A novel technique for closed-chamber iridodialysis repair

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Abstract:
PURPOSE: We introduce a novel technique for closed chamber iridodialysis repair.

MATERIALS AND METHODS: We use a 2.8-mm paracentesis knife to penetrate into the anterior chamber and create interrupted incisions in the sclera. The wounds are 1.5 mm distant from the limbus, at consistent 2.8-mm intervals along the dialysis area. After injecting viscohesive ophthalmic viscosurgical device through a side port to relieve the synechia and to push the iris toward the incisions, the iris is then grasped by Kelman forceps through the sclera, dragged carefully, and incarcerated. After adjusting the tension of the iris according to the pupil shape, the sclera and the incarcerated iris tissue were sutured together with 10-0 nylon.

RESULTS: The technique was effective in six patients with traumatic iridodialysis.

CONCLUSION: Our surgical technique repairs the iris, restores the shape of pupil, as well as avoids creating a large incision in the limbus in patients suffering from iridodialysis.

Keywords: Closed-chamber, iridodialysis, repair

Introduction

Traumatic iridodialysis usually occurs as a result of blunt trauma. Intervention is usually not necessary when it occurs in the upper half of the eye and less than one clock hour. However, if it occurs in the lower half of the eye, temporally or nasally, or is larger than one clock hour in the upper half, it must be repaired because patients may suffer from vision problems such as diplopia or photophobia and/or cosmetic deformity.

Various methods have been used since Goldfeder described the incarceration technique in 1932.[1] Multiple closed-chamber techniques to repair the detached iris periphery to the internal eye wall have been described. We present six cases of iridodialysis repair using the surgical technique we developed.

Subjects and Methods

The surgical technique is described as follows [Figure 1]. First, we create a side port at the limbus about 90°–180° away from the iridodialysis with a 2.8-mm paracentesis knife commonly used during phacoemulsification for corneoscleral incisions. The actual position of the side port depends on the position and extent of the dialysis for ease of needle insertion to sweep over the iris. Then, we create interrupted incisions in the sclera along the iridodialysis, using 2.8-mm paracentesis knife. The wounds are 1.5 mm distant from the limbus at 2.8-mm intervals. The number of incisions depends on the extent of iridodialysis. We inject ophthalmic viscosurgical device (OVD) through the side port to relieve any synechia and to push the iris toward the incisions until it is about 1 mm distant from the limbus. The outer margin of the iris is then grasped by Kelman forceps through the scleral...
incision, dragged carefully, and incarcerated at the site. Only minimal amounts of iris should be incarcerated to avoid iris prolapse. After adjusting the tension of the iris according to the pupil shape, the sclera wounds and the incarcerated iris tissue are sutured together with 10-0 nylon. The suture knots are buried in the sclera. The stroma of the side port is hydrated to prevent wound leakage [Video 1].

Results

Six male patients, aged from 6 to 72 years, with traumatic iridodialysis underwent closed-chamber iridodialysis repair at Changhua Christian Hospital, Taiwan, from 2008 to 2015 [Figure 2]. Follow-up visits were scheduled at 1 day, 1 week, and 1, 3, 6, 9, and 12 months; all patients received a standard regimen of topical TobraDex® (tobramycin and dexamethasone) four times daily initially, which was tapered gradually depending on the degree of inflammation. To restore the roundness of the pupil, 2% pilocarpine was given for the first case; unfortunately, the iridodialysis relapsed, so the following cases were given 0.125% atropine to dilate the pupil and to release the tension at the suture area. Diamox (acetazolamide) was given if intraocular pressure (IOP) was higher than 21 mmHg after the operation. We administered it 250-mg four times daily for a week and gradually tapered if IOP returned to the normal limit. Antiglaucomatous medications were also given according to the IOP measurements and the severity of the disease.

After operation, all the six cases achieved satisfactory iris-to-sclera attachment with acceptable size and shape of pupil and improvement of visual symptoms. Table 1 shows the preoperative clinical characteristics of the patients and the postoperative outcomes at 1 year of follow-up. Three cases (cases 2, 3, and 6) were complicated with elevated IOP. In one case (case 2), the pressure subsided after 1 month. However, in the other two cases (cases 3 and 6), the long-term use of antiglaucomatous medications was needed. Cases 2 and 6 also presented with focal peripheral anterior synechiae. In case 2, he received further synechiolysis 6 months after the previous iridodialysis repair.

Discussion

Numerous techniques for repair of iridodialysis have been reported. In 1932, Goldfeder reported a technique...
using a small iris hook to incarcerate the fibers of the iris margin at a small keratome incision. Paton described the open-chamber incarceration technique in 1973. Various closed-chamber techniques, first described by McCannel, have been reported, in which access to the anterior chamber is attained with a needle. Recently, Ozdek and Özmen described hang-back technique, in which a suture is tied and the knot is left in the anterior chamber. Richards and Kennedy developed a sutureless technique with the iris directly incarcerated at the level of the iris insertion through a microvitreoretinal sclerostomy, using 20G forceps.

In our cases, the result of symptom relief was rather satisfactory. None of the six cases experienced diplopia or photophobia after the operations. The shape of the pupil was oval in two cases, but none of the patients complained of undesired cosmetic deformity. Although two cases are still using antiglaucomatous agent to control the elevated IOP, we believe that these resulted from previous trauma rather than from our repair procedure.

The main advantage of our technique is the ease of unfolding of the rolled-up iris tissue due to support from the OVD which also helps to release adhesion between the iris and lens. By avoiding needle insertion into the anterior chamber, inadvertent damage to the anterior lens capsule is also prevented, which also means less chance of hyphema and cataract, compared to the previous techniques. In our cases, none experienced damage to the lens capsule during the procedure. Three of the cases developed lens opacity at 1 year of follow-up, which may be late complications from previous ocular trauma. Our technique can also be performed in conjunction with surgery for traumatic cataract.

Two possible complications of our technique include wound leakage and sympathetic ophthalmia. Theoretically, leakage from the side port can be avoided by choosing smaller size of paracentesis knives or stromal hydration. If any leaks are noted, corneal suture with 10-0 nylon may be considered. In our cases, no leakage through the side port or sclerostomy sites was noted. Although rare, any manipulation of the uveal tissue may cause sympathetic ophthalmia. Care should be taken when manipulating the sclerostomy sites for the iris to retract into the sclerostomy without uveal tissue protrusion. None of our cases developed sympathetic ophthalmia under the use of corticosteroids at 1 year of follow-up.

Locating the exact position of the iris root can be difficult. It is possible to occlude the remaining angle structures if the repair is placed too anterior. Placing the suture more posterior to the native iris root, however, can inadvertently engage the ciliary body, causing a hemorrhage or even cyclitis. According to previous studies, the iris root location is 1.75 mm superiorly, 1.45 mm inferiorly, 1.0 mm nasally, and temporally from the limbus. Using our technique, incision at the precise sites is made at the mean distance of 1.5 mm to prevent direct injury when threading the needle through the sclera. Once the iris is well incarcerated, the suture is also made easy at the incision sites. In two cases, peripheral anterior synechia developed, which we assumed was due to the contact of dilated and nonreactive iris stroma to the cornea. In case 2, we tried direct incarceration of the iris without suture. Loosening of the iris root was noted after a week, and anterior synechia gradually developed. He received further synechiolysis 6 months after the previous operation. In the other case, the synechia seemed stable. No progression of synechia was noted for both cases at 1 year of follow-up.

Table 1: Patient characteristics

| Case number | Age | Mechanism | Preoperative findings | Postoperative findings at 1 year |
|-------------|-----|-----------|-----------------------|----------------------------------|
|              |     |           | Diplopia | CC/SCH | Traumatic cataract | Hyphema | Pupil | Synchilia | Glaucoma | Progression of cataract |
| 1           | 38  | Blunt     | +        | +      | +                 | +      | Round | +        | +       | +                       |
| 2           | 72  | Blunt     | +        |         |                    |        | Round | +‡       | +‡      | +‡                      |
| 3           | 49  | Penetrating | +        | +      | +                 | +      | Oval  | +        | +       | +                       |
| 4           | 29  | Penetrating | +        |         |                    |        | Oval  | +        | +       | +                       |
| 5           | 55  | Blunt     | +        |         |                    |        | Round | +        | +       | +                       |
| 6           | 6   | Blunt     | +        |         |                    |        | Round | +        | +       | +                       |

*Round but slightly upward, †Repeat synechiolysis, ‡Transient elevated IOP for 1 month, *“Present, CC= Conjunctival chemosis, SCH= Subconjunctival hemorrhage, IOP= Intraocular pressure

Figure 2: Case report (case 3). (a) A 49-year-old male was injured on his left eye by rocks when working. One corneoscleral wound was noted at the 2 o’clock position of the cornea, combined with 11–2 o’clock wide iridodialysis. The dialysis area is outlined with white dashed lines. (b) One week after the repair, one 12-o’clock stitch was noted under the conjunctiva. The pupil was of normal size but mildly oval in shape.
Conclusion

We provide an easy surgical technique which repairs the iris, restores the shape of pupil, as well as avoids creating a large incision in the limbus in patients suffering from iridodialysis.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
The authors declare that there are no conflicts of interests of this paper.

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