Case Reports

Arteriovenous Fistula of Vertebral Vessels in the Neck*

Shelley N. Chou, M.D., and Lyle A. French, M.D.

Division of Neurosurgery, Department of Surgery, University of Minnesota Medical School, Minneapolis, Minnesota

The occurrence of a fistula between the vertebral artery and vein in the neck is extremely rare. Only 20 cases have been found in a review of the literature. All of these fistulae occurred following some type of trauma; the majority were the result of war injuries. Two developed subsequent to blunt injury of the neck;1,2 1 resulted from a percutaneous arterial puncture.3 Most of the cases were reported either prior to or immediately following World War II, hence there are only 2 cases verified by angiography reported in the literature.4,5 It is conceivable that some of the earlier cases may not have been true arteriovenous fistulae but traumatic, false arterial aneurysms. It is the purpose of this report to present 2 cases of arteriovenous fistula of the vertebral artery. Both were verified angiographically and successfully obliterated surgically.

Case Reports

Case 1. U.H. 2962653, L.J., a 35-year-old man, had 2 episodes of hemiparesis, each affecting a different side. Both attacks lasted about 3 hours and subsided spontaneously. The 2nd episode occurred on July 27, 1960. He had a left hemiparesis and hyperreflexia and a mild left central facial palsy. His blood pressure was 154/104 mm. of Hg. Bilateral carotid angiography revealed no abnormality. A right subclavian angiogram failed to demonstrate the vertebral artery. A left percutaneous vertebral angiogram revealed excellent filling of the left as well as the right vertebral artery. The vertebral artery was punctured at the C5–C6 level. It was felt that the patient had cerebrovascular disease and that his two episodes of alternate hemiparesis were the result of transient cerebral ischemia. He was given a vasodilator and a tranquilizer and sent home.

The patient was first seen at the University Hospitals in January 1961. At this time he complained of a noise in his neck. He claimed that this noise had been present since the angiographic examination referred to previously. This was described as a “whistling noise” occurring at the same rhythm as his heart beat. It would disappear if he turned his head to the right or if he hyperextended his neck.

Examination. There was a loud bruit with systolic and diastolic components heard in his neck bilaterally, the left being more prominent. There was no mass or thrill. Turning of the head to the right, hyperextension,

Received for publication January 20, 1964.

* Presented at the 13th annual meeting of the Congress of Neurological Surgeons, October 9–12, 1963, Denver, Colorado.

Fig. 1. Case 1. Left vertebral angiogram showing the arteriovenous fistulous lesion. Note catheter in orifice of the vertebral artery.

digital compression of the carotid artery and almost any pressure applied to the left side of his neck could obliterate the bruit. His neurological findings were normal.

Bilateral carotid angiography was repeated without demonstration of any vascular abnormality. Subclavian angiography on the right revealed filling of the vertebral artery but there appeared a partial obstruction at the take-off of the right vertebral from the subclavian artery. This was thought to be the result of an atheromatous plaque. A left subclavian angiogram demonstrated an arteriovenous fistulous lesion of the vertebral artery at the C5–C6 level (Fig. 1).

Operation. A procedure planned to obliterate the fistula was done in March 1961 under general anesthesia and hypothermia of 86°F. Hypothermia was employed because of 1) history of cerebrovascular ischemia; 2) question of angiographic evidence of a plaque at the take-off of the right vertebral artery; and 3) anticipation that temporary occlusion of the left vertebral artery might be necessary.

An incision in the skin was made parallel to the
Thereafter the fistula was bleeding. It was impossible to locate the orifices of the subclavian vessels using a subclavian angiogram. After the fistula was isolated and strips of Gelfoam were placed between the artery and the venous channels running posteriorly, Temporary occlusion of the vertebral artery proximal and distal to the fistula was not necessary because there was no serious bleeding. The fistulous opening or openings were never identified. Since the vertebral artery was isolated from the venous channels it was assumed that the fistulous communications were obliterated.

Postoperative course was uneventful. The noise in the neck disappeared. In January 1963, about 22 months after operation, a left vertebral angiogram was repeated using retrograde brachial-artery technique. There was no evidence of the arteriovenous fistula (Fig. 2). The patient has been followed in the clinic. He has not had any further neurological problem.

Case 2. U.H. #078810. C.L., a 14-year-old boy, was brought into the Emergency Room, University Hos-

pitals in October 1961, following a hunting accident in which he was struck in the back of the head and neck by a blast from a 12-gauge shotgun at a distance of about 20 yards.

Examination. He was awake and oriented. Blood pressure was 120/80 mm. of Hg. In the occipital and suboccipital region there were numerous perforations of shot. Pertinent neurological findings included paresis of the left upper extremity and impairment of sense of position and tactile discrimination in the left arm. In the right upper extremity and over the upper thoracic segments there was hypalgesia and hypesthesia.

Roentgenograms of the skull and cervical spine showed no fracture. There were multiple pellets in the head. By stereoscopic visualization 2 pellets were seen in the cerebral hemispheres, each just lateral to the midline about 2 in. anterior to the inion. In addition, 1 shot was believed to be inside the spinal canal against the left side of the 1st cervical vertebra. Another shot appeared to be located just left of the odontoid process.

Course. Following the patient’s admission, his scalp was debrided. He was given tetanus toxoid and antibiotics. His neurological deficit improved gradually. Just prior to his discharge in November 1961, he noticed a “soft noise” in his head. The possibility of a vascular complication was entertained but because of some induration and edema which were still present in the suboccipital region, it was felt that further investigation for this “soft noise” should be postponed. He was referred to the Department of Physical Medicine and Rehabilitation for therapy.

On follow-up examinations in February and March 1961, the “soft noise” was louder. There was a distinct audible bruit heard best over the right posterior auricular and cervical region. There was also a small suboccipital subcutaneous mass. A right subclavian angiogram showed an arteriovenous malformation extending from the occiput down to the level of the 3rd cervical vertebra (Fig. 3). The ascending branches of the right thyrocervical trunk fed into the malformation and were unusually large. The right vertebral artery was well demonstrated and it, too, was involved in the lesion. A right carotid angiogram showed no abnormality. A 2-stage surgical treatment of this lesion was planned.

Operations. In the 1st operation the external carotid artery, the superior thyroid artery and all the branches of the thyrocervical trunk on the right side were ligated and sectioned. This procedure reduced the bruit greatly but did not eliminate it completely.

Two days later, therefore, a 2nd operation was carried out under general anesthesia. The incision was made in the suboccipital region behind the right ear. There was a mass, about 3 cm. in diameter, consisting of large arterial as well as venous channels, embedded in the suboccipital muscles. This was partially removed to gain access to the 3rd portion of the vertebral artery. Extending posteriorly from this portion of the artery was a glomery of vessels about 1 cm. in diameter. These vessels seemed to enter the circular sinuses at the foramen magnum. With further dissection it was possible to ligate these vessels which served as the fistulous opening. Following this, the large anastomosing mass collapsed and it was removed totally. At this time, a partial laminectomy was done at C1, C2 and C3 levels. Intradural inspection did not reveal any further abnormality.

Fig. 2. Case 1. Postoperative vertebral angiogram, showing complete obliteration of the fistula.