Clinical outcomes after lumbar discectomy for sciatica: the effects of fragment type and anular competence.

Carragee EJ, Han MY, Suen PW, Kim D.

BACKGROUND: The surgical treatment of sciatica with discectomy is ineffective in a sizable percentage of patients, and reherniation occurs after 5% to 15% of such procedures. The purpose of the present study was to determine if competence of the disc anulus and the type of herniation could be used to predict postoperative clinical outcomes following lumbar discectomy. METHODS: A prospective observational study of 187 consecutive patients undergoing single-level primary lumbar discectomy was conducted. A single surgeon performed all of the procedures, and an independent examiner evaluated 180 of the patients clinically at a minimum of two and a median of six years after surgery. The extent of anular deficiency and the presence of disc fragments were determined. On the basis of these intraoperative findings, disc herniations were classified into four categories: (1) Fragment-Fissure herniations (eighty-nine patients), (2) Fragment-Defect herniations (thirty-three patients), (3) Fragment-Contained herniations (forty-two patients), and (4) No Fragment-Contained herniations (sixteen patients). The effects of disc herniation morphology and preoperative variables on subsequent clinical outcome were determined with the Student t test for continuous variables and chi-square analysis for categorical variables. RESULTS: Patients in the Fragment-Fissure group, who had disc fragments and a small anular defect, had the best overall outcomes and the lowest rates of reherniation (1%) and reoperation (1%). Patients in the Fragment-Contained group had a 10% rate of reherniation and a 5% rate of reoperation. Patients in the Fragment-Defect group, who had extruded fragments and massive posterior anular loss, had a 27% rate of reherniation and a 21% rate of reoperation. Patients in the No Fragment-Contained group did poorly: 38% had recurrent or persistent sciatica, and the standard outcomes scores were less improved compared with those in the other groups (p < 0.001). CONCLUSION: Intraoperative findings, as described in the present study, were more clearly associated with outcomes than were demographic, socioeconomic, or clinical variables. The degree of anular competence after discectomy and the type of herniation appear to have value for the prediction of the recurrence of sciatica, reoperation, and clinical outcome following lumbar discectomy. Level of Evidence: Prognostic study, Level I-1 (prospective study). See p. 2 for complete description of levels of evidence.

PMID: 12533579 [PubMed - in process]

Activity restrictions after posterior lumbar discectomy. A prospective study of outcomes in 152 cases with no postoperative restrictions.

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STUDY DESIGN: A prospective clinical trial was conducted. OBJECTIVES: To determine the feasibility of removing activity restrictions after surgery and encouraging early return to work; to ascertain the clinical and behavioral response to such a strategy; and to identify factors predictive of early return to work, preparatory to possible randomized clinical trials. SUMMARY OF BACKGROUND INFORMATION: Current practice usually entails several weeks to several months of restricted activities after lumbar discectomy to avoid disc
reinjury." Earlier work has suggested these restrictions may not be necessary.

METHODS: One hundred fifty-two consecutive working patients undergoing limited open discectomy for herniated lumbar intervertebral disc were treated postoperatively with no activity restrictions. Patients were encouraged to return to full activities as soon as possible. The patients were followed for a minimum of 2 years (average follow-up time = 4.8 years). At follow-up, an independent examiner evaluated each patient and collected further postoperative data.

RESULTS: One hundred forty-nine of the 152 patients (98%) returned to work. The average work loss was 1.2 weeks and 148 of 149 patients had returned to full duty by 8 weeks. Approximately one-third of the group returned to work within 1 week of surgery (32%), many the next day. Statistical analysis demonstrated very early return to work did not correlate with either recurrent sciatica, reoperation for reherniation, or ultimate clinical outcome. Seventeen patients (11.2%) had possible reherniations (recurrent sciatica) and eight underwent reoperation (5.3%). CONCLUSION: Lifting of postoperative activity restrictions after limited discectomy allowed shortened time to return to work relative to the 4 to 16 weeks commonly recommended. Complication rates appear comparable to those reported in the literature for patients under postoperative restrictions. 

Postoperative restrictions may not be necessary in most patients.

Publication Types:
Clinical Trial

PMID: 10586459 [PubMed - indexed for MEDLINE]


The straight leg raising test and the severity of symptoms in lumbar disc herniation. A preoperative evaluation.

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STUDY DESIGN. In a prospective, consecutive study, correlation between the straight leg raising and other pain-related symptoms in lumbar disc herniation was evaluated preoperatively and postoperatively. OBJECTIVES. All patients were interviewed and examined preoperatively and at follow-up investigations 4 and 12 months postoperatively. SUMMARY OF BACKGROUND DATA. One-hundred-and-fifty consecutive patients underwent lumbar disc surgery. Mean patient age was 42 years (range, 21-81 years). Eighty-nine patients were men and 61 were women. Two herniations occurred at L2-L3, seven at L3-L4, 61 at L4-L5, and 80 at L5-S1.

METHODS. Pain at rest, at night, and upon coughing was recorded. Consumption of analgesics was classified into three categories: 1) none, 2) intermittent, or 3) regular. Walking capacity was recorded as > 5 km, 1-5 km, 0.5-1 km, or < 0.5 km. The straight leg raising test was graded pos 0 degree-30 degrees, pos 30 degrees-60 degrees, or negative. At surgery, the herniation was classified as focal protrusion, subligamentous herniation, or perforation. The patient's assessment of outcome was graded into one of four categories.

RESULTS. There was an almost linear correlation between a positive straight leg raising test and pain at rest, pain at night, pain upon coughing, and reduction of walking capacity. Regular consumption of analgesics was more common in patients who had a very restricted positive straight leg raising test (30 degrees). A positive straight leg raising test early postoperatively correlated with inferior outcome of the surgical procedure. CONCLUSION. The straight leg raising test as performed in clinical practice has a strong correlation with various parameters that signify the pain level of the patient. A positive straight leg raising test postoperatively correlates with inferior surgical
Duration of leg pain as a predictor of outcome after surgery for lumbar disc herniation: a prospective cohort study with 1-year follow up.

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OBJECT: The aim of this study was to investigate different variables in the duration of symptoms that can be used to predict outcome after lumbar microdiscectomy. METHODS: In a prospective study of 132 consecutive patients who underwent surgery for lumbar disc herniation, the authors evaluated the prognostic value of different variables in the duration of symptoms for the 1-year period after surgery. The 1-year follow-up investigation was conducted by an independent observer. Assessment of outcome was performed using a clinical overall score (COS), which was recently assessed for its reliability and validity. As for factors predictive of outcome, only duration of leg pain and sick leave reached statistical significance in the multivariate analysis. Results of the univariate analysis demonstrated that in patients experiencing preoperative leg pain fewer than 4 months and between 4 and 8 months, a significantly lower COS at the 1-year follow up was demonstrated compared with those in whom the duration of leg pain was longer (> 8 months). One hundred eight patients returned to work within the 1st year after surgery. Patients who took a sick leave of more than 28 weeks before the operation were at higher risk of not returning to work. CONCLUSIONS: Analysis of these results indicates that leg pain lasting more than 8 months correlates with an unfavorable postoperative outcome in patients with lumbar disc herniation, as well as a high risk of not returning to work.

Predicting the outcome of sciatica at short-term follow-up.

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BACKGROUND: The prognostic value of the clinical findings elicited in the patient presenting with sciatica is unknown. AIM: To investigate whether history and physical examination findings can predict outcome. DESIGN OF STUDY: Prospective study of prognostic factors. SETTING: A sample of primary care patients with sciatica. METHOD: Short-term favourable outcome was registered as improvement perceived by the patient after two weeks. Long-term failure was
defined as eventual surgery or lack of improvement after three months. RESULTS: The signs and symptoms that most consistently predicted an unfavourable outcome were: a disease duration of more than 30 days; increased pain on sitting; and more pain on coughing, sneezing or straining. The straight leg raising test and, to a lesser degree the reversed straight leg raising test, were the most consistent examination findings associated with poor outcome. Chances of short-term improvement were also related to the body weight relative to the length. CONCLUSION: The predictors in this study can indicate the prognosis of patients with sciatica at an early stage. Knowledge of these prognostic factors may help to fine tune treatment decisions and improve patient selection in trials of conservative therapy strategies.

PMID: 11887877 [PubMed - indexed for MEDLINE]

1: J Neurosurg  1999 Jul;91(1 Suppl):50-3

Significance of a persistent positive straight leg raising test after lumbar disc surgery.

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OBJECT: Results of the straight leg raising (SLR) test provide the clinician with valuable information regarding possible causes of a patient's pain. In a previous study the results have also demonstrated a correlation between the outcome of the test and the severity of pain, as well as the prognostic value of the test; patients for whom the SLR test is persistently positive postoperatively appear to have a poorer short-term outcome. In a prospective study of 200 consecutive patients who underwent surgery for disc herniation, the authors evaluated the frequency of repeated surgery and outcome of surgery in patients with a persistent positive SLR test. METHODS: The preoperative radiological evaluation included myelography, computerized tomography scanning, and/or magnetic resonance imaging. Preoperatively as well as 4, 12, and 24 months postoperatively, each patient was interviewed and examined using a standard protocol in which common symptoms and signs were described. The result of the SLR test was also classified into one of four categories: positive 0 to 30 degrees; positive 30 to 60 degrees, positive greater than 60 degrees, or negative, and the surgical results were evaluated using a four-grade scale. Preoperatively, the SLR test was positive in 86% of patients. At 4 months postoperatively, 22% still had a positive SLR test. For the patients whose SLR test was positive 4 months postoperatively, the long-term outcome at all three follow-up examinations was inferior; this difference was statistically significant. CONCLUSIONS: During the 2-year period, the reoperation rate was 18% (eight of 44) in patients with a positive postoperative SLR test compared with 4.5% (seven of 156) in patients whose postoperative SLR test was negative. A postoperative positive SLR test thus correlates to an unfavorable surgical outcome.

PMID: 10419368 [PubMed - indexed for MEDLINE]

1: Eur Spine J  1994;3(4):214-8

Prognostic criteria of discogenic paresis.

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This discourse is aimed at elucidating prognostic criteria for the assessment of the course of a paresis in the case of lumbar disc herniation. Four hundred and fifty patients were examined who had been operated on for lumbar disc herniation at the Orthopaedic University Clinic Mainz between 1986 and 1991. Of these, 240 showed radicular paralytic symptoms. They were examined prior to the operation, immediately afterwards and 1 year after the operation. The influence of the degree of intensity of the paresis, the time elapsed since the occurrence and other factors like nerve root affected, intraoperative findings, age, sex and weight of the patient were registered.

It is obvious that the degree of intensity of a paresis is a good prognostic criterion for the assessment of the postoperative course. A paresis classified as grade III or IV receded in more than 70% of the cases within 6 months. For a paresis of grade II, the recovery rate was 40%. In the case of a total paresis, no complete neurological recovery was registered. The period of time which had elapsed since the occurrence of the paresis, the weight of the patient, the nerve root affected and other factors did not show any significant influence. As a criterion for an emergency or postponed operation on a herniated disc, the duration of paralytic symptoms should therefore be attributed less importance than the progression.

PMID: 7866838 [PubMed - indexed for MEDLINE]

Can exercise therapy improve the outcome of microdiscectomy?

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STUDY DESIGN: A prospective randomized controlled trial of exercise therapy in patients who underwent microdiscectomy for prolapsed lumbar intervertebral disc. Results of a pilot study are presented. OBJECTIVE: To determine the effects of a postoperative exercise program on pain, disability, psychological status, and spinal function. SUMMARY OF BACKGROUND DATA: Microdiscectomy is often used successfully to treat prolapsed lumbar intervertebral disc. However, some patients do not have a good outcome and many continue to have low back pain. The reasons for this are unclear but impairment of back muscle function due to months of inactivity before surgery may be a contributing factor. A postoperative exercise program may improve outcome in such patients. METHODS: Twenty patients who underwent lumbar microdiscectomy were randomized into EXERCISE and CONTROL groups. After surgery, all patients received normal postoperative care that included advice from a physiotherapist about exercise and a return to normal activities. Six weeks after surgery, patients in the EXERCISE group undertook a 4-week exercise program that concentrated on improving strength and endurance of the back and abdominal muscles and mobility of the spine and hips. Assessments of spinal function were performed in all patients during the week before surgery and at 6, 10, 26, and 52 weeks after.

The assessment included measures of posture, hip and lumbar mobility, back muscle endurance capacity and electromyographic measures of back muscle fatigue. On each occasion, patients completed questionnaires inquiring about pain, disability and psychological status. RESULTS: Surgery improved pain, disability, back muscle endurance capacity and hip and lumbar mobility in both groups of patients. After the exercise program, the EXERCISE group showed further improvements in these measures and also in electromyographic measures of back muscle fatigability. All these improvements were maintained 12 months after
surgery. The only further improvement showed by the CONTROL group between 6 and 52 weeks was an increase in back muscle endurance capacity. **CONCLUSION:** A 4-week postoperative exercise program can improve pain, disability, and spinal function in patients who undergo microdiscectomy. **Key words:** electromyogram median frequency, exercise therapy, intervertebral disc prolapse, microdiscectomy, randomized controlled trial, spinal function.

**Publication Types:**
Clinical Trial
Randomized Controlled Trial

**Cochrane Database Syst Rev 2002;(2):CD003007**

**Rehabilitation after lumbar disc surgery.**


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**BACKGROUND:** Although several rehabilitation programs, physical fitness programs or protocols regarding instruction for patients to return to work after lumbar disc surgery have been suggested, little is known about the efficacy and effectiveness of these treatments. There are still persistent fears of causing re-injury, re-herniation, or instability. **OBJECTIVES:** The objective of this systematic review was to evaluate the effectiveness of active treatments that are used in the rehabilitation after first-time lumbar disc surgery. **SEARCH STRATEGY:** We searched the MEDLINE, EMBASE and Psyclit databases up to April 2000 and the Cochrane Controlled Trials Register 2001, Issue 3. **SELECTION CRITERIA:** Both randomized and non-randomized controlled trials on any type of active rehabilitation program after first-time disc surgery were included. **DATA COLLECTION AND ANALYSIS:** Two independent reviewers performed the inclusion of studies and two other reviewers independently performed the methodological quality assessment. A rating system that consists of four levels of scientific evidence summarizes the results. **MAIN RESULTS:** Thirteen studies were included, six of which were of high quality. There is no strong evidence for the effectiveness for any treatment starting immediately post-surgery, mainly because of lack of (good quality) studies. For treatments that start four to six weeks post-surgery there is strong evidence (level 1) that intensive exercise programs are more effective on functional status and faster return to work (short-term follow-up) as compared to mild exercise programs and there is strong evidence (level 1) that on long-term follow-up there is no difference between intensive exercise programs and mild exercise programs with regard to overall improvement. For all other primary outcome measures for the comparison between intensive and mild exercise programs there is conflicting evidence (level 3) with regard to long-term follow-up. Furthermore, there is no strong evidence for the effectiveness of supervised training as compared to home exercises. There was also no strong evidence for the effectiveness of multidisciplinary rehabilitation as compared to usual care. There is limited evidence (level 3) that treatments in working populations that aim at return to work are more effective than usual care with regard to return to work. Also, there is limited evidence (level 3) that low-tech and high-tech exercises, started more than 12 months post-surgery are more effective in improving low back functional status as compared to physical agents, joint manipulations or no treatment. Finally, there is no strong evidence for the effectiveness of any specific intervention when added to an exercise program, regardless of whether exercise programs start immediately post-surgery or later. None of the investigated treatments seem
harmful with regard to re-herniation or re-operation. REVIEWER'S CONCLUSIONS: There is no evidence that patients need to have their activities restricted after first time lumbar disc surgery. There is strong evidence for intensive exercise programs (at least if started about 4-6 weeks post-operative) on short term for functional status and faster return to work and there is no evidence they increase the re-operation rate. It is unclear what the exact content of post-surgery rehabilitation should be. Moreover, there are no studies that investigated whether active rehabilitation programs should start immediately post-surgery or possibly four to six weeks later.

Publication Types:
Review
Review, Academic

Spine  1993 Apr;18(5):560-7

Intensive dynamic back exercises with or without hyperextension in chronic back pain after surgery for lumbar disc protrusion. A clinical trial.


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Sixty-two patients with chronic low back pain occurring 14-60 months after undergoing discectomy for the first time were randomized to two physical treatment groups: 24 sessions of intensive dynamic back exercises with hyperextension or 24 sessions of intensive dynamic back exercises without hyperextension. At the conclusion of therapy and at one-year follow-up, no difference was seen between the randomized groups, with regard to the combined assessments of pain, disability and objective measurements. A difference for back exercises without hyperextension to be superior to the other treatment regimen was statistically significant at the three-month follow-up. In the patient's qualitative assessment of treatment outcome there were seen no significant differences between back exercises with or without hyperextension. There was a similar and significant improvement of the isometric endurance of back muscles in both groups, but the flexibility of the spine was significantly improved only in the group using hyperextension exercises. The overall response rate of an earlier published investigation was reproduced. It is concluded that chronic back patients after first time discectomy may benefit from an intensive rehabilitation protocol including intensive exercises. The added use of hyperextension exercises does not confer any independent benefit. Furthermore, the training had to continue for more than 2-3 months before a statistical significant decrease in back pain was reported in the patient pain diary.

Publication Types:
Clinical Trial

Eur Spine J  1998;7(1):24-8

Lumbar disc herniation: favourable outcome associated with intake of wine.

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Recent research indicates that non-smoking and intake of alcoholic beverages, in particular wine, are associated with beneficial effects on several diseases,
especially atherosclerosis. The aim of the study was to investigate whether smoking or the intake of different alcoholic beverages are associated with the outcome 2 1/2 years after first-time lumbar disc surgery. The design was a follow-up study, using a questionnaire including a rating scale. All 170 patients consecutively operated upon for a lumbar disc herniation over a 1-year period were clinically examined at the time of the operation and classified according to various social and demographic variables. The main outcome measure, 2 1/2 years after, was the total rating score, i.e. the sum of three equally weighted outcome measures: pain, impairment and self-assessment of the operation result. The questionnaires were completed by 148 patients (87%). The median age of patients was 41 years; 60 of them were women. Fifty-four per cent were smokers and 42% wine drinkers. **Logistic regression analysis calculated a fourfold increase in the success rate for wine drinkers.** This fourfold odds ratio was not significantly reduced by the following variables: age, sex, social class, household income, smoking habits, employment status or marital status. Smoking could not be shown to be an independent risk factor for the outcome. **Intake of wine was found to be associated with a good prognosis after first-time lumbar disc surgery, and this association could not be attributed to the lifestyle characteristics studied.**

PMID: 9548354 [PubMed - indexed for MEDLINE]

Spine 2002 Jun 1;27(11):1232-7

Comment in:

Three-question depression screener used for lumbar disc herniations and spinal stenosis.

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STUDY DESIGN: A depression screener was used to determine positive responses amongst patients with two disorders commonly treated with surgery. OBJECTIVE: To examine the relation between positive responses to the depression screener and pain characteristics, sociodemographic responses, and Short-Form 36-Item Health Survey subscale scores among patients with lumbar disc herniation or spinal stenosis. SUMMARY OF BACKGROUND DATA: Numerous studies have reported a correlation between depression and low back pain, but few have examined this relation among patients with a diagnosis of sciatica from lumbar disc herniation or spinal stenosis. The Health Status Questionnaire 2.0 includes both the Short-Form 36-Item Health Survey (a validated, multidimensional, generic instrument measuring health-related quality of life and functional status) and the three-question depression screener. METHODS: The database of the National Spine Network (a nonprofit collaboration of physicians caring for patients with back and neck problems that pools patient data) was queried for patients 18 to 65 years of age with a diagnosis of lumbar disc herniation (n = 2878) and patients 30 to 80 years of age with a diagnosis of spinal stenosis (n = 3801). Depression screeners scored positive when patients reported depressive symptoms within the year to any question about symptoms. RESULTS: The screener elicited positive responses from 36.4% of the patients with spinal stenosis and 38.4% of the patients with lumbar disc herniation. Among the patients with spinal stenosis or lumbar disc herniation, those with positive depression screener
responses reported longer duration of symptoms (>7 weeks) and failure to improve. They were more likely to be obese, recipients of workers' compensation, unmarried, and less educated (below Grade 12). In multivariate analyses, positive depression screener responses were significantly associated with an attorney's services and a longer duration of symptoms. CONCLUSIONS: A positive depression screener response is strongly associated with poorer functional status and health-related quality of life, as measured by the Short-Form 36-Item Health Survey, among patients with lumbar disc herniation or spinal stenosis, and higher symptom intensity.

PMID: 12045523 [PubMed - indexed for MEDLINE]

J Manipulative Physiol Ther  2000 Jun;23(5):312-9

Comment in:

Behavioral-graded activity compared with usual care after first-time disk surgery: considerations of the design of a randomized clinical trial.


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OBJECTIVE: To present the design of a trial on the effectiveness of a behavioral-graded activity model. DESIGN: Randomized clinical trial. PATIENTS: Patients undergoing first-time lumbar disk surgery who still have low-back pain at the 6-week neurosurgical consultation. INTERVENTIONS: A patient-tailored behavioral-graded activity program that is based on operant therapy. The key elements of this program are baseline measurements, goal-setting, and time-contingency. This program is compared with usual care in physiotherapy, which is pain-contingent. Outcome Measures: Primary measures are the patient's global impression of the effect and their functional status. Secondary measures are kinesiophobia, catastrophizing, pain, main complaint, range of motion, and relapses. The direct and indirect costs will also be assessed. The effect measures are rated before randomization and 3, 6, and 12 months later.

DISCUSSION: Several trials have been conducted on the effectiveness of behavioral treatments. Subjects were always patients with chronic low-back pain. In this trial, we apply such a treatment in patients after first-time disk surgery in a primary care setting.

Publication Types:
Clinical Trial
Randomized Controlled Trial


Response to steroid and duration of radicular pain as predictors of surgical outcome.


Prolonged structural compromise of spinal nerve roots can lead to chronic changes that surgical decompression might not be able to reverse. In this study, it was hypothesized that if there were a reversible structural pain component, a steroid injected into the patient's symptomatic nerve root should provide temporary pain relief and
that these patients should have a favorable surgical outcome. It also was hypothesized that duration of radicular symptoms would correlate inversely with surgical outcome. For postoperative relief of radicular pain, the results showed that patients with pain lasting less than 1 year had a positive surgical result (89%), regardless of response to steroid. Patients with pain lasting more than 1 year and who have had a positive response to steroid injected into the symptomatic nerve root (roots) had a positive surgical outcome of 85%. Patients who did not respond to the steroid and had pain for more than 1 year (95%) generally had a poor surgical outcome. Although the poor outcome in the last group might be explained in some cases by an inadequate structural correction, inadequate stabilization, or functional reasons, the majority of these failures represented irreversible changes in the neural structures. PMID: 1631715 [PubMed - indexed for MEDLINE]


Cramp finding: can it be used as a new diagnostic and prognostic factor in lumbar disc surgery?

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In this prospective study, the validity and the importance of a new finding (cramp finding) in the diagnosis and outcome after lumbar disc surgery were tested. The test is performed with the person in prone position. Against a forceful knee flexion, the examiner holds the leg with one hand and applies a force to overcome the knee flexion. The finding is positive if the examined person feels a disturbing cramp in the leg or thigh. The study was performed between October 1997 and December 1999. Besides the cramp finding, the classical disc herniation examination, including mechanical and neurological findings, magnetic resonance (MR) imaging tests, and laboratory findings were checked pre- and postoperatively.

The positive cramp finding in the operated group was 72% (n=133) preoperatively and straight leg raising (SLR) test was positive in all of them. Cramp finding was positive in 70%, 52%, 34%, and 8% of patients postoperatively in the first, 3rd, 12th and 24th months, respectively. The presented finding appears to be as valuable as the SLR, and especially contralateral SLR, tests in lumbar disc surgery. Cramp finding is also important in outcome evaluation.

Publication Types:
Clinical Trial
Controlled Clinical Trial

PMID: 11931063 [PubMed - indexed for MEDLINE]


Use of lumbar extension, slump test, physical and neurological examination in the evaluation of patients with suspected herniated nucleus pulposus. A prospective clinical study.

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This prospective and consecutive study was designed to evaluate the validity of different clinical tests, e.g. lumbar extension in lying and slump test for patients with suspected herniated nucleus pulposus, in comparison with findings on computed tomography (CT) and/or magnetic resonance imaging (MRI) scan. There were 105 patients who were seen and examined by the senior author (for the sake of the study) at the Orthopaedic Physiotherapy Department, on an average of 5.5 days (range 0-21 days) before CT and/or MRI examination were carried out. There were 36 women and 69 men with an average age of 42.7 +/- 9.8 (range 19-64) years. According to the radiological findings on CT and/or MRI, the patients were divided into three groups:
52 patients with disc hernia, 41 patients with bulging discs and 12 patients without positive findings. The mean values with standard deviations of 25 variables of three diagnostic groups were studied. Multiple comparison adjustment according to Bonferroni showed significant differences for three variables that were of diagnostic value (lumbar range of motion for forward flexion, left side-bending in standing, and pain distribution during extension in standing). The agreement between clinical and radiological findings for type and level of diagnosis of disc herniation was accurate in 72 patients (69%). The diagnostic sensitivity for disc herniation was 82.6% and the specificity 54.7%.

PMID: 10463018 [PubMed - indexed for MEDLINE]


Systematic review of antidepressants in the treatment of chronic low back pain.

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BACKGROUND: Three previous reviews have reached conflicting conclusions regarding the efficacy of antidepressants for patients with back pain.
OBJECTIVES: To systematically review the efficacy of antidepressants for the treatment of patients with back pain and to determine whether there is evidence that outcomes vary between classes of antidepressants. MATERIALS AND METHODS: Best evidence synthesis of randomized, placebo-controlled trials of oral antidepressive agents in patients with back pain. Studies were identified by searching MEDLINE, PsycINFO, and the Cochrane Controlled Trials Registry. Two independent reviewers performed data extraction and assessed included studies with a 22-point methodologic quality assessment scale. Effect sizes were calculated if sufficient data were available. RESULTS: Twenty-two trials of antidepressants for the treatment of back pain were identified, of which seven studies of chronic low back pain met inclusion criteria. Among studies using antidepressants that inhibit norepinephrine reuptake (tricyclic or tetracyclic antidepressants), four of five found significant improvement in at least one relevant outcome measure. Assessment of these agents' impact on functional measures produced mixed results. No benefit in pain relief or functional status was found in three studies of antidepressants that do not inhibit norepinephrine reuptake. CONCLUSIONS: Based on a small number of studies, tricyclic and tetracyclic antidepressants appear to produce moderate symptom reductions for patients with chronic low back pain. This benefit appears to be independent of depression status. SSRIs do not appear to be beneficial for patients with chronic low back pain. There is conflicting evidence whether antidepressants improve functional status of patients with chronic low back pain.

Spine. 2002 Sep 1;27(17):E388-95.


Rebain R, Baxter GD, McDonough S.

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STUDY DESIGN: A systematic review. OBJECTIVES: This systematic review sought papers (January 1989-January 2000) on the passive straight leg raising test (PSLR) as a diagnostic component for low back pain (LBP) to identify, summarize, and assess developments in the test procedure, the factors influencing PSLR outcome, and the clinical significance of that outcome.
SUMMARY OF BACKGROUND DATA: Previous studies suggested that the PSLR tractioned the sciatic nerve and that diminished leg elevation with reproduced pain indicated low lumbar intervertebral disc pathology.

METHODS: Searches on six computerized bibliographic databases identified publications written about the PSLR. Papers were excluded if they were published before January 1989, were non-English language papers, or employed either an active SLR or a PSLR for purposes other than LBP diagnosis. The references of qualifying papers (and the references of references) were searched. Contact with primary authors, and others known to be active in this field, was attempted. RESULTS: The PSLR procedure remains unchanged. The influence of hip rotation during the PSLR was discussed without consensus. Biomechanical devices improved intra- and interobserver reliability and so increased test reproducibility. Hamstrings were found to have a defensive role in protecting nerve roots by limiting PSLR range in cases of nerve root inflammation. A small diurnal variation in the PSLR may imply a poorer prognosis. A positive PSLR at 4 months after lumbar intervertebral disc surgery predicted poor reoperative outcome, and a negative 4-month PSLR predicted excellent outcome. The influence of psychosocial factors was not discussed, neither was the diagnostic significance of a negative PSLR outcome.

CONCLUSIONS: There remains no standard PSLR procedure, no consensus on interpretation of results, and little recognition that a negative PSLR test outcome may be of greater diagnostic value than a positive one. The causal link between LBP pathology and hamstring action remains unclear. There is a need for research into the clinical use of the PSLR; its intra- and interobserver reliability; the influences of age, gender, diurnal variation, and psychosocial factors; and its predictive value in lumbar intervertebral disc surgery.


The test of Lasègue: systematic review of the accuracy in diagnosing herniated discs.

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STUDY DESIGN: A systematic review of the literature including statistical meta-analysis. OBJECTIVES: To evaluate published methods of the test of Lasègue or straight leg raising test and the cross straight leg raising test by using a recently developed criteria list and to summarize and explore reasons for variation in diagnostic accuracy. SUMMARY OF BACKGROUND DATA: Little evidence exists on the diagnostic accuracy of the widely used straight leg raising test and the cross straight leg raising test in diagnosing herniated discs in patients with low back pain. METHODS: MEDLINE and EMBASE searches up to 1997 showed 17 diagnostic publications evaluating the straight leg raising test with surgery as reference standard. Quality of methods was assessed with a specific checklist. Eleven studies were selected for statistical pooling. Sources of variation and heterogeneity were studied by meta-regression of the diagnostic odds ratio. RESULTS: All studies were surgical case-series at nonprimary care level. Verification-bias was obvious in one study. Pooled sensitivity for straight leg raising test was 0. 91 (95% CI 0.82-0.94), pooled specificity 0.26 (95% CI 0.16-0.38). Pooled diagnostic odds ratio was 3.74 (95% CI 1.2-11.4). Discriminative power was lower in recent studies, in studies with only inclusion of primary hernias, and with blind assessment of both the index-test (straight leg raising test) and the reference (surgery). For the cross straight leg raising test pooled sensitivity was 0.29 (95% CI 0.24-0.34), pooled specificity was 0.88 (95% CI 0.86-0.90), and the pooled diagnostic odds ratio 4.39 (95% CI
CONCLUSIONS: The diagnostic accuracy of the straight leg raising test is limited by its low specificity. Discriminative power decreased with a more valid design, a more homogenous case-mix, and year of publication. Although the studies may reflect everyday clinical practice, they do not enable a valid evaluation of the diagnostic accuracy of both tests. Diagnostic research should evaluate the validity of the complete diagnostic process and study the evidence of the added value of the different tests used. [Key words: sensitivity, specificity, diagnosis, meta-analysis, test of Lasègue, straight leg raising test]

 Publication Types:
 Review
 Review Literature


Diagnostic value of history and physical examination in patients suspected of sciatica due to disc herniation: a systematic review.

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We conducted a systematic review of the literature from 1965-1994 to assess the value of history and physical examination in the diagnosis of sciatica due to disc herniation; we also included population characteristics and features of the study design affecting diagnostic value. Studies on the diagnostic value of history and physical examination in the diagnosis of sciatica due to disc herniation are subject to important biases, and information on numerous signs and symptoms is scarce or absent. Our search revealed 37 studies meeting the selection criteria; these were systematically and independently read by three readers to determine diagnostic test properties using a standard scoring list to determine the methodological quality of the diagnostic information. A meta-analysis was performed when study results allowed statistical pooling. Few studies investigated the value of the history. Pain distribution seemed to be the only useful history item. Of the physical examination signs the straight leg raising test was the only sign consistently reported to be sensitive for sciatica due to disc herniation. However, the sensitivity values varied greatly, the pooled sensitivity and specificity values being 0.85 and 0.52, respectively. The crossed straight leg raising test was the only sign shown to be specific; the pooled sensitivity and specificity values were 0.30 and 0.84, respectively. There was considerable disagreement on the specificity of the other neurological signs (paresis, sensory loss, reflex loss). Several types of bias and other methodological drawbacks were encountered in the studies limiting the validity of the study results. As a result of these drawbacks it is probable that test sensitivity was overestimated and test specificity underestimated.

Publication Types:
 Meta-Analysis


Consistency of history taking and physical examination in patients with suspected lumbar nerve root involvement.

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STUDY DESIGN: A cross-sectional study of interobserver variability in primary care patients. OBJECTIVE: To investigate the consistency of signs and symptoms of nerve root compression in primary care patients with pain irradiating pain into the leg (sciatica). SUMMARY OF BACKGROUND DATA: The literature does not report on all the clinical tests for nerve root compression. In previous studies, most patients had low back pain with no irradiation. Often, little information on examination technique, proportion of positive test results, or clinical patient characteristics was provided. METHODS: A random selection of 91 patients was investigated by a neurologist-resident couple. Agreement percentages, proportions of positive test results, and kappas were calculated. RESULTS: The kappa of the overall conclusion after the history taking was 0.40, increasing to 0.66 after physical examination. Kappas were good for decreased muscle strength and sensory loss (0.57-0.82), intermediate for reflex changes (0.42-0.53), and poor for the examination of the lumbar spine (0.16-0.33). The straight leg raising, crossed straight leg raising, Bragard's sign, and Naffziger's sign were the most consistent nerve root tension signs (> 0.66). CONCLUSIONS: Two clinicians disagreed on the presence of nerve root involvement in one of four patients after history taking, and in one of five patients after physical examination. For a more consistent overall diagnosis, the physician probably should put more emphasis on the history of pain on coughing-straining-sneezing, a feeling of coldness in the legs, and urinary incontinence. The investigation of paresis, sensory loss, reflex changes, straight leg raising, and Bragard's sign provide the most consistent results.


Sciatic tension signs and lumbar disc herniation.

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STUDY DESIGN. Sciatic stretch maneuvers designed to elicit signs of nerve root compressions secondary to lumbar disc herniation were evaluated in a prospective manner to correlate intraoperative evaluation of surgical pathology regarding level and anatomic location and proximity of the herniated disc to the nerve root. OBJECTIVES. To study the correlation between specific diagnostic maneuvers of sciatic stretch and anatomic location or level of lumbar disc pathology. SUMMARY OF BACKGROUND DATA. Maneuvers of sciatic tension, such as the straight leg lift, the well leg lift, Lasègue's sign, and the bowstring sign, have been used since the 1880s as a diagnostic maneuver to separate sciatica from hip pain. METHODS. Fifty consecutive candidates with clinical and radiographic evidence of disc herniation were examined. Initial physical examination included evaluation of sciatic tension signs using the straight leg lift, cross leg lift, Lasègue's sign, and the bowstring sign. The presence of lumbar disc herniation was confirmed radiographically. Intraoperatively, the 50 patients were assessed for anatomic location of disc herniation and the presence of disc protrusion or extrusion. RESULTS. The straight leg lift was the most sensitive preoperative physical diagnostic sign for correlating intraoperative pathology of lumbar disc herniation. CONCLUSIONS. Physical diagnostic maneuvers for evaluating sciatic tension in patients with documented lumbar disc herniation have a high correlation with surgical pathology. These diagnostic signs of sciatic stretch can be reliable guides that lead to more aggressive modes of evaluation. No correlation was found between specific sciatic stretch maneuvers regarding
location of disc herniation relative to the nerve root.

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Significance of sciatic scoliotic list in operated patients with lumbar disc herniation.

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STUDY DESIGN: The authors retrospectively reviewed the relation between the location of disc herniation and pre- and postoperative changes in sciatic scoliotic list in 40 patients with surgically confirmed lumbar disc herniation who had sciatic scoliotic list with postoperative recovery. Clinical factors associated with scoliosis also were included. OBJECTIVES: To evaluate the significance and pathomechanism of sciatic scoliotic list. SUMMARY OF BACKGROUND DATA: The proposed causes of lumbar sciatic scoliosis mainly imply an alleviation of nerve root irritation in relation to the anatomic location of disc herniation relative to the nerve root. METHODS: The pre- and postoperative serial Cobb angle between L1 and L5 in anteroposterior lumbar radiographs in the standing position were measured. The relation between the convex side of scoliosis and clinical parameters in terms of the side of symptoms, age, gender, duration of low back pain or leg pain, the angle of a positive straight leg raising test, and the time required for recovery of sciatic scoliosis were investigated. In addition, magnetic resonance imaging also was performed in five recent cases from 40 patients. RESULTS: The average Cobb angle decreased from 10.7 degrees to 2.7 degrees within an average of 7.5 months after surgery. The preoperative Cobb angle of patients with disc herniation medial to the nerve root was significantly higher than that just beneath or lateral to the nerve root. Thirty-two of 40 patients (80.0%) had a lumbar disc herniation at the convex side of scoliosis, irrespective of the transverse location of the herniation. The time required for scoliosis disappearance in disc herniation located lateral to the nerve root tended to be longer than that for other types of disc herniation. Magnetic resonance imaging through the paramedian planes showed enlargement of the intervertebral foramen at the convex side of scoliosis, compared with that at the concave side in five recent cases from the current study. CONCLUSION: These results suggest that sciatic scoliotic list is not a predictive factor of the anatomic location of disc herniation; rather, it is only suggestive of the side of disc herniation. The location of disc herniation may aide in the preoperative estimation of the recovery of the scoliosis.


Lumbosacral scoliotic list by lumbar disc herniation.

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STUDY DESIGN: A prospective study of 45 patients with lumbar disc herniation and scoliotic list who had undergone conventional open discectomy. OBJECTIVES: To determine the association between the location of the disc herniation and the direction of sciatic scoliotic list and to clarify the mechanism of sciatic...
Scoliosis. SUMMARY OF BACKGROUND DATA: The association between the scoliotic list and lumbar disc herniation is well known. However, there have been few studies regarding the direction of scoliotic list and the location of the disc herniation observed during surgery. METHODS: The direction of scoliotic list, the preoperative and postoperative Cobb's angle, and the displacement of the first lumbar vertebra from the center sacral line were measured. The location, side, and degree of disc herniation were observed during surgery. RESULTS: There was no statistically significant association observed between the location or degree of nerve root compression and the direction or degree of sciatic scoliosis. Moreover, there was no statistically significant association observed between the location or degree of nerve root compression and the displacement of the first lumbar spine from the center sacral line. However, there was a significant association between the side of the disc herniation and the direction of sciatic scoliosis. Most of the sciatic scoliotic list disappeared after surgical decompression. CONCLUSION: The direction of sciatic scoliosis was not observed to be associated with the location of nerve root compression, although it was related to the side of disc herniation.

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Severity of symptoms and signs in relation to magnetic resonance imaging findings among sciatic patients.


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STUDY DESIGN: A cross-sectional study in sciatic population. OBJECTIVES: To evaluate the separate roles of nerve root entrapment-based on magnetic resonance imaging-and other discogenic pain mechanisms on disability and physical signs among symptomatic sciatic patients. SUMMARY OF BACKGROUND DATA: Data symptoms of sciatica are generally understood to be generated by nerve root compression, but other pain mechanisms of sciatica have been suggested. METHODS: The authors obtained magnetic resonance scans from 160 patients with unilateral sciatic pain. The patients reported the intensity of their back and leg pain and their back-specific disability. Clinical examination and magnetic resonance imaging (1.5 T) was performed on every patient. The degree of disc displacement, neural enhancement, and nerve root compression was evaluated from magnetic resonance scans. The correlations of symptoms and signs with magnetic resonance imaging findings were calculated. RESULTS: The degree of disc displacement in magnetic resonance imaging did not correlate with any subjective symptoms, nor did nerve root enhancement or nerve compression. Magnetic resonance imaging classification was associated, however, with straight leg raising restriction. In regression analysis, straight leg raising restriction was best explained with a simple classification of nonherniations versus herniations. CONCLUSIONS: The results suggest that a discogenic pain mechanism other than the nerve root entrapment generates the subjective symptoms among sciatic patients. The findings of this study thus indicate that magnetic resonance imaging is unable to distinguish sciatic patients in terms of the severity of their symptoms.
Types of lumbar herniated disc and clinical course.

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STUDY DESIGN: A retrospective study of different types of herniated discs and duration of symptoms in patients with lumbar disc herniation, and a trial of longer conservative treatment to reduce the number of operations. OBJECTIVE: To determine whether noncontained and contained herniated discs have different clinical courses and to evaluate the results of the clinical trial of longer and vigorous conservative treatment. SUMMARY OF BACKGROUND DATA: The possibility of a difference in clinical features between contained and noncontained disc herniation has been suggested previously. METHODS: In the first study, the medical history and intraoperative findings of 156 patients who had undergone herniotomy were reviewed. In the second study, conservative treatment of at least 2 months' duration was recommended for all patients with lumbar disc herniation. RESULTS: In the first study, patients with noncontained disc herniation had a shorter preoperative clinical course than those with contained disc herniation. It was rare for noncontained herniation to require surgery 4 months or more after the onset of symptoms. In the second study, the authors' protocol reduced the number of herniotomies required, especially the number of operations for the patients with noncontained disc herniation. CONCLUSIONS: The authors believe that patients with noncontained lumbar disc herniation can be treated without surgery, if these patients can tolerate the symptoms for the first 2 months.


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The optimum timing of lumbar discectomy for sciatica is imprecise. We have investigated a number of prognostic factors in relation to the outcome of radiculopathy after lumbar discectomy. We recruited 113 consecutive patients of whom 103 (91%) were followed up at one year. We found a significant association between the duration of radiculopathy and the changes in the Oswestry Disability Index score (p = 0.005) and the low back outcome score (p = 0.03). Improvement in pain was independent of all variables. Patients with an uncontained herniated disc had a shorter duration of symptoms and a better functional outcome than those with a contained herniation. Our study suggests that patients with sciatica for more than 12 months have a less favourable outcome. We detected no variation in the results for patients operated on in whom the duration of sciatica was less than 12 months.

Proximal neuromuscular impairment in lumbar disc herniation: a prospective controlled study.
STUDY DESIGN: A prospective and controlled study investigated the relation of muscle dysfunction to residual pain and disability in patients with lumbar disc herniation. OBJECTIVES: To determine the incidence of lower limb muscle dysfunction in lumbar disc herniation and its evolution over time after surgery, and to ascertain whether neuromuscular dysfunction has a prognostic value regarding pain and disability. SUMMARY OF BACKGROUND DATA: Residual sciatica, low back pain, and disability are common after lumbar discectomy. Preoperative motor dysfunction corresponding to the afflicted nerve root is often seen. METHODS: The participants in this study were 71 patients, ages 15 to 50 years, with disc prolapse at L4-L5 or L5-S1. Before surgery, then 6 weeks, 4 months, and 12 months after surgery, low back pain and leg pain were estimated on a visual analog scale, and disability was determined according to the Roland-Morris Questionnaire and a designed functional muscle test. RESULTS: Motor function of the sciatic leg frequently was impaired. Inferior outcome of proximal motor tests 6 weeks after surgery predicted pain and disability 1 year after surgery. The mean leg pain was 59 mm before surgery and 15 mm at 6 weeks, remaining at that level during the follow-up period. The mean disability score was 14.4 before surgery, 8.8 at 6 weeks, and 4.7 at 4 and 12 months, whereas muscle function improved gradually through 1 year of follow-up evaluation. CONCLUSIONS: Neuromuscular dysfunction frequently is present in patients with lumbar disc herniation. Sciatica resolves quickly after surgery, whereas disability improves gradually up to 4 months and muscular performance improves throughout the first year. Proximal muscular dysfunction in lumbar disc herniation has a prognostic value concerning residual pain and disability.


Single-blind randomised controlled trial of chemonucleolysis and manipulation in the treatment of symptomatic lumbar disc herniation.

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This single-blind randomised clinical trial compared osteopathic manipulative treatment with chemonucleolysis (used as a control of known efficacy) for symptomatic lumbar disc herniation. Forty patients with sciatica due to this diagnosis (confirmed by imaging) were treated either by chemonucleolysis or manipulation. Outcomes (leg pain, back pain and self-reported disability) were measured at 2 weeks, 6 weeks and 12 months. The mean values for all outcomes improved in both groups. By 12 months, there was no statistically significant difference in outcome between the treatments, but manipulation produced a statistically significant greater improvement for back pain and disability in the first few weeks. A similar number from both groups required additional orthopaedic intervention; there were no serious complications. Crude cost analysis suggested an overall financial advantage from manipulation. Because osteopathic manipulation produced a 12-month outcome that was equivalent to chemonucleolysis, it can be considered as an option for the treatment of symptomatic lumbar disc herniation, at least in the absence of clear indications for surgery. Further study into the value of manipulation at a more acute stage is warranted.


Clinical appearance of contained and noncontained lumbar disc herniation.
In a prospective and consecutive study, we evaluated the incidence of common symptoms and neurologic disturbances in 200 patients operated on because of lumbar disc herniation by using a computer-coded protocol with pre- and perioperative registration. The preoperative occurrence of pain at rest, at night, and on coughing was registered. Use of analgesics and walking ability were registered as category data. At examination, a straight-leg-raising (SLR) test was graded in four categories, and results from neurologic findings were collected. At surgery, disc herniation was classified as extruded/sequestered herniation, prolapse, or focal protrusion. There were no significant differences concerning pain at rest or at night related to type of herniation. Pain on coughing was more common in extruded/sequestered herniations. Use of analgesics as well as severe reduction of walking capacity were significantly more common in patients with extrusion/sequestration. The highly restricted SLR test, as well as the crossed positive SLR test, were also significantly more common in patients with extruded/sequestered herniation, and this was also true for the incidence of relevant reflex/extensor hallucis longus (EHL) and sensory disturbance. In conclusion, the clinical appearance of lumbar disc herniation was most "aggressive" in extruded and sequestered disc herniation. The symptoms and signs in disc protrusion were less severe, whereas patients with prolapse had an "intermediate" appearance concerning symptoms and signs. The differences in incidence of common signs in noncontained versus contained herniation were statistically significant; these differences may be of clinical interest for patient selection and information as well as in pathophysiologic considerations.