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Superselective Ophthalmic Angiography for Diagnostic and Therapeutic Use

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Until recently, the use of superselective orbital angiography for the diagnosis of orbital vascular lesions has rarely been attempted because of the technical difficulty of the procedure [1–5]. However, recent advances in catheter technology have made it easier to perform superselective catheterization of the ophthalmic artery. We describe the use of this technique for orbital interventional procedures.

Case Reports

Case 1

A 30-year-old man presented with progressively decreasing visual acuity, right proptosis, and increasing pain in the right eye. He had no history of head trauma. His symptoms had been worsening for eight years. He had undergone radiation treatment for a previously diagnosed orbital arteriovenous malformation (AVM) without improvement. A prominent bruit was heard over the right eye, and a severe visual deficit was noted (he could count fingers only at 3 feet).

Selective internal and external carotid angiograms (Fig. 1) revealed an ocular AVM that was fed only by the ophthalmic artery, without external carotid arterial supply. After diagnostic angiography, a 2.5-French Tracker catheter (Target Therapeutics, Los Angeles, CA) was selectively placed into the proximal ophthalmic artery coaxially through a 5-French catheter. Polyvinyl alcohol foam particles were selected for embolizing the malformation, first with a suspension of 590–1000 μm particles and then with particles about 0.5 mm in diameter. They were injected through the Tracker catheter and monitored by digital subtraction angiograms after a negative Wada test [3]. Clinical follow-up over 2 years has shown no recurrent symptoms. No further visual loss has occurred, and the proptosis and pain have subsided.

Case 2

A 32-year-old man presented with acute left hemiparesis and blindness of the right eye. He had a long history of mitral valve prolapse and had had similar visual symptoms previously, although

Fig. 1.—A, Lateral view of right internal carotid angiogram shows isolated ocular arteriovenous malformation (AVM) supplied by ophthalmic artery. B, Digital subtraction arteriogram (DSA) of superselective ophthalmic artery shows placement of Tracker catheter in proximal ophthalmic artery feeding the orbital AVM. C, Postembolization angiography demonstrated a total obliteration of the ocular AVM with preservation of the ophthalmic artery.
they had cleared after several hours. CT showed a right frontal infarct. Arterial thrombi were noted by fundus examination. Cerebral angiography (Fig. 2) showed an acute thrombus in the right ophthalmic artery. No intracranial vascular occlusion was noted. Superselective ophthalmic artery catheterization was performed with a Tracker catheter. Urokinase was infused over 3 hr for a total dose of 250,000 IU. The ophthalmic artery thrombus was dissolved completely. Although he still had impairment, the patient’s vision was partially restored.

Discussion

In the past, selective ophthalmic artery catheterization was possible only with a calibrated-leak microballoon catheter. The technique was quite difficult [1–3], and the angiographic diagnosis of orbital disease usually relied on carotid artery angiography without superselective catheterization. However, the details of angiographic anatomy often is not well delineated by nonsuperselective carotid arteriography.

Orbital AVM is a rare vascular disorder that usually is associated with facial or cranial vascular malformation. An isolated AVM of the orbit is even less common [4–7]. Since many orbital vascular malformations are self-limited and may not justify the risk of surgery, embolization with superselective catheterization is the treatment of choice [3–9]. Intraorbital embolization of an AVM is impossible without superselective catheterization because nonselective embolization in the region of the ophthalmic artery can lead to significant morbidity. The soft tip of the Tracker catheter allows one to catheterize the ophthalmic artery without damaging it. Successful embolization and thrombolytic treatment can be done with this technique. If urokinase is injected into the internal carotid artery without superselective technique, there is a high risk of intracranial bleeding because the bulk of the urokinase enters the intracranial arteries rather than the ophthalmic artery. For the same reason, lysis of a thrombus of the ophthalmic artery should not be attempted [10].

In summary, use of the Tracker catheter is an easy and effective way to catheterize the ophthalmic artery. Many vascular orbital lesions can now be effectively diagnosed, and therapeutic procedures such as embolizations and intraarterial thrombolytic treatment can be safely done.

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REFERENCES