DEGENERATIVE DISEASE AND INJURY OF THE BACK

Epidemiology and Differential Diagnosis in Injuries and Degenerative Diseases of the Low Back

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Epidemiology is defined in the dictionary as "the branch of medicine dealing with epidemic diseases." Epidemic is defined as "affecting at the same time a large number of persons in a locality, and spreading from person to person," or "a rapid spread or increase in the prevalence of something". A Greek word, epidemia, means "staying in one place, among the people." My linguistic analysis suggests another meaning of "demi" is "half" which is about the accuracy with which injuries and degenerative diseases of the low back can be defined.

Exact figures on the numbers of annual back injuries or afflictions in the U.S.A. are hard to come by, for there is no central reporting agency. The Bureau of Labor Statistics estimates that eight million persons with mechanical difficulties of the low back annually seek care. Two hundred thousand of these individuals had surgical treatment in 1974.

In 1976, records of 2,600 neurosurgeons indicated they performed 117,000 operations on the back. That would leave 83,000 procedures for about five times as many orthopedic surgeons. It has been estimated there probably were 450,000 back operations in the U.S. in 1976. Interpolation of data compiled by the National Disease and Therapeutic Index in a statistical profile of the practice characteristics of orthopedic surgeons places 28,000 patients with back complaints under treatment by orthopedists each day of the year.

It is estimated the actual medically-related expenses are $18,000 per patient, while the associated losses of interrupted income and related benefits are $22,000. Using those figures, just the base cost of the 200,000 operative procedures would be 8 billion dollars. In addition, much money is expended on nonsurgical treatment, appliances, spa memberships, medications, and so forth.

Auto crash stories usually focus on deaths, which are easy to count. But a new study by the non-profit Insurance Institute for Highway Safety explores what is, in some ways, a more horrible and costly toll: crippling spinal cord injuries. In an average year, the spinal cords of 5,300 American drivers, passengers, and pedestrians are severed, and the majority survive but without recovery of function, continuing to be paraplegic or quadriplegic. The cost to taxpayers for their medical care is almost 1 billion dollars. The Institute suggests that one way to reduce this toll is to mandate passive preventive measures in all new cars. Another is to observe the 55 mile an hour speed limit. Yet another is to refrain from driving after drinking.

Predicting those who may develop back pain in future work has been an aim of industry for some time. MacNab and LaRocca showed pre-employment x-rays are of no help in prognostication. Rowe reported 56% of workers at age 65 had received treatment for significant back trouble. No increase in pain is noted in Scheuermann's disease--juvenile epiphysisitis, or apprentice round back in England--after adolescent age is past. Lordosis beyond 70° predicates an increase and likelihood of future back pain. Leg length difference of 3-4 cm from early age will usually cause no problem--but a later discrepancy of 2 cm after a fracture in an adult will often give trouble. Scoliotics show little or no difference in development of future back pain, as compared with that in the general population.

The best single predictor of back trouble according to Wiltse, is previous trouble, or previous surgery on the low back. As Winston Churchill spoke phrases on another topic which seem to apply to back pain: "It's a riddle inside an enigma wrapped in a mystery."

In summary, the differential diagnosis of low back injuries and degenerative diseases includes mainly the separation of those with herniating nucleus pulposus from those with hypertrophic arthritic changes, acute or chronic strains or sprains, fractures, rheumatoid spondylitis, and tumors.

In a study of risk factors in the development of herniating lumbar intervertebral discs, Kelsey and Horly found that the driving of motor vehicles increases risk. People of either sex who drive cars regularly were more apt to develop an acute disc herniation than those who did not drive. Men who spent one-half or more of

their time on their job driving are three times as likely to develop disc herniation as those who do not hold such jobs.

Truck drivers are particularly prone to develop disc problems unrelated to lifting. The relative risk with sitting while driving is nearly twice as high as with sitting in a chair. Driving seems to be productive of L4 level disc problems, rather than those at L5-S1. Back pain in predisposed subjects is more likely to occur in sports car type seating with the legs almost straight in front, rather than in seats designed more like a chair.

The differential diagnosis of causes of low back pain and sciatica can be viewed as a list of various possibilities. (Table 1)

Table 1. Differential diagnosis: causes of low-back pain and sciatica

Protruded intervertebral disc
Hypertrophic arthritis of the lumbar spine
Rheumatoid spondylitis
Spondylolithisis
Spinal cord, nerve root or sciatic nerve tumor
Intervertebral space infection
Bone tumor
Osteoidosteoma
Eocenelphelicoma
Primary malignant tumor
Metastatic malignant tumor
Multiple myeloma
Hypertrophic arthritis of the hip
Paget's disease
Neuritis, especially diabetic neuritis
Psychoneurosis
Malingering
Septic arthritis of the sacroiliac joint
Twisted ovarian cyst
Pelvic endometriosis
Glomus tumor
Occlusive disease in aorta or iliac vessels
Spinal stenosis
Fracture of vertebral bodies or processes
Strain or sprains
Osteoporosis

We will limit our attention to injuries and degenerative diseases of the low back, not considering tumors, infections, metabolic disease, and pelvic disorders. Whether psychoneurosis and malingering is secondary to injury depends on the psychiatrist and attorney.

Ordinarily, it will be possible to arrive at a reasonable assessment of the cause of the trouble with a good history, physical examination, and roentgenograms of the lumbosacral spine. Refinements in the diagnosis may depend on special tests. It is fair to state that more mistakes are made from not looking than from not knowing.

It may be helpful to differentiate posterior division syndromes from anterior division nerve root syndromes in categorizing patients, while keeping in mind that psychogenic symptoms can mimic discogenic symptoms quite accurately. Etiologic factors in posterior division lesions include:

strains, such as postural or leg inequality,
sprains at ligamentous and tendonous attachments,
tension states,
and some bony injuries of vertebrae and their processes.

Radiated pain in these situations is not a true referred pain but is what Luck calls "reflex radiation," which has less sharply defined boundaries, is more variable in extent, and is less persistent.

Anterior division syndromes include the herniating nucleus pulposus as the most common course, but tumors of the spinal cord, nerve root, or peripheral nerve need to be excluded, as well as some instances of hypertrophic arthritis of the back of hip, spondylolysis, spinal stenosis, or occlusive diseases of the aorta and iliac arteries.

Of help in the differential diagnosis of back pain is the fact that radicular pain is usually linear and central pain is more of a diffuse ache with some sensory diminution. Tumor pain is often severe at night during rest, while disc pain when it occurs at night is often secondary to movement.

In attempting to differentiate degenerative arthritis pain from discogenic pain, early morning stiffness may be of help, but this is often not conclusive. Frequently, a trial of anti-inflammatory medication for 10 days and the response to it can be a deciding factor. Hypertrophic arthritis of the hip as the cause of leg

pain can sometimes be determined by limitation of hip motion and pain on extremes of motion, especially of rotation, but also by the addition of Kernig's tests to straight leg raising. Increased pain with this maneuver should incriminate nerve root pressure.

Rheumatoid spondylitis can attack a seemingly healthy young or adult male complaining of back pain with or without sciatica. Often the pain will be dorsal initially, and later it may be accompanied by diminution of chest expansion. Roentgenographic evidence of sacroiliac joint destruction is helpful in differential diagnosis.

Spinal stenosis in the lower lumbar area and occlusive vascular disease may be difficult to differentiate clinically, if vascular deficit is apparent in one or both extremities. Symptoms of increasing pain and numbness of the lower extremities with decreasing amounts of activity may be present in both. While roentgenograms may be helpful in showing aortic or iliac calcification, or spinal cord narrowing, it is usually necessary to include vascular studies, electromyography, and myelography to be definitive in the diagnosis. Spinal fluid determination can, of course, be helpful in differentiating tumors and disc protrusion, since the spinal fluid protein is seldom above 60 mg or 80 mg per 100 ml in the latter.

Routine roentgenograms can be most helpful in determining congenital anomalies, pedicle defect of spondylolysis, hypertrophic changes of spondylosis, changes secondary to fracture or infection, tumor, or metabolic disorders.

Demineralization of the spine, osteoporosis, is a source of disabling pain of insidious onset, which is seen mostly in mature females and can cause back pain and/or sciatica of excruciating severity accompanied by compression fractures, rib fractures, and the like due to only normal muscle tension.

It is claimed that 25% to 50% of all back pain includes a psychological factor, either as contributing cause or as the exclusive cause of the disability. Since I am neither a psychologist nor a psychiatrist, I feel it incumbent upon me as an orthopedist to make doubly certain that I am unable to find an organic basis for complaints before I label them psychological. Knowing that both factors may be present often presents a challenge in diagnosis

and treatment. We do use the Minnesota Multiphasic Personality Inventory (MMPI) as a screening device, and it is often helpful in evaluating findings to identify those patients with hysteria and hypochondriasis.

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OCCUPATIONAL SAFETY AND HEALTH SYMPOSIA 1977

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Division of Technical Services
Cincinnati, Ohio 45226

June 1978

For sale by the Superintendent of Documents, U.S. Government
Printing Office, Washington, D.C. 20402

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Contract #210-77-0088

DHEW (NIOSH) Publication No. 78-169