

New-Onset Low Back Pain in an Elderly Woman

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Case Study, *Marietta Babayev, MD*

INSTRUCTIONS



The following case study, "New-Onset Low Back Pain in an Elderly Woman," is accompanied by a continuing medical education (CME) evaluation that consists of 5 multiple-choice questions. After reading the case study, carefully consider each of the questions in the CME evaluation on page 54. Then, circle your selected answer to each question on the CME evaluation form on page 55. In order to receive one CME credit, at least 3 of the 5 questions must be answered correctly. The estimated time for this CME activity is 1 hour.

OBJECTIVES



After participating in the CME activity, primary care physicians should be able to:

1. Understand the common causes of low back pain in the elderly and identify "red flags" representing more serious causes of low back pain.
2. Perform an examination of the patient with low back pain, with attention to the neurologic examination and nerve root tension signs.
3. Understand the laboratory and imaging studies that may be helpful in diagnosing the cause of low back pain.
4. Understand the causes and treatment of sacral insufficiency fracture.
5. Understand the treatment options for elderly patients with myofascial low back pain.

INTRODUCTION

Low back pain is a common problem in the geriatric population. The often sedentary lifestyle of older people may predispose them to the onset or exacerbation of low back pain caused by mechanical strain, but clinicians must keep in mind the potentially serious conditions that occasionally cause low back pain symptoms.

This article reviews the causes of low back pain in the elderly and discusses some of the appropriate diagnostic and treatment strategies available.

CASE STUDY

Initial Presentation



A 70-year-old woman presents to her primary care physician complaining of severe back pain.

History

Four weeks ago, the patient was admitted to the hospital for inability to bear weight on the left leg secondary to a left inferior pubic ramus fracture sustained during a fall. She was treated conservatively with left-leg weight bearing as tolerated with the use of a walker and was discharged after several days. Her left groin pain improved, but over the past weeks she has had increasing lower back pain that radiates bilaterally to the thighs, requiring narcotic analgesia for pain relief.

The patient denies a history of trauma other than the fall. She has no tingling or numbness. Bladder and bowel symptoms are absent. Her history is negative for weight loss, fever, tuberculosis, vaginal discharge, and constipation. Past medical history is significant for hypothyroidism, anxiety, and a 40 pack-year history of smoking. The patient lives alone in an elevator-serviced building located in the downtown region of a large city. She is completely homebound because of the pain and misses her formerly active social life.

Physical Examination

Physical examination reveals a well-developed slim woman in no acute distress. Height is 5'4", weight is 110 lb, and temperature is 98.7° F. The patient is neurologically intact. The examination is performed with the patient supine as she is unable to tolerate sitting because of the pain. There are no dural tension signs. Pain does not increase with Valsalva maneuver. Straight leg raising test increases low back pain, and Patrick's test of the left hip is positive. The left groin and bilateral sacroiliac joints are tender to palpation. The lumbosacral paraspinal muscles are nontender to palpation. Costovertebral angle tenderness to

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percussion is not present. No pulsatile abdominal mass is appreciated. Femoral, popliteal, and dorsalis pedis pulses are symmetrical and intact.

Laboratory Evaluation

Results of urinalysis are within normal limits with no indication of a urinary tract infection.

- **What are common causes of low back pain in the elderly?**
- **What historical points should raise suspicion of the more ominous causes of low back pain?**

Dr. Tunkel:

Causes of Back Pain in the Elderly

Most back pain in the elderly is caused by mechanical strain [1]. The actual pain generators of mechanical strain have been postulated to be nerve endings residing around the various joints or soft tissues of the spine. The existence of “tender” or “trigger” points in local soft tissues has also been described as the major pain generator in mechanical low back pain. Trigger points may also refer pain into the legs, usually not distal to the knee. Mechanical low back pain may worsen with prolonged sitting or standing as well as with changes in position.

Spinal stenosis is a less common cause of low back pain but becomes more prevalent with increased age. Spinal stenosis usually results from soft tissue and bony encroachment of the spinal canal and nerve roots. Patients with lumbar spinal stenosis may report neurogenic claudication and nonspecific leg symptoms that interfere with the duration of comfortable standing and walking [2]. Herniated nucleus pulposus is generally a disease of younger and middle-aged adults; the disc nucleus desiccates and is less likely to herniate in older populations [3].

A definitive pathophysiologic or pathoanatomic diagnosis cannot be defined in up to 85% of those with low back pain [4]. In most cases, symptoms resolve spontaneously in 2 to 4 weeks [5].

Dr. Tunkel and Dr. Lachmann:

Red Flags

A detailed history helps to identify “red flags” that signify more serious causes of back pain. Metastatic disease to the spine may need to be considered, especially with a history of osteophilic malignancy, unexplained weight loss or fever, failure to improve with conservative therapy, or pain unrelieved by bed rest [4]. Progressive back pain present both day and night may represent not only malignancy but also spinal infection [1]. Recent infection such as cystitis may be associ-

Table 1. Serious Conditions Presenting as Low Back Pain

O	Osteomyelitis
M	Metabolic bone disease (eg, Paget’s)
I	Infection (discitis, tuberculosis)
N	Neoplasm
O	Other (eg, epidural abscess, retroperitoneal bleed, abdominal aortic aneurysm)
U	Unstable spine
S	Spondylolisthesis, spondyloarthropathies

ated with the onset of spinal infection or pyelonephritis, both of which may initially present as back pain. Renal colic may be suggested by the precise location and severity of pain as well as by a history of nephrolithiasis. Vertebral compression fracture may present as localized back pain, sometimes without any history of specific trauma [4]. Acute onset cauda equina syndrome may represent a surgical emergency. Therefore, patients should be questioned about the presence of new onset neurogenic bowel or bladder, sciatica, lower limb weakness, and decreased sensation especially in a saddle distribution [4]. **Table 1** shows a mnemonic device useful for remembering causes of low back pain requiring immediate evaluation and management.

Causes of low back pain with significant morbidity and potential mortality are less common than mechanical causes of low back pain. Deyo et al [4] reported that of adult primary care patients with low back pain, 4% have compression fractures, 3% have spondylolisthesis, 0.7% have spinal malignancy, 0.3% have ankylosing spondylitis, and 0.01% have spinal infection. Incidence rates for some of these conditions, such as compression fracture and spinal malignancy, may possibly be greater in the geriatric population. Tumors are more prevalent in those older than 65 years [6].

- **What are the routine aspects of physical examination in the older patient with low back pain?**

Dr. Nagler:

General Observation

The clinician should observe the patient’s general appearance. The patient’s posture and mobility, including gait, should be noted. The patient with mechanical low back pain often will be unable to sit comfortably. A pelvic shift may be present because of acute muscle spasm, sometimes observed with acute lumbar disc herniation. The patient may stand with a wide-based stance, with knees, hips, and lumbar

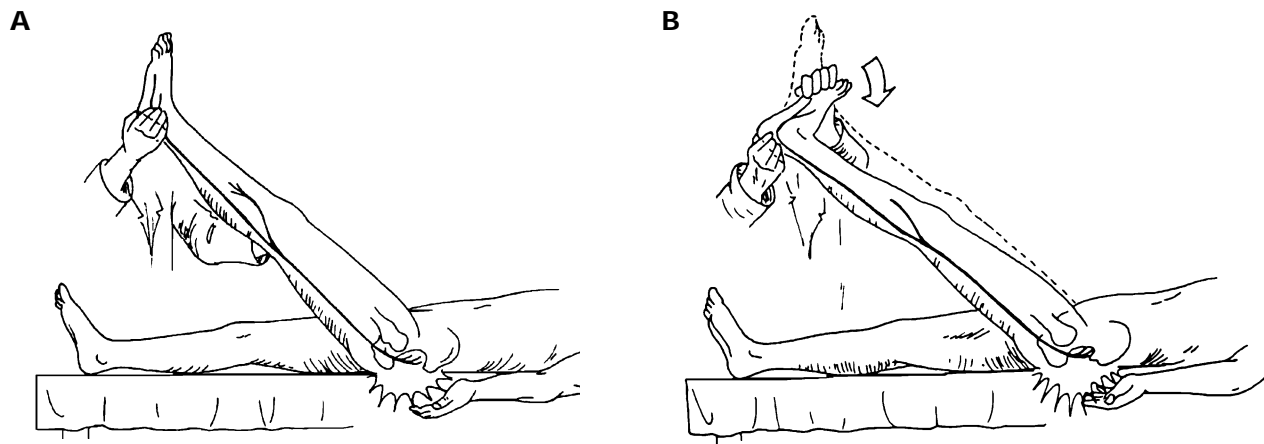


Figure 1. Straight leg raising test. (A) The leg is raised until radicular symptoms are elicited. (B) The leg is lowered until pain is relieved and the foot is then dorsiflexed. Return of radicular symptoms with dorsiflexion indicates a positive test. (Reprinted with permission from Reilly BM. *Practical strategies in outpatient medicine*. Philadelphia: WB Saunders; 1984:10.)

spine flexed; this is sometimes referred to as a “simian stance” [7] and may be seen in certain patients with severe lumbar spinal stenosis. Gait disorders may arise from neurologic deficits resulting from a spinal space-occupying lesion producing radicular compressive signs. For example, an L5 radiculopathy may manifest as an ipsilateral foot drop. The patient may walk with an ipsilateral foot drag or slapping gait, which may be compensated for by using leg circumduction or a steppage gait.

Regional Back Examination

Palpation of lumbosacral, paraspinal, and buttock muscles may reveal spasms. Muscle spasm can represent the primary myofascial pain generator or protective muscle spasm of underlying pathology. Percussion tenderness of the spinous processes of the lumbar spine may represent underlying bone disease such as fracture. Costovertebral angle tenderness has classically been considered to be a sign of underlying renal pathology. While the patient is supine, the patient’s abdomen may be auscultated for a bruit; if a bruit is present, the patient must be evaluated for an abdominal aortic aneurysm. Decreased lumbar spine range of motion is a non-specific finding. Most standing forward flexion is performed from the hips, not from the lumbar spine. This testing may provoke pain but is not diagnostic.

Dr. Tunkel:

Neurologic Examination

Sensory loss in the lower limbs in a lumbar radiculopathy, when present, usually is seen in a corresponding dermatomal distribution. Widespread sensory deficits in a lower limb may suggest a polyradiculopathy or plexopathy. Elderly patients

may have symmetrically diminished muscle stretch reflexes. An asymmetrically decreased reflex may help localize a radiculopathy. In addition to the well-known reflexes at the knee and ankle, the tibialis posterior reflex, elicited by tapping the medial foot, may help to evaluate the L5 nerve root [8]. A classic sign of an L5 radiculopathy is weakness of the extensor hallucis longus (the extensor of the great toe). Hyperreflexia of the lower limbs or other signs of increased tone suggest the presence of a neurologic lesion cephalad to the conus medullaris.

Testing for Nerve Root Tension

Physical evaluation usually includes the supine straight leg raising (SLR) test (Figure 1), which can detect tension on the L5 and/or S1 nerve root. In disc herniation, elevations of 30° to 70° produce pain. However, SLR elicits pain in many other conditions and the test is considered relatively nonspecific. Test specificity may be increased by slightly lowering the affected limb to a less painful elevation and then noting worsening of radicular pain with forced ankle dorsiflexion. Crossed SLR testing using the unaffected leg is thought to be more specific for radiculopathy than ipsilateral SLR [5]. Contralateral SLR does not produce pain on the affected side if the pain is not due to root disease. Femoral nerve stretch testing, done in the prone position, may suggest midlumbar radiculopathy. A positive Patrick’s test of the hip, producing ipsilateral groin pain, may suggest hip rather than nerve root pathology (Figure 2). If FABERE (flexion, abduction, external rotation, and extension) testing produces ipsilateral buttock pain, the source is less clear but the finding may represent mechanical low back pain.

- What laboratory studies may help diagnose the cause of low back pain?

Dr. Nagler and Dr. Tunkel:

Laboratory Evaluation

Certain laboratory values may be helpful in the evaluation of new-onset low back pain in the elderly. However, routine laboratory testing is not recommended during the first 4 weeks of symptoms unless a red flag for a potentially serious condition is noted on history or physical examination [9].

Complete blood count may reveal an anemia accompanying an occult malignancy, such as occurs with gastrointestinal bleeding or in anemia of chronic disease. Retroperitoneal bleeding, which may cause low back pain, may be accompanied by a significant drop in hemoglobin and hematocrit. Elevated white blood cell count may be noted in patients with spinal or ascending urinary tract infection. An elevated erythrocyte sedimentation rate (ESR) or C-reactive protein level is a nonspecific finding that may be seen in a number of systemic disease processes. Serum and urine protein electrophoresis (SPEP and UPEP) may be helpful in demonstrating monoclonal gammopathy, as seen in multiple myeloma.

Certain serum biochemistry studies may yield helpful information. For example, hypercalcemia may be seen in those with a paraneoplastic syndrome, with or without bony metastasis. Blood urea nitrogen and creatinine levels are often elevated in renal disease. Urinalysis and urine culture and sensitivity are helpful in identifying urinary tract infection.

- Which imaging studies are useful for assessing low back pain?

Dr. Tunkel:

Imaging Studies for Low Back Pain

Most patients with low back pain require no imaging procedures. A focused medical history and physical examination are sufficient to assess the patient with acute back symptoms of less than 4 weeks' duration [9]. Plain radiographs of the lumbosacral spine may be helpful if trauma, infection, a neoplasm, or a metabolic disorder is suspected [8]. Plain films may also be ordered for patients with no red flags who do not respond after 2 to 3 weeks of conservative treatment [7,10].

Lumbosacral spine radiographs may reveal compression deformity of vertebral bodies from various causes. Lytic or blastic lesions of bone on radiographs may represent meta-

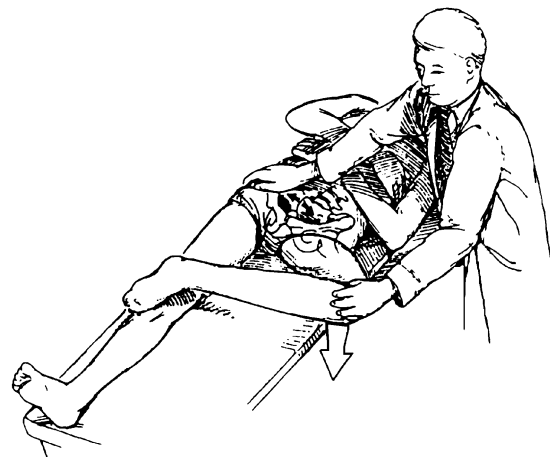


Figure 2. Patrick's test. With the patient's heel placed on the opposite knee, the flexed knee is slowly pressed downward placing the hip in flexion, abduction, external rotation, and extension (FABERE). Sacroiliac joint tenderness with downward pressure indicates a positive test. (Reprinted with permission from West SG. *Rheumatology secrets*. Philadelphia: Hanley & Belfus; 1997:214.)

static bone disease. Degenerative changes from lumbar spondylosis may be seen, including disc space narrowing, degenerative spondylolisthesis, osteophyte formation, sclerotic changes, and subchondral cyst formation of the facet joints. However, no firm evidence exists for the presence or absence of a causal relationship between radiographic findings of spondylolysis and spondylolisthesis, spina bifida, transitional vertebrae, spondylosis, and Scheuermann's disease and nonspecific low back pain [11]. Bone scans may be more sensitive than radiographs in detecting osseous malignancy, infection, or occult fracture [7]. One study revealed that bone scintigraphy yield for identification of occult tumor (about 9%) is sufficient to justify its use in those aged 50 years or older with persistent musculoskeletal pain or pain out of proportion to clinical findings [12]. However, in certain malignancies (eg, multiple myeloma) a bone scan may be falsely negative. Gallium scans may identify the presence of spinal infection [7]. MRI may be superior to CT of the lumbosacral spine in delineating many lesions; these include foraminal or sequestered disc herniations, epidural or leptomeningeal disease, and marrow edema. CT, however, may be especially helpful for cortical bone evaluation.

Imaging Study Ordered

Based on this patient's history and physical examination findings, a bone scan is ordered to evaluate for possible fracture. In light of the patient's age and smoking history, the physician suspects that insufficiency fractures may have been sustained during her initial fall.

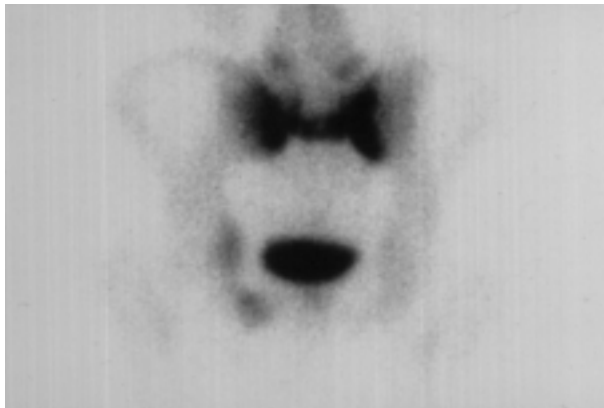


Figure 3. Bone scan showing the characteristic “H” shape representative of bilateral sacral insufficiency fractures.

The bone scan reveals increased uptake in both sacroiliac joints with a linear component traversing the mid sacrum, and increased uptake in the left inferior and superior pubic rami and acetabulum consistent with insufficiency fracture (Figure 3). CT of the pelvis reveals severe osteopenia, left inferior pubic ramus fracture, a left superior pubic ramus fracture extending into the acetabulum, and bilateral sacral insufficiency fractures.

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- **What are sacral insufficiency fractures?**

Dr. Lachmann and Dr. Tunkel:

Insufficiency Fracture

Sacral insufficiency fracture is an easily overlooked cause of low back pain [13–15]. This type of traumatic stress fracture occurs in bone with decreased mineralization and decreased elastic resistance [13,16,17] as seen in osteoporosis, postradiation change of bone, prolonged corticosteroid use, and rheumatoid arthritis [14]. Postmenopausal osteoporosis is the most common risk factor. The presentation of sacral insufficiency fracture can be subtle because symptoms may be superimposed on preexisting “aches and pains” in the elderly population. Patients typically present with nonspecific low back pain radiating to the lower limbs. The neurologic examination is nonfocal. Other insufficiency fractures that can present as acute low back pain include those of the lumbar vertebrae, pubis, and ischium [14,18].

Radiographic abnormalities are generally not apparent for several weeks following onset of symptoms [14,15]. Bone scintigraphy is a sensitive method to detect sacral insufficiency fractures and should be performed in patients with unexplained back pain and normal or inconclusive radiographs [14,15,19–21]. Abnormal uptake by the sacrum is

seen generally within 72 hours following insufficiency fracture. The characteristic “H” shape may be seen on bone scan, as the fracture courses vertically in the sacral alae, medial to the sacroiliac joints with a transverse component uniting the vertical, often bilateral, fractures [14,15,20–23].

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- **How should sacral insufficiency fractures be treated?**

Dr. Lachmann:

For patients with sacral insufficiency fractures, pain control and early mobilization may be warranted, since these fractures are generally stable and require no surgical intervention. Management of underlying osteoporosis should also not be overlooked as it is the major predisposing factor to developing insufficiency fractures [24].

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- **What therapeutic options are available for the more common causes of low back pain in the elderly?**

Dr. Lachmann:

Management of Musculoskeletal Pain

In those with musculoskeletal pain, especially myofascial pain with or without degenerative disc disease, treatment is based upon physical examination findings and previous response to treatment. Deyo et al [25] demonstrated that a similar outcome with acute low back pain is seen whether a patient has 2 or 7 days of bed rest. This and other studies demonstrate the lack of efficiency of prolonged bed rest for management of low back pain [26]. However, the patient should be advised to avoid certain activities, especially those that originally provoked or currently exacerbate the low back pain.

The initial goal in treating significant acute low back pain is to decrease acute muscle spasm using various physical modalities such as electrical stimulation and local ice and heat application when not contraindicated. Physical therapists apply electrical stimulation to muscles in spasm to induce muscle relaxation. Local ice application for 20 to 30 minutes can help relieve pain from muscle spasm. Local heat application from a hot shower or moist heating pad for 15 to 20 minutes can loosen and relax chronically tightened muscles. Transcutaneous electrical nerve stimulation (TENS) has been shown to be no better than placebo for the treatment of those with chronic low back pain [27]. For significant tender or trigger points in the local musculature, local intramuscular injection of normal saline and a short-acting anesthetic agent into the points may be helpful to reduce local spasm.

Therapeutic exercise is directed at the involved musculature, with the goal of normalizing range of motion. One

Table 2. Recommended Body Mechanics for the Lower Back

1. Sit in a firm chair that has a supportive back. Do not sit in a deep or overstuffed chair or couch.
2. Sit with your knees 2 to 3 inches higher than your hips. Placing a thick book, such as a phonebook, under your feet may be helpful.
3. When driving, sit with your knees higher than your hips.
4. When standing, place one foot on a small stool and stand with your weight on both legs, maintaining good posture.
5. Sleep on your back or on your side, with a pillow under or between your knees.
6. Sleep with your arms relaxed at your sides.
7. To get out of bed, place your feet on the bed slowly, then log roll to your side. As you place your feet on the floor, start to sit up.
8. Do not lean over furniture to open or close windows.
9. Use a step stool when reaching for objects on high shelves.
10. When performing tasks such as brushing your teeth or shaving, bend your knees, keeping your back straight.
11. Push, do not pull, large objects when moving them.

study revealed that 80% of nearly 12,000 people who completed a 6-week course of therapeutic exercise reported a decrease in low back pain, including 200 postsurgical patients [28]. A recent study by Cherkin et al [29] has questioned the cost-effectiveness of physical therapy and chiropractic manipulation over use of an educational booklet for back pain sufferers. Patients in the study who received the active treatments for back pain had only marginally better outcomes than those who were given the educational booklet. Attention to proper posture and body mechanics may be helpful (Table 2).

Patients with spinal stenosis should avoid full extension of the lumbar spine, which may exacerbate symptoms of back and leg pain. Some advocate use of glucocorticoids, whether systemic or delivered epidurally, in cases of lumbar radiculopathy or possibly lumbar spinal stenosis, but this treatment remains controversial. Nonsteroidal anti-inflammatory medications (NSAIDs) and opioids with or without acetaminophen may help decrease low back pain and increase a patient's participation in physical therapy. Well-designed clinical trials have shown the superiority of diflunisal, naproxen sodium, and piroxicam therapy over placebo for patients with acute nonspecific low back pain [30].

Table 3 lists a cost-effective approach to drug therapy for with low back pain [30,31]. Gastrointestinal bleeding and irritation are the most common side effects of NSAIDs, which increase in frequency and severity in the elderly. Deterioration in renal function is another important side effect of

Table 3. Principles of Cost-Effective Drug Therapy for Acute Low Back Pain

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Modified from Deyo RA. Drug therapy for back pain. Which drugs help which patients? *Spine* 1996;21:2840-50 and Green JM, Winikoff RN. Cost-conscious prescribing of nonsteroidal anti-inflammatory drugs for adults with arthritis: a review and suggestions. *Arch Intern Med* 1992;152:1995-2002.

NSAIDs, fortunately reversible in most patients [30]. Capsaicin cream does not have a role in the acute care setting for treatment of low back pain. In certain instances of low back pain, minor analgesics and the use of proper postural mechanics may be adequate to treat an episode of low back pain. Use of lumbosacral orthoses may have a role in the elderly in certain cases of subacute and chronic low back pain. Patients with low back pain unresponsive to conservative treatment and who are not surgical candidates presently, or those patients who have failed surgical intervention in the past may benefit from a referral to a pain management team.

Figure 4 shows an algorithm for evaluation and management of low back pain.

- When should surgical intervention be considered?

Dr. Nagler:

Surgical Considerations

Patients with acute low back pain alone, without findings of serious conditions or significant nerve root compression, rarely benefit from a surgical consultation. Within the first 3 months of acute low back symptoms, surgery is considered only when serious spinal pathology or nerve root dysfunction obviously due to a herniated lumbar disc is detected. The presence of a herniated lumbar disc on an imaging study does not necessarily imply nerve root dysfunction.

Elderly patients with spinal stenosis who tolerate their daily activities usually do not need surgery.

Acute low back pain with or without leg pain

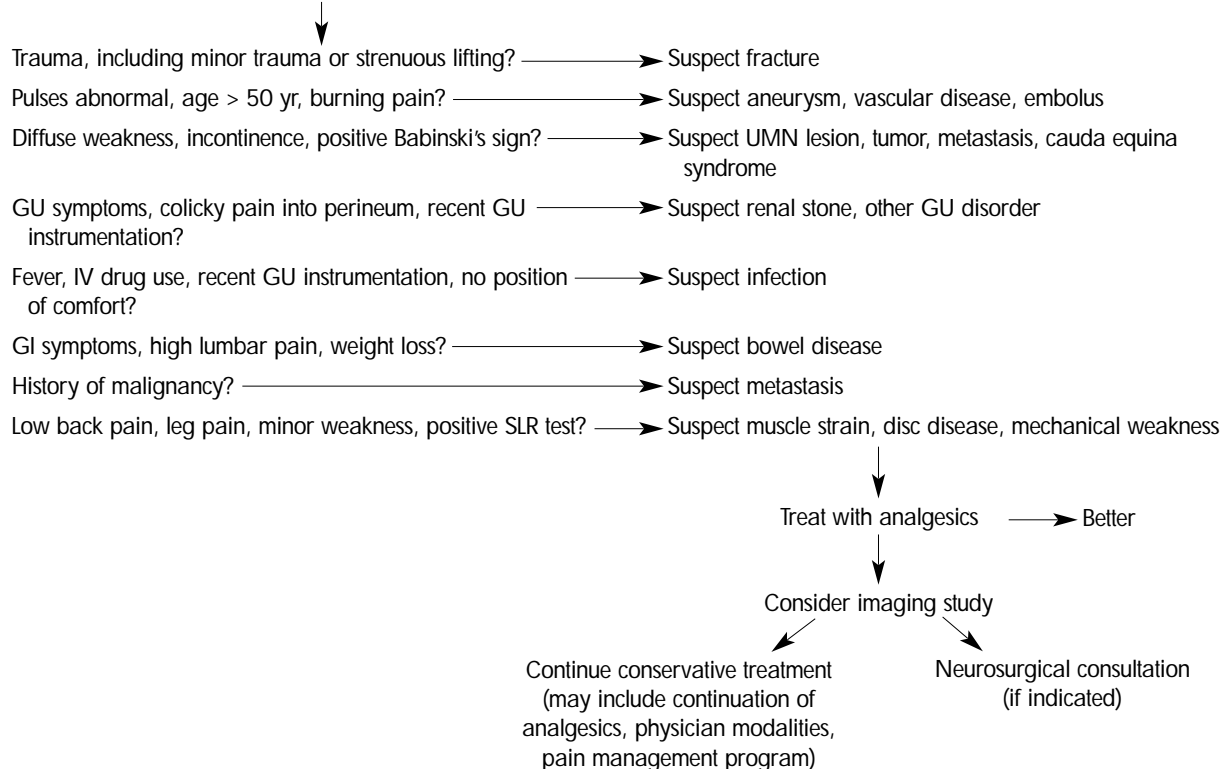


Figure 4. Algorithm for acute low back pain. GI = gastrointestinal; GU = genitourinary; IV = intravenous; NSAID = nonsteroidal anti-inflammatory drug; SLR = straight leg raising; UMN = upper motor neuron. (Adapted with permission from Mercier LR, Pettid FJ, Tamisiea DF, Heieck JJ. *Practical orthopedics*. 4th ed. St. Louis: Mosby-Yearbook; 1995:170.)

Treatment and Follow-up

The patient is treated conservatively with 325 mg of aspirin and 5 mg of oxycodone four times daily and weight bearing as tolerated with use of a standard cane. She is started on alendronate and calcium for her osteoporosis. The patient progresses well and her back pain resolves completely within 8 weeks.

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EVALUATION FORM: New-Onset Low Back Pain in an Elderly Woman

DIRECTIONS: Each of the questions below is followed by four answers. Select the ONE lettered answer that is BEST in each case and circle the corresponding letter on the answer sheet.

Questions 1-3

A 72-year-old woman presents to her primary care physician for the evaluation of severe low back pain of 1 weeks' duration. She describes the pain as worse with sitting, standing, and walking. The pain is relieved with rest (lying supine). One week ago she slipped on a rug and fell, landing on her buttocks. She was able to stand after the fall but the back pain was severe. The patient has a history of osteoporosis diagnosed by bone densitometry. She has lost 2" of height since age 25. She takes no medications, is a non-smoker and a nondrinker, and reached menopause at age 50. Radiographs of the lumbosacral spine, pelvis, and hips reveal osteopenia but no evidence of fracture. Physical examination reveals paraspinal muscle spasm. Neurologic examination is nonfocal.

1. What imaging modality would be most appropriate for diagnosing the cause of this patient's low back pain?
 - (A) Abdominal sonogram
 - (B) Bone scan
 - (C) Repeat radiographs
 - (D) CT
2. The patient is diagnosed with bilateral sacral insufficiency fractures. Which of the following treatments is NOT appropriate?
 - (A) Analgesia
 - (B) Weight bearing on the legs as tolerated
 - (C) Physical modalities and therapeutic exercises
 - (D) Seven days of complete bed rest
3. The patient subsequently develops a fever and has a recurrence of severe back pain. Of the following tests, which would be LEAST helpful in ruling out a spinal infection?
 - (A) Gallium scan
 - (B) MRI of the lumbosacral spine
 - (C) Erythrocyte sedimentation rate
 - (D) Spinal radiographs
4. Which of the following should be considered LEAST helpful for the treatment of chronic low back pain?
 - (A) Analgesia
 - (B) Physical modalities
 - (C) TENS
 - (D) Therapeutic exercises
5. Which physical examination maneuver is MOST specific for the evaluation of radicular pain?
 - (A) Pain provoked by crossed straight leg raising test
 - (B) Positive Patrick's test
 - (C) Pain provoked by spinal forward flexion (standing)
 - (D) Simian stance



EVALUATION FORM: New-Onset Low Back Pain in an Elderly Woman

To receive CME credit for this case study, read the case study and then answer the multiple-choice questions on page 54. Circle your answers below. Also, please respond to the four questions that follow. Then, detach the evaluation form and mail or FAX, along with your payment of \$15.00 (check, MasterCard, or VISA accepted) to:

**JCOM® CME Evaluation
Wayne State University
University Health Center, 5E
4201 St. Antoine
Detroit, MI 48201**

Phone: (313) 577-1453 FAX: (313) 577-7560

Circle your answer to the CME questions below:

- 1. A B C D
- 2. A B C D
- 3. A B C D
- 4. A B C D
- 5. A B C D

Please answer the following questions:

1. In general, how do you rate the information presented in the case study?

- excellent good fair poor

2. Do you find the information presented in this case study to be fair, objective, and balanced? yes no

3. Name three clinical conditions that, in your experience, lead to less than optimal patient outcomes:

Condition 1: _____

Condition 2: _____

Condition 3: _____

4. Name three clinical topics you would like explored in future JCOM® case studies:

Topic 1: _____

Topic 2: _____

Topic 3: _____

Please print clearly:

Name: _____

Address: _____

City: _____

State: _____ Zip: _____

Phone: () _____

Social Security #: _____

Medical specialty: _____

Check enclosed (made payable to *Division of Continuing Medical Education*)

MasterCard or VISA # _____

Expiration date: _____

Signature: _____

Note: CME credit letter and correct responses will be sent to the above-named person.



Wayne State University
School of Medicine

Wayne State University School of Medicine is accredited by the Accreditation Council for Continuing Medical Education to sponsor continuing medical education for physicians.

The Wayne State University School of Medicine designates this continuing medical education activity for 1 credit hour of the Physician's Recognition Award of the American Medical Association.

The credit designation for this activity will expire on December 31, 1999.

Cut along the dotted line

