Herniation of Intervertebral Discs

An Evaluation of the "Indirect Signs"

A. JUSTIN WILLIAMS, M.D., and TOM FULLENLOVE, M.D., San Francisco

• *The incidence of so-called indirect signs of posterior herniation of an intervertebral disc in a series of working men who had no symptoms referable to the back was compared with the incidence of those signs in a group of cases in which herniation of a disc was proved at operation. There was no significant difference in incidence. In the cases in which herniation was proved at operation, it occurred no more often at a level where there was a thin disc than at a level where the disc was of normal thickness.*

DURING THE PAST several years many physicians have accepted as valid the so-called indirect signs of posterior herniation of an intervertebral disc. This has led to erroneous diagnosis in some cases, and to unnecessary examinations and treatment, not to mention compensation awards that may have been unwarranted. Myelographic studies in more than 2,500 cases have brought conviction that these indirect signs do not indicate posterior herniation of an intervertebral disc, but at best can only point to degeneration of a disc, a condition of less clinical importance.

Nevertheless, in a case in which herniation of a disc is suspected, a preliminary x-ray examination of the spine should always be made. Usually a single anteroposterior and lateral view of the lower thoracic and entire lumbar spine, and a lateral spot film of the lumbosacral region will suffice. These films are more to make certain other disease is not present than to aid in the diagnosis of posterior rupture of the disc. To cite Bradford and Spurling:[1] "A clinical diagnosis of ruptured intervertebral disc would be impossible were it not for the fact that almost all conditions producing a similar picture which were not excluded by physical examination, can be eliminated by roentgen examination. The more frequently encountered lesions are primary and secondary neoplasm, decalcifying vertebral disease, spondylolisthesis, fracture, inflammatory disease and anomalies of significant types."

The present study, limited to the lumbar spine, which is the common site of herniation, was undertaken to determine what value the commonly accepted "indirect signs" of herniation might have in the diagnosis of that condition. The signs considered were: Narrowing of the disc space, flatness of the lordotic curve, scoliosis and localized hypertrophic spur formation.

Usually narrowing is indicative of either degeneration and shrinking of the nucleus pulposus or of protrusion in some direction—anteriorly, laterally or into the vertebral body or into the neural canal. In the lumbar region each disc is thicker than the one above, the dorsolumbar being the thinnest and the fourth lumbar the thickest. Orley[3] said that, "when a distal lumbar disc is narrower than the adjacent proximal one the condition is decidedly abnormal." However, this does not apply to the lumbosacral disc, which is usually thinner than the fourth, or to the discs of transitional vertebrae, which are almost always thinner. Willis[5] observed that the lumbosacral disc "may vary in width anywhere from that of the fourth to the first sacral disc."

Actually, narrowing of the lumbosacral disc should not be considered clinically significant unless there is definite intrusion of the superior facets of the sacrum into the neural foramen. No reliance can be placed on this sign in the diagnosis of posterior herniation.

In the present study it was arbitrarily decided to classify the lumbosacral disc as thin if it was less than one-half the width of the fourth at the posterior margin. With this the criterion for "thin disc," undoubtedly some normal discs were included in the total classified as abnormal, but since there are such variable structural differences at this level, it is doubtful that a more accurate criterion can be found.

Flatness of the back, or lessening of lordosis, is a frequent finding, but is not diagnostic of posterior herniation, for it may also be caused by herniation in any direction or by muscle spasm caused by degenerative or rheumatoid arthritis of the apophyseal joints, by pain of neoplasm, by inflammatory disease or by congenital anomaly.

Hypertrophic spur formation occurs in many persons who make no complaint of discomfort in

Presented before the Section on Radiology at the 84th Annual Session of the California Medical Association, San Francisco, May 1-4, 1955.

the back, and in most instances this sign of degenerative disease is of little or no importance. Localized spur formation may occur following injury or perhaps from faulty posture, as well as bulging or degenerated discs. It cannot be relied upon as a sign of such degeneration and certainly not as indicating herniation.

Scoliosis is frequently a concomitant of posterior herniation, but its presence cannot be of value in diagnosis of that condition, for it may be due to a wide variety of causes and it quite commonly occurs in persons who have no discomfort in the back.

Not long ago a large industrial company[4] decided to survey a group of employees who had worked for the company for ten years or more, who denied having discomfort in the back either on or off the job and who had not asked for treatment for back disability at any time during their employment.

Chosen for the survey were 200 men in the outside equipment and construction forces, including some drivers and supplymen, who had worked in those forces exclusively for not less than ten years. The 200 men were divided into two groups, one made up of those under 38 years of age, the other of those over 38. By chance there were 99 in the younger group and 101 in the older. In the younger group the average age was 33 years and the length of service in the company 11 years; in the older group 48 and 24 years, respectively.

Anteroposterior and lateral films of the entire lumbar spine and a spot film of the fifth lumbar vertebral area were made. All abnormalities observed were reported in the following classifications: Congenital, traumatic, degenerative, inflammatory, arthritic, neoplastic and structural. In the entire series there were only 16 men without one or more of those abnormalities. Scoliosis was noted in 91 cases, decreased lordosis in 44, one or more discs thinner than normal in 80 and local spurs in 18. In 51 of the subjects some abnormality at the lumbosacral level was seen.

For purposes of comparison, 68 unselected cases proven at operation were reviewed with attention to the concomitance of "indirect signs" and herniation. The incidence of those signs in the group of 200 symptomless men was used as control.

TABLE 1.—*Incidence of indirect signs of herniated intervertebral disc*

Indirect sign	68 Symptomatic Cases Proven at Operation* (Per Cent of Cases)	200 Symptomless Working Men (Per Cent of Cases)
Lessened lordotic curve	25	22
Scoliosis	20	45
Local spurs	40	37
Disc thinner than its neighbors	66.6	40

*Herniation was observed in 60 cases—the fourth lumbar disc in 30 cases, the fifth lumbar in 29 cases and the third lumbar in one case.

The incidence of most of the indirect signs was somewhat greater in the presence of herniation, but not enough greater to warrant conclusion that the association is significant (Table 1).

Herniation at the level of a thin disc occurs no more frequently than at the level of a normal disc. In 50.4 per cent of the 60 cases proven at operation, herniation occurred at the level of a thinned disc. The remaining 49.6 per cent of cases were divided as follows: Herniation without thinning of any discs, 33 per cent; herniation at a level above a thin disc, 10.0 per cent; herniation below a thin disc, 6.6 per cent. Hampton and Robinson[2] noted thinness of the fourth disc in only about one-third of cases of posterior herniation at the fourth disc; and in cases in which the lumbosacral disc was thin, herniation occurred more often at the fourth disc than at the lumbosacral.

450 Sutter Street, San Francisco 8.

REFERENCES

1. Bradford, K. F., and Spurling, L. G.: The Intervertebral Disc, Charles C. Thomas Publishers, Springfield, Illinois, 1945.

2. Hampton, A. O., and Robinson, J. M.: The roentgenographic demonstration of rupture of the intervertebral disc into the spinal canal after injection of lipiodol with special reference to unilateral lumbar lesions accompanied by low back pain with sciatic distribution, Am. J. Roentgenology, 36:782-803, 1936.

3. Orley, A.: Neuroradiology, Charles C. Thomas, Publisher, Springfield, Illinois, 1936.

4. Nagel G. W., and Carson, D. A. (Medical Directors, Pacific Telephone and Telegraph Co., 140 New Montgomery, San Francisco, Calif.): Personal communication.

5. Willis, T. A.: Low back pain—anatomical structure of the lumbar region, including variations, J. Bone & Joint Surg., 19:745-748, July 1937.