Treatment of Carotid-Cavernous Fistula by Muscle Embolization and Jaeger's Maneuver

C. B. Sedzimir, M.D., F.R.C.S. (Ed.), and J. V. Occleshaw, B.Sc., M.B., Ch.B., F.F.R.
Regional Neurosurgical Centre, Walton Hospital, Liverpool, England

Although carotid artery-cavernous sinus fistula was, in the words of Hamby,2 “the earliest recognized surgically treated intracranial vascular lesion,” it is not common. He reported 32 patients with this lesion, the largest series from one source.

The Regional Neurosurgical Centre at Walton Hospital, Liverpool, serves the heavily industrialized population of Merseyside as well as the semi-rural and purely rural areas of South West Lancashire, North-West Cheshire, North Wales, and the Isle of Man; in all, there is a population approaching three million. To determine the frequency of carotid-cavernous fistula, we have analysed the records of our Centre in the following way.

Between 1956 and 1965, 12,000 patients were admitted, four of whom had this type of fistula. Only one such fistula occurred among the 669 intracranial aneurysms studied during this period and was apparently due to rupture of an aneurysm within the cavernous sinus. Three such fistulas developed among the 1100 patients treated for cranio-facial injuries, and one among the 1100 patients treated for subarachnoid hemorrhage. We are reporting this latter patient because of his unusual lack of symptoms, and one patient admitted in 1966 (after this study was completed) to illustrate our subsequent successful use of the Jaeger operation.

Case Reports

Case 1. On October 11, 1965, this 19-year-old man suddenly felt pain over the left side of his head and soon became unconscious. He recovered consciousness about 20 minutes later, vomited several times, and had a generalized headache and a stiff neck. His symptoms persisted and he was admitted to a local hospital on October 14 where a lumbar puncture revealed heavily blood-stained cerebrospinal fluid; he was transferred to our Centre on the same day.

History. About 2½ years earlier, on March 23, 1963, he had had the left side of the face and neck accidentally blown off by a shot gun fired at close range. During the succeeding months he underwent several operations on bony structures and on the skin of the face and neck. Two days after the accident, he was unconscious with evidence of a slight right hemiparesis. Eighteen days later, he was conscious and fully orientated. There was a left external and internal ophthalmoplegia with slight blurring of the left optic disc, and vision reduced to finger counting. No mention was made of proptosis nor of either the presence or absence of a bruit. He returned to work as a brick layer in 1964. He managed his work and had no complaints until the recent sudden onset of the head pain.

Examination. On admission on October 14, 1965, the left side of the face and neck showed extensive scarring and evidence of skin grafting. The patient was fully conscious, well-oriented, and cooperative. He was right-handed and there were no speech disturbances. There was a slight degree of ptosis of the left eyelid; the left pupil was oval and did not react to light by direct or consensual stimulation. There was no reaction to accommodation on the left side. There was slight restriction of upward movement of the left eye, while movements of the right eye were normal. The fields of vision were full to confrontation. The right optic fundus was normal, but the left optic disc was hazy and gray, probably due to past swelling. Visual acuity in the right eye was 6/6 and in the left eye 6/36. On auscultation over the left eyeball and over the left internal carotid artery, a systolic bruit could be heard. Although very definite, it was not a loud bruit and disappeared when the left common carotid artery was compressed. The patient stated that he had had a constant...
“noise in the head” since he had recovered consciousness following the accident in March, 1963. No other abnormal neurological signs were present.

**Angiographic examination.** Bilateral carotid angiography (Fig. 1 A) showed that the left cavernous sinus filled with contrast medium, which followed the course of the carotid syphon. No opacification was observed in the ophthalmic vein. The cavernous sinus drained into the opposite cavernous sinus (Fig. 1 B) by the superficial cerebral vein and via the anastomotic veins into the sagittal sinus as well as into the internal cerebral vein. No filling of the jugular vein was seen on the left side. When the left carotid artery was compressed in the neck, there was good cross circulation in the left side of the circle of Willis from the right.

**Operation.** On October 22, the left com-