

Clinical Assessment of Low Back Pain

EBEM Commentator Contact

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0196-0644/\$-see front matter

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doi:10.1016/j.annemergmed.2005.12.021

[Ann Emerg Med. 2006;47:283-285.]

RATIONAL CLINICAL EXAMINATION REVIEW SOURCE

This is a rational clinical examination abstract, a regular feature of the *Annals'* Evidence-Based Emergency Medicine (EBEM) series. Each segment features an abstract of a rational clinical examination review from the *Journal of the American Medical Association* and commentary by an emergency physician knowledgeable in the subject area.

The source for this Rational Clinical Examination review abstract is: Deyo RA, Rainville J, Kent D. What can the history and physical examination tell us about low back pain? *JAMA*. 1992;268:760-765.¹

OBJECTIVE

This article reviews and summarizes the value of the clinical examination for diagnosing the cause of nontraumatic low back pain. It also attempts to use the clinical examination to determine significant causes of low back pain with increased morbidity and mortality.

DATA SOURCES

No specific database searches or hand searches were reported by the authors. A number of the source articles for the data presented in this rational clinical examination installment are either prospective observational studies or reviews performed by the lead author for the rational clinical examination (RD). In one case (the diagnosis of spinal compression fracture), the data presented are unpublished data collected by this author from a cohort of low back pain patients in a clinical setting. Likelihood ratios reported here were calculated by the rational clinical examination abstract authors based on the data published in the rational clinical examination installment.

STUDY SELECTION

The author did not specify selection criteria for the articles referenced in this review.

DATA EXTRACTION AND ANALYSIS

Data are extracted and reported directly from literature included in the rational clinical examination; therefore, no

pooling of data is performed. Agreement is reported using κ statistics.

MAIN RESULTS

The patient's age at presentation for new-onset back pain can help narrow the diagnosis. Younger patients are more likely to have benign musculoskeletal disorders, herniated disks, or ankylosing spondylitis,² whereas older patients (>50 years) are more prone to have serious diseases such as fractures, spinal stenosis, and cancer (Table 1).

A medical history of cancer (except skin) or unexplained weight loss should immediately raise the possibility of metastasis. A recent history of trauma or steroid use makes a compression fracture more likely as the cause of low back pain. Spinal infections, such as osteomyelitis and epidural abscess, should be considered for all intravenous drug abusers or any febrile low back pain patient.

The onset and duration of low back pain can also give important clues to the differential of low back pain. Pain with an insidious onset or pain that is present for more than 1 to 3 months despite conservative therapy is consistent with either ankylosing spondylitis or cancer.

A combination of symptoms for certain diseases increases their predictive power. The diagnosis of ankylosing spondylitis increases if 4 of the following 5 historical characteristics are met: (1) duration of pain longer than 5 months, (2) insidious onset of symptoms, (3) onset of symptoms at age younger than 40 years, (4) morning stiffness of the back, and (5) discomfort improvement with exercise.³ For malignancy, the absence of all the following criteria effectively rules out this diagnosis: (1) older than 50 years, (2) history of cancer, (3) symptoms of more than 1 month's duration, and (4) unexplained weight loss.⁴

The final relevant historical element for low back pain is a description of how the pain changes with position and the presence of any associated symptoms. Back pain that improves when the patient is seated is consistent with spinal stenosis.³ When pain is worse at rest or lying down, malignancy is more concerning. Although sciatica is common to both a herniated disk and cauda equina syndrome, urinary retention is more specific for cauda equina syndrome, which is a surgical emergency.⁴

Primarily disc herniation and a massive herniation can present with neurologic deficits consistent with a cauda equina

Table 1. Operating characteristics of medical history and physical examination findings for nontraumatic causes of lower back pain.

Etiologies of Back Pain	Historical and Physical Exam Findings	Sensitivity/Specificity, %	LR+/LR-
Cancer	Age >50 y	77/71	2.7/0.3
	Previous hx of cancer	51/98	25.5/0.5
	Unexplained weight loss	15/4	0.2/21.3
	No relief with bedrest	31/48	0.6/1.4
	Pain duration >1 mo	50/81	2.6/0.6
Compression fracture	Age >50 y, cancer hx, weight loss, or therapy failure	100/60	2.5/0.0
	Age >50 y	84/61	2.2/0.3
	Age >70 y	22/90	2.2/0.9
	Trauma	30/85	2.0/0.8
	Corticosteroid use	6/99	12.0/0.9
Spinal osteomyelitis	IVDA or UTI or skin infection	40/NA	na
Herniated disc	Sciatica	95/88	7.9/0.1
Spinal stenosis	Pseudoclaudication	60/NA	na
	Age >50 y	90/70	3.0/0.1
Ankylosing spondylitis	Age of onset \leq 40 y	23/82	1.3/0.9
	Pain not relieved by supine	100/49	2.0/0.0
	Morning back stiffness	64/59	1.6/0.6
	Pain duration \geq 3 mo	71/54	1.5/0.5
	4 Of 5 positive responses	95/85	6.3/0.6

Hx, History; IVDA, intravenous drug abuse history; LR, likelihood ratio; na, not applicable; UTI, urinary tract infection.

syndrome. These cauda equina syndrome deficits include decreased anal sphincter tone and saddle anesthesia. Both cauda equina syndrome and herniated disks have positive straight-leg-raising signs less than 60°. Further physical findings consistent with the presence of a herniated disk include great toe extensor weakness and an impaired ankle reflex.

Interobserver agreement (κ) for physical signs associated with low back pain was highest for the more objectively measured neurologic deficits, such as weak ankle dorsiflexion and mechanically measured straight leg raising ($\kappa=0.81$ to 1.00). Softer physical signs such as calf wasting, sensory deficits, and straight leg raising by visual inspection demonstrated a good ($\kappa=0.61$ to 0.80) agreement. Only fair ($\kappa=0.21$ to 0.40) agreement was noted for the findings of bony or soft tissue tenderness.

Patients presenting with acute onset of low back pain will often improve with conservative treatment alone and need no further evaluation. The routine use of radiographs in the evaluation of most low back pain syndromes is unwarranted. Imaging studies should be reserved for the following patients: any patient with neurologic deficit, who is older than 50 years, or who is younger than 20 years and has fever, trauma, or signs of neoplasm.

CONCLUSIONS

When a patient with low back pain is evaluated, a few specific signs and symptoms are important for identifying the cause. Among historical elements are age, duration of pain, response to previous therapy, and history of malignancy, trauma, or intravenous drug abuse. A physical examination that

reveals fever, focal neurologic deficits, or midline vertebral tenderness should alert the physician to a specific cause for the pain, which should require a further evaluation.

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COMMENTARY: CLINICAL IMPLICATION

The lifetime prevalence of back pain is estimated at 70%,⁵ and with nearly 2.7 million emergency department (ED) visits per year in the United States in 2003,⁶ it is among the most common complaints addressed by emergency physicians. This rational clinical examination reviews the nontraumatic causes of low back pain. At first glance, this seems to limit the applicability of this review's findings to emergency medicine because many of our patients have acute back pain syndromes of musculoskeletal origin. However, this rational clinical examination focuses on the most complex and easily misdiagnosed group of back pain patients: those with an underlying systemic disease as the cause for their back pain.

This rational clinical examination is helpful in identifying a number of indicators pointing to specific nontraumatic causes of low back pain. From an emergency medicine perspective, the development of new or progressive neurologic deficits often supplants the need to make the exact diagnosis in the ED. These

patients often require emergency interventions from consulting services, including radiology, a spinal surgeon, or radiation oncology.

Neurologically stable or intact patients with indicators suggesting ankylosing spondylitis, spinal stenosis, stable compression fractures, and herniated discs can be treated conservatively with pain control and referred to the appropriate subspecialists for a more detailed evaluation. A history of intravenous drug abuse or fever puts the onus on the emergency physician to satisfactorily rule out the possibility of a spinal infection and identify its primary focus. The investigation of spinal infections, coupled with the risk of progressive neurologic and infectious processes, will often require admission. Likewise, malignancy needs to be scrupulously investigated in patients older than 50 years and those with a history of cancer, unexplained weight loss, or failure of conservative therapy. These patients also often require admission or expeditious and well-directed outpatient follow-up. Finally, although it is not mentioned in this review, the emergency physician should always consider abdominal aortic aneurysm as a potentially life-threatening cause for back pain, particularly in patients with known risk factors such as vascular disease, hypertension, or age older than 50 years.

As can be seen from Table 1, the majority of signs and symptoms had LR+ less than 5 and LR- greater than 0.20, which should be interpreted to mean that few if any findings can be used to conclusively (LR+ >10, LR <0.10) rule in or rule out any of the causes of low back pain.

TAKE HOME MESSAGE

There are warning signs and symptoms that, if present in neurologically stable low back pain patients, require further extensive evaluation for underlying diseases. Malignancy should be considered in any patient older than 50 years or any aged patient with a history of cancer, recent unexplained weight loss, or failure of conservative therapy. Spinal infections should be considered in low back pain patients with fever or a history of intravenous drug abuse. Though positive symptoms and signs are suggestive of certain diseases, the absence of these warning signs is not strong enough evidence to conclusively rule out their associated conditions. Patients with back pain of greater than 1 month's duration deserve a thorough review in the ED and expeditious follow-up if discharged.

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EBEM TEACHING POINT

Interpretation of κ . κ Is a measure of consistency in interpreting a diagnostic test (in this rational clinical

Table 2. Interpretation of κ values.⁶

κ	Interpretation
<0	No agreement
0.0–0.19	Poor agreement
0.20–0.39	Fair agreement
0.40–0.59	Moderate agreement
0.60–0.79	Substantial agreement
0.80–1.00	Almost perfect agreement

examination, the “test” is a physical finding). For a symptom or sign to be useful, multiple examiners should consistently agree on its presence or absence (interobserver reliability). Interobserver reliability is therefore not a measure of a test's validity; however, it describes the test's precision. The most straightforward measure of interobserver agreement is the raw percentage of agreement between 2 examiners. However, this does not account for the agreement rate that would have occurred by chance. The κ statistic contains a term, “expected agreement (%)” that is the agreement rate as a consequence of pure chance. The formula for κ is stated below:

$$\kappa = \frac{\text{observed agreement (\%)} - \text{expected agreement (\%)}}{100\% - \text{expected agreement (\%)}}$$

The calculation of expected agreement (%) can be found in Landis and Koch.⁷

The κ value measures the degree of agreement beyond that expected only by chance. A κ of 0 indicates that the observed agreement between examiners is precisely what could have been expected by random chance. κ Ranges from 1 (perfect agreement) to -1 (perfect disagreement). One interpretation of the κ value is shown in Table 2. There is no recommended threshold for an acceptable κ for any symptom or sign. κ Should be thought of as a measure of the reproducibility of a diagnostic test in much the same way that we interpret confidence intervals for means of interval data.

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