Treatment of Carotid-Cavernous Fistula by Gelfoam Embolization

SHOJI ISHIMORI, M.D., MITSUO HATTORI, M.D., YOSHIYUKI SHIBATA, M.D., HISAO SHIZAWA, M.D., AND RYOZO FUJINAGA, M.D.

Department of Surgery, Division of Neurological Surgery, Keio University School of Medicine, Tokyo, Japan

Carotid-cavernous fistula has been treated in various ways, including cervical carotid ligation, trapping by cervical internal-carotid ligation, intracranial internal-carotid ligation, and embolization through the cervical carotid artery with muscle and other thrombos-making material. Pool had 66% success after unilateral common carotid occlusion, 72% after internal carotid occlusion, and 94% after trapping procedures. However, Brooks, Hamby, Speakman, Parkinson, Browder, and Lang and Bucy have found it necessary to treat difficult cases by occlusion with radiopaque thrombos-making materials.

We are reporting two cases of large carotid-cavernous fistula which were successfully treated by gelfoam embolization.

Case Reports

Case 1. A 33-year-old man sustained a head injury and jaw fracture on September 29, 1965, after which he was unconscious for 2 days. He was transferred from a local hospital to the dental department of our hospital for treatment of the mandible fracture. Soon afterwards he noticed pulsation and protrusion of the right eyeball and visual disturbance of the right eye.

Examination. On October 25, the patient was transferred to the neurosurgical department; upon examination bruit was heard over the right eyeball, which disappeared abruptly upon compression of the right carotid artery. The right exophthalmos was progressive with severe engorgement of the right conjunctiva; the right pupil was larger than the left. The retinal veins were engorged, with blurring of the right disc. The left eye appeared normal; all other neurological findings were also normal.

Right carotid arteriography showed a definite carotid-cavernous fistula and an extremely dilated superior ophthalmic vein (Fig. 1 left). Left carotid arteriography demonstrated good cross-filling through the anterior communicating artery to the right cerebral hemisphere.

First operation. On February 11, 1966, the right common carotid artery was closed with a Silverstone clamp. The exophthalmos and bruit diminished slightly for about 10 days but returned thereafter. On March 15, right brachial angiography showed good visualization of the vertebral-basilar, right middle cerebral, and anterior cerebral arteries through the posterior communicating artery. Moreover, the carotid-cavernous fistula was as well-visualized as it had been before the common carotid ligation.

Second operation. On March 24, the right internal carotid and external carotid arteries were ligated, without any improvement of the symptoms. The right pupil dilated to 5 mm in diameter with diminished light reaction and increased right global pain.

Third operation. On April 22, under endotracheal anesthesia, a right frontal craniotomy was carried out for clipping of the internal carotid artery at the distal portion of the fistula. The ophthalmic artery was not clipped because of the hazard involved in searching the operative area. There was no postoperative improvement, and, in fact, vision was diminished.

Fourth operation and embolization. On June 3, the right cervical internal carotid artery was exposed at the distal portion of the previous ligation, and a polyethylene tube 2.5 mm in diameter was inserted into the internal carotid artery for about 10 cm to a point close to the cavernous portion. Through this tube, tightly rolled gelfoam, with gold film as an x-ray marker, was injected in saline solution until no blood flowed back through the tube from the internal carotid artery. Three gelfoam pieces (20 X 60 X 7 mm) and one rolled sheet of gold film
Case 1. Preoperative right carotid arteriogram lateral projection (left) shows excellent filling of cerebra vessels, as well as the cavernous sinus (single arrow) and distended ophthalmic vein (double arrows). Postoperative lateral view (right) after trapping procedure shows polyethylene tube inserted into the internal carotid artery. The contrast medium has been injected through the tube, showing the fistula patent and ophthalmic vein dilated (arrow). Immediately after this exposure, embolization was performed.

Postoperative course. The pulsating exophthalmos, bruit, engorgement of the conjunctiva, and papilledema subsided within 2 weeks. Postoperative x-rays showed the rolled gold film stuck at the site of fistula (Fig. 2). On discharge, the patient showed minimal anisocoria but no bruit.

Case 2. The patient, a 24-year-old man, had sustained a traffic accident on October 4, 1965, which left him unconscious for about 5 hours. In May, 1966, he was admitted to a local hospital for treatment of right exophthalmos, and on July 20, 1966, was transferred to the neurosurgical department.

Examination. The patient was alert and showed no physical abnormalities except for a right pulsating exophthalmos, proptosis, ecchymosis of the right globe, and bruit synchronous with heart beat. The right pupil was larger than the left and reacted sluggishly to light; no papilledema was seen on either side. During compression of the right common carotid artery, the bruit disappeared abruptly. The left eye appeared normal. On August 24, bilateral carotid arteriography showed a definite carotid-cavernous fistula with an extremely dilated