Surgical Treatment of Vertebral Artery Insufficiency Caused by Cervical Spondylosis*

LOUIS BAKAY, M.D., AND EUGENE V. LESLIE, M.D.
Division of Neurosurgery and Department of Radiology, State University of New York at Buffalo, School of Medicine, and Departments of Neurosurgery and Radiology, Edward J. Meyer Memorial Hospital, Buffalo, New York

SYMPTOMS that can be attributed to vertebral-basilar insufficiency are being diagnosed more commonly because of the increasing use of angiographic visualization of the vertebral arteries. Congenital or acquired stenosis of the vertebral artery at its origin from the subclavian artery, or kinking, especially of the first portion of the artery, can critically reduce the blood flow to the brain stem.\textsuperscript{7,8} Atherosclerotic narrowing of the vertebral-basilar system with involvement of long stretches of the vessels has a similar effect on the circulation. On rare occasions, the formation of cicatrices after thyroidecotomy has caused vertebral insufficiency;\textsuperscript{13} compression of the vertebral artery against the lateral mass of the atlas has also been reported.\textsuperscript{3} It has been suggested that compression and displacement of one or both vertebral arteries, by spondylotic cervical vertebrae, may interfere with circulation. The frequency of this lesion and its exact clinical significance is not well known and few attempts have been made to correct this condition by surgical measures.

The surgical procedure presented here evolved from observations of patients after removal of spondylotic spurs by an anterior approach. A number of such patients have been operated upon for spondylosis with associated pyramidal tract signs. Postoperative x-rays and myelograms not only demonstrated that the big bony spurs have been effectively removed; they also showed an even more interesting development, namely, the disappearance of the remnants of these spurs following interbody fusion. Even those lateral osteophytes that were not completely removed at the operation subsequently disappeared.\textsuperscript{1} This prompted one of the authors (L.B.) to perform this operation in patients with vertebral insufficiency produced by cervical spondylosis.

Radiological and Operative Technique

The operation was performed in 3 patients whose chief complaint was severe and disabling dizziness brought about by positional change in the cervical spine. The detailed description will be limited to 2 of these patients, who were adequately evaluated several months after operation.

All patients had initial and follow-up plain films of the cervical spine. Myelography was used to determine the degree of encroachment upon the neural canal by the spurs. Pre- and postoperative three-positional pancervical angiography was carried out. Using the Seldinger technique, a #8 Teflon catheter was introduced into the ascending aorta via the femoral artery. Three sets of serial films were taken with the neck in extension, rotated to the right and then to the left. The patient was asked if any given position had exacerbated the symptoms; an attempt was made to simulate this position. A 40–45 cc. bolus of 90 per cent Hypaque was injected for each series. The procedure was well tolerated.

The operation was carried out in a routine fashion as described by Cloward.\textsuperscript{6} The cervical canal was entered not in the midline but centered toward the side where the vertebral artery is larger and more compressed (Fig. 1). The bulk of the spondylotic spur was removed in this process. From a cleav-
age plane between the posterior aspect of the vertebral bodies and the posterior longitudinal ligament, as much of the lateral osteophytes as possible was removed by curettes directed toward the intervertebral foramina. This usually resulted in the removal of the bulk of the lateral spur. However, we deliberately refrained from entering the intervertebral foramen so as to avoid any possible direct or indirect injury to the artery or nerve. Particular attention was paid to the disruption of the osteophytic bridges between the two adjacent vertebrae. A routine interbody fusion was then performed with bone taken from the iliac crest.

Case Reports

Case 1. R. G., a 47-year-old white man, was admitted on September 18, 1962, with the chief complaints of dizziness and fainting spells. These symptoms had started 4 years earlier, but had become more frequent in the last year, occurring almost daily during the last few months. These spells were associated with bending over or looking up. Beyond this observation, the patient, whose intelligence was limited, could not associate symptoms with any particular motion of the cervical spine. Every vertiginous episode was characterized by a feeling that the room was spinning around. This was immediately followed by a feeling of faintness. Occasionally the patient had to hold on to objects to steady himself; sometimes he dropped to his knees, and on about 24 occasions, he actually lost consciousness for a brief but undetermined period of time. The patient also complained of intermittent numbness of the 3rd, 4th and 5th fingers of both hands. He was a chronic alcoholic and had been treated for diabetes over the last 6 years.

Examination. Physical examination revealed a blood pressure of 160/90. His neck was supple, with only slight limitation of movement in flexion, extension, and lateral rotation of the cervical spine. Tests of labyrinthine function revealed no abnormality that could have accounted for his vertigo. Muscle weakness was limited to the left triceps. There was no spasticity and no ataxia. Sensory examination showed no abnormality. Both triceps and biceps reflexes were absent on the left. Knee jerks were very lively bilaterally but both ankle jerks were depressed. A positive Babinski response was present bilaterally. An electroencephalogram showed slight and diffuse slow wave activity. There were no epileptiform discharges and no focal abnormality.