Patien Selection and Technical Nuances for Microsurgical Clipping of Carotid-Ophthalmic Aneurysms: 2-Dimensional Operative Video

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The options for aneurysms arising from the ophthalmic segment of the internal carotid artery (or carotid-ophthalmic aneurysms) have diversified over the past 2 decades and now include microsurgical clipping, flow diversion, and coiling with or without stent or balloon assistance. This expansion of options may have led to better overall outcomes, but decision making has become more complex, and dilution of technical experience has raised new challenges for trainees and practitioners. While advances on the endovascular front are obvious, contrary to popular discourse, advances in imaging (angiography and magnetic resonance imaging [MRI]), neuroanesthesia, microsurgical instrumentation, and drilling technologies have also advanced open approaches. The higher recurrence and retreatment rates with endovascular therapy may favor a microsurgical approach especially at a young age. Additionally, anatomic and patient-specific features, such as tortuous neck anatomy, may make endovascular approaches more hazardous than open approaches. After informed consent was obtained, we present a series of carotid-ophthalmic aneurysms in 3 patients, with unique patient characteristics and aneurysm/access anatomy. Specific aspects of imaging and operative technique are emphasized. We review decision making which can be facilitated by FIESTA (Fast Imaging Employing Steady-state Acquisition) or CISS (Constructive Interference in Steady State) MRI sequences in understanding the relationship of the aneurysm to the optic nerve. We also illustrate the value of source images from 3-dimensional rotational angiogram in understanding the relationship of the aneurysm to the anterior clinoid process. Finally, we illustrate decision making regarding anterior clinoidectomy and illustrate an ultrasonic drill for this purpose.

Disclosures
Bernard R. Bendok received funding as Principal Investigator for HEAT (Hydrogel Endovascular Aneurysm Treatment) trial (MicroVention Inc, Aliso Viejo, California). The authors have no personal, financial, or institutional interest in any of the drugs, materials, or devices described in this article.

COMMENT
Although most unruptured ophthalmic segment aneurysms are currently being treated endovascularly, in this article and accompanying video the authors elegantly illustrate 3 cases better suited for microsurgical clipping. The video is loaded with technical pearls. The first case is that of a young woman with a small, infundibular ophthalmic aneurysm. The morphology of this aneurysm (with full incorporation of the ophthalmic artery into its base) would have rendered flow diversion risky. The patient’s young age also favored definitive therapy. The use of adenosine for physiological “proximal control” so the clip would be less likely to slip off the dome is an interesting adjunct. In the other 2 cases, endovascular therapy was considered suboptimal given tortuous (and in 1 case dissected) cervical internal carotid arteries. Both required clinoidectomies, 1 done with the ultrasonic claw and the other with a diamond drill. The third case is unusual since the optic nerve was displaced laterally by the aneurysm. A generous clinoidectomy, however, allowed for clipping with minimal manipulation of the nerve. The MRI FIESTA sequence was particularly helpful in all 3 cases. I congratulate the authors on this instructive video and on these clean, elegant microsurgical dissections.

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