Chapter 23
Back Pain

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Introduction

The majority of patients who present with back pain to a primary care setting will have nonspecific back pain [1]. Acute back pain less than 4 weeks' duration is usually self-limited, but rare cases may reflect serious systemic etiology. It is important to look for evidence of the specific etiology of back pain. The history of back pain includes location, duration, and severity of the pain, activities, or detailed events prior to the onset of the back pain. In order to make sure not to miss a serious etiology, red flag signs and symptoms should be elicited.

Upper/middle back pain is located from the posterior neck to the lowest rib edge, and low back pain is located from the thoracolumbar spine down to the sacrum. Upper/middle back pain is often due to mechanical problems, whereas low back pain is related to various pathologies.

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Key History and Physical Exam

First, ascertain if the back pain is acute/sudden or chronic. Patients with severe back pain with abrupt onset or abnormal vital signs should be seen in the emergency room.

Next, red flag signs reflecting underlying systemic illness or an acute condition requiring urgent intervention should be sought in the history. Clinicians should be alert to clinical pictures of back pain resulting from cancer, infection, fracture, or ankylosing spondylitis. Key historical features include constitutional symptoms including unintentional weight loss or night sweats, history of malignancy, neurologic symptoms such as weakness or gait instability, numbness/sensory changes, bowel/bladder symptoms, history of recent bacterial infections, prolonged glucocorticoid use, and recent history of invasive procedures to the back.

Distribution of low back pain is either classified as axial (pain generally localized to the low back) or radicular neuropathic (pain radiating to the lower extremities). This classification often helps the primary care physician to identify disease processes occurring in the lumbar spine [2].

History

Abrupt onset, extremely sharp back pain causing patients to seek medical attention within hours of the onset may suggest vascular etiology. Spinal cord infarction secondary to aortic dissection leading to the anterior spinal artery may present with concomitant severe back pain and flaccid paralysis.

Epidural spinal cord compression and cauda equina syndrome are serious neurologic conditions. The spinal cord at the L1-L2 level connects to the cauda equina, in which autonomic nerve ends and lumbosacral nerve roots float in cerebrospinal fluid. Compression and damage to the spinal cord or cauda equina could lead to potentially irreversible loss of function of the lumbar plexus below the conus medullaris of the spinal cord. Sudden onset of severe back pain

radiating to both legs associated with saddle anesthesia and urinary retention (S3-S5 nerve roots) suggests cauda equina syndrome. Weakness of plantar flexion of the feet and loss of the ankle jerk reflex suggest S1-S2 nerve root involvement.

Numbness, cold, or burning sensations of the lower extremities are common symptoms of nerve root compression. This rare but serious condition usually arises from spinal cord compression due to trauma, tumors (intradural extramedullary tumor, epidural tumor), massive midline intervertebral disc herniation, spinal stenosis, epidural abscess, or inflammatory diseases (e.g., spondyloarthritis, sarcoidosis) [3].

Osteoporotic fractures commonly affect the thoracolumbar junction (T12-L1) and may result in significant back pain. Acute back pain may develop after sudden lifting or bending and is variable in quality.

Inflammatory back pain is a key feature of spondyloarthritis. Inflammatory back pain includes at least four of the following five features: insidious onset, the age of onset before 40 years, improvement with exercise, no improvement with rest, and pain at night [4].

When serious causes of back pain are not likely, as usually is the case, the differential diagnosis of axial low back pain or radicular pain in the primary care setting includes intervertebral disc herniation, spinal stenosis, facet joint osteoarthritis, sacroiliac joint inflammation, and pain in the paraspinal musculature.

Intervertebral disc herniation tends to occur in patients younger than 45 years old, and its onset is usually insidious but may have an inciting event such as lifting or bending. Patients will often report localized pain to the midline of the spine [5].

Herniated intervertebral discs at the L4-L5 or L5-S1 level are also an important cause of radicular pain. Clinicians should determine the distribution of the pain, which should follow one or multiple dermatomal patterns and is worsened by forward bending, coughing, and sneezing and improved with recumbency.

Lumbar facet joint hypertrophy frequently occurs in patients over 65 years old. Low back pain may be localized to the paraspinal region and is worse with standing and better with sitting or recumbency [5]. Sacroiliac joint pain is usually reported as pain in the paraspinal region below L5 or gluteal pain radiating to the thigh or distal to the knee and is worsened by transitional movements such as rising from the seated position.

The clinician needs to rule out piriformis muscle pain which presents with unilateral or bilateral buttock pain radiating to the L5 or S1 dermatome distribution [6]. Physical examination with negative straight leg raising test in piriformis muscle syndrome is helpful to distinguish this from radicular pain. Lumbar spinal stenosis could present with both axial and radicular pain. Patients older than 65 should be asked about neurogenic claudication, in which the pain worsens when standing and walking and improves when sitting or bending forward. Bilateral buttock or leg pain can also be present [7].

Axial low back pain in adolescents and young adults often originates from spondylolysis caused by bilateral stress fractures of the pars interarticularis of the L5 vertebra [8]. This pain is worsened by repetitive flexion-extension movements of the lumbar spine. A specific underlying pathology or condition cannot be identified for the vast majority of patients. In most patients with nonspecific back pain, symptoms improve within a few weeks.

Past Medical and Surgical History

Epidural abscess or vertebral osteomyelitis could be caused by hematogenous spread from recent bacteremia or contiguous spread from adjacent tissue or direct inoculation from spinal surgery. Insidious onset of spinal pain exacerbated by physical activity with or without fever progressively worsens over several weeks. Epidural abscess may cause shooting pain in the affected nerve root, which may progress to motor

weakness or bladder/bowel dysfunction. A high index of suspicion is the key for the diagnosis especially for those with risk factors such as diabetes, alcoholism, hemodialysis, IV drug use, HIV, or spinal surgery/epidural catheter. History of cancer and severe back pain at rest suggest a metastatic skeletal lesion. Breast, prostate, lung, thyroid, kidney, and gastrointestinal tract cancers have a propensity for skeletal metastasis.

Neoplastic epidural spinal cord compression arises most commonly in the thoracic spine (60%), followed by the lumbar spine (30%) and cervical spine (10%). Previous spinal surgeries, history of osteoporosis, or prior fractures should be noted.

Medications

Prolonged corticosteroid use increases the risk of vertebral compression fracture. Risk of infection is increased with immunosuppressant use.

Social History

Physical demands of work in manual workers are associated with a higher prevalence of low back pain compared to those with sedentary occupations [9]. Lower educational status and obesity are also related to an increased risk of low back pain [10].

History Elements for Back Pain

- Where is the pain in the back? Could you point where the pain is located?
- Is there pain radiating to your buttock or legs?
- How severe is the pain? Have you had any back pain before? Is the current pain better or worse than previous back pain?

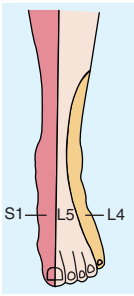
- Do you have prior history of cancer? If so, how long ago was it?
- Do you have fever or weight loss?
- Do you find it difficult to walk? Is there any numbness or change in sensation?
- Do you have any fecal/urinary incontinence?
- Do you have any recent preceding infection (bacterial pneumonia or urinary tract infection)?
- Does the pain wake you up at night?
- Is the back pain worse at rest or during the night? Does the pain get better when you walk? (spondyloarthritis)
- Is the pain localized to the back or radiating to the buttock or legs?
- Is the pain worsened by bending forward, coughing, or prolonged sitting? Is the pain improved with recumbency?

Physical Examination

A complete neurologic examination should be performed especially when red flags or neurologic complaints are present. Weakness of the lower extremity or bowel/bladder dysfunction could be due to a cervical spinal cord compression if subtle examination findings in the upper extremities such as hyperreflexia or a positive Hofmann sign are found.

In patients with sciatica or pseudoclaudication, straight leg raising test (elevation of the symptomatic leg to less than 60° with pain radiating below the knee is positive) and crossed straight leg raising test (elevation of the non-symptomatic leg to less than 60° with pain radiating below the knee is positive) could illicit radicular pain by compression or irritation of the L4-S1 nerve roots, but sensitivity is generally low [11]. Impaired reflexes of the Achilles tendon (S1 radiculopathy) or patellar tendon (L4 radiculopathy), weakness of ankle dorsiflexion or extension of the great toe (L5 radiculopathy), and reduced sensation in a dermatomal distribution are also helpful (Fig. 23.1). The L5 and S1 nerve roots are most commonly involved in lumbar disc herniation.

Lower extremity dermatomes, myotomes, and reflexes



Nerve Root	Sensory	Muscle	Tendon reflex
L2	Anterior medial thigh	Hip flexor	None
L3	Anterior thigh to knee	quadriceps	patellar
L4	Medial calf/ankle	Anterior tibialis	Patellar
L5	Lateral ankle/ dorsum of foot	Extensor hallicus longus	None
S1	Plantar lateral foot	Gastrocnemius/ soleus/ peroneals	Achilles

FIG. 23.1 Lower extremity dermatomes, myotomes, and reflexes

In lumbar spinal stenosis, motor or sensory findings mostly reflect the involvement of proprioceptive fibers in the posterior columns of the spinal cord [12]. Romberg sign and wide-based gait have moderate sensitivity but high specificity. Lumbar spinal pain is diminished on lumbar flexion, and vibratory and pinprick sensation are reduced. Achilles tendon reflex is often absent [13].

Sacroiliac joint pain is likely if it is reproduced by three or more of the following on physical examination: compression of the iliac crest in the lateral position, downward pressure on the anterior superior iliac crest, FABER test (flexion, abduction, and external rotation of the thigh and hip), Gaenslen test (hyperextension of the leg on the affected side), and Fortin finger test (pain localized within a finger breadth of the posterior iliac crest) [14].

Differential Diagnosis

- See Fig. 23.2 for a visual depiction of the differential diagnosis.

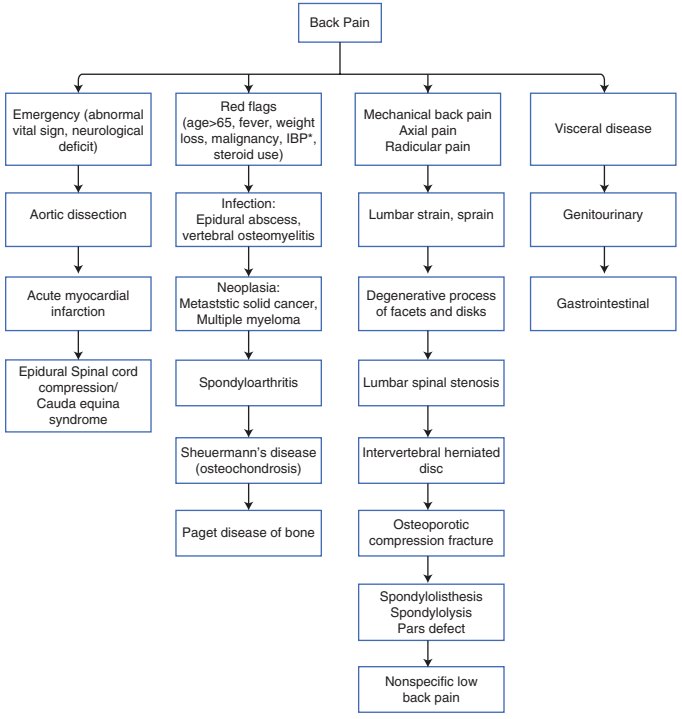


FIG. 23.2 Back pain algorithm

Serious Conditions

- Aortic dissection
- Acute myocardial infarction
- Anterior spinal artery syndrome
- Epidural spinal cord compression
- Cauda equina syndrome: trauma, tumors and metastatic lesions, and spinal stenosis
- Inflammatory diseases (e.g., spondyloarthritis), infectious conditions (e.g., tuberculosis)
- Spinal epidural abscess or vertebral osteomyelitis
- Metastatic solid cancer or multiple myeloma
- Spondyloarthritis

Mechanical Back Pain

- Vertebral compression fracture
- Lumbar spinal stenosis
- Intervertebral herniated disc
- Spondylolisthesis
- Lumbar spondylolysis
- Nonspecific low back pain

Decision-Making

Plain radiography should be limited to patients with signs or symptoms suggesting systemic diseases. Early imaging of axial low back pain or radiculopathy should be deferred until after initial treatment in the patient with weak risk factors for cancer or vertebral compression fracture. No imaging is indicated when back pain has improved or resolved 1 month after treatment [15].

Immediate imaging by MRI is indicated in the setting of progressive motor weakness, new urinary retention, or saddle anesthesia suggesting cauda equina syndrome. If current or recent cancer history and high clinical suspicion for malignancy is present, either MRI or plain X-ray should be performed. Spinal infection (epidural abscess or osteomyelitis) is strongly suspected in patients with risk factors including history of IVDU, recent infection, hemodialysis, or use of immunosuppressive agents. In this setting MRI and inflammatory markers such as ESR or CRP need to be checked. When infection is suspected, if blood cultures are positive for a likely pathogen (e.g., *Staph. aureus*), biopsy of the infected vertebral bone or intervertebral disc may not be necessary.

Vertebral compression fracture is suspected with advanced age, trauma, history of prolonged glucocorticoid use, and prior osteoporotic fracture. Plain X-ray film should be performed. Compression fracture with hypercalcemia, anemia, or elevated creatinine at presentation is suspicious for multiple myeloma. Monoclonal (M) protein can be detected by protein electrophoresis of the serum (SPEP) and/or of urine

(UPEP) from a 24-hour collection along with immunofixation of the serum and urine.

When spondyloarthritis is suspected, HLA-B27 positivity and MRI of sacroiliac joints help diagnose this condition.

Treatment

Patients with acute low back pain should be advised against bed rest and encouraged to return to daily living and activities.

Pharmacotherapy

Most acute low back pain will resolve within 8 weeks without active treatment. Evidence supports the use of nonsteroidal anti-inflammatory drugs (NSAIDs) for up to 3 months for chronic axial low back pain; however, short-term treatment within 4 weeks' duration is preferred. Start with ibuprofen 400–600 mg four times daily or naproxen 250–500 mg twice daily and taper as tolerated. Recent evidence concluded that acetaminophen showed no benefit compared to placebo in acute low back pain [16]; thus, only selected patients with contraindications to NSAIDs should be advised to use acetaminophen.

Non-benzodiazepine muscle relaxants may be effective for patients with acute low back pain who are refractory to initial pharmacotherapy [17]. Cyclobenzaprine is a reasonable choice. Benzodiazepine muscle relaxants should not be used because of the risk of physical dependence. Tramadol may be effective for acute and chronic low back pain [18]. For radicular pain, gabapentin could be used as add-on analgesic or stand-alone therapy.

In chronic axial pain, the use of simple analgesics such as acetaminophen or tramadol in combination with an antidepressant appears to be efficacious [19]. Tricyclic antidepressants or duloxetine can be tried if chronic low back pain is refractory.

Non-pharmacotherapy

Patients with acute low back pain should be advised against bed rest. Encourage patients to return to activities or work as soon as possible. In patients with acute low back pain, exercise does not improve outcomes. For patients with subacute (4–12 weeks) or chronic (12 weeks or longer) nonspecific low back pain, exercise should be encouraged for those who were already active. Referral to physical therapy to strengthen abdominal muscles by increasing lumbar flexion and reducing lumbar lordosis may prevent recurrence of low back pain. Aerobic exercise is recommended to all patients for chronic back pain.

Clinical Pearls

- Osteoporotic compression fracture can mask malignancy-related vertebral compression fracture. Always look for any sign of malignancy or infection even when the history is highly suggestive of osteoporotic fracture.
- Most back pain seen in the clinic will be from a simple, mechanical cause.
- Patients with simple back pain should resume their usual activity and avoid bed rest.

Don't Miss This!

- Cauda equina syndrome secondary to malignancy or midline intervertebral disc herniation should not be missed as it could lead to irreversible neurological deficits.
- Aortic dissection and anterior spinal artery infarction are life-threatening conditions in the differential diagnosis of acute back pain in older patients.

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