



Rational Evaluation and Management of Acute Low Back Pain

Acute low back pain is a common problem, and affected patients often present to the emergency department for acute care. Although published guidelines exist regarding appropriate radiologic evaluation, level of activity, and therapy, controversy still exists on how to best treat this disorder. The lecturer will review the recent literature on acute low back pain and provide practical recommendations for its management.

- Describe clinical findings in acute low back pain that suggest emergent conditions.
- Recognize which injuries require radiographic evaluation in the emergency department.
- Discuss the uses of pharmacologic and nonpharmacologic therapy in the treatment of acute low back pain.

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FACULTY

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Evaluation and Management of **Acute Low Back Pain**

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Definitions

Low back pain (LBP): Pain that is located between the lower rib cage and the gluteal folds that often radiates into the thighs

- ♦ **Acute LBP:** Less than 6 weeks of duration of the pain
- ♦ **Subacute LBP:** Between 6 and 12 weeks of pain
- ♦ **Chronic LBP:** Greater than 12 weeks of pain

Sciatica: Pain in the distribution of a lumbar nerve root, often accompanied by neurosensory and motor deficits

Epidemiology and Financial Impact

- Men and women are equally affected, but women report LBP more often after age 60
- The annual incidence of acute LBP is 5%
- The lifetime prevalence of LBP ranges from 60-90%
- The lifetime prevalence of sciatica is 40%
- Only upper respiratory disease account for more cases of temporary work disability
- In people under age 45, low back problems are the most common cause of disability
- The direct cost of diagnosing and treating LBP were estimated at \$23.5 billion in 1990
- The indirect cost, including lost earnings, approached \$35 billion in 1990

Clinical Evaluation of Low Back Pain

History

An accurate history is important for not only will it allow one to determine the diagnosis, but it allows one to identify *red flags* that allow the examiner to proceed with an appropriate, cost effective evaluation.

The following are pertinent areas to address in the history: *Red flags are in bold and italics.*

Age of the patient: *Age greater than 50 or less than 18* should raise a red flag because there is a higher likelihood of serious pathology as the etiology for the pain. Specifically, tumor or infection for both age groups and an abdominal aortic aneurysm in the older population.

Duration of the pain: Most benign sources of LBP will resolve or improve significantly by 6 - 8 weeks. *Pain lasting longer than 6 weeks* raises the suspicion of a more serious etiology for the symptoms. In addition, if the diagnostic evaluation is normal, then the conservative treatment plan prescribed is less likely to be successful.

Location and radiation of the pain: Pain that is caused by muscular or ligamentous strain, or disc disease without nerve involvement will be located primarily in the back, possibly with radiation into the buttocks or thighs. Pain caused by nerve root irritation usually radiates below the knee and into the foot.

History of trauma: Any *history of major trauma, or minor trauma in the elderly* raise the suspicion for fracture and should inspire one to order plain X-rays of the involved spine.

Systemic complaints: *Constitutional complaints such as fever, chills, night sweats or an unexplained weight loss (>10 pounds in 3 months)* raise the suspicion for infection or malignancy.

Atypical pain features: *Night pain and pain unrelieved with rest and recumbency* are concerning for tumor and infection.

Associated neurologic deficits: Most importantly *any new bowel or bladder incontinence, erectile dysfunction, saddle anesthesia or severe and progressive neurologic deficit.* All of these symptoms are concerning and require an immediate evaluation for cauda equina syndrome or spinal cord compression.

Past medical history: Patients with a *known history of cancer*, especially breast, lung, thyroid, kidney, prostate or multiple myeloma are at high risk of metastases to the spine. Neurofibromatosis is one of the most common primary tumors of the spine.

Aggravating or alleviating factors: *Unrelenting pain* is worrisome for cancer or an infectious etiology. Pain, especially sciatic pain that worsens with coughing, valsalva, trunk flexion, prolonged sitting or standing is more likely to be secondary to a herniated disc. Low back and bilateral sciatic pain that is worsened with activity such as walking, prolonged standing, and back extension but is relieved with rest and forward flexion is more characteristic for spinal stenosis, especially if the patient is over age 60.

Risk factors for infection: *History of recent bacterial infection, immunocompromise, or IV drug abuse* all raise the suspicion of a bacterial infection of the spine

Urinary, abdominal or chest complaints: Complaints associated with these areas should evoke a greater search for a source outside of the back for the etiology of the pain.

Physical Examination

Vital signs: *Fever* raises the concern for infection

General: The patient who is *writhing in pain* is more concerning for an infectious, vascular (AAA), intraabdominal, or retroperitoneal (renal stone or hemorrhage) etiology for their pain.

Abdomen: Rule out abdominal mass, AAA or other abdominal etiology

Back: Inspection for scoliosis, erythema, and previous surgery. Vertebral point tenderness to palpation or percussion is suggestive, but not specific for fracture or infection.

Straight leg raise test: A positive test reproduces or causes a radicular pain down the affected leg between 30 and 70 degrees of elevation, especially if this pain is worsened by ankle dorsiflexion. This exam is about 80% sensitive for a herniated disc as the etiology of the pain. If there is pain in the affected leg when lifting the asymptomatic leg (**positive crossed straight leg raise**), this is pathognomonic for nerve root compression by a herniated disc.

Neurologic exam:

Neurologic levels L1, L2, L3

Strength: Hip flexion
Sensation: Anterior thigh

Neurologic level L4

Strength: Knee extension (L2-L4), ankle dorsiflexion and inversion
Sensation: Medial leg down to medial surface great toe
Reflex: Patellar reflex

Neurologic level L5

Strength: Great toe dorsiflexion (EHL), heel walking
Sensation: Lateral leg and dorsum of foot
Reflex: None

Neurologic level S1

Strength: Foot eversion (peroneals), toe walking (S1, S2)
Sensation: Lateral malleolus, lateral side and plantar surface of the foot
Reflex: Ankle jerk

Neurologic levels S2, S3, S4

Strength: Intrinsic foot musculature, bladder innervation
Sensation: Perianal sensation in concentric rings
Reflex: Anal wink

Rectal exam: Loss of deep sphincter tone indicates an S5 defect. Absence of the superficial reflex indicates dysfunction of S2-S4. In association with back pain and saddle anesthesia, it diagnoses a cord compression syndrome of some etiology. A normal exam essentially rules out a peri-rectal abscess as cause for back pain.

Babinski test: A positive test is great toe extension with flexion and splaying of the other toes. A positive test is indicative of a lesion affecting the corticospinal tract or the upper motor neurons

Summary of the Red Flags

Historical Red Flags

Age < 18, >50
Major trauma
Minor trauma in elderly
History of cancer
Fever and chills
Weight loss
IV drug abuse
Immunocompromise
Night pain
Unrelenting pain, even when supine
Incontinence
Saddle anesthesia
Severe or rapidly progressive neuro deficit

Concern

Congenital, tumor
Fracture
Fracture
Tumor
Infection
Tumor, infection
Infection
Infection
Tumor, infection
Tumor, infection
Cauda equina syndrome, cord compression
Cauda equina syndrome, cord compression
Cauda equina syndrome, cord compression

Summary of the Red Flags (continued)

Physical Red Flags

Fever
Unexpected anal sphincter laxity
Perianal/perineal sensory loss
Major motor weakness

Concern

Infection
Cauda equina, cord compression
Cauda equina, cord compression
Single or multiple nerve root compression

Indications for Diagnostic Studies

Lab

CBC, ESR, UA:

If red flags or concern for **infection, tumor** or **rheumatologic** etiology. If these are normal and still concerned, consider plain radiographs and spinal MRI. A negative x-ray does not rule out disease.

Radiography

Plain films:

If red flags or concern for **fracture, metastatic disease, infection, or neurologic dysfunction**. Only the AP and lateral films are needed for the lumbar spine. Oblique views add little information, but greatly increase the radiation and cost. If these views are negative and concerned of metastatic disease, occult fracture or infection, may follow with MRI or bone scan depending on the circumstance.

MRI:

The **gold standard** for the evaluation of possible **cauda equina syndrome, spinal cord compression, and infectious lesions** of the spinal column, vertebral canal or spinal cord. In addition, this is the study of choice for radicular pain from soft tissue **nerve root compression**. If there is no severe acute neurologic deterioration or concern for compression, this study may be delayed up to 4 - 6 weeks.

CT Scan:

This is the study of choice to evaluate for **vertebral fractures** and bony disease. If a MRI were not available or is unable to be obtained, then a CT with myelography (CT-myelogram) would be the next choice for diagnosing spinal cord compressive lesions.

Bone Scan:

This study modality has been largely replaced by the MRI in imaging for infectious or metastatic disease of the spine. This is used primarily for localizing **metastatic lesions** of the spine in the asymptomatic or minimally symptomatic patient with back pain and a history of cancer. It is also useful in evaluating the non-verbal child with a concern for spinal infection or the adolescent with whom you have a concern for **stress fracture** in the back.

Differential Diagnosis and Treatment

1. Acute lumbosacral strain

This is one of many terms given for the patient who presents with low back pain with an essentially negative history, physical examination, and ancillary exam (if obtained).

Outcome

- Approx. 40 % of patients with acute low back pain recover in 1 week
- Approx. 90 % recover activity tolerance within 1 month

Treatment

Activity

- Avoid bed rest
- Continue routine activity as tolerated, using the pain as the limiting factor
- Exercises are **not** effective in patients with low back pain in the *acute* setting

Analgesia

- Acetaminophen or NSAIDs are the initial drugs of choice
- There has been no proven benefit of one NSAID over any other
- The combination of a NSAID with acetaminophen is probably better, but never studied
- Narcotic analgesics may and should be used for a short time period for more severe pain, but generally no more than 1-2 weeks
- Muscle relaxants are more efficacious than placebo for LBP. There are no good studies of combination therapy with NSAIDs and/or acetaminophen, or efficacy compared to these drugs.

Corticosteroids

- There is **no proven benefit** for *systemic steroids* for acute low back pain with or without sciatica
- There is **no** evidence for the use of *epidural steroid injection* for low back pain without sciatica

Manipulation

- This may be effective in the first 4 weeks, but after that it has no proven efficacy
- There has been no study which has demonstrated that long-term manipulation is effective
- There is no convincing evidence that manipulation corrects spinal malalignment

Physical modalities

- Massage, traction, ultrasound, diathermy, biofeedback and transcutaneous electrical nerve stimulation have no proven efficacy in the treatment of acute back pain
- The patient may be instructed on the self application of heat or ice for the temporary relief of symptoms

Additional Evaluation

- In the absence of red flags there is no additional evaluation needed for the first 4 weeks
- If there is continued or worsening symptoms plain films may be indicated, as well as additional tests, as indicated by the history

2. Low back pain with sciatica

- Sciatica is present in only 2-3% of all patients with low back pain, however it is present in almost all (95%) of those patients with herniated nucleus pulposis (HNP).
- In general these patients present with mild back pain with a predominance of leg pain with associated paresthesias, numbness and weakness.
- More than 95% of disk herniations occur at the L4-L5 or L5-S1 level, producing L5 or S1 radiculopathies
- Other etiologies for sciatica than HNP
 - ◆ Lateral or foraminal stenosis
 - ◆ Intraspinous tumor or infection
 - ◆ Extraspinous plexus or cord compression
 - ◆ Lumbar canal stenosis

Outcome

- More than 50% of patients with HNP will recover in 6 weeks
- No more than 5-10% of patients with unrelenting sciatica require an operation
- In patients with sciatica, 2 studies comparing surgical and nonsurgical treatment showed that at 1-2 years after surgery that there was an improved functional ability and fewer symptoms than in the nonsurgical group. However, at 4 and 10 years after the surgery there was no difference between the groups.

Treatment

The treatment regimen is essentially the same as for non-sciatic low back pain with a few exceptions

- Activity as tolerated, rather than bedrest, is the best course (same as LS strain)
- If bed rest is used due to severe symptoms, generally use for 2-3 days, and no more than 7 days
- Manipulation is probably best avoided in these patients, although not contraindicated
- Epidural steroid injections may add a marginal benefit of pain relief (10-15%) in these patients, although it has not been shown to reduce need for surgery

Additional Evaluation

- Initially, these patients should have plain x-rays of the LS spine performed, although they are unlikely to be abnormal.
- If there is no improvement in the symptoms they should have an MRI should be obtained
- Persistent sciatica or a worsening of the symptoms may warrant specialty consultation

3. Cauda equina syndrome and spinal cord compression

- These syndromes typically present with bilateral leg symptoms and neurologic deficits, but not necessarily with much, if any back pain.
- Associated neurologic symptoms include:
 - ◆ Bowel incontinence
 - ◆ Bladder dysfunction → urinary retention with overflow incontinence or increased urinary frequency
 - ◆ Saddle anesthesia with decreased anal sphincter tone
 - ◆ Major motor weakness in the legs (and arms if a cervical lesion) with loss of DTRs
 - ◆ Anesthesia or hypesthesia in the legs, thorax and arms depending on the location of the lesion
- Etiologies
 - ◆ Large central disc herniation
 - ◆ Spinal canal hematoma
 - ◆ Spinal canal abscess
 - ◆ Metastatic tumor
 - ◆ Primary tumor
 - ◆ Traumatic compression

Outcome

- This is dependent upon the etiology of the cord compression
- For patients with tumors as the etiology for their compression:
 - ◆ Patients paraplegic on arrival, rarely walk again
 - ◆ Patients too weak to walk, but not paraplegic have a 50% chance of walking
 - ◆ Patients who are ambulatory at the start of therapy usually remain so
 - ◆ Of those requiring a urinary catheter at the outset of therapy, 79% will continue to require it

Treatment and evaluation

- Decadron 100 mg IV at onset of evaluation → do not wait for the results of the diagnostic tests
 - ◆ Animal studies show increased efficacy with the high dosing
 - ◆ A human study showed efficacy at the high dose in conjunction with radiation therapy
- Plain x-rays of the area of the spine that appears to be involved
- Emergent MRI of cervical, thoracic, lumbo-sacral spine → If the compression is due to metastatic disease, silent epidural metastases distant from the symptomatic lesions occur in up to 10% of patients
- Consultation with appropriate specialist based on the cause

4. Vertebral Osteomyelitis

- A delay in diagnosis is not uncommon with this disease → in 50% of the patients, the symptoms have been ongoing for ≥ 3 months
- Pain is the primary symptom, being found in greater than 90% of patients
- ***IV drug abuse is a significant red flag*** → back pain in an IVDA = osteomyelitis or abscess until proven otherwise
- Associated with other infections/host immune status:
 - ◆ Urinary tract
 - ◆ Pulmonary
 - ◆ Immunocompromised host → diabetes, transplant patients
 - ◆ 37% have no identifiable source
- Microbiology
 - ◆ This infection is most commonly due to Staph. aureus
 - ◆ If not Staph, then it is usually a single organism such as E. coli, Proteus, or Pseudomonas
- Pathophysiology
 - ◆ Usually hematogenously spread
 - ◆ A sluggish vertebral venous plexus without valves predisposes to the infection
 - ◆ Exact etiology for the infection is unclear

Physical findings

- Fever → present in 52%
- Vertebral body tenderness to percussion (not specific)
- Sepsis or toxic appearance → only found in approximately 10%

Diagnostic evaluation

Labs

- WBC – the WBC count may be normal
- ESR – universally elevated
- UA – usually negative, unless this is the source of the bacteremia
- Blood cultures are frequently positive – at least 40% of the time

Radiography

- Plain radiographs
 - ◆ Lag behind the clinical findings by 2 – 3 weeks
 - ◆ May take up to 8 weeks to become positive
 - ◆ Looking for:
 - Irregularity of the vertebral end-plates
 - Narrowing of the disk space
 - Bony destruction
- MRI
 - ◆ The gold standard for diagnosing infection
 - ◆ Brightening of the marrow on T2
 - ◆ Brightening of the disk on T2
 - ◆ Darkening of the marrow on T1

Treatment

- Primary treatment is medical – IV antibiotics for 6 – 8 weeks, followed by oral ABx for 4 – 8 weeks
- Organism identification is important
 - ◆ This is the importance of obtaining the blood cultures
 - ◆ Withhold antibiotics until case is discussed with the consultant because core bone biopsies may be required to obtain a positive culture.

- Remainder of treatment is symptomatic
 - ◆ Bedrest until the pain is improved
 - ◆ Immobilization with an orthosis
 - Surgical therapy reserved for
 - ◆ Clinically significant abscess
 - ◆ Refractory conservative course
 - ◆ Spinal cord compression
 - ◆ Neurologic deficit
 - ◆ Significant bony destruction
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Back Pain in the Cancer Patient

The evaluation of the patient with known cancer who has back pain is best accomplished by dividing the patients into three different groups based on their symptoms.

Group I

- These patients have signs or symptoms of progressive spinal cord or cauda equina disease
- They are at risk of rapid deterioration and need emergency treatment and evaluation
- Proceed as previously discussed for spinal cord compression

Group II

- These patients have mild and stable symptoms
- Typically have an isolated Babinski sign, or radiculopathy in a single nerve root distribution
- These patients need not be treated as an emergency, but need an evaluation within 24 hours
- Most physicians would treat them as in group I on an emergent basis
- Initiate Decadron therapy 100 mg IV at outset of evaluation → even if waiting for the next day to initiate the diagnostic evaluation

Group III

- Isolated back pain without any neurologic deficits
 - Obtain plain spine x-rays (AP, lateral, and obliques) of the symptomatic area at the initial evaluation
 - If there is any bony pathology then it should be evaluated with either MRI preferably, or CT scan
 - If there are no bony lesions on plain films, then the patient may be discharged home with urgent follow-up and possible bone scan, MRI, or CT scan of the affected area
 - Note that normal spine x-rays do not exclude epidural metastases → more than 60% of patients with this problem have normal plain films
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Back Pain in Children

Differences from adults

- Back pain in adults is a common complaint, however it is a relatively rare complaint in children before adolescence
- When back pain does occur in children, it is much more likely to have a diagnosable pathologic etiology than in the adult
- The single most common cause of back pain in the growing individual is spondylolisthesis
- Idiopathic scoliosis in children is rarely a painful condition and back pain in association with scoliosis should prompt the evaluation for a tumor or infection

Clinical evaluation

History

Essentially the same history as obtained in the adult patient with some additional important historical factors

- Any change or increase in physical activity
- Participation in gymnastics, dance or football
- Any preceding bacterial or febrile illness
- Any change in gait
- Pain that limits activity → children who will not play due to pain should raise concern
- Night pain – awakens the child from sleep

Physical Exam

The same as in the adult patient with additional areas of evaluation

- Inspection of the skin for the presence of certain “birthmarks” such as a hairy nevus, hemangioma, lipoma, café au lait spots or dermoid sinus (midline) → all signs of congenital disease
- Inspection of the spine, looking specifically for any abnormal scoliosis, kyphosis or lordosis → do not use these as the explanation for the pain, rather as a sign of underlying spinal disease
- Assessment of gait pattern → watch them walk

Diagnostic Evaluation

- Most patients should have a CBC, ESR and urinalysis
- Plain x-rays of the area of the spine in question → AP and lateral at least; obliques may be obtained but after first evaluating the initial films because most abnormalities will show up on the AP or lateral views
- MRI or bone scan is warranted if there is a concern for infection or tumor and the plain films are normal
- Bone scanning will also aid in the diagnosis of early spondylolysis
- The remainder of the evaluation is similar to adults

Differential Diagnosis

Mechanical:

- Fracture
- Muscular disorders
- Herniated nucleus pulposus
- “Overuse syndrome”

Neoplastic Diseases:

- Benign bony tumors
 - ♦ Osteoid osteoma
 - ♦ benign osteoblastoma
- Malignant bony tumors
 - ♦ Ewing’s tumor
 - ♦ osteogenic sarcoma
 - ♦ bone cyst
- Metastatic tumors
 - ♦ Neuroblastoma
 - ♦ Wilm’s tumor
 - ♦ Lymphoma
- Leukemia

Developmental Abnormalities:

- Scheuermann’s kyphosis
- Spondylolysis
- Spondylolisthesis
- Spina bifida occulta
- Diastematomyelia

Inflammatory Processes:

- Diskitis
- Vertebral osteomyelitis
- Collagen vascular diseases
- Spinal epidural abscess

Rheumatologic:

- Ankylosing spondylitis
- JRA

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