POSTERIOR FUSION OF VERTEBRAE IN TREATMENT FOR PROTRUDED INTERVERTEBRAL DISK*

H. HERMAN YOUNG, M.D.
Section of Orthopedic Surgery, Mayo Clinic and Mayo Foundation, Rochester, Minnesota

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More than a quarter of a century ago Mixter and Barr described the protruded intervertebral disk as one of the causes of low-back and sciatic pain. Now after 27 years of investigation, the controversy over the proper treatment of these patients is still with us. The main question is whether to fuse the vertebrae following removal of a protruded intervertebral disk. Unfortunately, some of the arguments rest solely on professional jealousy.

Before Mixter and Barr described the protruded intervertebral disk, the diagnosis and treatment of low-back pain and sciatic pain were relegated to the field of orthopedic surgery. There was not much broad interest in how the problem was handled. In the light of today’s knowledge, the methods used appear rather crude. Manipulations under anesthesia, physical-therapy measures, use of braces and supports, and lumbosacral and sacroiliac fusions yielded equivocal results; and yet some of the patients seemed to get well. Naturally the orthopedist was interested in the spinal column as the source of the patient’s complaint and believed that if he could correct the vertebral abnormality the patient would be relieved of his symptoms. Some patients with no sciatic pain were incapacitated by backache, and among that group several abnormalities were encountered that were relieved by fusion of the vertebrae involved. Moreover, some of these same patients had sciatic pain, and the fusion relieved a few of them of this latter symptom as well. Although the orthopedic surgeon was encouraged, he was not satisfied with the result of his efforts, for other patients still suffered from their symptoms.

In 1934 it appeared that the solution had been found. In that year Mixter and Barr described the protruded disk as one of the causes of backache and sciatic pain, which fact suggested that perhaps removal of this lesion was what was required for relief of the patients who did not improve with other orthopedic treatment.

Although opinion swung back and forth, a trend toward acceptance persisted until finally it was stated that all backache and sciatic pain were caused by protruded intervertebral disks and if one only removed them the patient would get well. The efforts of the orthopedic surgeon were discarded. Backache ceased to be considered, and relief of sciatic pain became paramount.

Soon after the recognition of the protruded intervertebral disk as an entity there were glowing reports of success following removal of the protruded fragments. Reports of 90 to 95 per cent relief of symptoms were not uncommon, and the operation gained favor not only among the medical profession but among lay persons. When these early reports were scrutinized carefully it became evident that the successes reported pertained only to the relief of the sciatic pain, the backache symptom having been ignored. The fallacy in judging by this single criterion soon became apparent. There are two main symptoms of a protruded disk: backache and sciatic pain. Also, every operation on the skeletal system must stand the test of time before it can be judged either a success or a failure; and removal of protruded intervertebral disks could not for long be allowed as an exception to this rule.

Subsequent reports on the success of disk operations began to consider the relief of both backache and sciatic pain, and the

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percentage of successful operations began to decline. It became apparent that any operation that relieved the sciatic pain but left the patient with a disabling backache—or relieved backache without relieving the sciatic pain—could not be counted a success. If this concept can be accepted the orthopedic surgeon and the neurosurgeon can meet on common ground for the ultimate benefit of their patient.

It must be agreed that there are certain conditions of the vertebral column that produce backache alone and are relieved by fusion. Unless there are nerve-root symptoms the neurosurgeon need not be interested and the orthopedist proceeds with the fusion operation. In this category, for examples, are congenital anomalies of the spine, spondylolisthesis, fractures, degenerative arthritis, and infectious lesions. In these cases fusion usually relieves backache satisfactorily.

If the above abnormalities of the spine are accompanied by nerve-root irritation and sciatic pain, however, the neurosurgeon should be interested for the part he can play in relieving the nerve-root compression. When the two symptoms are associated, is it justifiable merely to attempt relief of the sciatic pain by removing the source of nerve-root irritation and to do nothing about the cause of the patient’s backache, not fusing the spine? Should a proved operation for relief of backache be discarded because of the recognition of an occasionally associated lesion, with hope to relieve both symptoms?

**SELECTION OF METHODS AND PATIENTS STUDIED**

At the Mayo Clinic we began in 1938 to try to identify before operation the patient who, because of spinal abnormalities, might have persistent backache after removal of a protruded disk, and who would be served better by simultaneous fusion. Our neurosurgical department has been most cooperative in this endeavor and has relied on orthopedic judgment as to whether to fuse the spine immediately following removal of a disk.

The first accepted indication for fusion was the presence of spondylolisthesis. Gradually added were spondylolysis, localized degenerative arthritis, partial sacralization, scoliosis, vertebral fractures, degenerative changes of the facets, presence of six lumbar vertebrae, and other congenital anomalies. But in some cases fusion was performed though the only physical indication for it was narrowing of the lumbosacral joint; and in some the decision for fusion was based on a judgment of operation that the joint was unstable, even though roentgenograms had revealed no skeletal abnormality. In both of these situations the histories described backaches experienced over long periods, aggravated by activity and relieved by rest, but without general change. Some other patients whose vertebrae appeared normal roentgenographically were treated with fusion because of recurrent protrusion of a disk.

In deciding whether to fuse the vertebrae after removal of a protruded intervertebral disk, each patient must be evaluated individually. The finding of a roentgenographic abnormality of the spine does not in itself make the decision. The patient’s history, his age, his stature, and his occupation must all be considered in making the final decision. One hesitates to advise fusion of the vertebrae for patients beyond the age of 55 to 60, and yet such a patient may be suffering from backache and sciatic pain that can be relieved only by surgical intervention. On the other hand, a young individual who intends to lead an active life may better be treated by fusion, even though the vertebral abnormalities at the time he is seen are rather minimal.

Fig. 1 compares the frequency of the removal of protruded intervertebral disks with that of the combined operation, as recorded at the Mayo Clinic. It is to be noted that in 1936 and 1937 fusion was not added to removal in any case; the evolution of the combined operation began in 1938. The incidence of fusion in conjunction with the removal of a protruded intervertebral disk, having followed a generally upward course,