X-RAY VISUALIZATION OF THE INTERVERTEBRAL DISK

Report of a Case

ROBERT E. WISE, M.D.
Department of Roentgenology
and
EDWARD C. WEIFORD, M.D.*
Department of Neurosurgery

ONE important source of interference with accuracy in the diagnosis of protruded intervertebral disks is the fact that the disk cartilage is not opaque to x-ray and therefore, for roentgen confirmation, the neurologic surgeon has had to depend upon the indirect and occasionally misleading evidence afforded by myelography. This difficulty now has been overcome by Lindblom[1,2] of Sweden who described a method of x-ray visualization of the disk by injection of the nucleus pulposus with Diodrast.

In this technic, a spinal puncture is performed at the suspected level using a short fine gage lumbar puncture needle. Through this needle, another smaller gage longer needle is introduced across the spinal canal into the center of the disk. The use of this two-needle technic permits the operator to accomplish the disk puncture with so fine a needle that practically no damage results

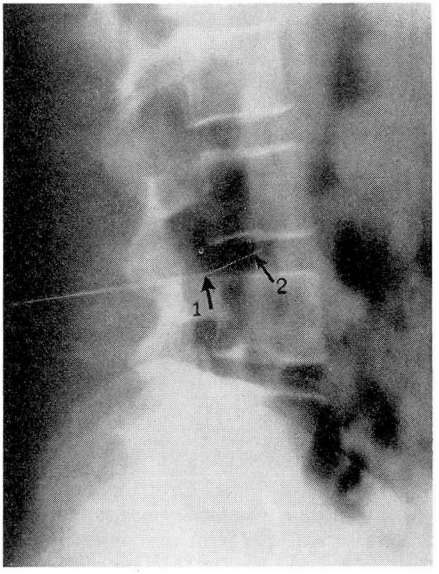
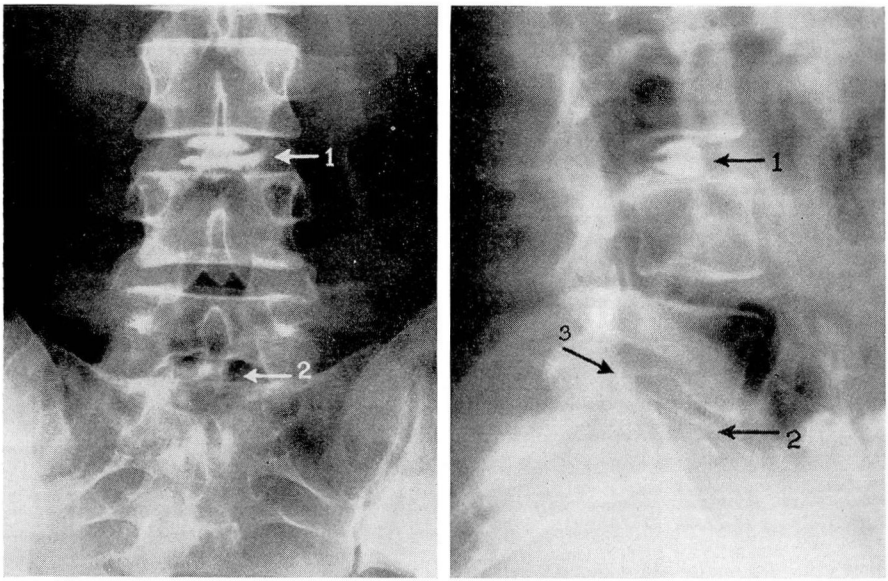


FIG. 1. 1. Tip of lumbar puncture needle. 2. Fine gage disk puncture needle in center of disk.

*Formerly on Assistant Staff, now practicing in Kansas City, Missouri.

to the posterior spinal ligament or annulus fibrosis. The position of the needle is checked by x-ray. When satisfactory, 2 cc. of 35 per cent Diodrast is injected, the needles removed and x-rays made. If the disk is normal, the injection meets great resistance, is painless or may produce slight localized back pain and the resulting film shows a biloculated collection of the dye near the center of the interspace. If the disk is ruptured the injection meets little resistance, although it is apt to cause a definite exacerbation of the patient's sciatica, and the resulting film shows a wide dispersion of the dye throughout the interspace and extruding posteriorly into the spinal canal.

The following case illustrates a normal disk outlined by this method, a pathologic disk which was not causing symptoms, and a ruptured disk which was responsible for the patient's sciatica.



(a) (b)

FIG. 2. (a) 1. Anteroposterior view of normal third lumbar disk showing a central biloculated collection of dye. 2. Irregular and flattened collection of dye in fifth lumbar disk. (b) 1. Normal third lumbar disk. 2. Narrowed fifth lumbar disk. 3. Posterior extrusion of dye.

Case Report

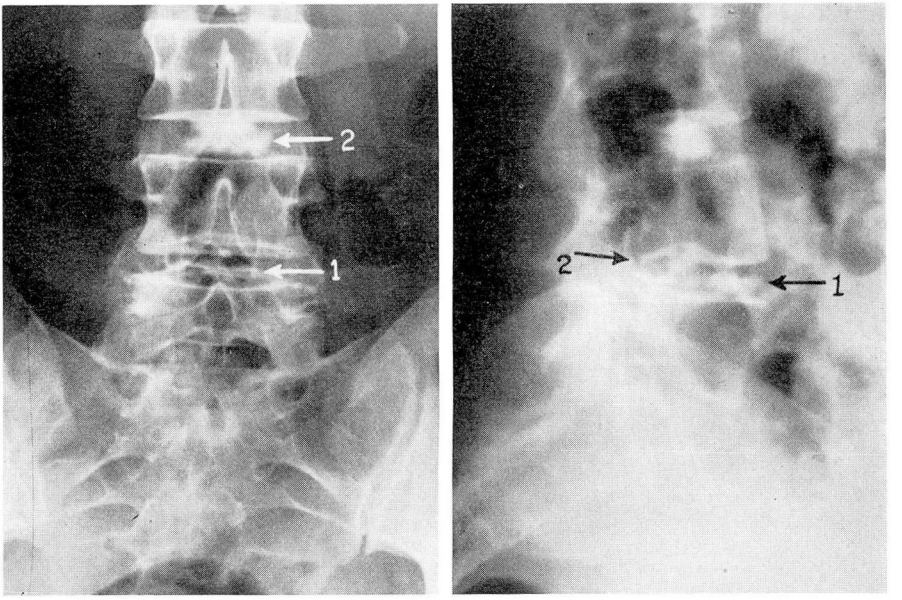
A woman aged 49 had experienced pain down the back of the left leg to the ankle for a period of 7 months. The sciatica had been unusually severe for 2 weeks and for 4 days she had been unable to stand. The pain was aggravated by coughing and straining and was accompanied by a sensation of "pins and needles" in the same area.

On examination the patient was able to stand only momentarily because of severe exacerbation of the pain while in the erect position. The lumbar spine was held rigidly with some reversal of the normal lordosis. The tendon reflexes were active and equal. The discomfort was exaggerated by straight leg raising and by jugular compression.

Weakness was apparent in dorsiflexion of the toes of the left foot and atrophy of the extensor brevis muscle. An area of hypalgesia existed on the outer surface of the left calf. X-rays of the lumbosacral spine were negative except for slight narrowing of the fifth intervertebral joint space while spinal fluid findings were normal.

The clinical diagnosis was protrusion of the fourth lumbar disk on the left side.

On October 11, 1950 a disk puncture was performed. With the patient in the prone position, a short 21 gage needle was inserted into the spinal canal between third and fourth spinous processes at the level of the third intervertebral disk. A 26 gage needle then was inserted through this needle into the center of the third lumbar disk; the position of the needle was checked by x-ray (fig. 1). A 2 cc. syringe containing 35 per cent Diodrast was attached to the needle and the medium injected against great resistance. When 1.5 cc. had been injected the needle was withdrawn and anteroposterior and lateral films were made which showed a bilocular collection of dye confined near the center of the disk (fig. 2).



(a) (b)

FIG. 3. (a) 1. Flattened and irregular fourth lumbar disk. 2. Partial absorption of dye from previously injected disk. (b) 1. Flattened and irregular fourth disk. 2. Extrusion of dye into spinal canal from ruptured fourth lumbar disk.

The fifth intervertebral disk was injected by the same technic. At this injection localized pain in the back was produced. The films disclosed irregularity, flattening, and posterior extrusion of dye into the spinal canal. In the anteroposterior view dye appeared to be extruding toward the right side (fig. 2).

In a similar manner the fourth disk was punctured and injected with 2 cc. of 35 per cent Diodrast. This injection met with much less resistance and during the injection the sciatic pain of which the patient complained was reproduced on the left with great intensity. Films made following injection showed a unilocular, irregular, flattened collection of dye with posterior extrusion into the spinal canal (fig. 3).

These films were interpreted as showing a normal third lumbar intervertebral disk. The fourth and fifth intervertebral disks were considered ruptured. However, since the patient's pain was reproduced by the injection of the fourth disk, it was felt that this was the cause of the sciatica although the fifth apparently revealed pathologic change.

Operation

On October 12, 1950, a laminectomy was performed by Dr. W. James Gardner. The lower border of the fourth lamina and the upper border of the fifth lamina were removed and a large protrusion of the fourth disk was disclosed on the left side extending well beyond the midline. The nerve root was stretched tightly over the dome of the swelling. It was retracted and after excising the posterior spinal ligament over the protrusion a thorough removal of the disk was performed. Two bone grafts measuring 2 cm. in length and 11 mm. in height then were fashioned from the crest of the right ileum. After utilization of the vertebra spreader a graft was driven into the disk space on either side. Inasmuch as the grafts fitted snugly the mobility at the interspace was eliminated.

The postoperative course was uneventful. The patient was discharged from the hospital on the twelfth postoperative day with instructions to increase her activity gradually. She was next seen 3 months after operation at which time the only symptoms were slight stiffness of the back, intermittent tingling of the right third toe and an occasional dull ache at donor site on the crest of the right ileum.

Summary

Since this experience, Lindblom's method has been employed in 43 cases. Twenty-one of these patients have been operated upon and the protrusion demonstrated by the diskogram has been disclosed in every instance. We feel that this is a valuable diagnostic test in the study of the patient having backache and sciatica.

References

1. Lindblom, K.: Diagnostic puncture of intervertebral disks in sciatica. Acta orth. Scandinav. **17**:231, 1948.

2. Idem: Technique and results in myelography and disk puncture. Acta radiol. **34**:321, 1950.