Novel treatment (new drug/intervention; established drug/procedure in new situation)

Closure of a persistent cyclodialysis cleft using the haptics of a normal-sized intraocular lens

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Summary

A 50-year-old man suffering from hypotony in the right eye caused by a traumatic cyclodialysis and complicated by a choroidal detachment and cataract was treated in our clinic. After an unsuccessful direct cyclohexy, phacoemulsification was performed and a normal-sized single-piece polymethyl methacrylate posterior chamber intraocular lens (PMMA PCIOL) was inserted into the ciliary sulcus, with the haptic rotated toward the cyclodialysis cleft. Postoperatively, the corrected visual acuity improved to 20/20, and the intraocular pressure returned to normal. Ultrasound biomicroscopy showed the closure of the cleft. Phacoemulsification with a normal-sized PMMA PCIOL inserted into the ciliary sulcus is a safe, effective and technically simple surgical treatment for small cyclodialysis induced hypotony complicated by cataract. Internal compression of the cleft by the haptic of a normal sized IOL along with postoperative inflammation led to scarring and closure of the cleft.

BACKGROUND

Cyclodialysis is the result of separation of the meridional ciliary muscle fibres from the scleral spur.¹ This creates an abnormal secondary pathway for the drainage of the aqueous humour into the suprachoroidal space, which increases uveoscleral outflow. The aqueous humour production by the ciliary epithelium decreases, resulting in chronic ocular hypotony. Choroidal effusion, disc oedema, shallowing of the anterior chamber (AC), cataract, retinal fibrosis, choroidal folds and hypotony maculopathy are recognised complications of chronic ocular hypotony.²

Cyclodialysis clefts can be traumatic or iatrogenic after anterior segment surgery. Multiple strategies for treatment have been described, including medical and laser therapy, cryopexy and surgical procedures. Since cyclodialysis clefts are rare, most ophthalmologists lack experience in managing these patients. Here, we describe a modified technique using phacoemulsification with a normal-sized polymethyl methacrylate posterior chamber intraocular lens (PMMA PCIOL) inserted into the ciliary sulcus to repair a persistent cyclodialysis cleft characterised by choroidal detachment, hypotony and cataract.

CASE PRESENTATION

A 50-year-old man who had presented with a history of blunt trauma to the right eye 7 months previously, complained of blurred vision, severe eye pain and headache. His right visual acuity was 20/125. Slitlamp examination showed a shallow AC with an angle of grade 2 according to the Shaffer gonioscopic grading system³ and a dense posterior subcapsular cataract. Fundus exam was limited due to the severe cataract. The AC was shallow, making gonioscopy impossible to perform. The intraocular pressure (IOP) fluctuated from 9 to 13.5 mm Hg as measured by a Goldman tonometer, while the eye was soft upon palpation. Ultrasound biomicroscopy (UBM) revealed a cyclodialysis cleft extending from 7:00 to 11:00 o'clock. B-scan ultrasound identified a 360-degree choroidal detachment resulting from the hypotony (figure 1).

The patient was treated with a cycloplegic (atropine 1% 3 times a day) for 6 weeks prior to surgery. A direct cyclohexy of the cleft was performed. Postoperatively, there was no improvement. The patient suffered from persistent eye pain and headache. His visual acuity did not improve and IOP was still soft upon palpation. UBM

Figure 1 (A) Preoperative UBM showed a cyclodialysis cleft extending from 7:00 to 11:00. (B) B-scan ultrasound showed a 360-degree choroidal detachment.

Figure 2 (A) Postoperative UBM shows closure of the cyclodialysis cleft, with the IOL haptic situated in the sulcus (white arrow) and angle recession. (B) B-scan revealed that the choroidal detachment had disappeared.

Figure 3 Gonioscopic view of the chamber angle at 19 months after the second surgery. (A) A general view of the area of previous cyclodialysis cleft. (B) White arrow indicated the angle recession. (C) White arrow indicated the 30-degree postoperative peripheral anterior synechiae. (D) Showed areas of postoperative normal chamber angle.

revealed a smaller cyclodialysis cleft, while the choroidal detachment remained the same.

Two months after the unsuccessful cyclopeity procedure, a second operation was performed. After retrobulbar anaesthesia, a 3.2 mm limbus tunnel was made at 11 o' clock. After the AC was filled with chondroitin sulfate 4% sodium hyaluronate 3% (Viscoat), a 120-degree zonular dialysis was observed between 12 and 4 o' clock. A 5 mm continuous curvilinear capsulorhexis was performed with a capsulorhexis forceps. Phacoemulsification was performed under a low flow rate with the stop-and-chop technique. A 13 mm Rayner type capsular tension ring (CTR) was inserted into the capsule in order to give support to the IOL and stabilise the IOL-iris diaphragm. Then a 12.75 mm, single-piece PMMA PCIOL (EZE-55, Bausch and Lomb, Rochester New York, United States) was inserted into the ciliary sulcus and rotated until the middle portion of the proximal haptic faced the site of the cyclodialysis

cleft. Postoperatively, topical dexamethasone 0.1% and tobramycin drops were applied for 1 month.

INVESTIGATIONS

- IOP
- UBM
- B-scan ultrasound.

TREATMENT

Phacoemulsification with a normal-sized PMMA PCIOL inserted into the ciliary sulcus.

OUTCOME AND FOLLOW-UP

The postoperative visual acuity quickly improved to 20/50 on day 1 and 20/40 on day 2. The IOP rose to 36 mm Hg after surgery. Using β blocker eyedrops and methazolamide, the IOP was decreased to 15 mm Hg. A week later,

visual acuity remained 20/40 and the IOP was 19 mm Hg with medication. Slitlamp examination found a deepened AC, and fundus examination revealed a flat retina. UBM showed that the ciliary body had reattached to the scleral spur, closing the cleft. The IOL remained stable in the sulcus. A B-scan confirmed that the choroidal detachment had resolved (figure 2). At the 1 month examination timepoint, the IOP remained 19 mm Hg without medication. The corrected visual acuity improved to 20/20. At 19 months, the IOP was 20 mm Hg, the visual acuity and UBM imaging remained stable. On gonioscopy, the cyclodialysis cleft appeared closed with a 30-degree peripheral anterior synechiae and some angle recessions (figure 3).

DISCUSSION

A persistent cyclodialysis cleft leads to chronic ocular hypotony which causes choroidal effusion, cataract, hypotony maculopathy, a decreased visual acuity and even phthisis. In our case, although IOP was almost normal measured by Goldman tonometer, the eye was soft upon palpation. Because the AC was so shallow, the IOP was deceptively high, as the cornea was against the lens during applanation.

Different treatment modalities have been reported for traumatic cyclodialysis. The key is to precisely locate the cyclodialysis cleft and reattach the ciliary body to the scleral spur, thus closing the cleft. Generally, patients with cyclodialysis clefts should be treated with 1% topical atropine for 6–8 weeks in the expectation of spontaneous cleft closure.⁴ If medicinal treatment is unsuccessful, management can include laser, cryotherapy, translimbal and transscleral suture fixation, direct cyclohexy, anterior scleral buckling, as well as combined vitrectomy, cryotherapy and gas tamponade.² Surgical repair appears to be the option of choice for moderate-to-large clefts when laser photocoagulation or medical therapy is ineffective. Combined vitrectomy, cryotherapy and gas tamponade is usually used in patients with additional posterior segment problems.⁵ Direct cyclohexy is an option when conservative management fails.⁶ However, due to the nearly blind surgical manipulation conditions, it carries the risk of a postoperative cleft left.

Persistent post-traumatic cyclodialysis clefts are difficult to manage. Sometimes deciding on the appropriate treatments for cyclodialysis clefts which are complicated by cataracts is more difficult. There are only few reports on cataract management in patients with a cyclodialysis cleft. Recently, Yuen *et al.* used a 13 mm Morcher type 1L CTR capsular tension ring inserted into the ciliary sulcus to repair a 360-degree traumatic cyclodialysis cleft following blunt trauma.⁷ This principle of internal cerclage has also been reported by Mardelli using a 13.5 mm large diameter posterior chamber IOL inserted into the ciliary sulcus. The IOL haptic has to bend at least 0.5 mm on either side to allow compression of the haptic against the ciliary body, thus closing the cleft.⁸ Malandrini also used a large diameter IOL to close the cleft according to the Mardelli's method, meanwhile, he proposed that the potential long-term risk of this technique was damage to the ciliary body by large IOL haptics that lead to erosion, haemorrhage, pain and severe inflammation.⁹ Based on these cases, we decided to try phacoemulsification and implant a normal-sized single-piece PMMA PCIOL in the ciliary sulcus with its haptics

facing the primary cyclodialysis cleft. The overall diameter of the lens we chose was 12.75 mm, which is close to the anatomic diameter of the ciliary sulcus in nearly emmetropic adult eyes.¹⁰ When the stiff haptics of this PCIOL was placed in the ciliary sulcus, it restored the detached ciliary body back to its normal position without any bending. This produced considerably less internal force than a large diameter IOL, which allowed the potential long-term risk caused by the large IOL haptics to be avoided. After the relocation of the ciliary body, postoperative inflammation led to its scarring and direct attachment to the sclera. Although we used a CTR in the course of the surgery, a CTR placed in the bag may not be able to exert the direct tamponade force needed, considering that the ring is tensile and the bag may limit the extent of the expansion of the CTR after implanted.⁷

Hence, we propose that a cicatrization process induced by postoperative inflammation and a moderate internal compression by the haptics resulted in a closure of the cleft in our case. The pressure spiking in the early postoperative course is considered to be due to the recovery of aqueous humour production by the ciliary body and a trabecular meshwork that only partially recovered its function.¹¹ The ocular hypertension can be controlled with medication, and this medication is not required long-term. With functional recovery of the trabecular meshwork, the IOP returns to normal.

Visual acuity may not improve after cleft closure owing to irreversible wrinkling and fibrosis of the retina.¹¹ Therefore hypotony should be treated as early as possible. Moreover as cataracts are common complication of cyclodialysis, we suggest that our method may be an effective way to treat cyclodialysis clefts and cataract at the same time. Not only do we remove the cataract, but the cyclodialysis cleft is also closed. Since a normal-sized IOL haptic avoids the potential negative effects caused by the larger ones, it is suggested this surgical technique is safer.

In conclusion, the method we report is a safe, effective and technically simple surgical treatment for small cyclodialysis complicated by cataract. The application of this technique to a greater number of cases and long-term follow-up data are needed to validate the effectiveness of this method.

Learning points

- ▶ UBM will outperform gonioscopy in the diagnosis of cyclodialysis when the eye is hypotonous and the chamber is shallow.
- ▶ Normal-sized IOL will outperform the large-sized IOL in closing the cyclodialysis cleft, for avoiding the possible damage to the ciliary body which is caused by large IOL haptics.
- ▶ It is important to make sure the IOL haptic locates toward the cleft.

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Competing interests None.

Patient consent Obtained.

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