

What Can the History and Physical Examination Tell Us About Low Back Pain?

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BACK pain ranks second only to upper respiratory illness as a symptomatic reason for office visits to physicians.¹ About 70% of adults have low back pain at some time, but only 14% have an episode that lasts more than 2 weeks. About 1.5% have such episodes with features of sciatica.^{2,3} Most causes of back pain respond to symptomatic and physical measures, but some are surgically remediable and some are systemic diseases (cancer or disseminated infection) requiring specific therapy, so careful diagnostic evaluation is important. Features of the clinical history and physical examination influence not only therapeutic choices but also decisions about diagnostic imaging, laboratory testing, and specialist referral.

ANATOMIC/PHYSIOLOGIC ORIGINS OF FINDINGS IN THE LOW BACK

Low back pain may arise from several structures in the lumbar spine, including the ligaments that interconnect vertebrae, outer fibers of the annulus fibrosus, facet joints, vertebral periosteum, paravertebral musculature and fascia, blood vessels, and spinal nerve roots. The causes of low back pain generated through these structures include (1) musculoligamentous injuries; (2) degenerative changes in the intervertebral disks and facet joints; (3) herniation of the nucleus pulposus of an intervertebral disk, with irritation of adjacent nerve roots; (4) spinal stenosis (narrowing of the central spinal canal or the

lateral recesses of the canal in which the nerve roots travel caudally; this usually results from hypertrophic degenerative changes in the disks, ligamentum flavum, and facet joints); (5) anatomic anomalies of the spine, such as scoliosis and spondylolisthesis, which are often asymptomatic but may cause pain when they are severe; (6) underlying systemic diseases, such as primary or metastatic cancer, spinal infections, and ankylosing spondylitis; and (7) visceral diseases unrelated to the spine, including diseases of the pelvic organs, kidneys, gastrointestinal tract, and aorta (diagnosis of which will not be discussed in the present report).

PREVALENCE OF DISEASES THAT PRODUCE LOW BACK PAIN

Up to 85% of patients cannot be given a definitive diagnosis because of weak associations among symptoms, pathological changes, and imaging results.^{4,5} We assume that many of these cases are related to musculoligamentous injury or degenerative changes.

Anatomic evidence of a herniated disk is found in 20% to 30% of imaging tests (myelography, computed tomography, and magnetic resonance imaging) among normal persons.^{6,7} These herniations are asymptomatic and result in no clinical disease. The proportion of all persons with low back pain who undergo surgery for a disk herniation is only about 2%.²

In primary care, about 4% of patients with back pain will prove to have compression fractures, 3% have spondylolisthesis, and only 0.7% have spinal malignant neoplasms (primary or metastatic).⁸⁻¹³ Even fewer have ankylosing spondylitis (about 0.3%) or spinal infections (0.01%).^{8,14,15} Widespread recognition of spinal stenosis has occurred only in the last 15 years. It is most common in older adults, but its prevalence is unknown.

Since a specific cause frequently cannot be identified, diagnostic efforts are often disappointing. Instead of seeking a precise cause in every case of back pain, it may be most useful to answer three basic questions⁹: (1) Is there a serious systemic disease causing the pain? (2) Is there neurologic compromise that might require surgical evaluation? (3) Is there social or psychological distress that may amplify or prolong pain? These questions can generally be answered on the basis of history and physical examination alone, and a minority of patients require further diagnostic testing.

IS THERE EVIDENCE OF SYSTEMIC DISEASE?

Cancer

Malignant neoplasm (primary or metastatic) is the most common systemic disease affecting the spine, although it accounts for less than 1% of episodes of low back pain. Approximately 80% of patients with this diagnosis are over the age of 50 years (Table 1). A previous history of cancer has such high specificity (0.98) that such patients should be considered to have cancer until proven otherwise (SpPin [an acronym for when Specificity is extremely high, a Positive test result rules *in* the target disorder]). However, only one third of patients with an underlying malignant neoplasm have this history (sensitivity, 0.31). Unexplained weight loss, pain duration greater than 1 month, and failure to improve with conservative therapy are moderately specific findings. Most patients with back pain due to cancer report that pain is unrelieved by bed rest (sensitivity >0.90, SnNout [an acronym for when Sensitivity of a symptom or sign is high, a Negative response rules *out* the target disorder]), but the finding is nonspecific.¹⁰ In a study of nearly 2000 patients with back pain, no cancer was identified in any patient under age

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50 years without a history of cancer, unexplained weight loss, or a failure of conservative therapy (combined sensitivity, 100%, SnNout).¹⁰

The physical examination is less useful than the history for detecting underlying cancer,¹⁰ except in late stages. Since the breast, lung, and prostate are the most common sources of spinal metastases, these organs should be examined when cancer is suspected.

Spinal Infections

Spinal infections usually are blood-borne from other sites, including urinary tract infections, indwelling urinary catheters, skin infections, and injection sites for illicit intravenous drugs. One of these sites is identified in approximately 40% of patients with spinal infections (sensitivity, 0.40).¹⁶

In patients with spinal infections, the sensitivity of fever is disappointing, varying from 0.27 for tuberculous osteomyelitis to 0.50 for pyogenic osteomyelitis¹⁷ and 0.83 for spinal epidural abscess.¹⁸ Because 2% of patients in primary care with mechanical low back pain have fever (perhaps due to viral syndromes), specificity for bacterial infection is approximately 0.98.¹⁰ Spine tenderness in response to percussion has a sensitivity of 0.86 for bacterial infection, but specificity is poor (0.60).^{10,19,20}

Compression Fractures

Although spinal compression fractures are not "systemic" diseases, they often occur in persons with generalized osteoporosis. Most patients with this problem do not have a history of identifiable trauma (sensitivity, 0.30). A person with back pain who is receiving long-term corticosteroid therapy is considered to have a compression fracture until proven otherwise (specificity, 0.99, SpPin). African-American and Mexican-American women have only one fourth as many compression fractures as white women.²¹ As shown in Table 1, age greater than 70 years is a relatively specific finding (specificity, 0.96, SpPin).

Ankylosing Spondylitis and Spine Range of Motion Measures

Ankylosing spondylitis shares several historical features with other inflammatory arthropathies, such as rheumatoid arthritis. Calin and colleagues²² described five screening questions for ankylosing spondylitis: (1) Is there morning stiffness? (2) Is there improvement in discomfort with exercise? (3) Was the onset of back pain before age 40 years? (4) Did the problem begin slowly? (5) Has the pain persisted for at least 3 months?

Using at least four positive answers

Table 1.—Estimated Accuracy of the Medical History in the Diagnosis of Spine Diseases Causing Low Back Pain

Disease to Be Detected	Source, y	Medical History	Sensitivity	Specificity*
Cancer	Deyo and Diehl, ¹⁰ 1988	Age \geq 50 y	0.77	0.71
		Previous history of cancer	0.31	0.98
		Unexplained weight loss	0.15	0.94
		Failure to improve with a month of therapy	0.31	0.90
		No relief with bed rest	>0.90	0.46
		Duration of pain >1 mo	0.50	0.81
		Age \geq 50 y or history of cancer or unexplained weight loss or failure of conservative therapy	1.00	0.60
Spinal osteomyelitis	Waldvogel and Vasey, ¹⁶ 1980	Intravenous drug abuse, urinary tract infection, or skin infection	0.40	NA
Compression fracture	Unpublished data†	Age \geq 50 y	0.84	0.61
		Age \geq 70 y	0.22	0.96
		Trauma	0.30	0.85
		Corticosteroid use	0.06	0.995
Herniated disk	Deyo and Tsui-Wu, ² 1987; Spangfort, ³³ 1972	Sciatica	0.95	0.88
Spinal stenosis	Turner et al, ³² 1992	Pseudoclaudication	0.60	NA
		Age \geq 50 y	0.90‡	0.70
Ankylosing spondylitis	Gran, ²³ 1985	4 out of 5 positive responses§	0.23	0.82
		Age at onset \leq 40 y	1.00	0.07
		Pain not relieved supine	0.80	0.49
		Morning back stiffness	0.64	0.59
		Pain duration \geq 3 mo	0.71	0.54

*NA indicates not available.

†From 833 patients with back pain at a walk-in clinic, all of whom received plain lumbar roentgenograms.

‡Authors' estimate.

§The five screening questions were (1) onset of back discomfort before age 40 years? (2) did the problem begin slowly? (3) persistence for at least 3 months? (4) morning stiffness? and (5) improved by exercise?

to define a positive "test" result, the sensitivity of these questions was 0.95 and specificity 0.85,²² although other authors report lower sensitivity.^{23,24} When screening for a rare disease such as ankylosing spondylitis, however, the predictive value of a positive test is low. In an industrial screening program, only 16 of 367 persons with positive criteria proved to have ankylosing spondylitis (a predictive value of 0.04).²⁵ "Inflammatory" symptoms (morning stiffness, night pain, relief with exercise) are moderately sensitive but nonspecific. All patients with ankylosing spondylitis in one population survey reported symptom onset before age 40 years, making this history highly sensitive but nonspecific (SnNout, Table 1).²³

Reduced spinal mobility results from "fusion" of adjacent vertebrae in this condition. The Schober Test, which measures distraction between two marks on the skin during forward flexion, is a commonly described method for quantifying reduced flexion. Although it is moderately reproducible,^{20,26} reduced spine flexion is not specific for inflammatory spondylopathies, being equally common in patients with chronic back pain or

spine tumors.²⁷ Reduced chest expansion (using a strict criterion for abnormality, such as expansion \leq 2.5 cm) is highly specific (0.99, SpPin) but insensitive in early ankylosing spondylitis (0.09),^{23,28} so that predictive values are poor.

Tests for sacroiliac joint tenderness (to discriminate ankylosing spondylitis from mechanical spine conditions) include a hip extension test, anteroposterior pelvic pressure, lateral pelvic compression, and direct pressure on the sacroiliac joints. Unfortunately, these tests are poorly reproducible^{20,29} and inaccurate in distinguishing ankylosing spondylitis from mechanical spine complaints.^{30,31} Early ankylosing spondylitis is most often suspected from roentgenograms obtained in the face of persistent pain.

Although spine flexion is of limited diagnostic value, it may be useful in planning or monitoring physical therapy in patients with low back pain of any cause.³² Range of motion in multiple directions can be assessed with two inclinometers (used in the construction industry) with good precision.^{26,32} The technique is detailed elsewhere.³²

IS THERE EVIDENCE OF NEUROLOGIC COMPROMISE?

The spinal cord, cauda equina, and nerve roots are vulnerable to several disorders that cause back pain and sciatica. The most common of these is a herniated intervertebral disk, but other causes include nerve root entrapment in the root canals by bony and ligamentous hypertrophy, spinal stenosis, spinal or paraspinous infections, and neoplasms. Irritation of neurological structures is manifested as motor, reflex, or sensory dysfunction in the lower extremities and (rarely) as bowel or bladder dysfunction.

The first clue to nerve root irritation is usually sciatica, a sharp or burning pain radiating down the posterior or lateral aspect of the leg (usually to the foot or ankle), often associated with numbness or paresthesia. The pain is sometimes aggravated by coughing, sneezing, or the Valsalva maneuver. Among patients with low back pain alone (no sciatica or neurological symptoms), the prevalence of neurological impairments is so low that extensive neurological evaluation is usually unnecessary.

Lumbar Disk Herniations

Sciatica has such a high sensitivity (0.95) that its absence makes a clinically important lumbar disk herniation unlikely (SnNout).^{33,34} Using the accuracy of sciatica in Table 1 and a prevalence of surgically important disk herniations of 2%, we would estimate the likelihood of disk herniation in a patient without sciatica to be one in 1000. Most patients have a long history of recurrent back pain prior to the onset of sciatica, but when a frank disk herniation occurs, leg pain usually overshadows the back pain. The peak incidence of herniated lumbar disks is in adults between the ages of 30 and 55 years.³³

A symptomatic disk herniation tethers the affected nerve root, so pain results from stretching the nerve by straight leg raising from the supine position. This is performed by cupping the heel in one hand and keeping the knee fully extended with the other. The straight leg is slowly raised from the examining table until pain occurs. Tension is transmitted to the nerve roots once the leg is raised beyond 30°, but after 70°, further movement of the nerve is negligible.³⁵ A typical positive straight leg raising sign is one that reproduces the patient's sciatica between 30° and 60° of leg elevation.^{33,36,37}

A related test is the "crossed straight leg raising sign." This occurs when straight leg raising is performed on the patient's well leg and is found to elicit pain in the leg with sciatica. The preci-

Table 2.—Reproducibility of Physical Examination Findings

Category	Test	Unit of Measurement	Interobserver Agreement (Statistic)	Source, y
Tenderness	Bone tenderness	Yes/no	0.40 (κ)	McCombe et al, ²⁰ 1989
	Soft-tissue tenderness	Yes/no	0.24 (κ)	McCombe et al, ²⁰ 1989
	Muscle spasm	Yes/no	"Discarded—too unreliable"	Waddell et al, ³⁸ 1982
SLR*	Ipsilateral SLR, inclinometer	Degrees	0.78 to 0.97 (<i>r</i>)	Hoehler and Tobis, ³⁹ 1982; Hsieh et al, ⁴⁰ 1983
	Ipsilateral SLR, goniometer	Degrees	0.69 (<i>r</i>)	McCombe et al, ²⁰ 1989
	SLR causes leg pain	Yes/no	0.66 (κ)	McCombe et al, ²⁰ 1989
	Ipsilateral SLR <75° by visual estimation	Yes/no	0.56 (κ)	Waddell et al, ³⁸ 1982
	Crossed SLR, causes pain	Yes/no	0.74 (κ)	McCombe et al, ²⁰ 1989
Neurologic examination	Ankle dorsiflexion weak	Yes/no	1.00 (κ)	McCombe et al, ²⁰ 1989
	Great toe extensors weak	Yes/no	0.65 (κ)	McCombe et al, ²⁰ 1989
	Ankle reflexes normal	Yes/no	0.39-0.50 (κ)	McCombe et al, ²⁰ 1989; Schwartz et al, ⁴⁸ 1990
	Any sensory deficit	Yes/no	0.68 (κ)	McCombe et al, ²⁰ 1989
	Calf wasting	Yes/no	0.80 (κ)	McCombe et al, ²⁰ 1989
Inappropriate signs	Superficial tenderness	Yes/no	0.29 (κ)	McCombe et al, ²⁰ 1989
	Simulated rotation or axial loading causes pain	Yes/no	0.25 (κ)	McCombe et al, ²⁰ 1989
	SLR with distraction causes pain	Yes/no	0.40 (κ)	McCombe et al, ²⁰ 1989
	Inexplicable pattern, neurologic examination	Yes/no	0.03 (κ)	McCombe et al, ²⁰ 1989
	Overreaction	Yes/no	0.29 (κ)	McCombe et al, ²⁰ 1989

*SLR indicates straight leg raising.

sion of tests for straight leg raising is shown in Table 2.^{20,38-40} Visual estimation is reasonably accurate but a goniometer or inclinometer improves interobserver agreement.

Limited ipsilateral straight leg raising at 60° is moderately sensitive for herniated lumbar disks but nonspecific, since limitation is often observed in the absence of disk herniations (Table 3).⁴¹⁻⁴³ Crossed straight leg raising is less sensitive but highly specific.^{33,42-44} Thus, a positive crossed straight leg raising test substantially increases the likelihood of a disk herniation (SpPin), while a negative result is of limited value. The lower the angle of a positive straight leg raising test, the more specific the test becomes and the larger the disk protrusion found at surgery.^{45,46}

Straight leg raising is most appropriate for testing the lower lumbar nerve roots (L5 and S1), where the vast majority of herniated disks occur. Irritation of higher lumbar roots is tested with the femoral nerve stretch test (flexing the knee with patient prone), but the precision and accuracy of this test are unknown.

Assessment of Motor, Reflex, and Sensory Function

Ninety-eight percent of clinically important lumbar disk herniations occur at either the L4-5 or L5-S1 intervertebral level,^{33,42,43,46} causing neurologic impairments in the motor and sensory territories of the L5 and S1 nerve roots. Thus, the most common neurologic impairments are weakness of the ankle and great toe dorsiflexors (L5), diminished ankle reflexes (S1), and sensory loss in the feet (L5 and S1).^{33,42,43,46} In a patient with sciatica, the neurological examination can be concentrated on these functions.

Ankle dorsiflexor strength is tested by having the supine patient dorsiflex the ankle against the examiner's resistance. Inability to maintain dorsiflexion against the examiner should be considered weakness, and the well side should be checked for comparison. This method shows excellent precision (Table 2) and is more reproducible than the patient's ability to heel stand.²⁰ Ankle dorsiflexor weakness rarely occurs in isolation and is nearly always associated with weak

Table 3.—Estimated Accuracy of Physical Examination for Lumbar Disk Herniation Among Patients With Sciatica

Text	Source, y	Sensitivity*	Specificity*	Comments
Ipsilateral straight leg raising	Kosteljanetz et al, ⁴¹ 1984; Hakelius and Hindmarsh, ⁴² 1972	0.80	0.40	Positive test result: leg pain at <60°
Crossed straight leg raising	Spangfort, ³³ 1972; Hakelius and Hindmarsh, ^{42,43} 1972	0.25	0.90	Positive test result: reproduction of contralateral pain
Ankle dorsiflexion weakness	Spangfort, ³³ 1972; Hakelius and Hindmarsh, ⁴² 1972	0.35	0.70	HNP† usually at L4-5 (80%)
Great toe extensor weakness	Hakelius and Hindmarsh, ⁴² 1972; Kortelainen et al, ⁴⁶ 1985	0.50	0.70	HNP usually at L5-S1 (60%) or L4-5 (30%)
Impaired ankle reflex	Spangfort, ³³ 1972; Hakelius and Hindmarsh, ⁴² 1972	0.50	0.60	HNP usually at L5-S1; absent reflex increases specificity
Sensory loss	Kosteljanetz et al, ⁴¹ 1984; Kortelainen et al, ⁴⁶ 1985	0.50	0.50	Area of loss poor predictor of HNP level
Patella reflex	Aronson and Dunsmore, ⁵⁰ 1963	0.50	...	For upper lumbar HNP only
Ankle plantar flexion weakness	Hakelius and Hindmarsh, ⁴² 1972	0.06	0.95	
Quadriceps weakness	Hakelius and Hindmarsh, ⁴² 1972	<0.01	0.99	

*Sensitivity and specificity were calculated by the authors of the present report. Values represent rounded averages where multiple references were available. All results are from surgical case series.

†HNP indicates herniated nucleus pulposus.

toe dorsiflexion, sensory deficits, or impaired reflexes.⁴⁷ For toe strength, the supine patient is instructed to maximally dorsiflex the great toe ("point your big toe at your nose" seems to work well) and resist the examiner's effort to flex the toe with two fingers.

Ankle reflexes are more difficult to reproduce, and patient positioning may be important. The side-lying, prone, and kneeling positions are probably best (rather than the sitting position), but we are unaware of comparative data. The foot is gently rocked until relaxation is obtained, and the calf muscles should be held under slight tension by dorsiflexing the foot. Estimated κ values for the precision of ankle reflexes range from 0.39 to 0.50.^{20,48} Schwartz and colleagues⁴⁸ found that a plantar tap is as good as an Achilles tendon tap (estimated κ , 0.55). In this technique, the patient lies supine and the ball of the foot is tapped with the reflex hammer. The plantar tap was preferred by patients and could be elicited in 91% of patients under age 65 years but in only 71% of patients over age 65 years.

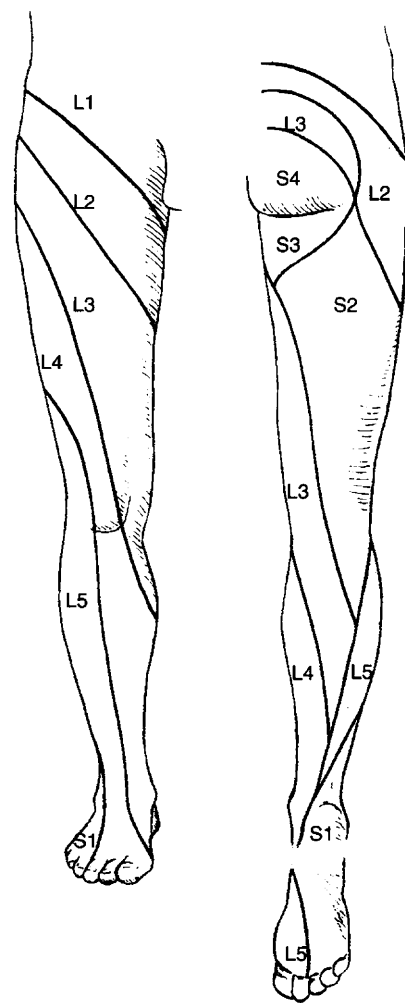
Ankle plantar flexion is an S1 function, but only severe impairments can be clinically detected, and sensitivity for disk herniation is low (Table 3). Toe walking appears to be an unreliable method of assessing plantar flexion strength ($\kappa=0.00$).²⁰ Hamstring and hip extensor strength have been used to evaluate S1 root injuries, but their precision and accuracy are unknown. Muscle wasting indicates long-standing denervation or disease and may be detected visually. Good

precision was noted for observations of anterior compartment and hamstring wasting in one study (Table 2).²⁰

Sensory examination of the lower extremities can be time-consuming and aggravating. Patients distinguish differences in pain intensity by pinprick more accurately than differences in touch or temperature, and sensory impairment from nerve root compression is most frequent in the distal extremes of the dermatomes.⁴⁹ Therefore, an efficient strategy is to check for symmetry of pain elicited by pinprick in the extremes of the L4, L5, and S1 dermatomes (the medial aspect, dorsum, and lateral aspect of the feet) (Figure).

Higher lumbar nerve roots account for only about 2% of lumbar disk herniations. They are suspected when numbness or pain involves the anterior thigh more prominently than the calf (Figure). Testing includes knee reflexes, quadriceps strength, and psoas strength.^{33,47,50} Quadriceps weakness is virtually always associated with impairment in the patella reflex.⁴⁷

The accuracy of neurologic findings for the diagnosis of a herniated disk is only moderate (Table 3). Considering combinations is helpful, however, since a finding of impaired ankle reflexes or weak foot dorsiflexion would have a sensitivity of almost 90% for patients with surgically proven disk herniations.³³ Multiple findings related to straight leg raising or neurologic examination increase the probability that a herniated disk will be found at surgery.⁵¹



Lower-extremity dermatomes.

Spinal Stenosis

The mean age of patients at the time of surgery for spinal stenosis is 55 years, with an average symptom duration of 4 years.⁵² The characteristic history is that of neurogenic claudication: pain in the legs and occasionally neurologic deficits that occur after walking. In contrast to arterial ischemic claudication, neurogenic claudication is more likely to occur on standing alone (without ambulation), may increase with cough or sneeze, and is associated with normal arterial pulses.⁵³ The sensitivity of neurogenic claudication is modest (about 0.60),⁵² but it is probably quite specific.

Few data are available concerning the accuracy of physical examination, because stenosis has only been widely recognized in recent years. Diagnostic criteria, indications for surgery, and the natural history are still being elucidated. Increased pain on spine extension is typical of stenosis (whereas flexion is usu-

ally most painful with herniated disks), but accuracy data are unavailable. The sensitivity of leg pain is about 85%, neurologic abnormalities about 60%, and abnormal straight leg raising about 50%.^{52,53}

Cauda Equina Syndrome

A massive midline disk herniation may cause spinal cord or cauda equina compression, requiring immediate surgical referral. Fortunately, the cauda equina syndrome occurs in only 1% to 2% of all lumbar disk herniations that come to surgery,³³ so its prevalence among all patients with low back pain is about 0.0004. The most consistent finding is urinary retention, with a sensitivity of 0.90.⁵⁴⁻⁵⁶ Assuming a specificity of about 95%, the predictive value of a negative test (no urinary retention) would be almost 0.9999. Unilateral or bilateral sciatica, sensory and motor deficits, and abnormal straight leg raising are all common, with sensitivities of over 0.80.⁵⁴⁻⁵⁶ The most common sensory deficit occurs over the buttocks, posterior-superior thighs, and perineal regions ("saddle anesthesia"), with a sensitivity of about 0.75.⁵⁴⁻⁵⁶ Anal sphincter tone is diminished in 60% to 80% of cases.^{54,56}

Indications for Imaging Tests

There is a growing consensus that plain roentgenograms are not necessary for every patient with low back pain because of a low yield of useful findings, potentially misleading results, substantial gonadal irradiation, and common interpretive disagreements. The Quebec Task Force on Spinal Disorders suggested that early roentgenography was necessary only in the face of neurologic deficits, age over 50 or under 20 years, fever, trauma, or signs of neoplasm.⁵⁷ Table 1 indicates "screening" questions that can virtually exclude neoplasm on the basis of patient history alone.¹⁰

Magnetic resonance imaging and computed tomography can be used even more selectively, usually for surgical planning. The finding of herniated disks and spinal stenosis in many asymptomatic persons⁶⁷ indicates that imaging results alone can be misleading, and valid decision making requires correlation with the history and physical examination.⁵⁸

IS THERE EVIDENCE OF SOCIAL OR PSYCHOLOGICAL DISTRESS THAT MAY AMPLIFY OR PROLONG PAIN?

Some features of patient history influence management regardless of the exact spinal pathology. Chronic pain or depression may be indications for the use of antidepressant medication rather than opiates. Alcohol or drug abuse in-

fluences the choice of medications and requires specific intervention. Disability compensation claims or litigation may affect initial evaluation and prognosis, and patients seeking compensation often respond poorly to a variety of treatments.⁵⁹

Patients with chronic low back pain (≥ 3 months) present complex problems, and often a pathoanatomic cause is not apparent.⁶⁰ Unlike acute pain, chronic pain is often not associated with ongoing tissue injury, serves no biological usefulness, and is not accompanied by the autonomic response of sympathetic overactivity. Vegetative signs, such as sleep disturbance, appetite disturbance, and irritability, appear, and pain is often reinforced or perpetuated by social and psychological factors. Back pain can affect employment, income, family, and social roles, producing psychological distress.^{60,61} Resulting somatic amplification can serve the patient's needs for economic survival and maintenance of self-esteem.⁶¹

In patients with chronic low back pain, the absence of systemic disease and treatable anatomic abnormalities should be confirmed by history, physical examination, and review of diagnostic tests. Neurological abnormalities often prove to be long-standing and may persist after surgical interventions. Evidence of psychological distress should be sought, because this may respond to direct intervention and improve the likelihood of response to other treatments. The Minnesota Multiphasic Personality Inventory (MMPI) is impractical in most primary care settings, and shorter depression scales are useful for screening.^{62,63}

Waddell and colleagues⁶⁴ proposed five categories of inappropriate or "nonorganic" signs that correlated with other indicators of psychological distress: (1) inappropriate tenderness that is superficial or widespread, (2) pain on simulated axial loading by pressing on the top of the head, or simulated spine rotation (performed by holding the patient's arms to the side while rotating the hips, assuring that the shoulders and hips rotate together), (3) "distraction" signs, such as inconsistent performance between straight leg raising in the seated position vs the supine position, (4) regional disturbances in strength and sensation that do not correspond with nerve root innervation patterns, and (5) overreaction during the physical examination. The occurrence of any one sign was of limited value, but positive findings in three of the five categories suggested psychological distress. The precision of nonorganic signs was reported by Waddell et al to be high, but subsequent evaluation found poor pre-

cision in the regional disturbance category (Table 2).²⁰

SUMMARY AND RECOMMENDATIONS

History

1. A few key questions can raise or lower the probability of underlying systemic disease. The most useful items are age, history of cancer, unexplained weight loss, duration of pain, and responsiveness to previous therapy.

2. Intravenous drug use or urinary infection raises the suspicion of spinal infection.

3. Ankylosing spondylitis is suggested by the patient's age and sex (most common in young men), but most clinical findings have limited accuracy.

4. Failure of bed rest to relieve the pain is a sensitive finding for all these systemic conditions, although not specific.

5. Neurologic involvement is suggested by symptoms of sciatica or pseudoclaudication. Pain radiating distally (below the knee) is more likely to represent a true radiculopathy than pain radiating only to the posterior thigh. A history of numbness or weakness in the legs further increases the likelihood of neurologic involvement.

6. Inquiry should be made concerning symptoms of the cauda equina syndrome: bladder dysfunction (especially urinary retention) and saddle anesthesia in addition to sciatica and weakness.

7. The psychosocial history helps to estimate prognosis and plan therapy. The most useful items are a history of failed previous treatments, substance abuse, and disability compensation. Brief screening questionnaires for depression may suggest important therapeutic opportunities.

Physical Examination

1. Fever suggests the possibility of spinal infection. Vertebral tenderness is a sensitive finding for infection but not specific.

2. The search for soft-tissue tenderness is unlikely to provide reproducible data or demonstrably valid pathophysiologic inferences.^{20,38}

3. Limited lumbar flexion is not highly sensitive or specific for ankylosing spondylitis or other diagnoses. However, limited spinal motion may be useful in planning physical therapy and monitoring response.

4. In a patient with sciatica or possible neurogenic claudication, straight leg raising should be assessed bilaterally, preferably using an inclinometer or goniometer.

5. Neurologic examination emphasizes ankle dorsiflexion strength, great

toe dorsiflexion strength, ankle reflexes, and the sensory examination. A rapid screening sensory examination would test pinprick sensation in the medial, dorsal, and lateral aspects of the foot.

6. For the patient with chronic pain, all of the evaluations described herein should be completed. Anatomically "inappropriate" signs may be helpful in

identifying psychological distress as a result of or as an amplifier of low back symptoms. The most reproducible of these signs are superficial tenderness, distracted straight leg raising, and the observation of patient overreaction during the physical examination.

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