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External Manual Carotid Compression for Cavernous Sinus Fistula

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Cavernous sinus dural arteriovenous fistula (CS-DAVF) typically occurs spontaneously, with several treatment options available, including endovascular embolization[1], external manual carotid compression (EMCC)[2], ophthalmic vein compression[3], and pharmacotherapy[4] in carefully selected cases. However, traditional methods, particularly EMCC, have long been neglected. Here, we report a case successfully treated with EMCC, highlighting the value of this older therapeutic approach.

A 68-year-old woman presented with an 11-day history of mild redness and prominence of the left eye. Her medical history was significant for type 2 diabetes mellitus of more than 10 years' duration, with no history of hypertension, thyroid disease, head trauma, or ocular surgery. On examination, her best-corrected visual acuity was 20/20 in both eyes [oculus dexter (OD) and oculus sinister (OS)], with intraocular pressures of 13.2 mmHg OD and 24.7 mmHg OS. Ophthalmic evaluation of the left eye revealed distinct corkscrew-shaped conjunctival vascular dilatation (Figure 1a) and mild proptosis confirmed by Hertel exophthalmometry (13 mm OD, 14 mm OS). Carotid auscultation revealed no audible bruits. Dilated fundoscopy identified mild retinal venous tortuosity in the affected eye. Ultrasound biomicroscopy showed widely open anterior chamber angles (360° bilaterally). Neuroimaging [computed tomography (CT) and magnetic resonance imaging (MRI)] demonstrated no orbital or intracranial abnormalities. Comprehensive laboratory testing ruled out common infectious and inflammatory orbital pathologies.

The patient's ocular findings were limited to mild retinal venous tortuosity in the left eye, with no other fundoscopic abnormalities, suggesting an extraocular etiology. Thyroid-associated ophthalmopathy, which often presents with conjunctival injection with or without proptosis and strabismus, was excluded based on the following: (1) absence of thyroid disease history, (2) unremarkable head and orbital CT/MRI findings, and (3) negative thyrotropin receptor antibody results. The presence of corkscrew conjunctival vessels and moderately elevated intraocular pressure raised clinical suspicion of a vascular shunt, prompting digital subtraction angiography (DSA). DSA (performed by Dr. W.S.) definitively diagnosed a CS-DAVF (Figure 1b), with the fistula site clearly identified (yellow arrowhead).

Given the patient's mild clinical manifestations, short symptom duration, and only moderately elevated intraocular pressure, neurosurgeon Dr. W.S. recommended initial conservative management with EMCC. Nurse Manager X.J. provided detailed instructions for the procedure (15 minutes per session, twice daily, alternating bilateral compression). The patient, a retired high school teacher with a bachelor's degree, received remote guidance via WeChat video during each EMCC session. At the 3-month follow-up, she demonstrated gradual resolution of conjunctival injection, with normalization of intraocular pressure. Long-term surveillance over 5 years revealed no recurrence of CS-DAVF. The most recent ocular examination confirmed the absence of conjunctival hyperemia or vascular engorgement and stable intraocular pressures (Figure 1c).

However, EMCC has been particularly underutilized in contemporary practice despite its historical significance. Although modern endovascular techniques have expanded therapeutic options, they are not without limitations. EMCC offers a safe treatment option for CS-DAVF, but its success depends on careful patient selection; efficacy may be delayed in some cases and absent in inappropriate candidates.[2] Current evidence suggests that patients with newly diagnosed low-flow CS-DAVF or those presenting with only moderately elevated intraocular pressure respond most favorably to EMCC.[2] In addition, successful EMCC requires precise compression of the

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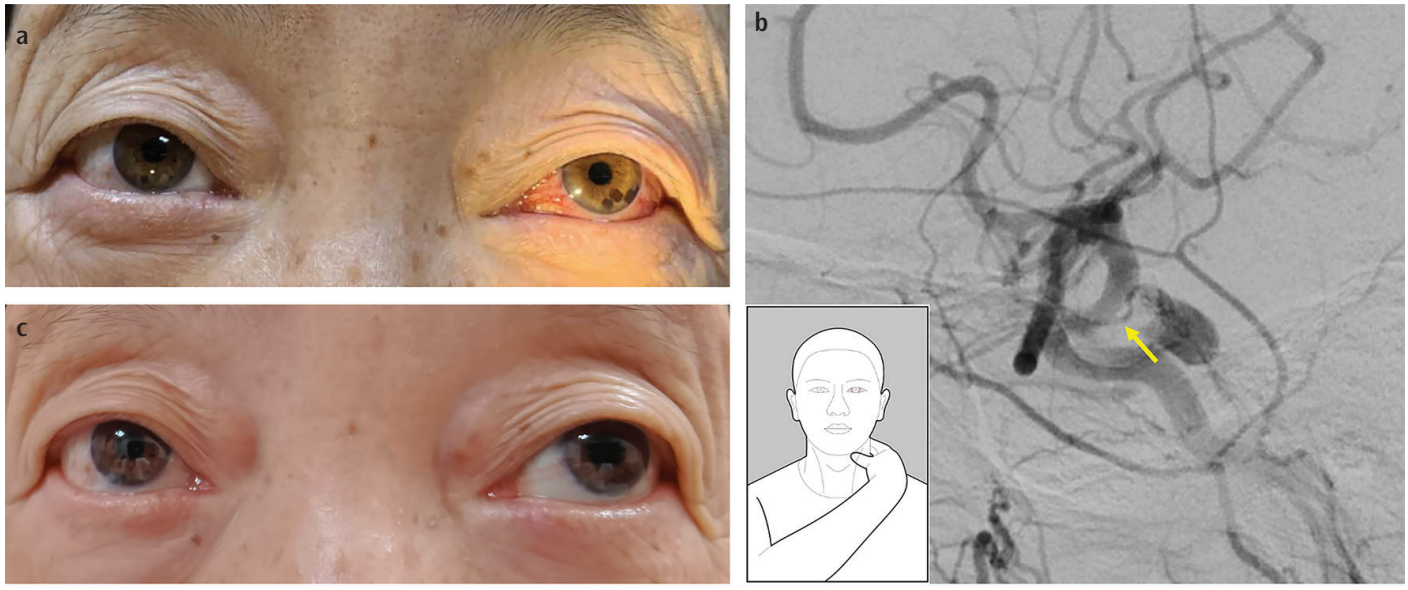

FIG. 1. Typical findings. (a) Initial presentation demonstrating left conjunctival injection with otherwise normal anterior segment anatomy (clear corneas, normal iris architecture, and transparent lenses bilaterally). (b) Digital subtraction angiography confirming cavernous sinus dural arteriovenous fistula (yellow arrowhead indicates fistula site). (c) Follow-up examination revealing resolution of conjunctival hyperemia. Inset: anatomical illustration of optimal external manual carotid compression technique, targeting the pulsatile common carotid artery segment between the thyroid cartilage and sternocleidomastoid muscle.

pulsatile segment of the common carotid artery, located between the thyroid cartilage and the sternocleidomastoid muscle (Figure 1b, inset). This strategic compression reduces both flow volume and velocity in the dural branches of the internal and external carotid arteries supplying the cavernous sinus, thereby inducing thrombosis and subsequent fistula closure.

In contrast, carotid-cavernous fistulas (CCFs) are most often post-traumatic, with transarterial or transvenous embolization using detachable coils or liquid embolic agents constituting the current standard of care in the United States.[5] Owing to their high-flow pathophysiology, CCFs are typically contraindicated for EMCC. Furthermore, bilateral simultaneous carotid compression is absolutely contraindicated because of the risk of cerebral hypoperfusion and consequent ischemic complications.

Informed Consent: Informed consent was obtained from the patient.

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