Transcavernous Repair of Carotid Cavernous Fistula*

Case Report

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When we were confronted with our first case of carotid cavernous fistula which required repair by transcavernous approach we doubted that another case would appear during our lifetime. However, when the current case failed to respond to all standard methods of obliteration, we found we had a second such case.

To review briefly the anatomy and pathology of the region, the normal cavernous carotid hangs freely within the cavernous sinus away from contact with the bony dura except in its most anterior-inferior portion. It normally has three main branches, the meningo-hypophyseal artery, the artery to the inferior cavernous sinus, and McConnell’s capsular artery, all of which come in intimate contact with the bony dura within the cavernous sinus.

There are two types of traumatic arterial fistulae within the cavernous sinus. In type 1, the carotid itself is torn. Trapping alone may or may not succeed depending on the size of the collaterals mentioned above. Embolization may or may not succeed depending on the size of the opening. In Type 2, a branch of the carotid is torn within the cavernous sinus. No amount of trapping and embolization can obliterate the distal source, which is fed from the opposite internal carotid or from the external system, as in Hayes’ case, or both.

Previous work has demonstrated a triangular space in the lateral wall of the cavernous sinus bounded by the third and fourth nerves above, and the fifth and sixth nerves below. An incision placed within this triangular space avoids the cranial nerves and provides exposure of the cavernous carotid and its primary branches.

Case Report

Examination. O. H., a 38-year-old man, was admitted to the Winnipeg General Hospital on October 19, 1964, profoundly comatose with a complete right hemiplegia and severe respiratory difficulty after a fall from a ladder. An emergency tracheostomy was performed. The left pupil was noted to be dilated and fixed. Skull films revealed no fracture, but there was an unusually large sella turcica, presumably the result of a large asymptomatic pituitary tumor (Fig. 1). A left carotid angiogram, performed in anticipation of an acute extra- or subdural hematoma, revealed a left carotid cavernous shunt (Fig. 2). A bruit was then noted. A right brachial angiogram revealed that the right carotid irrigated both hemispheres and also cross-filled into the left carotid cavernous fistula.

Within 24 hours, the left eye was proposed and pulsating with marked engorgement of the conjunctival vessels (Fig. 3). By the 14th day, it was evident that the patient was going to survive; the tracheostomy was no longer necessary. He remained hemiplegic, completely aphasic, and had a total ophthalmoplegia on the left.

First Operation. A left transfrontal craniotomy was performed and the left internal carotid clipped above the clinoid. The ophthalmic artery was coagulated and divided over a hook. The bulging blue mass was noted within and above the sella, but not touched. The left carotid bifurcation was exposed in the neck. Clamping the internal carotid in the neck did not abolish the bruit. Therefore, muscle and tagged cottonoid emboli were introduced via the severed stump of the external carotid, after the method of Jaeger. The bruit diminished transiently with each embolism. Finally, a lengthy muscle strip was stuffed into the internal carotid; the opening in the external carotid was sutured and the clamp removed from the common carotid. It was hoped that this muscle strip would eventually wash up into the fistula or initiate a thrombus which would propagate up into the fistula.

Postoperative Course. Four days later, a
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left carotid angiogram demonstrated that the carotid and the fistula were both entirely open. The opacification in the cavernous sinus had enlarged upward, and one of the tagged cottonoids was visible in the angiogram and in the plane films lodged at the very apex of the ballooned vascular channels (Fig. 4). The other tagged cottonoid emboli could be seen lying in a column conforming to the curve of the carotid siphon within the cavernous sinus.

Second Operation. On December 16 the left carotid was re-exposed in the neck, and additional muscle and cottonoid emboli were forced up the internal carotid through a catheter. Assuming the emboli were lodging within the cavernous carotid, we hoped that successive emboli might pack the lumen further back until the region of the fistula or the principal feeder was occluded. After the insertion of 15 more emboli, the bruit ceased. The internal carotid was then ligated and sectioned in the neck.

Postoperative Course. Thirty-six hours later, the bruit and pulsations were back as forcefully as ever. On more careful inspection of the x-rays, it was now evident that the tagged cottonoids, although in a curved

Fig. 1. Skull film showing marked enlargement of the sella turcica with posterior displacement of the posterior clinoids.

Fig. 2. Left carotid angiogram showing dense opacification of the left cavernous sinus and feeble opacification of the vessels distal in the carotid system.

Fig. 3. Patient 24 hours after the accident. Note the exophthalmus on the left with obliteration of the superior palpebral crease.