DEGENERATIVE DISEASE AND INJURY OF THE BACK

The Role of Myelography and Discography in Low Back Pain

Lee T. Ford, MD

The purpose of a lumbar myelogram in evaluating low back pain is to indicate the presence of a space-occupying lesion in the spinal canal, which may affect the dural sac. The most common abnormality seen in large series of lumbar myelograms is that caused by a disc lesion. In a review of 856 patients, all of whom had lumbar spine surgery, Dr. Edward Lansche and I found a neoplasm present in only 1% (1). These were patients with disabling low back pain and sciatica who came to surgery at three St. Louis hospitals.

Pantopaque is the most commonly used medium for such myelographic studies. In rare cases air has been used, but it is not as satisfactory as Pantopaque. Pantopaque is not readily absorbed, and we have used it without reaction on some patients who are allergic to iodine. In the same allergic patients one would not use an absorbable medium for intravenous pyelography or arteriography.

It is my firm belief that a myelogram should rarely be done merely to make or exclude the diagnosis of a ruptured lumbar disc. The procedure should only be considered after conservative measures have been tried adequately and have failed, and surgery is being contemplated. It is a procedure which will help determine the diagnosis of pathology in the lumbar spine, locate its level and serve as a guide to the surgeon, who will then explore the back as indicated.

Myelography is not 100% accurate. Properly performed, it is presently 90-95% accurate. Twelve or more cubic centimeters (12 cc) of the dye should be used. There should be enough dye that with the patient in the standing position, the level of the medium will reach the body of the fourth lumbar vertebra. The majority of disc lesions occur at the lumbosacral and at the penultimate disc. Even with well performed myelograms, false positives and false negatives may occur.

During recent years we have had favorable experience with Dimeray (Dimer-X) involving several hundred patients at the Mallinckrodt Institute of Radiology and Missouri Pacific Hospital. This is an absorbable medium which fills root sleeves farther out than does Pantopaque and is not as dense. The material requires four to six hours to absorb, and the patients must be kept in an upright position during this time. If the medium is allowed to contact the spinal cord or brain, muscle spasms and epileptic seizures may occur. The drug was withdrawn from use in the United States several months ago after three fatalities occurred shortly after radiculograms with Dimeray. The medium is still in use in many other countries.

A lumbar myelogram is normally done with local anesthesia and is performed with careful sterile technique. In rare cases, a patient may be in so much pain as to be unable to lie in the prone position. In such a case, a general anesthetic with intubation has been used, although sometimes relaxation with intravenous diazepam (Valium) has allowed the myelogram to be completed without general anesthesia. Demerol should not be used as a pre-medication for a myelogram, because a sizeable percent of patients may become faint, sweaty and hypotensive. The best pre-medication is a barbiturate with atropine.

Technique in performing a myelogram is quite important. We follow that recommended by Shapiro in his excellent book on myelography (2). A lumbar interspace should be selected above the site of suspected pathology. The needle puncture site is usually at the second or third lumbar vertebra. Midline insertion of the needle is essential and is best performed with x-ray control. For this reason, the procedure is done with the patient in the prone position with two pillows under the abdomen to flatten the lumbar spine. A clear flow of spinal fluid is essential. Adequate fluid is removed for testing. If there is some blood in the first few drops and the fluid clears, one may procede with the myelogram. Determination of spinal fluid pressure is optional. If a bloody tap is obtained and does not clear and Pantopaque is injected, there is a good chance of producing an arachnoiditis. Experimental studies in dogs have shown, that Pantopaque mixed with the dog's own blood injected into the subarachnoid space produces an intense arachnoiditis (3). Should such a bloody tap be encountered, the Pantopaque study should be delayed two to three weeks to allow the blood to absorb.

After Pantopaque is introduced, adequate fluoroscopic studies with films are essential and should extend from the cul-de-sac to the lower dorsal spine. The reason for this is that in about 1% of patients with low back pain and aciatica, a disc lesion can exist in the lower dorsal spine. Rarely, tumor may involve the lower cord and affect the same roots as disc lesions in the lower lumbar spine. Thus, a Pantopaque study is not complete unless the lower dorsal spine is included. It is essential that fluoroscopy and films in all four planes be made (anteroposterior (AP), lateral, and both obliques), also including those views with the patient in the upright position.

Several types of defects in the dural sac may be encountered. The common one from a disc rupture is indentation. If this is on one side only, a prone or cross-table lateral view may result in what is called a "double density." Root sleeve asymmetry may be the only abnormality seen, or there can be a complete block of the column at any level. It is important to study the outline of such a block in all planes, to determine its location in relation to the level of the disc and its outline as to whether it may be from a disc lesion or a neoplasm. Enlargement of nerve roots intradurally can result in striations of the dye column, which is said to be the result of retrograde edema of the roots compressed distally. Tumor defects must be watched for. Gross striation, irregularity, and even blocks, may be associated with arachnoiditis.

Upon completion of fluoroscopy and films, removal of as much Pantopaque as possible is done. The use of a newly devised Quatico needle is quite helpful. Its stylet has seven small perforations so that suction of intradural roots against several perforations will still allow oil to be extracted through the others. The end of the stylet is round and once inside will not penetrate the dural sac. If a standard spinal needle is used, an eighteen gauge size is needed, and it is important during oil extraction to keep the bevel caudad or cephalad at all times, so that roots are not sucked against the bevel. Again, central placement of the needle is essential, since the dural sac narrows laterally and is widest in the midline.

DISCOGRAPHY

This author, over a nine year period, had the experience of performing discography in the majority of over 850 patients on whom he used chymopapain for chemonucleolysis for lumbar and dorsal disc lesions. Ninety-five percent of these patients had

myelography performed and the same percentage had discography performed. This gave an opportunity to study the efficacy and diagnostic accuracy of the two procedures.

The absorbable media used were: Diodrast, Renograffin and Conray. A discogram shows different factors than a myelogram. It will define a normal nucleus pulposus. It will indicate degeneration, a very common finding. When a disc begins to degenerate, the nucleus enlarges at the expense of the annulus, which becomes thin and weakens. A grossly degenerated disc can have dye injected into the nucleus through the annulus with a needle at almost any part of the disc. For a discogram to demonstrate a normal nucleus, the needle tip must be within the pedicles in the AP x-ray and close to the midline in the lateral projection.

A discogram may show a bulging disc, a protruded disc with a thin annular ligament, or a possible extrusion of disc material by dye leaking into the spinal canal. If the discogram injection is done under local anesthesia, injection of dye at the offending disc should reproduce the patient's pain in the back and disc. The fact that a discogram reveals degeneration does not mean that disc is necessarily the offending one. The same is true in lumbar myelography. There are several series of cervical myelograms which showed asymptomatic disc ruptures in the lumbar area.

The discogram may be most valuable when it shows a normal nuclear outline and so may avoid an unnecessary exploratory laminotomy.

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Center for Disease Control
National Institute for Occupational Safety and Health

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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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NIOSH Project Officer: Loren L. Hatch, DO, PhD
Principal Investigators: Theodore C. Doege, M.D.
Robert H. Wheater, M.S.

Contract #210-77-0088

DHEW (NIOSH) Publication No. 78-169