

## HISTORY AND PHYSICAL EXAMINATION

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A thorough history and careful physical examination provide significant insight into the cause of failed spine surgery. The history and physical examination provide the information necessary to direct further evaluation, eliminating the need to do each and every available test on every patient. Keep the specific causes of failed back surgery syndrome (FBSS) in mind during the interview, listening for specific clues to etiology. No single aspect of the history or examination will be definitive. It is the overall picture gained from careful listening and attention to details that proves most fruitful.

### HISTORY

An open-ended history is more informative than a direct interview. If a comprehensive spine pain questionnaire is used to save time, the patient must still be given adequate opportunity to talk about his or her problem. In an open-ended format, the patient will usually offer problems in order of their importance. What the patient says may not be as important as how it is said. The tone of the discussion may disclose contributing psychological and social factors. Much of the information needed will be elicited from the initial responses, but directive questioning may be needed to complete the interview. Part of the physical examination, of course, is being done simultaneously while the history is being taken. During the discussion, observations of pain behavior, gait, sitting and moving postures, range of motion, and patient/spouse interaction are quite informative, especially when compared with the same actions made during the physical examination.

The spine questionnaire is a valuable tool and a great time-saver for evaluation of the patient with FBSS. It is also readily computerized for immediate and future reference. It must be considered a supplement to the oral history. It is a data gathering device, not a primary modality. A questionnaire will insure adequate attention to the medical, social, and vocational aspects of the history. Any answers out of the ordinary will prompt direct inquiry and may uncover significant visceral disease or secondary gain. A questionnaire can also provide objective data about the patient's subjective pain complaints. The McGill Pain Questionnaire,<sup>3</sup> Oswestry Function Test,<sup>1</sup> pain drawing,<sup>7</sup> and Zung Depression Index<sup>8</sup> can all be included to add valuable psychological and functional data. Significant inconsistencies might be discovered comparing the psychological inventories with the oral history.

We feel it is best to begin with a description of the current problems, rather than discussing prior pains and prior surgeries. Pain is the usual problem. Determine the location of the current pain by the patient's verbal description and the pain drawing. Low back pain (LBP) in the area of previous surgery is not specific. Pain that is above the level of previous surgery may mean a degenerating motion segment cephalad to the surgery, missed pathology, or soft-tissue dysfunction. Pain in the posterior superior iliac crest or gluteal pain is often called "hip pain" by the patient. Referral of pain to these areas is also nonspecific, but may come from structures as high as L2-3 or L1-2. Consider the bone donor site as a source of this pain, as well as postsurgical soft-tissue dysfunction.

Pain in the leg may prove more useful diagnostically. The exact distribution of pain is elicited, as well as the quality of pain, to separate referred pain from radicular pain. Kirkaldy-Willis states that in the absence of neurologic deficit, leg pain is referred, and in the presence of neurologic deficit, it is radicular.<sup>5</sup> However, in early radicular pain, the neurologic deficit may not yet be present. True-positive nerve root tension signs suggest radicular pain, even in the absence of frank neurologic deficit. Referred pain shares the same distribution as the innervation of the affected zygapophyseal joint. Pain arising from the facet joints of L4-5 or L5-S1 will be felt in the posterior thigh, and occasionally in the medial or lateral calf, and back pain is usually greater than leg pain. Numbness or tingling may accompany this pain.<sup>5</sup> Posterior joint complex pain (facet, ligament, annulus) rarely, but occasionally, extends beyond the calf and into the foot. Pain arising in the quadratus lumborum muscle can be referred to the anterior thigh, posterior thigh, or groin. Piriformis pain is felt in the gluteal area and posterior thigh, often in the rectum or vagina, and rarely in the foot.

Radicular pain is caused by nerve irritation, inflammation or compression. The predominant and more severe pain is usually felt in the thigh, present in the posterior lateral calf, extending to the toes. Dermatomal radiation may not be exact, and much overlap exists. However, certain patterns are characteristic: L3 pain involves the groin and anterior medial thigh. L4 pain involves the anterior thigh and medial calf, as well as the gluteal area. L5 pain involves the lateral thigh, lateral and possibly medial calf, and the great toe. S1 nerve involvement is felt in the posterior thigh, posterior calf, and lateral aspect of the foot and heel. The sensations of pain and numbness may not overlap. Consider that a number of patients have coexisting back prob-

lems and degenerative hip disease. Therefore, the hip joint needs to be assessed in the evaluation of FBSS.

Leg pain that is much more pronounced distally than proximally can also be of radicular origin. If the predominant problem is extremity pain and back pain is minimal or absent, consider spinal stenosis. Peripheral neuropathy can also cause distal leg and foot pain in the absence of back pain. It can coexist with lumbar spine problems and be quite confusing. Pain of peripheral neuropathy often has a "stocking" distribution.

A description of leg pain which is not well localized can still be of some diagnostic help. Poorly described pain or unusual and strange sensations that affect the whole of one or both legs can be due to central spinal stenosis.<sup>2</sup> However, such descriptions might also be heard from the patient who is consciously or unconsciously elaborating the pain.

Pain intensity is not very helpful diagnostically in terms of identifying its source, but is a very important factor in terms of determining the degree of disability. Pain is a subjective phenomenon, and the examiner is totally dependent on the patient's report to assess it. However, visual analog scales and the McGill Pain Questionnaire may help to quantify the pain. Each is simple to use, highly reproducible, and very useful to follow the course of the patient's illness.

Changes in the quality or intensity of the pain with activities are helpful in diagnosis, and can be useful to determine from which area of the motion segment the pain arises. Changes in back pain and leg pain must be evaluated separately. Pain that does not decrease at all with rest, especially if it is described as unusually intense or unbearable, is likely to have a significant psychological overlay or indicate a severe structural problem.

Back pain that increases during or shortly after a nonspecific activity is consistent with structural problems. Back pain that occurs one to 12 hours after an activity that involves lumbar extension or rotation may be from the facet. Prolonged sitting can also cause facet pain. Prolonged sitting in lumbar flexion increases disc loading and heightens the pain of the degenerative segment, instability, recurrent disc herniation, or annulus tear, or soft-tissue dysfunction. Standing stresses posterior elements. Therefore, pain produced by standing may signal facet syndrome, epidural or intradural fibrosis, pseudomeningocele, or soft-tissue dysfunction.<sup>6</sup> When coughing or straining increases pain, epidural fibrosis, recurrent herniated disc, or pseudomeningocele may be present.

Changes in leg pain may parallel the changes in low back pain. However, calf pain or thigh pain that increases with walking and is promptly relieved by rest suggests vascular or neurogenic claudication. Walking uphill causes lumbar flexion and may decrease or not change the pain of spinal stenosis, but worsen the pain of a herniated disc or vascular claudication. Walking downhill causes lumbar extension and pain that is relieved or unchanged may be a clue to disc disease, but pain that is made worse may mean spinal stenosis, facet syndrome, or vascular claudication.

The effects of other activities of daily living on pain provide useful information. Sitting, leaning forward to shave or brush teeth, lying on the back, driving, and bending forward all increase disc loading. These are likely to increase the pain of recurrent disc herniation, disc disease at an unoperated

level, or instability. The pain of spinal stenosis may be alleviated by staying in one position for a prolonged period of time, which often increases the pain of fibrosis or arachnoiditis, but this effect is less specific. Standing, walking flat or downhill, and lying prone all load the posterior elements and increase the pain of facet syndrome, foraminal stenosis, or central stenosis. The pain from an annulus tear or disc herniation might lessen. Pain worsened by rising from a sitting position may suggest instability or internal disc disruption.

The quality of the pain may provide diagnostic information. Numbness with tingling implies nerve irritation, compression, or inflammation. Once again, the McGill Pain Questionnaire may help the patient to find the words to best describe the pain. Moderately superficial aches or tightness may be caused by tight hamstrings or gluteal muscles. Throbbing pain and deep pain are nonspecific. Burning is likely to originate in neural structures themselves, from damage which may have occurred during previous or ongoing compression forces, nerve trauma during surgery or reflex sympathetic dystrophy.

It is essential to understand the impact of pain on the patient's life. A good overview of function can be rapidly obtained using the Oswestry Function Test,<sup>1</sup> but the interview is equally valuable. Determine the effects of pain on activities of daily life, personal care, lifting and carrying, walking, sleeping, sexual function, and social life. Can the patient do housework? Is he or she still working? A description of current or prior jobs emphasizing the ergonomic variables may disclose a great deal about the pathophysiology of the problem.

It is important to obtain the pattern of current medication use. Learn which medications have been tried in the past. Inquire specifically about any past substance abuse, prescribed medication use, and past and current alcohol use.

Discuss the treatments that have been tried. If the patient has had physical therapy, the specifics must be determined. Too many patients still get only what we call "shake, bake and ultraviolet" (massage, heat, and ultrasound) in physical therapy rather than education in body mechanics, strengthening and stretching. If exercises have been prescribed, ask the patient to demonstrate each one. At times, the patient is doing an exercise that is exactly the antithesis of exercise that would benefit his or her condition, and at times the exercises are being done entirely wrong. Discuss ice, heat, transcutaneous nerve stimulation (TNS), traction, and any other specific modalities to learn whether they were tried and how successful they were. Of course, obtain the results of any diagnostic or therapeutic blocks.

At this time in the history, it is useful to trace the chronology of the back problem from its origin. Determine the original precipitating event, the pain complaints prior to each prior surgical procedure and the short-term and long-term outcomes of each. Compare the current pain with the preoperative pain. Pain not changed after surgery suggests missed pathology or psychological elaboration. Pain that improves significantly only to recur in a similar fashion may imply instability, missed organic or psychological function pathology, recurrent disc herniation, fibrosis, or infection. This pattern is also consistent with a placebo effect of surgery. Pain in a new location implies iatrogenic problems or a new pathologic process.

### Medical History

Various disorders can present as FBSS. Details are available in the preceding chapter.<sup>4</sup> Ask about any current medical problems, then perform a routine review of systems to obtain a general health status and look for heart, lung, or abdominal disease. Inquire specifically about symptoms or signs of cancer and infection, and about bowel and bladder function to discover incontinence which may accompany cauda equina syndrome.

The family history may include arthritis, but this is probably not helpful. More relevant might be the finding of a parent with a long history of a painful disorder or alcohol abuse while the patient was a child. Either might be a clue to psychological difficulties presenting as low back pain.

### Vocational History

The vocational history should outline the major jobs the patient has had. It is important to obtain the specific demands of each occupation. Ask specifically about any work-related injuries prior to the back problem, if the current illness is work-related. Inquire specifically about workmen's compensation and litigation. It is useful to determine exact dollar amounts. Frequently we find the patient is receiving far less in workmen's compensation than he was earning in his occupation, making it much less likely to be a significant secondary gain. Litigation, however, may offer much more substantial rewards in the future and serve as a substantial secondary gain. If the patient is no longer working, evaluate any potential for future work. Some patients are content living on the little money they receive and receive significant secondary gains from family and community. Others are eager to return to the work force. Every effort should be made to return the patient to working as a part of any rehabilitation process.

### Additional History

It is frequently useful to obtain a history from the spouse or significant other independent of the history obtained from the patient. At times a more accurate picture of pain complaints, degree of disability, medication use, depression, and other important variables can be obtained from a second concerned person.

## REFERENCES

1. Fairbank JCT, Cooper J, Davies JB, et al: Oswestry disability questionnaire. *Physiotherapy* 66:271, 1980.
2. Kirkaldy-Willis WH: The three phases of degenerative disc disease. *In: Kirkaldy-Willis WH (ed): Managing Low Back Pain.* New York, Churchill-Livingstone, 1983.
3. Melzack R: The McGill Pain Questionnaire: major properties and scoring methods. *Pain* 1: 277-299, 1975.
4. Schofferman J, Zucherman J: Pathology of the failed back surgery syndrome. *Spine: State Art Rev* 1:1986.
5. Sikorski JM: A rationalized approach to physiotherapy for low back pain. *Spine* 10:571-579, 1985.
6. Wilkerson HA: *The Failed Back Syndrome. Etiology and Therapy.* Philadelphia, J.B. Lippincott, 1983.
7. Wiltse LL, Rocchio PD: Preoperative psychological tests as predictors of success of chemonucleolysis in the treatment of the low back syndrome. *J Bone Joint Surg* 57A:478-483, 1975.
8. Zung WWK: A self-rating depression scale. *Arch Gen Psychiatry* 12:63-70, 1965.

## II. Physical Examination

Inspection begins the minute the examiner enters the room. The position of the waiting patient is noted. Sitting increases intradiscal pressure and opens lateral canals. Standing narrows lateral canals and loads facet joints. Patients will naturally assume positions associated with the least discomfort. The way in which a patient moves and transfers conveys information about his skills in body mechanics and trunk strength. Signs of pain behavior such as grimacing, moaning, etc., should be noted. The patient's relative strength in relation to body size can be observed when the patient performs a transfer from the lying to sitting position. If there has been any trauma, ecchymosis should be looked for.

Standing posture is evaluated. The amount of lumbar lordosis in standing, and the presence or absence of a list, suggest the nature of the lesion. Loss of lumbar lordosis is commonly seen in stenotic syndromes, while an increase is seen in some types of instability. Surgical changes may reduce disc height and flatten lumbar lordosis.

The patient's gait is inspected, with attention to asymmetry and weakness. Heel gait and toe gait are gross indications of L5 and S1 root integrity.

When the patient is still standing, range of motion in flexion and extension is examined, with attention directed to lumbar motion as opposed to hip motion. Since many lesions are dynamic and produce symptoms only with repetitive unidirectional forces, it is important to test motion repetitively, especially forward flexion and extension.<sup>2</sup> Instability often clinically manifests only after several bending cycles. Pain in returning from forward bending seems to be associated with segmental instability, internal disc disruption, or facet arthropathy; this corresponds to the patient who has pain when straightening up after sitting for a period. A list in forward bending suggests neural element encroachment by disc material. This can also be seen with an annulus tear. Limitation of movement with pain on extension is consistent with facet arthropathy, stenosis, herniated disc, and soft-tissue dysfunction. Extension and rotation to each side specifically loads the ipsilateral facet and narrows the neuroforamen.

Lateral bending should be observed. Splinting results in an asymmetric bending apex when comparing side-to-side motion. Alterations in pain with each of these maneuvers are monitored.

With the patient supine, the hips should be palpated and taken through range of motion. Back and hip disorders may mimic each other and be coexistent.

Range of motion is examined with the patient recumbent. The examiner brings the knees to the chest repetitively, producing flexion of the lumbar spine with less axial loading than in standing. Patients with painful degenerative discs, internally disrupted discs, or herniated discs will find this uncomfortable and usually say they get the same pain as when they sit. In the case of functional stenosis, this maneuver often relieves pain. While the patient remains supine, the hips and knees are held flexed at 90 degrees and the pelvis is rotated to the right and to the left. This loads the facet joint on

the side of the leg closest to the table and may be associated with either increased or decreased pain. Decreased pain may signal an annulus tear. Straight leg raising is performed elevating the limb to be tested to the point of pain and then dorsiflexing and plantar flexing the foot in that position. Increased pain on plantar flexion of the foot indicates an element of functional overlay. Increased pain on dorsiflexion is consistent with root tethering, mechanical pressure, or irritation. When limb pain is produced in the opposite leg there is usually a moderate to severe midline intraspinal pathologic process such as a large herniated disc. Straight leg raising is most indicative of neural element compromise when positive at less than 45 degrees. When only back pain is produced by straight leg raising, no specific information about the differential diagnosis is obtained.

It is usually useful to compare lying straight leg raising with sitting straight leg raising in assessing pain behavior. Distraction is useful in this regard. The examiner might inquire about the patient's knees in the sitting position while covertly performing a straight leg raise examination. One must keep in mind that the positions of the lumbosacral spine are different in the sitting position and in lying. In the sitting position the lordotic curve is flattened, the neuroforamina are enlarged, and the pelvis is antiflexed. Some discrepancy on the order of 10-15 degrees of increased range of motion in sitting should therefore be expected.

Sensory examination includes testing the lower extremities with light touch, pinprick, or cold sensation. Nondermatomal distributions may indicate an exaggerated response to pain, or malingering. The trunk and upper extremity should be tested, as sometimes abnormalities here may reveal spinal cord tumors and other central nervous system diseases which may have been overlooked. Deep tendon reflexes at the Achilles tendon, patellar tendon, biceps, and triceps are tested. Hyperreflexia may indicate central nervous system disease. Plantar reflexes and evaluation for clonus should always be performed for the same reason.

Extremity strength should be evaluated to determine weakness. This may be "give-away," "cogwheel," and neuromuscular weakness. Cogwheel weakness is characterized by ratchety failure of resistance and give-away weakness is characterized by sudden release of resistance by the patient. These indicate some behavioral exaggeration of the response to pain. By testing simultaneously bilateral muscle groups such as in the peroneals and the extensor hallucis longus, one can sometimes get a more accurate strength assessment when disproportionate pain behavior is present.

Lower extremity pulses should be checked to expose vascular stenosis, which may mimic or exist with spinal stenosis and present similar symptoms. The patient with spinal stenosis is typically able to ride a stationary bicycle. Flexion of the lumbosacral spine when sitting on the bike does not help the patient with vascular claudication.

Abdominal palpation should be performed in search of aneurysms, which may produce symptoms similar to those of intraspinal pathologic processes. Lumbar discs may be palpated anteriorly. Exquisite pain and reproduction of symptoms by anterior palpation at a discrete level suggests internal disc disruption syndrome or discitis.

The patient should be examined in the prone position. Passive press-up extensions are repetitively performed. Relief or centralization of symptoms is typical of some discogenic pain. Lack of relief or worsening is consistent with facet syndromes, stenosis, recurrent disc, fixed disc herniation, disc extrusion, and ligament dysfunction.

Palpation of the spine is performed. Areas of tenderness are noted. Very diffuse tenderness usually indicates myofascial pain syndromes or disproportionate pain behavior. Facet syndrome patients have tenderness on palpation of the facet joint posteriorly. Sacroiliitis from a variety of causes is associated with tenderness in the sacroiliac joints. The particular spinal segments that are producing pain can usually be identified by deep posterior segment palpation, which elicits tenderness and reproduction of symptoms. Supine straight leg raising, when positive, suggests lower lumbar pathology. The prone knee bend test elicits L3 and L4 root disorders. In the prone position, the lower extremities are flexed at the knee, which results in anterior thigh pain when the roots are involved. As this maneuver increases lumbar lordosis, it produces back pain in a variety of conditions.

Digital rectal examination in search of masses, neurologic disorders affecting sphincter musculature, and prostate abnormalities should be performed on all patients. Perianal sensation and reflex should be examined.

Waddell et al.<sup>2</sup> have described five types of screening tests for nonorganic symptoms. These include superficial and nonanatomic tenderness, skull axial loading and rotation of the pelvis on the hips while standing, straight leg raise during distraction of the patient's attention, regional weakness and sensory change of a nonanatomic nature, and overreaction. When a solitary sign of a nonorganic disorder is present, it is not of great significance. However, two or more such signs are indicative of a greater chance of a poor result from future surgery.<sup>2</sup> When pain behavior is identified it means that there is an additional problem that must be further diagnosed, and treated. It does not mean that there is no back problem.

## REFERENCES

1. McKenzie, AA: *The Lumbar Spine. Mechanical Diagnosis and Therapy*. Waikanae, New Zealand, Spinal Publications, 1981.
2. Waddell G, et al: Nonorganic physical signs in low back pain. *Spine* 5:117, 1980.