THE TREATMENT OF RUPTURED LUMBAR INTER-VERTEBRAL DISCS BY VERTEBRAL BODY FUSION

I. INDICATIONS, OPERATIVE TECHNIQUE, AFTER CARE

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Whenever the subject of the treatment of ruptured lumbar intervertebral discs is discussed, one always finds controversy and disagreement among neurosurgeons and orthopedic surgeons on the advisability, indication and necessity of a spinal fusion in these cases. The reason for this controversy is obviously the fact that many patients who have had operations for the removal of a ruptured intervertebral disc have not been cured of their symptoms or have returned at a later date with a recurrence of them.

Dandy12 stated very positively that spinal fusions were absolutely unnecessary and that one had only to curette out the nucleus pulposus and the involved joint would fuse itself! More conservative neurosurgeons14, 15, 19, 21, 24, 27 believe that if a patient has leg pain predominantly, simple removal of the disc may be sufficient. When the disability is primarily low-back pain and the patient has abnormal facets or arthritic spur formation giving evidence of an unstable back,1, 25 a fusion operation is indicated. Most orthopedic surgeons are in favor of combining the removal of the herniated portion of the ruptured disc with a fusion operation.13, 15 In the light of personal experience in the surgical treatment of ruptured lumbar discs since 1937 and in studying the results of others, it is my opinion that more patients will be permanently cured of their symptoms if removal of the ruptured disc is accompanied by bony fixation of the involved vertebral joint. The writer is one of few neurosurgeons who seriously believes that all lumbar disc operations should be accompanied by a spinal fusion, if the fusion is done between the bodies of the vertebrae.

The two types of disabling pain associated with ruptured intervertebral discs are produced by various pathological factors. (1) The low-back pain is primarily caused by collapse of the intervertebral disc and the resultant loose, unstable vertebral joint. The torn fragments of the disc may move about within the intervertebral space. If loose fragments shift to one side of the interspace, they may interfere with the normal articulation of one vertebral body upon the other, producing changes of alignment of the spine, limitation of movement and pain. There may result from this situation muscle spasm, which will also contribute to the back pain. Overriding of the articular facet resulting from collapse of the disc causes traction upon the joint capsule, which is painful.

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(2) The pain in the lower extremities may occur with compression of the nerve root at the intervertebral foramen. One or all of the following abnormal conditions may be responsible for nerve root pressure: (a) Herniation of the torn fragments of the intervertebral disc or bulging backward of the nucleus pulposus into the spinal canal. (b) Narrowing of the intervertebral foramen by subluxation of the articulate facets following collapse and narrowing of the intervertebral space. (c) Proliferation of bone along the margins of the body of the vertebrae posteriorly, (osteophytes) encroaching upon the intervertebral foramen. (d) Hypertrophy of the ligamentum flavum which, with the facet, forms the posterior boundary of the intervertebral foramen. This latter condition, however, is questioned by some writers.

In the medical literature of the past 15 years on the treatment of ruptured intervertebral disc, most emphasis has been placed upon the relief of the sciatic pain by removal of the mechanical pressure upon the nerve root.\textsuperscript{27} The primary pathology, which is a damaged or broken joint of the spine, has received less attention. In recent years, however, more and more spinal fusion operations are being advocated, indicating a trend toward treatment of the joint pathology.\textsuperscript{4} Obviously both causes of disability must be considered and treated if one expects to completely cure the patient of all symptoms. First, one must remove all abnormal mechanical factors that may compress the nerve root; and second, one must immobilize the broken, movable, painful vertebral joint. Removing the herniated fragments of the intervertebral disc without immobilizing the joint disregards the primary pathology and, likewise, fusion of the spine without thorough investigation and decompression of the involved nerve root cannot be expected to relieve the patient of the radiating pain in the lower extremities.

In 1944, after the appearance of a report by Shinners and Hamby,\textsuperscript{23} the writer made a follow-up survey of 162 patients who had been operated upon for ruptured disc in the previous 5-year period. They had all had hemilaminectomies with simple removal of the protruded disc. The number of patients who had continued to complain of low-back pain or recurrence of sciatica was impressive. Over 70 per cent of them had returned to the office at one time or another after operation with complaints referable to their ruptured disc. [Of these patients 32 or 19.7 per cent subsequently had a second (fusion) operation.] It was concluded that any operative procedure that could not promise the patient at least 50 per cent chance of a complete and permanent cure was not worth while. The writer therefore set about to devise some procedure that could permanently cure these patients without disability. It seemed logical that to correct the underlying cause of the low-back pain, i.e., the collapse of the intervertebral disc, an operative procedure should be directed toward immobilizing the abnormal vertebral joint.

A series of patients were operated upon with an orthopedic surgeon. A posterior (Hibbs) type of spinal fusion was done after removal of the herniated fragment of disc. We were not satisfied with our results. It never