Cyclodialysis Cleft

Thoughts on its diagnosis and repair.

BY ROBERT CHANG, MD

A cyclodialysis cleft is a rare traumatic or iatrogenically induced pathway between the anterior chamber and the suprachoroidal space. It results from the disruption of the attachment of the ciliary body complex to the scleral spur.[1,2] In contrast, angle recession occurs when the ciliary muscle is torn between the circular and longitudinal layers, but the longitudinal (or meridional) muscle is still attached. As long as the partial or 360° circumferential cyclodialysis cleft is open without obstruction, the IOP is low, which can result in chronic hypotony and its associated complications.

DIAGNOSIS

Typically, the first clue to the presence of a cyclodialysis cleft is low IOP, which can decrease vision through various mechanisms. Identifying a cyclodialysis cleft by gonioscopy may be difficult if there is a traumatic hyphema, corneal edema, or peripheral anterior synechiae hiding the cleft or if the eye is very soft with a shallow anterior chamber. The surgeon should consider performing an intracameral injection of a viscoelastic to reform the anterior chamber if it is shallow in order to visualize the cleft. Wallace Alward, MD, has created a fantastic educational site that includes gonioscopic videos of cyclodialysis clefts (http://www.gonioscopy.org/cyclodialysisCleft.html).

Newer techniques for imaging the angle include anterior segment optical coherence tomography (AS-OCT) and high-resolution ultrasound biomicroscopy (UBM).[3,4] AS-OCT has the advantage of being easy to use, noninvasive, and noncontact. Moreover, AS-OCT can display—in higher resolution than UBM—the disinsertion of the ciliary body from the scleral spur. UBM combined with B-scan ultrasonography, however, may provide superior visualization of the ciliary body and any fluid in the suprachoroidal space. If the technology is available, the physician can perform an endoscopic evaluation of the angle, which can be advantageous when the cornea is very cloudy.[5]

(Courtesy of Steven D. Vold, MD.)

Figure. A long-standing cyclodialysis cleft extends approximately 3 clock hours.

MANAGEMENT

Once a cleft has been identified and its extent localized, it can be closed by way of various medical, laser, or surgical techniques (Figure). Even in cases of prolonged duration, the reversal of hypotony can improve the patient's visual acuity.[4] For small clefts, typically less than 4 clock hours, the first intervention is medical treatment with a topical cycloplegic agent such as atropine 1% for 6 to 8 weeks, often without topical steroids in order to promote scarring. If the cleft does not close, the next step is to use a very high-energy argon laser to induce inflammation. This technique is usually combined with continued cycloplegia. Transscleral diathermy or transconjunctival cryotherapy can achieve the same scarring effect without requiring incisional surgery, and the techniques have been reported in conjunction with intravitreal gas for internal tamponade.[1,2,5]

For large clefts, or those that do not close with conservative medical or laser therapy, direct cyclopexy

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through a partial-thickness limbal scleral flap is the definitive option. This approach usually has a high rate of success. Taking care to avoid bleeding, the surgeon can suture the ciliary body back to the sclera or the iris root to the sclera to close the cleft. Steven Vold, MD, has compiled a nicely edited video on Eyetube.net demonstrating the closure of a cleft by securing small bites of uveal tissue to the scleral wall under a partial-thickness scleral flap.

Alternate surgical techniques employ a capsular tension ring or an IOL.[1,6,7] A capsular tension ring in the sulcus as well as the large haptics of a PMMA lens take advantage of internal cerclage by compressing the cleft against the sclera to close it. These novel techniques are currently described only as case reports and have not been studied extensively.

Postoperatively, after any cyclodialysis repair method, it is critical to monitor patients for IOP spikes, which are common but typically can be controlled with medical therapy.

THE RELEVANCE OF CYCLODIALYSIS CLEFTS TO SUPRACHOROIDAL SHUNTS

Currently, there is a lot of interest in designing the ideal suprachoroidal shunt, either ab externo or ab interno, as a new type of glaucoma surgery that will avoid a bleb. In effect, the goal is to create a controlled cyclodialysis cleft to shunt fluid from the anterior chamber to the suprachoroidal space without causing hypotony. This idea has been around for decades, tracing back to when Otto Barkan, MD, and colleagues described a case series of cyclodialysis as a glaucoma surgery.[8]

Several companies are working on suprachoroidal shunts. For example, Transcend Medical is currently enrolling patients in its pivotal Compass multicenter FDA clinical trial of the CyPass Micro-Stent (compassclinicalstudy.com). The 2-year primary outcome measure is a medication-free decrease in IOP of greater than 20% from baseline. The company is estimating an enrollment of 505 randomized subjects who are undergoing cataract surgery.

CONCLUSION

Perhaps the most interesting aspect of cyclodialysis clefts is that, when they close, the IOP often rises rapidly. Why? When a cleft is open, all of the aqueous is exiting by way of the path of lowest resistance, so Schlemm canal likely stays collapsed, resulting in transient trabecular dysfunction. Creating a large bypass to the suprachoroidal space may therefore compromise flow in the residual trabecular meshwork (as in traditional glaucoma incisional surgery). Should surgeons be determining patients' outflow facility before and after performing combined cataract and outflow surgery to the suprachoroidal space? Why are IOPs not in the single digits with suprachoroidal stents when such low IOPs are seen with cyclodialysis clefts? How much fibrosis is there in the suprachoroidal space? As more imaging data are collected on suprachoroidal shunts in vivo, perhaps surgeons will learn how to artificially create the ideal iatrogenic cyclodialysis cleft. ■

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