Managing Nontraumatic Acute Back Pain

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Editor’s Note: The Expert Clinical Management series consists of shorter, practical review articles focused on the optimal approach to a specific sign, symptom, disease, procedure, technology, or other emergency department challenge. These articles—typically solicited from recognized experts in the subject area—will summarize the best available evidence relating to the topic while including practical recommendations where the evidence is incomplete or conflicting.

INTRODUCTION

Scope of the Problem
Back pain is common and costly.1 Adults with acute nontraumatic back pain account for 2% to 3% of emergency department (ED) visits.2,3 Although most patients’ pain has a benign, self-limited cause, a small percentage has serious pathology that, if not rapidly identified, can result in neurologic damage. Emergency physicians must develop strategies to identify the majority of patients who require nothing more than history and physical examination and identify those with serious causes while minimizing use of high-cost, time-consuming resources. Overall, the quality of supporting evidence as it specifically relates to ED patients is weak and recommendations in the article are mostly based on guidelines, expert opinion, and the author’s 33 years of clinical experience. This article will exclude interventions not typically related to the ED phase of care such as epidural steroid injections, chiropractic treatment, and acupuncture therapy.

Differential Diagnosis and Misdiagnosis
Acute, nontraumatic low back pain can be broadly divided into 3 categories: benign, self-limited musculoskeletal causes; spinal pathologies that can cause severe neurologic disability because of spinal cord or cauda equina damage; and other abdominal or retroperitoneal processes that can present with back pain. For simplicity, I will refer to these groups as simple, serious, and nonspine causes of back pain, respectively.

Simple musculoskeletal causes include degenerative spine disease, muscular or ligamentous injury, and most acute disc herniations. These patients may have severe pain but have normal neurologic examination results, except for some patients with sciatica with a monoradiculopathy. Making a specific anatomic diagnosis (eg, ligamentous strain versus disc herniation) is neither helpful nor necessary because the initial management is identical and the outcomes are almost always excellent.

It is crucial to remember that although new neurologic physical findings strongly suggest serious disease, the converse is not true. Patients with any of the common serious causes can present with normal neurologic examination results—and thus be at risk for misdiagnosis.4 Failure to consider a serious diagnosis is the most common oversight.5

Emergency physicians must think broadly and carefully consider nonspine causes of back pain (eg, aortic aneurysm, cholangitis) (Figure 1), which will not be discussed further in this article.

RISK STRATIFICATION
After history and physical examination, patients with simple back pain can be discharged from the ED, whereas those with serious back pain require advanced imaging, usually magnetic resonance imaging (MRI). Distinguishing between these 2 groups is therefore critical. The clinical examination (history and physical examination) helps make
this distinction, and a few extra minutes at the bedside can save significant time by identifying patients for whom neither testing nor imaging is indicated.6-8

Clinical Examination and “Red Flags”

The history and physical examination can identify various red flags (Figure 2), for which the evidence basis is typically weak. The best-validated ones include history of cancer, corticosteroid use, abnormal neurologic physical findings (including new ataxia and difficulty walking), and anticoagulant use.4,9-11 It is possible that combinations of red flags and interpreting them in the context of an individual patient could improve their utility. Patients with no red flags and normal neurologic examination results are at extremely low risk for serious causes of back pain. Patients with new hard neurologic findings (including a sensory level and saddle anesthesia) are at high risk for serious causes. Patients with the presence of historic red flags but normal neurologic examination results are at intermediate risk for cord or cauda equine syndrome.

Decisionmaking in Intermediate-Risk Patients

Management of these patients must be individualized (Figure 2). For example, back pain patients with the red flags of fever (but a presentation suggesting cholangitis) or those receiving warfarin (but whose histories suggest a lumbar muscle strain) do not need emergency MRI. On the other hand, an intravenous drug user with new back pain and unexplained fever, even with a normal neurological examination, should undergo emergency MRI.

Physicians may opt to use inflammatory biomarkers or consult a neurologist to help with decisionmaking. Timing of the scan is another consideration, which is partly based on the evolution of the disease in question. Neurologic dysfunction is not always a linear progression of “compression” caused by mass effect. Patients with spinal epidural abscess can abruptly decompensate because of cord infarction from vascular thrombosis.12 Patients with metastatic spine disease can also deteriorate abruptly because of vertebral collapse with acute compression.13 Therefore, even in neurologically intact patients, there is more urgency for the MRI if spinal epidural abscess is the target diagnosis and slightly less urgency if cancer is the major concern. Finally, disposition (inpatient versus outpatient) must also be considered. Social factors, availability of a primary care physician, potential availability of next-morning MRI or neurologic consultation, and the specific differential diagnosis all factor into these decisions.

Biomarkers

Routine laboratory testing is not useful. Elevated WBC counts are found in only two thirds of patients with spinal epidural abscess.12 Inflammatory markers such as erythrocyte sedimentation rate (ESR) or C-reactive protein are highly sensitive but nonspecific markers for epidural abscess and, to a lesser extent, cancer.12,14,15 The problem is the threshold. An ESR of greater than 20 mm/hour has a
LOW RISK

- No Red Flags* & normal neurological exam (or isolated root finding consistent with sciatica)

1. No routine lab testing, imaging, or consults
2. Treat symptoms
   - Use non-steroidal anti-inflammatory drug; opioids for severe pain
   - Consider a muscle relaxant
3. 2-3 days of bedrest for severe pain
4. Rapid return to normal activities
5. Explain the problem & treatment to the patient
6. Primary care physician follow-up
7. Written instructions about symptoms for which to return (development of red flags)

INTERMEDIATE RISK

Presence of ≥ 1 history Red Flags* AND normal neurological exam (or isolated single root finding consistent with sciatica)

Options based on clinical judgement:
1. Further risk stratification
   - C-reactive protein or erythrocyte sedimentation rate if ? cancer or spinal abscess
2. Consultation (neurology or spine surgery)
3. Timing of imaging
   - Emergent magnetic resonance imaging in the emergency department
   - Urgent in next 48 hours
4. Disposition
   - Discharge with urgent magnetic resonance imaging & primary care physician follow-up
   - Admission to hospital for observation

HIGH RISK

Any new abnormality on neurological exam (except for isolated single root finding consistent with sciatica)

Options based on clinical judgement:
1. Further risk stratification
   - C-reactive protein or erythrocyte sedimentation rate if ? cancer or spinal abscess
2. Consultation (neurology or spine surgery)
3. Timing of imaging
   - Emergent magnetic resonance imaging in the emergency department
   - Urgent in next 48 hours
4. Disposition
   - Discharge with urgent magnetic resonance imaging & primary care physician follow-up
   - Admission to hospital for observation

EMERGENCY MAGNETIC RESONANCE IMAGING

facilitate rapid imaging of the correct portion of spine (Figure 3)

Consider (case-by-case):
1. Empiric antibiotics
2. Empiric IV dexamethasone
3. Relevant consultations

History

* Red Flags (for cord/cauda equina compression)
- Epidural abscess: fever, immunocompromised, intravenous drug abuse, h/o bacteremia
- Epidural tumor: history of systemic cancer or weight loss
- Epidural hematoma: anticoagulation or recent spinal anesthesia
- General: new frequent falls or ataxia, ≥3 weeks of midline pain, nocturnal pain, sphincter incontinence or urinary urgency, bilateral leg symptoms

Physical examination

- Motor - weakness in legs (or arms)
- Sensory - sensory level or saddle anesthesia
- Reflexes - diminished or abnormal reflexes including positive Babinski sign
- Sphincter dysfunction - lax rectal tone (rectal optional but perform in intermediate or high risk patients) or post-void residual >100 cc’s

Caution:
1. Communicate clearly with the patient
   - The plan, the concerns & the follow-up
   - Symptoms for which to return to the emergency department
2. Coordinate with primary care physician or admitting physician
3. Treat symptoms with analgesics

Negative magnetic resonance imaging

1. Review with radiologist
   - Is the scan truly negative?
   - Is the scan technically adequate?
   - Have the correct levels been imaged?
2. Repeat the neurological exam
   - Is it truly abnormal?
   - Has it evolved?
3. Consider lumbar puncture
4. Admission for further evaluation

Positive magnetic resonance imaging

1. Consult spine surgeon for definitive care
2. Start emergency department-based treatments and/or consults based on the diagnosis

^ Solid lines indicate usual care; dotted lines indicate options based on case-by-case clinical judgment.

Figure 2. Algorithm for management of nontraumatic back pain.
sensitivity approaching 100% for epidural abscess (but with poor specificity); as one increases the threshold, the specificity improves but at the price of decreased sensitivity.\(^{14}\)

A single-institution study of patients with suspected spinal epidural abscess compared clinical outcomes before and after implementation of a guideline using ESR (cutoff of 20 mm/hour) and C-reactive protein. Diagnostic delays decreased from 84% to 10%, and the proportion of patients with motor abnormalities at diagnosis decreased from 82% to 19%.\(^{14}\) ESR performed better than C-reactive protein in this small study. Using ESR for patients with possible metastatic cancer to the spine has a lower sensitivity (78% with a cutoff of 20 mm/hour).\(^{15}\) Because of poor specificity, ESR and C-reactive protein are not recommended for patients without red flags, and because of poor sensitivity, they are not useful for patients when disc herniation or epidural hematoma is the main diagnostic consideration.

**Imaging**

Better-quality evidence derived from primary care populations underlies the recommendations against routine imaging of patients with simple back pain.\(^{1,6,8}\) In actual ED practice, more than 30% of patients with nontraumatic back pain are imaged, possibly reflecting the skewed acuity. Over time, there has been a strong trend toward computed tomography (CT) or MRI.\(^{3}\) A meta-analysis of 1,804 patients from 6 studies who received no imaging versus those with any imaging (spine radiographs or MRI) found no difference in outcomes.\(^{16}\) Another study randomized 380 back pain patients (whose physicians had ordered radiographs) to radiographs versus MRI.\(^{17}\) Use of MRI did not improve outcomes, but costs trended higher in the MRI group, in part because of increased numbers of procedures based on abnormal MRI findings that are often incidental; fully 52% of asymptomatic individuals with no history of back pain have disc bulges and 27% have disc protrusions.\(^{18}\)

In patients with red flags, radiographs should not be used to distinguish simple from serious back pain because negative radiograph results are insufficient to exclude serious pathology and positive ones require follow-up MRI anyway.

**MANAGING PATIENTS WITH SIMPLE BACK PAIN**

Application of heat is weakly recommended.\(^{1,6}\) Rapid resumption of ordinary activity leads to faster, better outcomes than bed rest.\(^{19}\) If the patient obtains relief from bed rest, a short duration (2 days) results in faster recovery than longer courses.\(^{0,7,20}\) Acutely, exercise is not recommended.\(^{1,6}\)

Guidelines and expert opinion recommend non-narcotic analgesics.\(^{1,6,7}\) Despite numerous studies and recommendations, there are few data that inform the best pharmacotherapy for the initial treatment of ED patients with acute back pain. We do not know whether, overall, ED patients have more severe pain than the primary care patients for which these guidelines were developed. In practice, emergency physicians commonly use opioids (61% in a large national sample).\(^{3}\) Muscle relaxants (prescribed by emergency physicians for 41% of back pain patients) are effective, although they often cause sedation.\(^{3,21}\) Oral steroids do not help unselected patients with acute back pain, but the subset of patients with an acute radiculopathy may benefit.\(^{22,23}\)

My approach prioritizes treating pain and recognizes that the guidelines allow some variation. For patients with severe pain, I recommend 2 to 3 days of bed rest with rapid resumption of normal activity thereafter, treatment for 2 to 3 days with opioid analgesics, acetaminophen, and a muscle relaxant. Simultaneously, I prescribe a longer course of ibuprofen to the patient and I emphasize the importance of using an anti inflammatory medication. For patients with less severe pain, I omit the bed rest and the opioids. I recommend follow-up with a primary care physician within 1 to 2 weeks and give careful instructions about symptoms for which to return sooner (red flags).

Patient satisfaction seems to be more related to their perception that a careful history and physical examination have been conducted and that the provider has clearly explained the diagnosis and care plan rather than to receiving imaging.\(^{24}\)

**DIAGNOSIS AND ED MANAGEMENT OF HIGH-RISK PATIENTS**

**Diagnosis of Serious Causes**

Classic presentations are frequently absent and symptoms and signs may evolve with time, even during the ED encounter. Many patients with cauda equina syndrome do not have rectal or urinary sphincter dysfunction or saddle anesthesia on presentation.\(^{25,26}\) Only approximately 10% of patients with spinal epidural abscess present with the classic triad of fever, back pain, and neurologic deficits.\(^{27}\) Only 66% of patients have fever at presentation.\(^{28}\) Although most patients with metastatic epidural spinal cord compression have a history of cancer, in approximately 20%, the vertebral metastasis is the first evidence of the cancer.\(^{15}\) In a meta-analysis of 613 patients with spinal epidural hematoma, 30% of patients had no identifiable reason for the bleeding.\(^{29}\)
Ensure that MRI safety checklist has been filled out and sent to the appropriate place.

- If there are absolute contraindications, do not send to MRI.
- Discuss alternative options (CT or conventional myelogram) with the radiologist.
- Ensure that pain and anxiety are controlled and that the patient can lie flat for the likely duration of the scan.
- Consider procedural sedation if there are adequate medical staff to safely monitor the patient, factoring in the logistics of the proximity of the MRI department to the ED.
- Intubation and sedation may be necessary.

Decide what part of the spine needs imaging.
- For patients with back pain and upgoing toes, isolated lumbosacral imaging is insufficient.
- If spinal epidural abscess or metastatic cancer is an important concern, the entire spine should be imaged because skip areas with abscess (that may affect surgical planning) and multiple metastases (that can affect radiation therapy planning) are common.
- Speak to radiologist.
- Discuss the urgency of the case to prioritize according to other cases in the queue.
- Ensure that the scan has the proper protocol for the specific diagnostic concern about use of contrast, which facilitates diagnosis of epidural abscess and epidural metastases.

**Figure 3.** MRI checklist.

Because some patients may not have a history of red flags, careful examination of the lower extremities and perineum is extremely important, including testing sensation in the feet and Babinski’s sign. Other than a monoradiculopathy from sciatica, new hard physical findings should drive rapid evaluation (Figure 2). Although a rectal examination is not required for all patients with back pain, testing for saddle anesthesia, which is a sensitive finding in cauda equina syndrome, should be conducted routinely. For patients with urinary symptoms, a postvoid residual of greater than 100 mL by ultrasonography or bladder scanning is abnormal.

Although the majority of patients without red flags and with normal neurologic examination results have simple back pain, the occasional serious causes will be extremely difficult to diagnose at initial presentation. Therefore, follow-up with another physician in 1 to 2 weeks, or sooner if red flag symptoms develop, is a very important instruction to give to the patient.

**Management**

Patients with back pain and new neurologic findings (other than a monoradiculopathy consistent with sciatica) should undergo emergency MRI. Figure 3 is an MRI checklist.

<table>
<thead>
<tr>
<th>Condition Diagnosed</th>
<th>Definitive Treatment</th>
<th>Steps to Be Initiated or Considered in the ED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metastatic tumor</td>
<td>Steroids, radiotherapy, surgery, and chemotherapy</td>
<td>Early consultation with oncology, radiation oncology Empiric dexamethasone</td>
</tr>
<tr>
<td>Spinal epidural abscess or vertebral osteomyelitis</td>
<td>Antibiotics and surgery</td>
<td>Always obtain 2 blood cultures before administration of antibiotics</td>
</tr>
<tr>
<td>Epidural hematoma</td>
<td>Anticoagulation reversal and surgery</td>
<td>Reversal of anticoagulation</td>
</tr>
<tr>
<td>Central disc herniation</td>
<td>Surgery</td>
<td></td>
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</tbody>
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*Spine surgical consultation should occur for all cases.

**Figure 4.** Initial management of patients receiving a diagnosis of a common serious cause of back pain.*
checklist that highlights key issues to help facilitate the study, including areas of the spine to be imaged, the use of contrast, and the need for sedation.

In general, patients who require emergency scanning should be transferred if MRI is not available at a given hospital. However, if a qualified local spine surgeon were willing to operate according to results of CT scanning, performing a CT would be a reasonable alternative. If the CT result were normal, an MRI would still be needed. These decisions should be individualized.

For high-risk patients with negative MRI results, physicians should reevaluate the situation. Discuss the clinical findings with the radiologist to help them focus to the clinically relevant area of spine. Reexamine the patient to confirm the initial findings (and to evaluate for evolution). Finally, consider lumbar puncture (to help diagnose transverse myelitis or Guillain–Barré syndrome) and neurology consultation to help clarify the diagnosis. Definitive treatment for patients with diagnostic MRI requires spine surgical consultation and is beyond the purview of emergency medicine, though some issues should be addressed in the ED (Figure 4).

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REFERENCES