were swelling of both DRG and/or nerve roots and DRG indentation.
- Lumbosacral radiculography by 3D MR rendering is a useful method for diagnosis of the symptomatic extraforaminal disc herniation.
- This publication was written by authors associated with the Department of Diagnostic Radiology and the Department of Neurosurgery, College of Medicine, Yeungnam University, Daegu, Republic of Korea. The authors disclose that Yeungnam University funds were received to support their work, and acknowledge that they received no benefits in any form either directly or indirectly as a result of this publication.

Summary

It was suggested that 3D MR radiculography can offer more information with respect to symptomatic disc herniation. In cases with eccentricity of disc contour at the extraforaminal zone on conventional MR imaging, the clinical diagnosis, in conjunction with the patient's symptoms and physical signs, can be supported by detection of the morphologic changes of the nerve root, DRG and spinal nerve on 3D MR lumbosacral radiculography.

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Abstracts & Literature Review

Diagnostic Accuracy of the Clinical Examination in Identifying the Level of Herniation in Patients with Sciatica

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Authors' Abstract:

Study Design: Cross Sectional previously diagnosed disc herniation with sciatica.

Objective: To identify the specificity and sensitivity of orthopedic and neurologic evaluation for the detection of level of disc injury in absence of MRI confirmation.

Summary of Background Data: Despite heavy weight put on neurologic and orthopedic test results, inter-examiner reliability is poor.

Methods: Two-Hundred eight three (283) patients with sciatic and confirmed MRI for disc injury from previously randomised test pool. The examiners were blinded to the MRI results.

Results: Individually the tests were not specific or sensitive for identifying the level of involvement. Cumulatively, the testing provided more specificity and sensitivity,

Conclusion: In absence of a full examination, individual testing was not accurate for the detection and identification of the level of disc herniation. Neurologists seemed to demonstrate more accurate findings than neurologic nurses, spine surgeons and rheumatologists.

Background

Most doctors of chiropractic will place high accuracy and weight on a thorough orthopedic and neurologic evaluation. This has been the nature of evaluation from chiropractic school to state boards with heavy weight placed on the accuracy of the levels. Many chiropractic students have stayed up countless sleepless nights reviewing and palpating spinal levels to pass various school and state board examinations. However, this study proves that the exact level of involvement is often elusive to determine in the absence of advanced study such as MRI or a full neurologic evaluation.

Methods

Two-Hundred eight three patients with confirmed herniation via MRI and sciatica (from a previous patient population) were evaluated. Individual neurologic and orthopedic evaluations were performed blinded to the previous MRI results.

Results

Taken individually, the accuracy of the neurologic and orthopedic tests were not very sensitive for the detection of level of disc injury. Despite the advanced level of certificate that the examiners held or the amount of supervision that they had previously experienced, their reliability was not highly sensitive or specific. However, dermatomal testing and examinations performed by a board certified neurologist proved to be the most accurate in discerning the level of disc injury

Conclusions

Individual accuracy is questionable in absence of specialty in neurology where the subtle nuance of disc derangement is more likely to be identified. This does not usually alter the nature of the treatment as there is often overlay of one neurologic level to the next.

Clinical Relevance

The results demonstrate that there is variability in identifying the level of disc herniation with sciatica in absence of MRI confirmation. This only poses a problem if surgery is needed, as generally, in the chiropractic and medical professions, the treatments are similar regardless of the level of disc derangement. Therefore, it is the opinion of this editor that the exact level is not necessary and often ambiguous.

JACO Editorial Summary:

- This article was written with a grant from the Netherlands Organisation for Health Research and Development and the Hoelen Foundation, the Hague.
- The purpose of the study was to evaluate inter and intra-examiner reliability for the determination of disc injury level.
- Dermatomal testing proved to be the most accurate in discriminating the level of disc injury.

Summary

As previously stated, in absence of surgical intervention, the exact level of disc herniation cannot often be made with orthopedic and neurologic testing alone. There are often inter-examiner discrepancies which do not necessarily affect the course of the treatment.

Neurologic testing was far superior to orthopedic testing when determining the level of injury. This is of particular importance to the chiropractic orthopedist who often heavily invests in orthopedic testing and does

not keep an open mind to the possibility that the neurologic portion of the examination may be just as, or more important than, the orthopedic portion.

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Announcements

The Academy of Chiropractic Orthopedists announces that six candidates successfully passed the Academy's Diplomate examination on September 29, 2012. Welcome new orthopedic Diplomates!

The 2013 examination is scheduled to be held at Northwestern Health Sciences University in Bloomington, Minnesota. The exact date has not been set but will likely be in late September 2013.

Please check the Academy website for further information: www.dcorthoacademy.com