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Sciatica from disk herniation: Medical treatment or surgery?

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Abstract

Disk-related sciatica is a common disorder that resolves without surgery in 95% of patients within 1 to 12 months. Several treatment strategies designed to hasten recovery, enable a return to previous social and occupational activities, and prevent chronicization have been evaluated. Available efficacy data support the use of analgesics, nonsteroidal anti-inflammatory drugs, and epidural steroid injections, which probably relieve the pain and improve the quality of life without radically changing the midterm outcome. After a specialized evaluation of physical, psychological, social, and occupational factors, surgery may be offered to patients with persistent nerve root pain (as opposed to low back pain). The complication rate ranges from 1% to 3%. Surgery is clearly effective, shortening the time to recovery by about 50% compared to nonsurgical treatment. Whether one specific surgical procedure is better than others remains unclear. Methodological weaknesses of studies evaluating the efficacy of percutaneous methods preclude definitive conclusions. Bed rest, systemic glucocorticoid therapy, spinal manipulation, bracing, spinal traction, and physical therapy have no proven effects on the outcome of sciatica.
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1. Introduction

Disk-related sciatica is a common and extremely painful disorder that resolves spontaneously in the overwhelming majority of cases: without surgery, 80% of patients recover within 8 weeks and 95% within 1 year [1,2]. Nonetheless, surgical treatment is widely used, most notably in the US (240,000 procedures per year), where the cost of sciatica management exceeds US$5 billion per year [3]. Surgical treatment rates vary widely across countries and within the US [4]. Although surgery has been reported to ensure a full recovery in about 85% of cases, complications occur in 1% to 3% of cases. Persistent sciatica despite treatment leads to physical and emotional suffering, costly healthcare service utilization,

and impaired work ability. Several studies have established that sciatica is among the factors that promote the chronicization of low back pain, which in turn induces high financial and social costs [5].

The challenge to physicians is identification of the best compromise between excessive use of early surgery, which leads to a number of unnecessary surgical procedures, and exposure of patients to an unreasonably long period of persistent symptoms despite medical treatment, whose efficacy, as discussed below, is limited. This update provides pointers for meeting this challenge, which is a focus of increasing concern not only to physicians, but also to a growing number of patients.

2. Ineffective medical treatments

The lack of efficacy of most of the treatments used in disk-related sciatica is central to the controversy about choosing

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between medical and surgical treatment. Many unfounded beliefs and rumors surround the treatments available for sciatica, even within the medical profession. Spontaneous recovery, which occurs within 2 months in about 80% of patients, is often mistakenly taken as evidence that medical treatment is effective.

2.1. Anti TNFα therapy

Open-label trials were extremely promising, with recovery of about 90% of patients within 1 year. Randomized controlled trials, however, found no evidence of efficacy. Etanercept injected within the disk was no better than the placebo [6]. Infliximab as an intravenous infusion in a dose of 5 mg/kg failed to relieve the pain or to decrease the rates of surgery after 3 or 12 months [7].

2.2. Systemic glucocorticoid therapy

Although given a prominent position in recent rheumatology manuals, systemic glucocorticoid therapy is not effective, as established by three randomized controlled trials. Even high-dose treatment (up to 100 mg prednisone-equivalents per day) failed to induce benefits. Thus, in a randomized controlled trial of 65 patients, no differences were found after day 3 between patients given 500 mg of intravenous methylprednisolone and those given the placebo [8].

2.3. Muscle relaxants

Muscle relaxants are widely used despite the absence of scientific evidence supporting their efficacy [9]. Tetrazepam, the most widely used compound, is a benzodiazepine. Because it has a long half-life, it may induce sedation or even somnolence, which may delay the resumption of normal activities.

2.4. Physical methods

Rest fails to improve the outcome of sciatica. In two high-quality trials [10,11], no differences were found between patients who rested and those who remained active [12]. A systematic Cochrane review of data on spinal traction showed very little evidence of efficacy, although the heterogeneity and poor quality of the studies precluded definitive conclusions [13]. There are no data to support the efficacy of rigid braces made of plaster or resin [14], which are nevertheless widely used in France. The fact that bed rest is not effective is consistent with absence of benefits from bracing the spine. Spinal manipulation should not be used, given the absence of proof of efficacy and the risk of neurological complications.

3. Partially effective medical treatments

3.1. Analgesics

Analgesics are useful, although there is no proof that they improve long-term outcomes. Analgesic therapy reduces the rate of surgical treatment and considerably improves the quality of life in the short-term. When step 2 analgesics (tramadol or codeine) fail to achieve pain relief, oral morphine can be given in a dosage of 40 to 120 mg/d for a few days, in combination with 4 g of acetaminophen per day. Refractoriness to 120 mg/d of morphine or recurrent pain upon gradual dosage tapering (after 1 week) is the best criterion for defining hyperalgic sciatica, which has become rare.

3.2. Nonsteroidal anti-inflammatory drugs (NSAIDs)

NSAIDs are widely used via the oral, intramuscular, or intravenous route in patients with sciatica. This practice is based chiefly on the beliefs of prescribing physicians, as little scientific proof of efficacy is available and a single randomized controlled trial (among four published trials) indicated efficacy [9]. There is no evidence to support intramuscular or intravenous administration, which is associated with a non-negligible risk of nosocomial infection. Neither are there any data to support NSAID therapy for longer than 2 weeks.

3.3. Epidural glucocorticoid injections

Numerous studies have investigated the effects of epidural glucocorticoid injections in sciatica. A recent review [15] suggests beneficial effects on pain and disability in the short term (3 to 6 weeks) but no effect on long-term outcomes, most notably return to work and use of surgery [16]. Intraforaminal glucocorticoid injections have produced conflicting results, with no effects in some studies and no proof of superiority over the conventional epidural route.

4. Evaluation of treatments used before hospital admission

In a study reported at this meeting, we evaluated the treatments used before admission in 100 patients with uncomplicated disk-related sciatica. There were 61 men and 39 women, with a mean age of 46.7 years and a mean pain duration of 52 days. Only 88% of patients had seen their family physician and 34% a rheumatologist before admission to our rheumatology department. Over half the patients had never received step 3 analgesics and only 18% had had one or more intraspinal glucocorticoid injections. In contrast, 25% had taken systemic glucocorticoid therapy, 28% had received spinal manipulation, and 38% had worn a lumbar corset. The findings indicate wide variability in outpatient treatments used for sciatica and suggest that some hospital admissions may be inappropriate. The development of healthcare networks deserves consideration as a means of improving the outpatient management of sciatica.

5. Hospital admission

Physicians may refer sciatica patients to the hospital for a number of reasons, including doubt regarding the diagnosis and presence of neurological deficits, although the most

common reasons are severe pain and patient request. Admission for sciatica seems far more common in France than in other countries [17]. In-hospital management of sciatica was evaluated in a 1998 survey conducted by the French Society for Rheumatology in 106 rheumatology departments [18]. Treatments varied widely across departments. Hospital stay duration ranged from 5 to 20 days and NSAID treatment duration from 5 to 30 days. The number of epidural injections ranged from 1 to 4 and the interval between injections from 2 to 7 days. Spinal traction was used in 38% of departments and bracing in 50%. Similar variability occurred in the use of immediate or delayed physical therapy. However, most rheumatologists agreed on the following points: bed rest should be limited to 2 weeks; NSAID therapy, step 1 or 2 analgesics, and epidural glucocorticoid injections should be given; and a lumbar corset should be prescribed in patients with persistent pain at discharge [18]. A study of short-term outcomes at discharge showed absence of pain in 19% of patients and marked improvements in 61% [19]. Factors predicting a favorable outcome may include absence of strict bed rest prior to admission, a wide angle of the straight leg-raising test, and absence of belief on the part of the patient that surgery is necessary.

The in-hospital treatment program delineated by this survey raises a number of questions. Strict bed rest, bracing, and spinal traction were widely used, although none of these methods has been proved effective. Analgesic therapy and epidural glucocorticoid injections can be given on an outpatient basis. Hospital admission delays the return to normal activities. Thus, available data fail to suggest that medical _in-hospital_ treatment improves the mid-or long-term outcomes of sciatica or reduces the use of surgery.

6. Radical treatments

6.1. Percutaneous procedures

This type of treatment was long dominated by chymopapain nucleolysis, which was effective but induced side effects. Chymopapain is no longer used, and current percutaneous treatments include a variety of methods.

- Ethanol chemonucleolysis produced complete symptom relief in 97.6% of patients in an open-label study. However, this result should be viewed with skepticism. Ethanol can induce nerve toxicity [20].
- Intradiscal injection of an oxygen-ozone mixture was successful in 70.3% of cases after 6 months in an open-label study [21].
- Intradiscal laser and radiofrequency ablation was successful in 75% to 80% of cases in several open-label trials [22].
- Automated percutaneous discectomy produced excellent results in open-label studies but had a 1-year success rate of only 37%, compared to 66% with chymopapain chemonucleolysis [23]. This result should prompt great caution when using percutaneous methods. In the absence

of comparative studies versus surgery or medical treatments, the efficacy of laser treatment or intradiscal injections remains unknown.

6.2. Disc surgery

Disc surgery is a reliable treatment method. Conventional discectomy and microdiscectomy seem to produce similar results [24]. The success rate is usually greater than 80%, with marked improvement of the nerve root pain. Improvements occur early, within the first few days after the procedure. Complications occur in 0.5% to 3% of patients and include dural tears, hematoma, infectious discitis, deep vein thrombosis, and pulmonary embolism.

7. Medical treatment or surgery?

Three randomized controlled trials in more than 100 patients compared surgery to continued medical treatment.

7.1. The earliest trial

The earliest trial [25] included 126 patients with persistent pain despite 2 weeks of in-hospital management. Patients were randomly assigned to surgery or medical treatment. The 17 patients in the medical-treatment group who required surgery were included in the medical-treatment failures. After 1 year, the outcome was favorable in 91% of patients treated surgically compared to only 61% of those treated medically. The difference was no longer statistically significant after 4 years and 10 years.

7.2. The Spine Patient Outcomes Research trial (SPORT)

The Spine Patient Outcomes Research trial (SPORT) compared surgery to medical treatment in 1244 patients included in two studies: 501 patients participated in a randomized controlled trial [26] and 743 in a prospective cohort study in which patients chose between surgery and medical treatment [27].

The randomized controlled trial [26] included 501 patients (42% women; mean age, 42 years) with sciatica or femoral neuralgia of at least 6 weeks' duration. Patients were allocated at random to discectomy or continued medical treatment. The two groups were comparable at baseline. Medical treatment included patient information, exercises, and NSAID therapy; oddly enough, the other components of the treatment program were not standardized. After 1 year, 94% of patients were available for evaluation. After surgery, complications occurred in 5% of patients; they included blood transfusion (2%), dural tears (4%), and infections (2%). Repeat surgery for recurrent disk herniation was needed in 2% of patients within the first year. Unfortunately, adherence to the assigned treatment was limited: within the first 3 months, 30% of patients in the medical group underwent surgery, whereas 50% of patients in the surgical group improved to such an extent that surgery was not performed. Patients who underwent surgery despite assignment to the medical-treatment group had significantly lower

incomes and significantly worse pain and disability; in addition, at inclusion in the study they were more likely to report a belief that their condition would worsen over time. No definitive conclusions can be drawn from this study, which merely suggests that surgery may effectively relieve the pain without modifying the overall outcome.

The observational cohort study [27] included 743 patients who chose surgery ($n = 521$) or medical treatment ($n = 222$). The authors point out the limitations of this uncontrolled study. Patients who chose surgery had lower incomes, higher body mass index values, and higher rates of co-morbidities, particularly joint disease; they were more likely to be on sick leave and to be receiving compensation. Despite these factors of adverse prognostic significance, their 3-month and 12-month outcomes were better than those in the medical-treatment group for all the evaluation criteria including return to work.

7.3. The third randomized controlled study

The third study was published in May 2007 [28]. Early surgery within 2 weeks ($n = 141$) was compared to prolonged medical treatment by the usual physician (reassuring information and analgesics), with surgery if needed ($n = 142$), in patients who had had sciatica for 6 to 12 weeks. In the early-surgery group, 16 patients recovered before surgery. In the other group, 55 patients eventually underwent surgery because of severe pain, after a median of 14.6 weeks. After 1 year, the perceived recovery rate was 95% in both groups. Nevertheless, median time to leg-pain resolution was 4 weeks in the early-surgery group compared to 12 weeks in the other group. The faster effect of surgery was not associated with any of the studied baseline factors, including age, occupation, sex, angle of the straight leg-raising test, baseline pain level, whether the herniation was excluded, level of the herniation, or patient preference for surgery.

Although these three studies support faster relief from pain and disability with surgical treatment, they share a number of methodological limitations. No sham operation (skin incision without discectomy) was performed in the control groups, so that a possible placebo effect of surgery cannot be ruled out. Placebo effects of surgery have been demonstrated in other fields. The evaluators were not blinded to the study treatment. The medical treatment used for comparison varied across patients. Furthermore, opiate analgesics and epidural injections were not used routinely in the medical-treatment arms.

8. Suggested management strategy

8.1. Initial diagnostic workup

The diagnostic phase often receives insufficient attention. An accurate diagnosis is essential to optimize treatment decisions in patients with disk-related sciatica. Many physicians underestimate the difficulty of diagnosing sciatica. The full-blown clinical picture is easy to recognize: it combines pain in the distribution of either the L5 or the S1 root that worsens with coughing and radiates to the foot, limited forward flexion of the lumbar spine, step deformity, and unilateral spasm of the paraspinal muscles. However, atypical pictures often lead to diagnostic errors, which in turn result in inappropriate treatment decisions. Sciatica may be overdiagnosed in a patient with low back pain radiating to the buttock and thigh but stopping above the knee, no neurological signs, and a straight leg-raising test that exacerbates the low back pain without eliciting nerve root pain. The correct diagnosis in this situation is low back pain without sciatica. Both prolonged medical treatment and surgery are inappropriate; the treatment should consist in physical therapy and a return to an active lifestyle. Another source of diagnostic error is sciatica that persists because of psychological factors related, for instance, to problems in the family or at work or to anxiety generated by documentation of a disk herniation on imaging studies. Resolution of the spinal signs, absence of neurological signs, reported severe pain contrasting with minimal physical findings, and unresponsiveness to all analgesics including morphine should suggest a role for psychological factors. The physician should conduct a nonjudgmental discussion with the patient about current sources of conflict, beliefs about the disease, and expectations about the outcomes. Finally, complications of sciatica may go unrecognized at first. Motor loss may be missed if the physician fails to evaluate toe and heel walking or to ask about sphincter dysfunction. Neurological complications due to nerve root ischemia may develop with delay, after 4 or 5 days, at a time when the pain is abating.

Even when imaging studies show a disk herniation at a location that matches the clinical manifestations, a comprehensive evaluation is in order before treatment decisions are made. The following factors should be evaluated: family life and situation at work; previous history of disease, most notably depression and suicide attempts; previous surgical procedures on the spine or elsewhere; objective spinal signs (spasm, stiffness, step deformity, and exacerbation of the nerve root pain by the straight leg-raising test on the same side or the contralateral side); neurological signs (motor or sensory loss, abnormalities of reflexes, or sphincter dysfunction); and the patient's beliefs about sciatica and disk herniation.

8.2. Choosing the initial medical treatment

According to evidence in the literature, medical treatments that are at least partly effective include analgesics (most notably opiates), NSAIDs taken for no longer than 2 weeks, and two to three epidural glucocorticoid injections. Family physicians should recognize that a patient with sciatica will require prompt morphine therapy if step 2 analgesics are inadequately effective. Patients with persistent pain after 10 days should be referred to the rheumatologist for epidural injections, which require specific technical expertise.

Patients should be told that bed rest is unnecessary and does not improve the outcome. They should be informed about the potentially devastating neurological complications that can occur after spinal manipulation. The inability of systemic

glucocorticoid treatment, bracing, spinal traction, and physical therapy to relieve the pain should be pointed out. Use of these ineffective treatments wastes time, results in high costs, discredits our profession, and further convinces the patient that surgery is inevitable.

8.3. When is admission to a medical ward appropriate?

Admission to a rheumatology department rather than an emergency department is in order in patients with complications of sciatica such as sphincter dysfunction suggesting cauda equina syndrome, a systematized motor deficit with onset within the last 7 days (although proof that surgery is effective in restoring motor function is not available [29]), evidence of infection, or signs suggesting a tumor (severe decline in general health, spreading neurological deficit, and recent history of cancer).

There is no evidence that admission is helpful in patients with uncomplicated sciatica. No controlled trials showing greater efficacy of inpatient treatment compared to outpatient treatment are available.

8.4. Selecting patients for surgery

There is a consensus that immediate surgery is appropriate in patients with cauda equina syndrome, as early decompression increases the chances of recovery. Early surgery is also advocated in patients with marked motor loss of less than 48 h duration, despite the absence of proof that this strategy increases the recovery rate [29].

No factors that reliably predict the outcome in the individual patient with uncomplicated sciatica have been identified to date. Neither the baseline clinical manifestations nor the imaging study findings predict the outcome. Nevertheless, the risk of a poor outcome seems higher when the evaluation is delayed or the patient has an extended period on sick leave before being evaluated for possible surgery. Failure of medical treatment can be defined as persistent pain after *combined* treatment with NSAIDs, morphine, and three epidural glucocorticoid injections over a 4-week period. In this situation, imaging studies should be obtained and the appropriateness of surgery evaluated. Based on available studies, surgery consistently produces better outcomes than percutaneous treatments, whose evaluation remains largely inadequate.

We believe that the most honest approach in this situation is to **let the patient choose** between surgery and medical treatment. The patient should be informed that surgery does not modify the long-term outcome but hastens the recovery, at the expense of a 1–3% rate of complications, most of which are reversible.

9. Conclusions: Developing healthcare networks

The management of patients with sciatica could be improved by developing an outpatient care network. The first level in the network would consist in general practitioners trained (a) to promptly identify patients with complicated sciatica; (b) to prescribe NSAIDs and, most importantly, analgesics, with regular dosage adjustments during home visits; and (c) to reassure anxious patients, by conducting careful physical examinations that demonstrate the absence of complications, providing clear information on the various steps of the management strategy, and giving reassurance about the imaging study findings. At the second level of the network, experienced rheumatologists would (a) perform two to three epidural glucocorticoid injections on an outpatient basis; (b) identify psychological disorders or sources of conflict within the family or at the workplace, then put the patient in contact with a mediator (usual physician, psychologist, psychiatrist, or social worker); and (c) identify patients whose unfavorable course warrants referral to a surgeon after information about the advantages and drawbacks of radical procedures. Finally, the last level would consist in surgeons who (a) refrain from operating on patients with predominantly low back pain or with persistent pain related to psychosocial or work-related factors; (b) provide patients with honest information on the results and complications of discectomy; and (c) perform surgical procedures in accordance with widely accepted guidelines.

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