CME CREDIT

Back pain: medical evaluation and therapy

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SUMMARY Most patients with acute low back pain or sciatica improve with appropriate conservative therapy, and most require no immediate diagnostic studies beyond a careful history and examination. In patients with "red flags" for visceral, malignant, or infectious causes or possible cauda equina syndrome, a more aggressive evaluation is mandatory. In patients whose pain does not respond to initial management or who have chronic symptoms, diagnostic reevaluation is appropriate.

KEY POINTS In patients with acute symptoms involving the low back and leg, the duration of symptoms, the distribution of pain, and the age of the patient help focus the initial evaluation. If a careful initial evaluation excludes serious visceral or noninflammatory disease, the favorable natural history of both back pain and radiculopathy mandates an aggressive medical approach to treatment. Results of imaging studies are frequently abnormal in people without symptoms and must be interpreted with careful clinical correlation. Identifying complicating psychosocial issues, particularly in patients with chronic symptoms, is critical for proper diagnosis and treatment.

INDEX TERMS: LOW BACK PAIN; SCIATICA
CLEVE CLIN J MED 1995; 62:163–168

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LOW BACK PAIN is enormously costly to society in both monetary and human terms. Approximately 90% of adults experience an episode of back pain at some point in their lives.[1] In fact, back pain is second only to upper respiratory infection as a symptom-related reason for visits to office-based physicians.[2] In people under age 45, it is the most common impairment that limits physical activity.[3]

The direct costs of diagnosing and treating low back pain in the United States in 1990 were estimated at $23.5 billion.[4] Indirect costs that same year, including lost earnings, approached $35 billion, resulting in total costs approaching $50 billion. Medical management is complicated by the absence of consistent, commonly accepted diagnostic terminology and marked variation in the use of diagnostic procedures and treatments among physicians from various specialties.[5,6]

Management of low back pain represents a challenge for healthcare providers, employers, and government, both state and federal. This paper examines these challenges and presents an overview of current management of this common complaint.

ETIOLOGY AND PRESENTING SYMPTOMS

A precise anatomic explanation is frequently impossible in patients who present with low back pain. In fact, a specific anatomic cause is clearly and objectively identified in only a minority, perhaps 20% to 25%. Only 1% to 2% of people with back pain have disk herniation with radiculopathy, although this is frequently the focus of the workup and the patient's primary concern.[1]

Unfortunately, the search for a specific explanation for symptoms often focuses on radiographic or imaging "abnormalities" of no real clinical significance. On plain radiographs, these clinically insignificant findings include single-level disk-space narrowing, disk calcification, mild spondylolisthesis, mild-to-moderate scoliosis, and increased lumbosacral angle.[7] Magnetic resonance imaging (MRI) and computed tomography (CT) reveal disk herniation, canal stenosis, and degenerative disk disease with surprising frequency in people who have no symptoms. Attributing symptoms to these radiographic findings may not only be inaccurate, but might also lead to inappropriate and often unnecessarily invasive therapy, including surgery.

DIAGNOSTIC FEATURES

Three important features help to direct the medical diagnosis and management of low back pain.

Duration of symptoms

Back pain is arbitrarily classified according to its duration. Acute back pain is defined as beginning less than 4 weeks previously; subacute, 4 to 12 weeks; and chronic, more than 12 weeks.

The duration of the pain has diagnostic and prognostic implications. Most acute low back pain resolves quickly with minimal intervention. In general, at least 60% of patients with acute back pain return to work within 1 month, and 90% return within 3 months.[8] The early diagnostic evaluation, therefore, should focus on recognizing the rare patient with a visceral or inflammatory cause of pain. The failure of symptoms to resolve as expected suggests the need to reevaluate the patient's complaints as well as to identify complicating issues—nonorganic psychosocial barriers—delaying recovery. Evaluating nonorganic factors is even more critical in patients with chronic pain, particularly when litigation or compensation is an issue.

Distribution of the pain

The ratio of back pain to leg pain is critical in establishing the differential diagnosis. Leg pain as the primary symptom, particularly below the knee, is characteristic of true sciatica. Absence of leg pain raises an entirely different set of possibilities.

Age of the patient

People over age 50 are clearly at greater risk for serious nonmechanical sources of subacute and chronic back pain, such as malignant diseases or infection. Degenerative disk and joint disease, often involving multiple levels, is another frequent source of pain in this age group. In younger patients, the differential diagnosis is quite different in most cases. The peak age for disk herniation and sciatica is 30 to 50 years. Likewise, fibromyalgia is more common in patients under age 50. Subacute or chronic back pain in a younger patient should prompt consideration of a spondyloarthropathy, such as ankylosing spondylitis or Reiter's syndrome.

EVALUATING SCIATICA

True sciatica

"True sciatica" refers to symptoms (eg, pain, paresthesia, weakness) related to nerve-root impingement and inflammation. Leg pain is the predominant symptom, as opposed to back pain. "Pseudosciatica" refers to a similar set of symptoms with a nonradicular cause. Sciatica has many causes, the most common being disk herniation with nerve-root impingement (*Table 1*).

Herniated nucleus pulposus

More than 95% of disk herniations occur at the L4-5 or L5-S1 level, producing L5 or S1 radiculopathy. Characteristically, the leg pain extends below the knee; this is useful for discriminating sciatica from other nonsciatic conditions. Another clinical feature of sciatica is more severe pain when seated, when intradiscal pressure is greatest. Pain is often relieved in the supine position and increases with coughing or the Valsalva maneuver.

A positive tension sign (sciatic pain when the straight leg is passively raised between 30° and 60° while the patient is supine) is about 80% sensitive for disk herniation in patients with L5 or S1 radiculopathy.[9] Even without any other neurologic features, a positive tension sign should strongly suggest disk herniation and sciatica. Patients with L5

radiculopathy may demonstrate motor signs that include weakness of the extensor hallucis longus muscle or an inability to walk on the heels. Patients with S1 radiculopathy may demonstrate loss of the ankle jerk reflex and an inability to walk on the toes. Classically, pain caused by disk herniation is worse with flexion and tends to be relieved with spinal extension, although these are not entirely reliable features.

In most cases, the history and physical examination suffice to diagnose disk herniation. Because most patients with disk herniation and sciatica improve with nonoperative care, and the results of imaging studies will not affect initial management in most cases, imaging should be considered only in cases of diagnostic uncertainty, failure of nonoperative care (symptoms persisting 8 to 12 weeks, suggesting the need for surgical consultation and intervention), or suspected cauda equina syndrome (rare), the classical presentation of which is the triad of saddle anesthesia, leg weakness, and loss of bowel and bladder control.

CT, MRI, and myelography have comparable sensitivity and specificity in identifying disk herniation. Myelography, although invasive, offers the advantage of visualizing the entire thoracolumbar spine and detecting abnormalities at levels that might not be scanned on CT. MRI shares this advantage and is noninvasive. Gadolinium contrast enables MRI to distinguish scar formation from disk material as a source of radicular symptoms.

Of note, 20% of subjects under age 60 *without symptoms* are found to have herniated disks by CT or MRI.[10,11] Spinal stenosis or disk degeneration is also frequently found in asymptomatic people, particularly after age 60. Therefore, imaging findings must be integrated with the clinical picture for appropriate interpretation.

Approximately 80% of patients with disk herniation and sciatica improve with nonoperative therapy, and only 5% to 10% may ultimately require surgery.[12] Nonoperative care consists of anti-inflammatory drugs, 1 week or less of rest, and an active physical therapy program, started early. Most patients managed in this manner show improvement within 6 weeks. Surgery is indicated in patients who do not respond to medical management or who are unwilling to wait 6 to 12 weeks for relief of symptoms.

Long-term outcomes of medical and surgical therapy are similar.[13] Weber[14] compared the outcomes of medical and surgical therapy in a 10-year study of 280 patients with myelographically proven herniated disks. Although surgical therapy produced faster improvement, the outcomes were equivalent at 4 years, and this lack of difference persisted at 10 years.

TABLE 1
DIFFERENTIAL DIAGNOSIS OF TRUE SCIATICA AND PSEUDOSCIATICA

True sciatica
Herniated nucleus pulposus
Lateral or foraminal stenosis
Intraspinal tumor or infection
Extraspinal plexus compression
Piriformis syndrome
Lumbar canal stenosis
Pseudosciatica
Hip disease (osteoarthritis)
Trochanteric bursitis
Meralgia paresthetica
Diabetic amyotrophy
Vascular claudication

Sciatica without disk herniation

Imaging studies sometimes fail to demonstrate a significant abnormality in patients strongly suspected on a clinical basis of having herniation with radiculopathy. Before ordering CT or MRI, one should consider and rule out several other conditions that can produce leg pain in the absence of disk herniation.

Trochanteric bursitis. This easily identified condition, which is more common in women, can produce leg pain that may superficially mimic radicular pain. Palpation over the greater trochanter reproduces the patient's typical pain syndrome. Clinical features include ipsilateral leg pain, iliotibial band tenderness, pain with crossed legs, pain while lying on the affected side, pain while walking down stairs, increased pain after standing for more than 15 minutes, and paresthesia. A recent study found that almost 25% of patients evaluated for low back pain had the greater trochanteric pain syndrome as the source of their symptoms.[15] The condition is usually managed well with oral anti-inflammatory agents or intrabursal corticosteroid injections.

Piriformis syndrome. The piriformis muscle arises from the inside of the pelvis over the sacrum and runs laterally through the sciatic notch. Trauma to

TABLE 2
SELECTIVE INDICATIONS FOR ROENTGENOGRAPHY IN ACUTE LOW BACK PAIN*

Age over 50 years
Significant trauma
Neuromotor deficits
Unexplained weight loss (10 pounds in 6 months)
Suspicion of ankylosing spondylitis
Drug or alcohol abuse
History of cancer
Use of corticosteroids
Temperature ≥ 100°F (37.8°C)
Recent visit (within 1 month) for same problem and not improved
Patients seeking compensation for back pain

*Adapted from Deyo and Diehl, reference 24

the piriformis muscle with spasm and inflammation may produce concomitant sciatic-nerve impingement. This little-known syndrome may be quite common: in one study, it accounted for 6% of patients with chronic back pain.[16]

The clinical syndrome is characterized by buttock and leg pain in almost all patients. Low back pain is present in 50% of patients; difficulty sitting and walking in 58%. In women, dyspareunia is noted in 23%.[17] Piriformis muscle tenderness, which may require rectal examination to demonstrate, is diagnostic. Other clinical signs include a positive Pace's sign (the seated patient abducts the flexed knees against the examiner's resistance; a positive test is characterized by pain with forced abduction), and a positive Freiberg's sign (in which internal rotation of the straight hip reproduces symptoms). An antecedent traumatic event, which may be quite minor, is identified in most patients. Effective treatment consists of a piriformis stretching exercise program and, in some cases, injection of the piriformis muscle with steroids.

Lumbar canal stenosis. Spinal stenosis is the most common reason for spinal surgery in patients over age 65.[18] The classic symptom is pseudoclaudication characterized by buttock, thigh, or leg pain, paresthesia, or weakness on standing or walking. Pain is relieved with spinal flexion. Most patients with spinal stenosis have bilateral symptoms, in contrast to the unilateral symptoms of disk herniation and sciatica. Back pain is present in 65% of patients with lumbar canal stenosis.[19] Although objective findings on physical examination are typically minimal, electromyography may demonstrate bilateral multiple lumbosacral radiculopathies. The clinical diagnosis is based primarily on the history.

Lateral recess or foraminal stenosis may produce a more unilateral symptom complex, but one unlike sciatica related to disk herniation. Symptoms are not relieved by supine posture, and sciatic pain on straight leg raising is much less common, present in 50% of patients.

EVALUATING ACUTE LOW BACK PAIN

Most patients with acute low back pain have a very favorable prognosis. In a Swedish study of almost 1000 men in their 40s, almost two thirds had returned to work by 30 days; 90% by 60 days.[8]

Clinical evaluation

The task during the initial evaluation is to identify the few patients (fewer than 1% in most studies[20,21]) who have a serious cause of their acute or recent-onset symptoms, such as a malignant disease or fracture.

In all patients with acute low back pain, a careful history and examination is indicated. The following "red flags" mandate a more aggressive investigation: constant pain not relieved by positional change; pain at rest, particularly at night; fever; weight loss; and history of malignant disease. An underlying malignant or infectious cause should be suspected in any patient (particularly over age 50) who does not respond to conservative therapy for a presumed benign back strain.

Roentgenography

Plain roentgenography of the lumbar spine rarely provides clinically useful information in the initial evaluation of acute low back pain. In a large retrospective analysis, radiographic findings were either normal or of questionable clinical significance in over 75% of patients.[22] A similar analysis found oblique views added useful information in only 2.7% of patients.[23]

Because of the benign natural history of acute low back pain and the low yield of roentgenographic studies, selective criteria have been proposed for ordering a lumbar roentgenogram (anteroposterior and lateral views only) at the first visit (*Table 2*).[24] Application of these criteria during the evaluation of 621 patients with low back pain appropriately resulted in

roentgenography being performed in all patients subsequently found to have malignant diseases and in 13 of 14 with fractures.[24] Whether these criteria might actually increase roentgenogram use and medical costs remains a concern.[25]

TABLE 3
WADDELL'S NONORGANIC PHYSICAL SIGNS*

Test	Inappropriate response†
Tenderness	Superficial, nonanatomic tenderness to light touch
Simulation	
Axial loading	Vertical loading on standing patient's skull produces low back pain
Rotation	Passive rotation of shoulders and pelvis in same plane causes low back pain
Distraction	Discrepancy between finding on sitting and supine straight leg raising tests
Regional disturbances	
Weakness	Cogwheel (give-way) weakness
Sensory	Nondermatomal sensory loss
Overreaction	Disproportionate facial expression, verbalization, or tremor during physical examination

*Adapted from Waddell et al, reference 32
†The presence of three or more inappropriate responses suggests complicating psychosocial issues in patients with low back pain

TREATMENT

Nonnarcotic analgesics should be used for symptom relief, with the goal of permitting the patient to resume normal physical activity. Passive treatments such as heat, ultrasound, or massage may be used briefly for early symptom relief.

Prolonged bed rest is not indicated and may prolong disability. Deyo[26] demonstrated that patients told to rest for 2 days had similar clinical outcomes compared with those for whom 7 days of rest were recommended, but the latter group missed 45% more work days. The adverse consequences of excessive bed rest probably result from deconditioning and reinforcement of sick-role behavior.

Although most studies of spinal manipulation had variable results and were of poor quality, a recent meta-analysis suggests that manipulation may provide marginal short-term benefit.[27] At 3 weeks, 50% of patients with acute low back symptoms had improved without manipulation, compared with 67% of those treated with manipulation. No conclusions regarding the efficacy of spinal manipulation for chronic pain could be made.

Subacute low back pain

After 4 to 6 weeks (during which most patients with acute symptoms improve), the examiner must consider three questions:

Was the original diagnosis correct? If a patient fails to exhibit improvement by 4 to 6 weeks, expansion of the differential diagnosis and additional diagnostic studies should be considered. The other possibilities include structural causes (severe multilevel degenerative disk or joint disease, severe spondylolisthesis, severe kyphoscoliosis), spondylitis, infection, malignant disease, and fibromyalgia. Patients should undergo roentgenography at this point, if they have not already.

Do psychosocial barriers to recovery exist? Psychosocial barriers can be economic (ie, greater financial compensation when off work than at work) or social (ie, job dissatisfaction). For example, a study at the Boeing Company in Seattle demonstrated that subjects who "hardly ever enjoyed their work" were 2.5 times more likely to report back injury than those who enjoyed their work.[28] In patients with more chronic symptoms, ongoing psychiatric disorders are common. A recent study using structured psychiatric interviews of patients with chronic back pain demonstrated anxiety disorders, depression, or substance abuse in 59%.[29] In more than 50% of these patients, these conditions antedated the back symptoms.

Historical and physical findings can identify patients in whom nonorganic issues are present early on. In "pain drawings," patients are asked to mark the nature and distribution of their pain on a standard silhouette of the human body; nonanatomic distribution of markings and markings outside the figure suggest a high likelihood of psychogenicity.[30] This pattern is easily distinguished from drawings by patients with sciatica or simple myofascial strain.[31]

The Waddell tests, a set of five maneuvers easily performed during a routine physical examination, identify patients with nonorganic issues important in symptom persistence (*Table 3*).[32]

Was the initial treatment appropriate? Was the therapy too passive for too long, resulting in decondi-

tioning, depression, pain behavior, and fear of reinjury? In this situation, more aggressive physical reconditioning that emphasizes functional restoration may be required for recovery.

SUMMARY

Evaluating acute low back pain is a challenge. The frequent inability to identify a specific cause, frustrating to both patient and physician, is offset by the generally very favorable prognosis for recovery with simple therapy. The clinician's task at the initial evaluation is to identify the rare patient who has a serious visceral or nonmechanical source of pain. In patients who do not respond to early treatment as expected, a reevaluation focusing on diagnosis, role of nonorganic issues, and possible deconditioning is critical to an optimal outcome.

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