A Surgical Approach to the Cavernous Portion of the Carotid Artery
Anatomical Studies and Case Report*

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Occasionally the neurosurgeon is confronted with a situation in which he wishes he could safely approach and leave the cavernous portion of the carotid artery. This paper records a case of traumatic carotid-cavernous fistula which was carried through many stages, including definitive surgery, and which illuminated certain related anatomical observations.

Case Report

F.H., a 29-year-old man, suffered a head injury in 1944. Following this he noticed the gradual development of a right pulsating exophthalmus and, shortly thereafter, a noise in his head synchronous with his pulse. He was examined for the first time in 1947. The pulsations and bruit could be obliterated by digital compression of the right common carotid. A carotid arteriogram revealed abnormal vasculature about the right orbit. The common carotid was ligated in April, 1947, with resulting cessation of the pulsation and the bruit. In December of the same year, the patient noticed the occasional return of a bruit.

By 1956, the bruit was continuous and the pulsations and proptosis had increased. There was marked engorgement of the vessels of the conjunctiva, lids and adjacent area of the face. Left and right carotid angiograms both demonstrated the right carotid-cavernous fistula; in the orbit as well as along the base of the frontal lobe were large tortuous veins filled with arterial blood. The right internal carotid artery was ligated under local anaesthesia. The external carotid artery and available branches on the left were double ligated. In both this neck exposure and the previous similar exposure on the right all the exposed veins were unduly large. Aside from some blanching of his nose and ears during the Winnipeg winter, there was no significant postoperative change.

In December, 1956, a right transfrontal craniotomy was performed. The bone was exceedingly hard without diploë but with multiple large channels containing blood of arterial pressure and colour. The roof of the orbit and the undersurface of the frontal lobe were covered with continuous,
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Billowing, thin-walled, looping veins up to 1 cm. in diameter. Swirling arterial blood was visible in many of these loops. These were encountered all the way down to the chiasm. The exposure resembled a proctoscopic passage through massive internal hemorrhoids. The vascular loops were easily compressed but on release instantly bulged back obscuring the vision. Eventually an internal carotid of normal size was visualized and clipped. Search for the ophthalmic artery was out of the question. The bruit was absent for about 4 hours, and in May, 1957, it was still diminished. Moreover, the exophthalmus was reduced so that he was able to wear sunglasses that had previously rubbed his right eye.

In June, 1962, he experienced a nearly fatal exsanguinating epistaxis. The exophthalmus was now as bad as ever with marked engorgement of the superficial vessels of the lids, conjunctiva and adjacent skin (Fig. 1). A retrograde brachial angiogram with films taken 6 per second revealed that the ascending arteries of the neck were unusually large and tortuous. There was no anomalous contribution from the vertebral to the carotid system but in the angiogram sequence the trapped carotid segment filled before the facial arteries or the ophthalmic artery had been visualized (Figs. 2 and 3). The trapped segment must have been fed from collateral vessels as well as from the ophthalmic system. Efforts to introduce muscle emboli into the internal carotid above the old occlusion in the neck were unsuccessful. The continuous bruit, waxing with systole and waning with diastole, suggested that the fistula was large enough to allow forcible arterial escape even under diastolic pressure. It was thought the man's only salvation lay in direct approach to the cavernous carotid.

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We have found one report of deliberate puncture and insertion of muscle into the cavernous sinus in a case of carotid cavernous fistula and know of one other but have been unable to find any reports of a surgical approach to the cavernous portion of the carotid. Modern anatomy books picture the cavernous carotid as a smooth non-branching tube, although most of them describe