Acute Low Back Pain:

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ABSTRACT: A focused history taking and physical examination directed toward uncovering signs that suggest a serious underlying cause of low back pain are crucial. "Red flags" include pain that lasts more than 6 weeks; pain in persons younger than 18 years or older than 50 years; pain that radiates below the knee; a history of major trauma; poor rectal tone; constitutional symptoms; atypical pain (eg, that which occurs at night or that is unrelenting); the presence of a severe or rapidly progressive neurologic deficit; and a history of malignancy. These markers provide a cost-effective means of guiding your selection of laboratory and diagnostic imaging studies.

Low back pain affects up to 90% of the population; the annual incidence is 5%. It is second only to upper respiratory tract infection as a symptom-related reason for visits to primary care physicians and affects men and women equally. The economic impact of low back pain is enormous. It is the most common cause of work-related disability in persons younger than 45 years and the second most common cause of temporary disability (after upper respiratory tract disease) for all ages. In 1990 the direct and indirect costs (including lost earnings) of diagnosing and treating low back pain totaled more than $58 billion. Some studies show that in up to 84% of patients with acute low back pain, no clear cause is ever determined. Although symptoms usually resolve within 4 to 6 weeks, all patients with back pain should be evaluated fully so that significant neurologic or life-threatening diseases may be ruled out. The "red flags" of back pain are important historical and physical features that point to potentially dangerous conditions. Identification of a red flag warrants close attention and further diagnostic testing. These red flags were defined in a set of guidelines on acute low back pain published by the Agency for Health Care Policy and Research.

In this article, we discuss the approach to the patient who presents with low back pain-with particular emphasis on red flags. We also review the most common diagnostic procedures. In a future article, we will describe the evaluation and treatment of common and worrisome back pain syndromes as well as the less common, but nonetheless important, presentations of back pain in children and in patients with a history of cancer.

THE HISTORY

A focused history taking is the most critical tool for identifying risk factors for serious disease in a patient who presents with low back pain. Directing the history taking toward the red flags allows for an efficient, cost-effective assessment (Table 1).

Duration of symptoms. Low back pain falls into 3 categories based on duration:

- **Acute pain** lasts less than 6 weeks.
- **Subacute pain** continues for 6 to 12 weeks.
- **Chronic pain** persists for more than 12 weeks.

Pain that lasts longer than 6 weeks raises a red flag because 80% to 90% of all episodes of low back pain resolve within 6 weeks. If the patient has been assessed for low back pain previously, and pain persists for more than 6 weeks, he or she requires further evaluation. However, if the patient has had pain for 4 to 6 weeks without appropriate treatment, it is reasonable to delay the workup and observe him closely-provided there are no other red flags. Prescribe analgesia and activity modification measures at the initial visit. If there is no dramatic improvement after 2 weeks, begin the diagnostic workup. In the patient who has chronic symptoms but who has already undergone a complete evaluation, review the workup to ensure that it has been thorough and that vital clues or signs have not been missed.

Age. Back pain in patients younger than 18 years or older than 50 years constitutes a red flag.
both groups, back pain is more likely to have a serious cause, such as tumor or infection.

- Patients under age 18 have a higher incidence of congenital and bony abnormalities, such as spondylolisthesis or spondylolysis, than older patients.
- In patients older than 50 years, nonmechanical causes, such as a rupturing abdominal aortic aneurysm or other intra-abdominal processes, are more common.
- Spinal stenosis resulting from hypertrophic degenerative processes and from degenerative spondylolisthesis is more common in persons older than 65 years.

**Location and radiation of the pain.** Pain that originates from muscular or ligamentous strain or from disk disease without nerve involvement is located primarily in the back, possibly with radiation into the buttocks or thighs. Pain that radiates below the knee raises a red flag for a herniated disk or nerve root inflammation below the L3 nerve root, given the dermatomal distribution of the nerve roots and the fact that the pain associated with inflammation radiates along the entire pathway of the nerve. Approximately 95% of herniated disks occur at the L4-5 or the L5-S1 disk space, thereby impinging on the L5 or S1 nerve root and producing a radiculopathy that extends into the lower leg and foot along the pathway of the involved nerve root.\(^6\)

The location of the pain helps distinguish mechanical low back pain from sciatica, which is radicular pain that radiates into the legs in the distribution of a lumbar or sacral nerve root and is often accompanied by neurosensory and motor deficits.\(^6\) Sciatica may be associated with low back pain, but patients with sciatica complain primarily of leg symptoms. Although the lifetime prevalence of sciatica is 40%, only 1% of patients with low back pain have associated sciatic symptoms.\(^6,8\)

**History of trauma.** Previous major trauma raises a red flag for the possibility of fracture and should prompt you to order plain radiographs of the involved spine. Elderly patients may sustain a fracture of the spine with even minimal trauma, such as falling from a standing or seated position. This is attributable to the bony changes-predominantly osteoporosis-associated with aging.

**Systemic complaints.** Constitutional symptoms—such as fever, chills, night sweats, malaise, or undesired weight loss—suggest infection or malignancy. These symptoms are of even greater concern if the patient has additional risk factors for infection, such as a recent bacterial infection, immunocompromised status, or injection drug use. Back pain in an injection drug user is generally assumed to be vertebral osteomyelitis or epidural abscess until these conditions are ruled out with imaging studies. A recent genitourinary or GI procedure may predispose the patient to infection secondary to bacteremia.

**Atypical pain features.** Benign low back pain is typically described as a dull, aching pain that generally worsens with movement but improves when the patient is lying still. Red flags for tumor and infection include pain that occurs at night, awakens the patient from sleep, or is unrelenting despite appropriate analgesia and rest. The pain of a herniated disk may be worsened by coughing, sitting, or the Valsalva maneuver and is relieved by lying supine.\(^1,6,8\) Spinal stenosis is associated with bilateral sciatic pain that is worsened by activities such as walking, prolonged standing, and back extension and is relieved by rest and forward flexion. In our experience, night pain and unrelenting pain are the most worrisome symptoms that are commonly ignored in the evaluation of patients with back pain.

**Associated neurologic deficits.** Most patients with benign low back pain have no associated neurologic deficits. Any severe or rapidly progressive neurologic deficit or complaint raises a red flag. Rule out an epidural compression syndrome such as spinal cord compression, cauda equina syndrome, or conus medullaris syndrome in a patient who reports bowel or bladder incontinence with low back pain.

Patients with a history of urinary incontinence (whether just 1 episode or many) may be evaluated by measuring a postvoid residual volume. A large postvoid residual indicates overflow incontinence which, in the setting of low back pain, suggests significant neurologic compromise and mandates an immediate evaluation for an epidural compression syndrome. A negative postvoid residual rules out significant neurologic compromise. Other neurologic complaints, such as paresthesias, numbness, weakness, and gait disturbances, need to be fully explored during the history taking and physical examination to determine whether the symptoms involve single or multiple nerve roots.

**History of cancer.** Patients with a history of cancer of the breast, lung, thyroid, kidney, or prostate; myeloma; lymphoma; or sarcoma are at high risk for metastatic disease to the spine.\(^9\) In 96% of such patients, back pain is the initial symptom. The evaluation of these patients will be covered in a future article.

**Urinary, abdominal, or chest complaints.** Although there are no specific red flags, it is important
to review these areas to avoid overlooking disease processes referring or radiating to the back. The most serious of these is a ruptured abdominal aortic aneurysm. Other potential causes of pain referred to the back include pancreatitis, a posterior lower lobe pneumonia, nephrolithiasis, and renal infarct.

**PHYSICAL EXAMINATION**

The examination is neither complicated nor prolonged. It is directed toward ruling out red flags and identifying specific neurologic deficits (*Table 2*).

Fever strongly suggests infection. Unfortunately, this sign is not very sensitive; it ranges from 27% for tuberculous osteomyelitis to 50% for pyogenic osteomyelitis and 83% for spinal epidural abscess.

**General appearance.** The patient with benign back pain is most comfortable when lying still. Consider abdominal aortic aneurysm, nephrolithiasis, and acute infection in patients who are in extreme pain.

**Abdomen.** All patients require an abdominal examination that includes auscultation for bruits and palpation for masses, tenderness, or a pulsatile aorta that may suggest an aortic aneurysm.

**Back.** Examine the back for any signs of underlying disease. Erythema, warmth, and purulent drainage are signs of infection; contusion or swelling raises a red flag for trauma. Palpation and percussion over the vertebral bodies may reveal a possible cause of pain. Point tenderness to percussion is found with fractures and bacterial infection, with a sensitivity of 86% and specificity of 60% for infection.

Finally, perform a straight leg raise. With the patient lying in the supine position, passively lift each leg in turn to approximately 70 degrees in an attempt to reproduce the pain. A positive result consists of the reproduction of the patient’s sciatic pain or radicular pain down the affected leg that radiates below the knee. The radicular pain is worsened by ankle dorsiflexion and improved with ankle plantar flexion or decreased elevation. Reproduction of the patient’s back pain or pain in the hamstring area does not constitute a positive result.

A positive straight leg raise is about 80% sensitive for an L4-5 or L5-S1 herniated nucleus pulposis (disk). Radicular pain in the affected leg when the asymptomatic leg is lifted (positive crossed straight leg raise) is highly specific (but not sensitive) for nerve root compression by a herniated disk.

**Neurologic examination.** This is the most important portion of the examination. It will allow you to identify an impending surgical emergency, such as cauda equina syndrome, as well as to define anatomic deficits, such as those that are found with a herniated disk. Test sensation by using light touch initially, followed by a pinprick, temperature, proprioception, and vibration.

The examination as it pertains to each of the spinal nerve roots in the lumbosacral plexus (*Figure*) may be described as follows:

- The L1 through L3 nerve roots supply sensation over the anterior thigh and provide strength to the hip flexors. There is no well-defined reflex for these nerve roots.
- The L4 nerve root is responsible for sensation over the medial surface of the leg and foot, including the medial surface of the great toe, but not the first dorsal web space. The motor component of L4 involves leg extension (L2 through L4) and ankle dorsiflexion and inversion. The patellar reflex is innervated predominantly by the L4 nerve root, although there is some contribution from L2 and L3.
- The L5 nerve root supplies sensation over the lateral leg and the dorsum of the foot, including the first dorsal web space. The muscular innervation for L5 is the extensor hallucis longus (great toe dorsiflexion) and dorsiflexors of the foot. There is no well-defined reflex for L5.
- The S1 dermatome covers the plantar and lateral surface of the foot. It innervates the peroneal muscles, which evert the foot and, along with the S2 nerve root, is responsible for the muscles that plantar flex the foot and allow toe walking. The S1 nerve root innervates the Achilles tendon reflex.
- The S2 through S4 nerve roots supply sensation to the perineum, making the 3 concentric rings surrounding the rectum. They are responsible for innervating the bladder and intrinsic muscle of the foot. These nerves innervate the anal wink reflex that is obtained by gently stroking the skin on the outside of the anus, causing a reflex contraction of the external anal sphincter.
masses and to rule out perirectal abscess.\textsuperscript{12} It is indicated in persons with red flags, especially those with neurologic complaints or severe pain. The loss of deep sphincter tone indicates an S5 defect. The absence of the superficial reflex or perineal sensation indicates dysfunction of the S2 through S4 nerve roots. Poor rectal tone in association with back pain and saddle anesthesia indicates cauda equina syndrome.

**DIAGNOSTIC STUDIES**

**Laboratory tests.** Order a complete blood cell count, erythrocyte sedimentation rate (ESR), and urinalysis if you suspect infection or tumor. The white blood cell count may be normal or elevated in patients with infection; the ESR is invariably elevated.\textsuperscript{13-15} C-reactive protein levels may be elevated in patients with acute infection; however, there are no studies to support a definitive association. Laboratory test results are generally normal in patients with neoplastic disease involving the spine; however, the ESR may be elevated.\textsuperscript{16} Order a urinalysis to rule out urinary tract infection as a source of infection that may have seeded the spine or primary renal disease referred to the back. If the laboratory results are normal but you suspect infection or tumor, order plain radiographs and MRI of the spine.

**Radiographs.** Obtain plain radiographs if you suspect fracture, tumor, infection, or nerve dysfunction. Only anteroposterior and lateral films of the lumbar spine are necessary. Oblique projections are rarely indicated because they add little information and more than double gonadal radiation exposure.\textsuperscript{6} Plain radiographs may be omitted for those patients who have significant symptoms and will undergo definitive imaging with MRI.

**MRI.** This is the preferred imaging modality for most patients with low back pain. It offers the best resolution of lesions in the vertebral bodies, spinal canal, and spinal cord and provides an excellent visualization of disk disease. Emergent MRI is the modality of choice for evaluation of suspected spinal infection (vertebral osteomyelitis or epidural abscess) and epidural compression syndrome. MRI is indicated for routine or urgent use in the evaluation of neoplastic processes of the spine and of disk disease or when the patient's symptoms fail to resolve after 6 to 8 weeks.\textsuperscript{2,17,18}

**CT scanning.** CT is superior to MRI in evaluating bony detail of the spine. It is most useful in evaluating vertebral fractures, the facet joints, and the posterior elements of the spine. Its widespread availability makes it useful in emergencies when MRI is either unavailable or unsuitable. CT myelography is the best alternative when lesions involving the spinal canal are suspected and MRI is unavailable.\textsuperscript{18,19} A major drawback of CT is the time needed to examine the entire spine, as is required in cases involving possible spinal cord compression.

**Radionuclide imaging.** This is primarily used to localize infectious or metastatic lesions of the spine. Radionuclide imaging has a high sensitivity for these lesions; however, because its specificity is low, a confirmatory test, such as MRI or CT, is usually required. Radionuclide imaging is also useful in evaluating suspected stress fractures in adolescents with low back pain. Generally, however, MRI has replaced radionuclide imaging.

**References:**


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