Anterolateral Surgery for Cervical Spondylosis in Cases of Myelopathy or Nerve-Root Compression

H. Verbiest, M.D., and H. D. Paz Y Geuse, M.D.
Neurosurgical Department, State University of Utrecht, Utrecht, The Netherlands

It is necessary in our discussion of cervical spondylosis to first define the term “hard protrusion,” which is used differently in America and Europe. We use it here to indicate either the protrusion created by hypertrophic changes in Luschka’s joints and transverse ridges, or that caused by subluxation of a vertebra. These hard protrusions are important factors in cervical spondylosis.

The pains occurring in cervical spondylosis are due not only to derangements of the intervertebral discs and Luschka’s joints, but also to changes in the capsular structure of the joints and ligaments of the back which alter the normal cervical curvature. In 1946 Belart identified the signs and symptoms of cervical spondylosis as “the cervical syndrome.” This syndrome has been studied extensively by French, German, and Swiss physicians. They found that a number of the patients suffered not only from brachialgia and neck pains but also from migraine cervicale, migraine pharyngée, occipital headaches, disorders of the arm joints and tissues, and pains in some of the internal organs. The individual variations in symptoms could not all be explained by involvement of the somatic or vegetative nervous systems and the related effects on various organs. Nor did the deformities shown in the radiographs explain the amount of radicular pain or its fluctuation.

Therefore, surgical treatment of the hard protrusions, which are but one aspect of cervical spondylosis, does not guarantee that the patient will be free from other manifestations of the cervical syndrome in the future. Derangements may develop at other levels of the vertebral column or joint disease may appear elsewhere, especially in the shoulder and shoulder girdle. The complexity of the situation is clearly demonstrated in Nugent’s classification. He divided the causes of the cervical syndrome into three overlapping groups: vascular, connective tissue, and mechanical. Not all can be eliminated by anterior operations. The effectiveness of anterolateral surgery is determined by the significance and interaction of the specific causes producing symptoms in each individual case.

Preoperative Considerations

We selected patients who suffered from severe, persistent, or recurring radicular pain that had not responded well to conservative treatment. We found it difficult to differentiate true radicular pain from that originating in the cervical ligaments, the paravertebral muscles, or shoulder joints. We therefore decided to limit our selections in this first series of operations to those patients having radicular pains accompanied by abnormal neurological signs. Obviously, radicular pains may have also been complicated by referred pains. In cases of extensive nerve-root involvement accompanied by massive muscular atrophy, we preferred foramenectomy.

Myelopathy. Myelopathy in cervical spondylosis is presently thought to be caused by either mechanical or vascular compression of the cord. Various possibilities of vascular compression have been suggested, such as compression of the anterior spinal artery by spondyloitic bars, intraforaminal compression of radicular arteries, or impairment of both the venous and arterial circulation. Girard, et al., found histological alterations in the spinal cord that were of vascular origin, yet did not involve compression of the cord, and were apparently unrelated to the territory of supplying vessels. Since different modes of vascular compression may be present in the same patient, adequate surgical treatment must include decompression at all possible sites as in a combined foramenec-
The question is whether removal of the compressing agents by an anterior approach has a similar effect. In spondylosis, encroachment on the cervical spinal canal frequently occurs at more than one level. This was true in 85% of the 117 patients in Clarke and Robians's series. In 11 of 17 patients examined by Wilkinson, there were three or more levels. Surgical decompression, whether anterior or posterior, must be extensive in most cases of spinal cord compression. Even then, the result depends on whether the removal of hard protrusions alone can effectively decompress the spinal cord.

Anterior compression may not be the only mechanical agent involved in cervical myelopathy. Clarke and Little described a case of cervical myelopathy with anterior compression due to a ridge, and posterior compression due to hypoplastic laminae. Other authors have stressed the relatively high incidence of congenital anomalies of the cervical spine in spondylosis. In 1955, Mayfield mentioned the possibility that a shallow vertebral canal could be of importance in the development of cord compression. Payne and Spillane found that the antero-posterior diameter of the cervical spinal canal was smaller in spondylotic spines than in normal ones, especially when there was paraplegia, and they suggested that the development of myelopathy might also be related to the initial size of the canal. This finding was confirmed by other authors. Albouker, et al., stated recently that all their paraplegic patients had, besides their disc protrusions, extensive dysmorphic stenosis of the cervical spinal canal which narrowed the sagittal as well as the transverse diameter.

In this series, we are reporting anterior operations for cervical spondylotic myelopathy that were only performed in cases of localized (focal) pressure on the spinal cord. Where there was extensive, abnormal narrowness of the cervical spinal canal, we performed decompressive posterior operations.

X-ray diagnosis. Discography is no diagnostic help. Sagittal tomography and air myelography are very useful, however, since they may demonstrate deformities not visualized in plain roentgenograms. The following patient is a striking example: G. E., a man of 46, had suffered from progressive paraplegia for 2 years. X-ray studies are reproduced in Fig. 1. The sagittal tomogram of his upper cervical spine showed considerable narrowing of the spinal canal because of posterior spurs between C2-3. These spurs did not show in the plain lateral roentgenogram. The air myelogram in flexion showed interruption of the contrast medium at the C2-3 level, both anterior and posterior to the spinal cord. Extension of the neck resulted in a great reduction of the sagittal diameter of the cervical canal that all air disappeared in front of the cord while only a small strip of air remained in the posterior spinal sub-arachnoid space. The diagnosis of spinal-cord compression by anterior spurs at C2-3 in a narrow cervical canal was confirmed by laminectomy of C1 through C-3. The operation was followed by a dramatic improvement in the neurological signs, including recovery of the use of his legs.

Use of Bone Grafts in the Anterior Operation

We used a modified Smith and Robinson's procedure. Through the emptied disc space, we removed the intraforaminal osteophytes (Figs. 2 and 3) and transverse ridges. In some of the cases this required resection of part of the uncinate process. When there was a backward luxation of a vertebra causing spinal cord compression, we removed the posterior-inferior portion of the vertebral body (Fig. 4). Anterior angulation of the cervical spine should be corrected, since in itself it is a source of neck pain and may cause undue stretching of the spinal cord. We tried to prevent the development of postoperative anterior angulation by reducing operative damage to the vertebral bodies and by using autogenous tibial cortical grafts instead of iliac bone. Fusion by means of the relatively soft, iliac grafts may result in anterior angulation, which is usually slight in one-level fusions (Fig. 5) but more pronounced following fusion at several levels.

Because of their weight-bearing properties, tibial cortical grafts can be used to restore the original height of a flattened disc space. This protects the intervertebral foramina from the superior articular processes when there is backward displacement of the adjacent vertebra. We have also found that the use of wedge-shaped tibial cortical grafts is a reliable way to correct the forward angulation of