

Clinical Signs of Low Back Pain

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Back pain has been cited as the fifth most common reason that patients visit a physician.¹ Common causes of back pain include musculoskeletal injuries, degenerative disease, herniated nucleus pulposus, and spinal stenosis. Less common causes include metastatic cancer, spinal infections, ankylosing spondylitis, and referred pain from visceral organs. Although the majority of causes of back pain are benign, clinicians must be alert to potential red flags indicating serious pathology.

HISTORY

A patient's medical history can provide major clues to a potential diagnosis. The essential components of a thorough history include onset, location, quality, and radiation of the pain, factors that relieve or aggravate the pain, and associated symptoms. Mechanical low back pain is characterized by increased pain with motion and decreased pain with rest, whereas the pain of nonmechanical low back pain generally occurs at rest and is less affected by motion.²

There are 2 important questions to consider when evaluating a patient with low back pain: (1) Is there a serious disease, such as metastatic cancer, causing the pain? (2) Is there any neurologic compromise? Assessment of historical clues, such as accompanying fever, weight loss, history of cancer, nocturnal pain, morning stiffness, and radicular pain, is also necessary.²

PHYSICAL EXAMINATION

The patient's spine should be inspected first for abnormal curvatures, and the gait should be observed. The gait is best assessed while the patient walks across the room, turns around, and then comes back. The physician should carefully observe the patient's posture and movement. The patient should then be observed in the seated position; patients with localized pain and muscle spasm may exhibit abnormal posture. Palpation and percussion of the vertebrae should be performed to elicit localized tenderness. Range of motion, including flexion, extension, and rotation, should also be assessed.³

CLINICAL EVALUATION FOR LOW BACK PAIN

History

Description of pain—onset, location, quality, radiation, relieving/aggravating factors
Associated signs and symptoms

Physical examination

Visual inspection of spine
Observation of gait
Observation of patient in seated position
Palpation/percussion of vertebrae
Range of motion (straight-leg raise test)

Neurologic examination of lower extremities

Muscle bulk, strength, tone
Tendon reflexes
Sensory examination

Neurologic examination should include assessment of muscle bulk, strength, and tone, assessment of tendon reflexes, and sensory examination.⁴ A straight-leg raise test should be performed in patients with evidence of sciatica or radicular pain. The straight-leg raise test is specifically aimed at detecting lumbar nerve root irritation. A positive straight-leg raise sign is identified when sciatica is reproduced between 30 and 60 degrees of leg elevation (**Figure 1**). Ipsilateral straight-leg raising has high sensitivity but low specificity, whereas the crossed straight-leg raising sign has high sensitivity and is also highly specific. Radicular pain arises from nerve root compression or irritation.

Other significant neurologic findings include pseudo-claudication (ie, bilateral leg pain of nonvascular etiology elicited by walking or prolonged standing), weakness of

(continued on page 42)

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(from page 39)

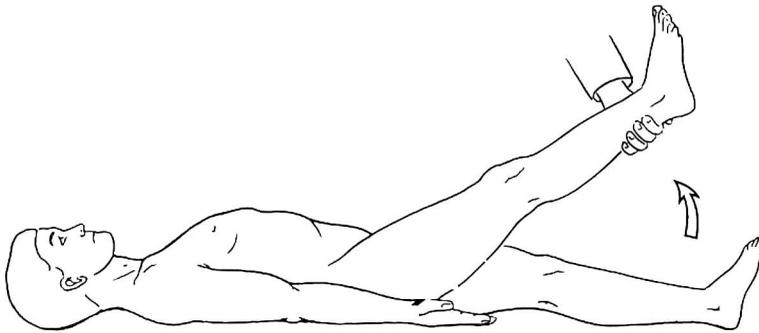


Figure 1. Illustration of the straight-leg raise test. (Reprinted with permission from Judge RD, Woolliscroft JO, Zeleznock GB, Zuidema GD, editors. The Michigan manual of clinical diagnosis: the basis of cost-effective medical practice. Philadelphia: Lippincott-Raven; 1998:298.)

Table I. Neurologic Testing for Lumbosacral Nerve Root Compression

Nerve Root	Intervertebral Space	Motor Function	Reflex
L4	L3-4	Dorsiflexion of foot	Knee jerk
L5	L4-5	Dorsiflexion of great toe	None
S1	L5-S1	Eversion of foot and plantar flexion	Ankle jerk

NOTE: Protrusion of an intervertebral disc is usually posterolateral. A posterolaterally protruded disc may compress the roots of a spinal nerve and usually compresses the next lower nerve root (eg, an L3-4 disc herniation will compress the L4 nerve root, an L4-5 disc herniation will compress the L5 nerve root).

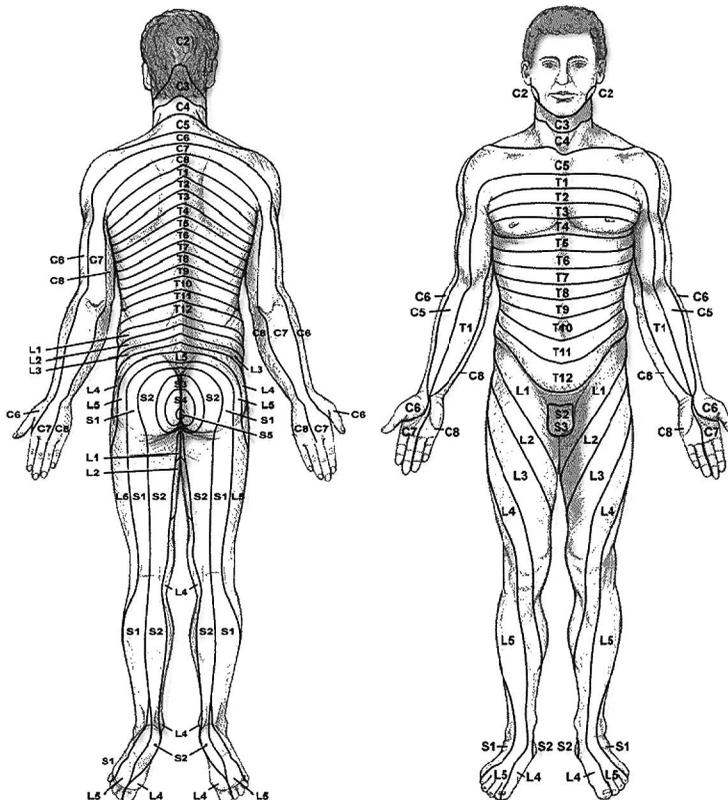


Figure 2. Illustration of the dermatomes. (Available at <http://www.chiroprpage.com/dermatomes.htm>. Reprinted with permission from Chiroprpage. Copyright © 1999.)

Table 2. Differential Diagnosis and Accompanying Signs of Low Back Pain

Type of Low Back Pain	Quality of Pain	Signs
Mechanical		
Back strain	Spasms	Increased pain with activity; tenderness to palpation; limited range of motion; abnormal posture
Disk herniation	Sharp	Increased pain with sitting; radicular pain on straight-leg raising
Osteoarthritis	Ache	Increased pain with activity; decreased range of motion
Spinal stenosis	Ache	Pseudoclaudication; decreased pain with back flexion; increased pain with extension
Spondylolisthesis	Ache	Exaggeration of lumbar curve; pain with spine extension
Nonmechanical		
Ankylosing spondylitis	Ache	Decreased range of motion; diagnosed by Schober's test
Infection (abscess, osteomyelitis, discitis)	Sharp	Localized tenderness to percussion; fever
Malignancy	Dull	Constant pain; nocturnal pain; localized tenderness; weight loss
Visceral		
Nephrolithiasis	Colicky	Flank pain radiating into the inguinal region and testicle; hematuria; writhing
Pyelonephritis	Dull	Fever; flank pain; chills; dysuria; costovertebral angle tenderness
Aortic aneurysm	Sharp	Pulsating abdominal mass; severe back, abdominal, or flank pain if ruptured
Diseases of the pelvic organs and gastrointestinal tract	Varies	Referred pain; associated abdominal pain; pain associated with menstrual cycle; pain unrelated to movement; cramping or colicky pain

the lower extremities, and diminished reflexes.⁴ The leg pain of pseudoclaudication is usually bilateral, although the pain on one side may be worse than on the other. Motor and reflex deficits for specific lumbar nerve roots are outlined in **Table 1**. Nerve root compression or irritation may also lead to a dermatomal distribution of pain (**Figure 2**), paresthesia, and numbness. The differential diagnosis and accompanying signs of low back pain are presented in **Table 2**.

MECHANICAL BACK PAIN

Causes of mechanical back pain include lumbar strain, herniated disks, spondylosis, spondylolisthesis, spinal stenosis, and fractures. Pain from mechanical causes is typically aggravated with motion and relieved with rest.

Disk Herniation

Disk herniation (**Figure 3**) occurs most commonly between the fourth and fifth lumbar vertebrae and between the fifth lumbar and first sacral vertebrae.⁵ Patients with L5 radiculopathy (at the L4-5 disk) report low back, hip, and lateral thigh and leg pain

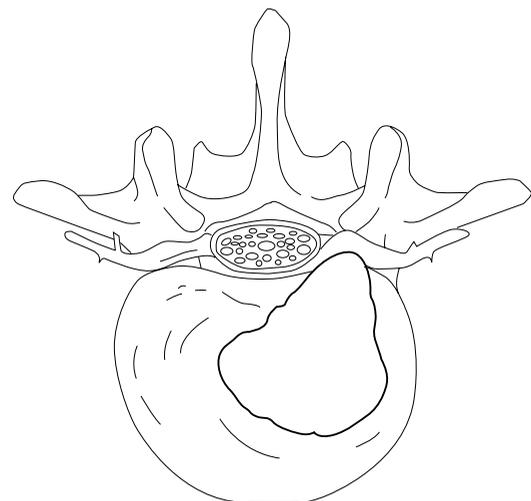


Figure 3. Herniated nucleus pulposus.

and have weakness of dorsiflexion of the foot and toes. Patients with S1 nerve root compression (at the L5-S1 disk) report pain in the posterior thigh, lateral calf, and foot, and have weakness of eversion and plantar

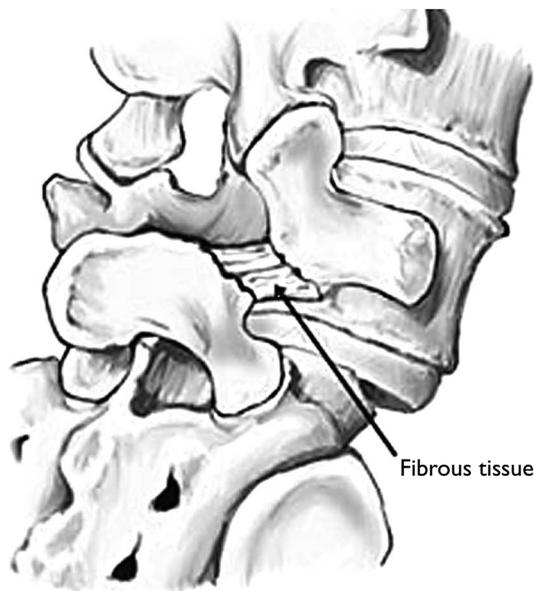


Figure 4. Mechanism of spondylolisthesis. (Reprinted with permission from Medtronic [<http://www.medtronicsofamordanek.com>]. Available at <http://www.back.com/causes-mechanical-spondylolisthesis.html>. Copyright ©2003.)

flexion of the foot with diminished ankle reflexes. Patients with disk herniation have pain with forward flexion, whereas patients with spinal stenosis have pain with extension. Cauda equina syndrome can be caused by a massive midline disk herniation. Patients may report bilateral sciatica with sensory deficits over the perineal regions (so-called “saddle anesthesia”).

Spinal Stenosis

Spinal stenosis occurs when the spinal cord is compressed. This condition should be suspected in patients with low back pain that is aggravated by walking and with hyperextension of the back and that is relieved by rest or flexion of the back. These patients often have fewer symptoms walking uphill than downhill, because the volume of the spinal canal increases with back flexion and decreases with extension. Patients may also report pseudoclaudication and sciatica. Pseudoclaudication or bilateral leg pain can occur with walking or prolonged standing.

Spondylolisthesis

Spondylolisthesis occurs when there is forward displacement of 1 or more lumbar vertebrae (Figure 4). Spondylitic spondylolisthesis is the most common type and occurs because of a defect in the pars interarticularis (ie, a defect in the thin isthmus of bone connecting the

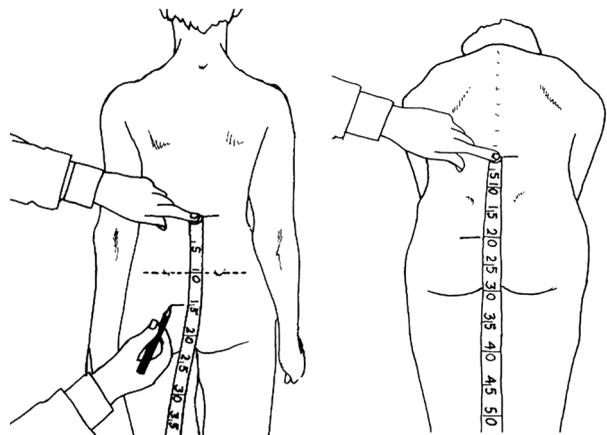


Figure 5. Illustration of Schober's test. (Reprinted from McRae R. *Clinical orthopaedic examination*. 4th ed. New York: Churchill Livingstone; 1997:133, with permission from Elsevier.)

superior and inferior facets); anterior displacement of L5 over S1 occurs most commonly.⁶ This type of spondylolisthesis is more common in patients who repeatedly lift heavy objects, thereby placing strain on this connection. Patients typically report low back pain that is worse with activity and spine extension but is relieved by flexion. Spondylolisthesis can occur at any age.

Fracture

Spinal compression fractures often occur in patients older than 70 years who have a history of osteoporosis. Patients with a history of long-term corticosteroid use are also at risk. Most patients who sustain spinal compression fractures do not have a history of trauma. Percussion tenderness over the involved vertebra can be elicited.

NONMECHANICAL BACK PAIN

Causes of nonmechanical low back pain include neoplasia, infection, and inflammatory arthritis. Typically, patients with a nonmechanical cause of low back pain report pain that occurs at rest and is less affected by motion.

Ankylosing Spondylitis

Ankylosing spondylitis is an inflammatory arthropathy affecting the spine and pelvis. Patients typically have morning stiffness that improves with activity. The condition has an insidious onset, typically starting in patients younger than 40 years. Affected patients have decreased range of motion of the lumbar and sacroiliac joints. Schober's test can be used to measure the degree of impairment of range of motion. This test is performed by

(continued on page 56)

(from page 44)

marking the lumbar spine at 0 cm and at 15 cm; more specifically, a mark is made 10 cm above S1 and another 5 cm below. The patient is then asked to flex as far forward as possible, and the degree to which the marks separate is noted. In patients without impaired range of motion, the points normally separate at least 5 cm (Figure 5).

Neoplastic Disease

Malignant neoplasm accounts for fewer than 1% of episodes of low back pain. However, metastatic cancer should be considered as a potential etiology in any patient with a previous history of cancer, until proved otherwise. The most common primary sites are the breasts, lungs, or prostate; primary neoplasms such as multiple myeloma are less commonly the cause. A key historical finding is that back pain due to cancer is unrelieved by bedrest and typically worsens at night. Onset is usually slow and progressive.⁷

Infection

Infectious etiologies of acute low back pain include osteomyelitis, septic discitis, and paraspinal or epidural abscess, whereas infectious etiologies of chronic low back pain include fungal or tuberculous infections. Patients typically first report fever and sharp focal pain in the lumbar spine. Physical examination reveals tenderness to percussion. A history of intravenous drug abuse is commonly elicited.

VISCERAL DISEASE

Common diseases causing referred back pain include renal diseases (eg, nephrolithiasis, pyelonephritis), vascular diseases (eg, abdominal aortic aneurysms), diseases of the pelvis (eg, endometriosis), and gastrointestinal diseases (eg, pancreatitis, cholecystitis). Patients with back pain caused by visceral diseases often have pain unrelated to activity and pain that is worse when they are lying down.^{8,9}

The back pain associated with nephrolithiasis can be severe and can cause the affected patient to writhe; pain is typically colicky and radiates to the groin. Pyelonephritis is another urologic cause of back pain; costovertebral angle tenderness can be elicited by percussing the paraspinal areas of affected patients.

CONCLUSION

Low back pain is one of the most common reasons that patients seek care from a primary care physician. In most cases, it has a benign etiology. However, a thorough history should be obtained and physical examination performed in patients with low back pain, because they can elicit warning signs that indicate the need for further work-up. Serious causes of low back pain, such as malignancy and infection, should not be missed. **HP**

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