

Case Report

A Case of Cyclodialysis after Microhook Trabeculotomy Treated with Vitreous Surgery

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Keywords

Microhook trabeculotomy · Cyclodialysis · Vitrectomy · Hypotony maculopathy

Abstract

We report a case of cyclodialysis with decreased visual acuity after microhook trabeculotomy (mTLO) successfully treated by vitreous surgery. A 41-year-old man had been medically treated for primary open-angle glaucoma in both eyes. He was scheduled to undergo mTLO due to progression of visual field impairment and unstable intraocular pressure in his right eye. His preoperative best-corrected visual acuity (BCVA) was 0.4 OD, and the intraocular pressure was unstable, ranging from 12 to 27 mm Hg. On the day after the operation, a shallow anterior chamber developed, and a low intraocular pressure occurred. His visual acuity continued to decrease, and cyclodialysis was confirmed by ultrasonic biomicroscopy. No improvement was obtained with medical treatment, and his BCVA dropped to 0.08 OD, while his intraocular pressure remained at 2–3 mm Hg. Three months later, a second surgery was performed by combining cataract surgery with intraocular lens implantation, vitrectomy, cryopexy for the pars plana of the ciliary body, and 20% SF₆ gas tamponade. Two weeks after the reoperation, the intraocular pressure had been normalized to 12 mm Hg, and the BCVA had returned to 0.3. We successfully treated cyclodialysis as a complication after mTLO by vitreous surgery that led to the recovery of the visual acuity and intraocular pressure.

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Introduction

In recent years, the rate of minimally invasive glaucoma surgery (MIGS) has been increasing as an option for glaucoma surgery. Compared to conventional trabeculectomy or trabeculotomy ab externo, there are many advantages associated with MIGS, such as a shorter operation time, less need for postoperative treatment, shorter hospital stay, and, in most cases, not having extremely low intraocular pressure. Accompanying its numerous benefits, small-incision trabeculotomy using a microhook (microhook trabeculotomy [mTLO]) has become increasingly popular, contributing to a reduction in the intraocular pressure in many patients with glaucoma.

However, one reported issue with trabeculotomy is that ciliary body detachment occurs at a certain rate after surgery and tends to reduce the intraocular pressure until recovery [1, 2]. It is thought that a prolonged low intraocular pressure may become a problem after mTLO in some patients.

We herein report a case of prolonged ciliary body detachment and a low intraocular pressure after mTLO due to cyclodialysis, which was successfully treated by vitreous surgery.

Case Report

A 41-year-old man had no remarkable medical history concerning his general condition. When he visited a local eye clinic for a prescription for contact lenses in 2002, he was found to have primary open-angle glaucoma in both eyes and was started on treatment using anti-glaucoma eye drops. However, his visual field defect gradually progressed despite treatment, and he was referred to our department in 2014 for further treatment.

At the initial consultation, the best-corrected visual acuity (BCVA) was 0.3 OU with highly myopic corrections (S-18.0D OD, S-18.0D C-0.50D OS). A gonioscopic examination detected a slightly high insertion of the iris root, although it was classified as Scheie I, open angle. The patient had mild anterior subcapsular cataracts bilaterally. No abnormalities were found by magnetic resonance imaging head screening, and treatment was continued in our department. His intraocular pressure subsequently remained stable for some time, but in 2018, the right intraocular pressure became unstable, ranging from 12 to 27 mm Hg despite 4 kinds of anti-glaucoma eye drops, and the glaucomatous visual field defect progressed in the right eye.

We therefore conducted mTLO. The preoperative examination of the right eye revealed a BCVA of 0.4 OD and an axis length of 31.7 mm OD. During the operation, the microhook was inserted into the nasal Schlemm's canal, and the incision was performed. When the incision was advanced, a thin film-like garment was incised along the trabecular meshwork from the Schlemm's canal to the root of the iris, and the corner angle widened accordingly (Fig. 1).

On the day after the operation, the patient showed a shallow anterior chamber and low intraocular pressure. Treatment with topical betamethasone and atropine did not resolve his hypotonia. Gonioscopic findings revealed angle recession at the nasal trabeculotomy site. The ciliary body detachment was confirmed by ultrasonic biomicroscopy, and continuity from the anterior chamber was found on the nasal side (Fig. 2, Fig. 3). No improvement was obtained by medical treatments, and the BCVA dropped to 0.08 OD, with an intraocular pressure of 2–3 mm Hg OD.

Approximately 3 months after the first operation, we performed a second surgery of combined cataract surgery and intraocular lens implantation, vitreous surgery associated with

cryopexy of the pars plana ciliaris, and 20% SF₆ gas tamponade. We first made a conjunctival incision of the trabeculotomy area and made surgical ports for the 25-gauge vitrectomy and then uneventfully performed phacoemulsification and aspiration before starting the vitrectomy procedure. After removal of the vitreous body, we performed cryopexy at the pars plana of the trabeculotomy area. Next, an intraocular lens was implanted in the bag, and fluid-air exchange of the vitreous cavity was done. Finally, we injected 20% SF₆ gas in the vitreous cavity, and then, we closed all surgical incisions (Fig. 4). No surgical complications occurred during the operation. After the operation, we aimed to resolve the ciliary body detachment by maintaining the supine position. However, as the intraocular lens was about to be captured at the examination on the day after the surgery, we had the patient remain in a face-down position until 4 days after the surgery. The supine position was resumed after waiting for the gas to decrease.

The anterior chamber depth recovered from the day after the operation (Fig. 5), and a low intraocular pressure persisted immediately after the operation, but 2 weeks after the reoperation, the intraocular pressure was normalized to 12 mm Hg, and the BCVA returned to 0.3 OD, as it had been before the first operation.

Approximately 1 month after the reoperation, although spike-like intraocular pressure elevations occurred for several days, these levels were normalized by the addition of antihypertensive eye drops. It was confirmed via ultrasonic biomicroscopy that the ciliary body detachment had almost disappeared (Fig. 6). At present, 1 year has passed since the reoperation, and good intraocular pressure has been maintained over follow-up.

Discussion

A few treatment reports have been published concerning patients with prolonged low intraocular pressure and reduced vision after trabeculotomy. Among these, there have been reports of conventional trabeculotomy and postoperative reports of MIGS, post-Trabectome, and the Kahook Dual Blade technique [3–9].

In our present case, the site of incision of the trabecular meshwork did not seem to be a major problem, but at the time of the incision, capsule-like tissue covering the corneal endothelium to the trabecular meshwork to the iris root was incised along with the trabecular meshwork. The iris root then seemed to be pulled, causing angular dissection. This tissue is considered to be the pectinate ligament, and its incision may have caused the low intraocular pressure after trabeculotomy.

Various treatments have been devised for the treatment of prolonged low intraocular pressure-induced traumatic or iatrogenic ciliary detachment. In our department, we have published several reports concerning vitreous surgery with cryopexy of pars plana and 20% SF₆ gas tamponade and adoption of a postoperative supine position for traumatic ciliary body detachment and prolonged low intraocular pressure [10–13].

Various other methods have also been considered, such as a method using transscleral ciliary body sutures, a method using laser photocoagulation of the angle while checking with an angle mirror, a method using scleral encircling [14], or the injection of SF₆ gas into the anterior chamber [15]. In addition, there is a report of a method using transscleral ciliary body sutures or intraocular lens transscleral fixation in addition to vitrectomy and gas replacement [4].

Of these proposed methods, laser photocoagulation of the angle was considered to be difficult to perform safely in the present patient using a contact angle mirror lens in a low-intraocular-pressure and shallow-anterior-chamber state, and the encircling method was excluded because it required an all-around conjunctival incision, so when subsequent glaucoma surgery was required, it would limit the treatment options. The utility of gas injection into the anterior chamber to resolve a low intraocular pressure after filtration surgery has been reported, but its application has not been described for traumatic injury or cyclodialysis, such as in the present case. Transscleral suturing is a method of threading and ligating from the scleral pocket or under the scleral flap to the pars plana. Although it is not a highly invasive procedure and the operation is considered to be relatively simple, the thread passing is performed blindly, regardless of the method used, so there is considered to be some difficulty with ensuring certainty. For these reasons, we chose vitreous surgery for the treatment in the present case.

Vitreous surgery was performed with cryopexy of the pars plana of the incision site in trabeculotomy. Although the cryopexy operation has issues with postoperative inflammation, in our case, IOL capture was likely to occur, so the patient was forced to remain in a position that hampered gas coming into contact with the ciliary body immediately after surgery. The cryopexy coagulation may also have contributed to the repositioning of the pars plana of the ciliary body. Therefore, it is recommended to perform cryopexy together with gas tamponade. In the present case, the vitreous liquefaction had progressed in a highly myopic eye, and it was somewhat difficult to create posterior vitreous detachment. However, advances in small-incision vitreous surgery have improved the safety of vitreous surgery in recent years. Therefore, it is considered that the treatment with this technique is the safest and has the highest probability of success if the surgeon is moderately proficient in small-incision vitreous surgery.

In the present case, a good postoperative course was obtained for cyclodialysis and ciliary body detachment after MIGS by performing combined cataract surgery and vitreous surgery associated with cryopexy of the pars plana of the ciliary body and gas tamponade. In the future, with the spread of MIGS, the frequency of such cases may increase, so this approach should be considered as a potential treatment method.

Statement of Ethics

The protocol for this retrospective study was approved by the Institutional Review Committee of the Hirosaki University Graduate School of Medicine. All clinical procedures were conducted according to the principles of the Declaration of Helsinki. Written informed consent was obtained from the patient prior to the procedure, and possible complications were explained.

Conflict of Interest Statement

The authors report no conflicts of interest.

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Author Contributions

T.K. and M.N. participated in drafting the manuscript. T.K., Y.S., K.Y., T.T., K.A., and M.N. made substantial contributions to diagnosis and treatment of the patient, acquisition of data, or analysis and interpretation of data, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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Fig. 1. Membrane-like substance of the angle that was incised along with the trabecular meshwork and pulled the iris root.

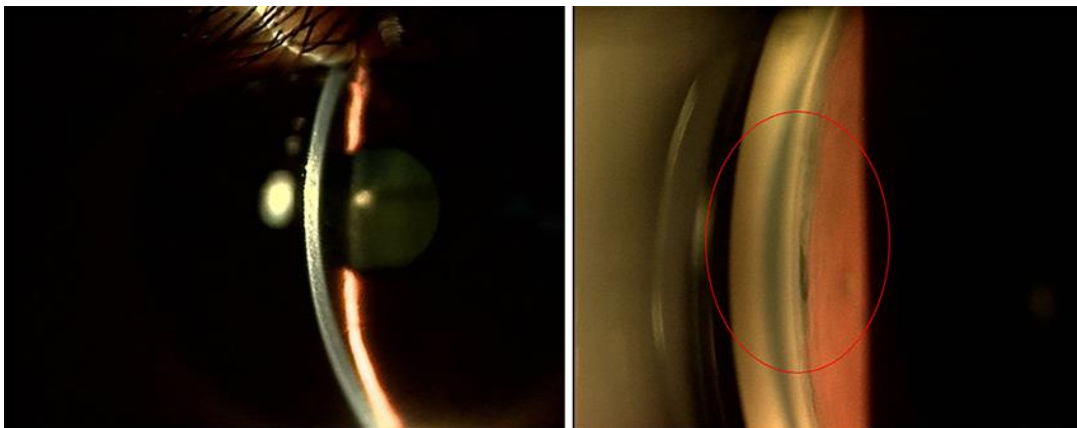


Fig. 2. Anterior segment and angle findings after the initial surgery. The evaluation showed a shallow anterior chamber, and cyclodialysis of the nasal angle was observed.

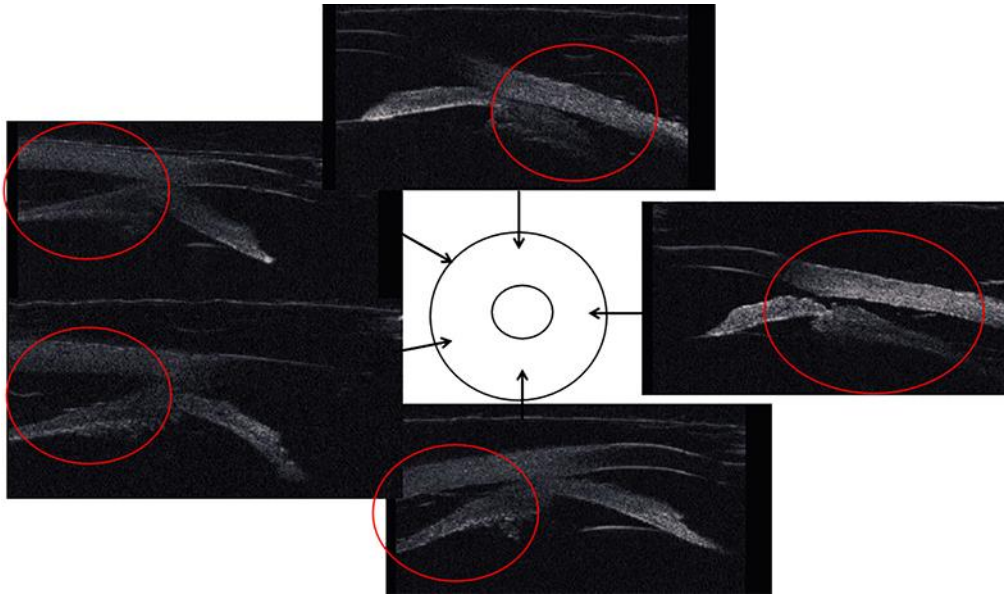


Fig. 3. Ultrasound biomicroscopic findings after the initial surgery. Circumferential ciliary detachment was confirmed, and continuity from the anterior chamber was confirmed on the nasal side.

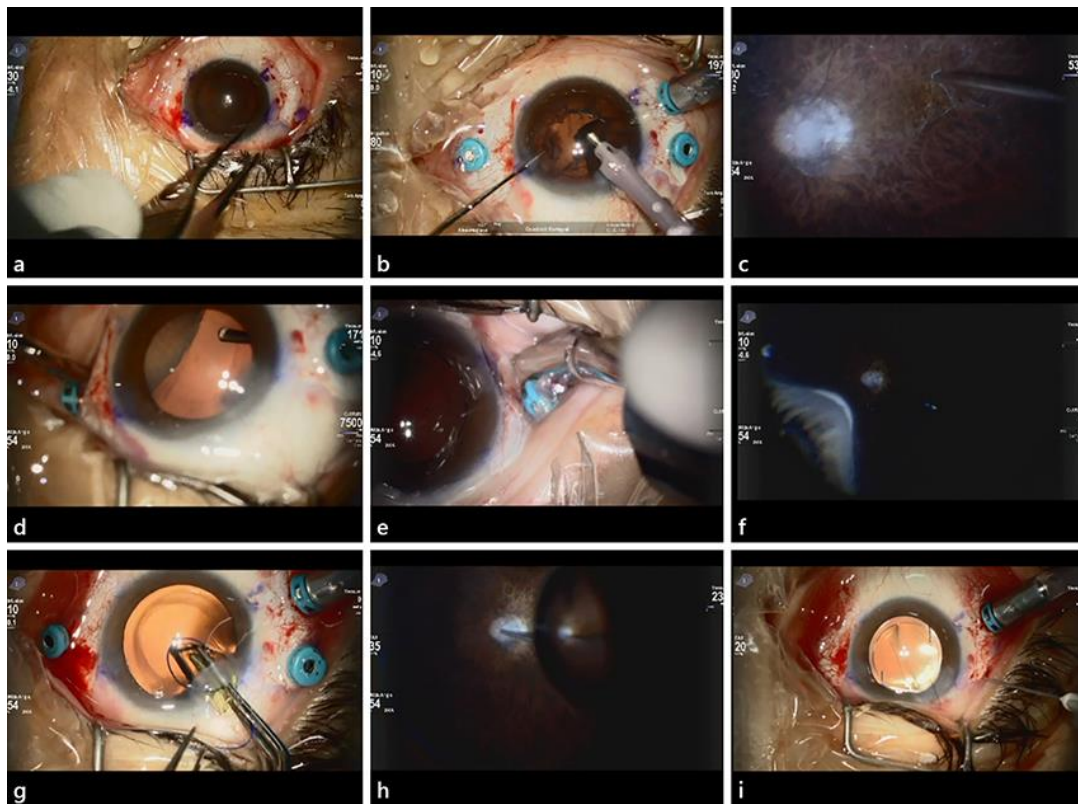


Fig. 4. Surgical findings. **a** Conjunctival incision of trabeculotomy area. **b** Phacoemulsification and aspiration. **c** 25-gauge vitrectomy. **d** Peripheral vitrectomy with scleral pressure. **e, f** Cryopexy of pars plana. **g** Intraocular lens implantation. **h** Fluid-air exchange. **i** 20% SF₆ gas injection.

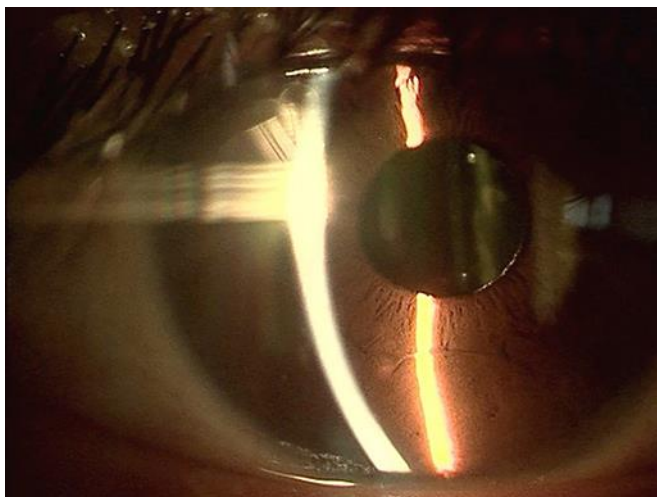


Fig. 5. Anterior segment findings after reoperation. The anterior chamber depth became normalized.

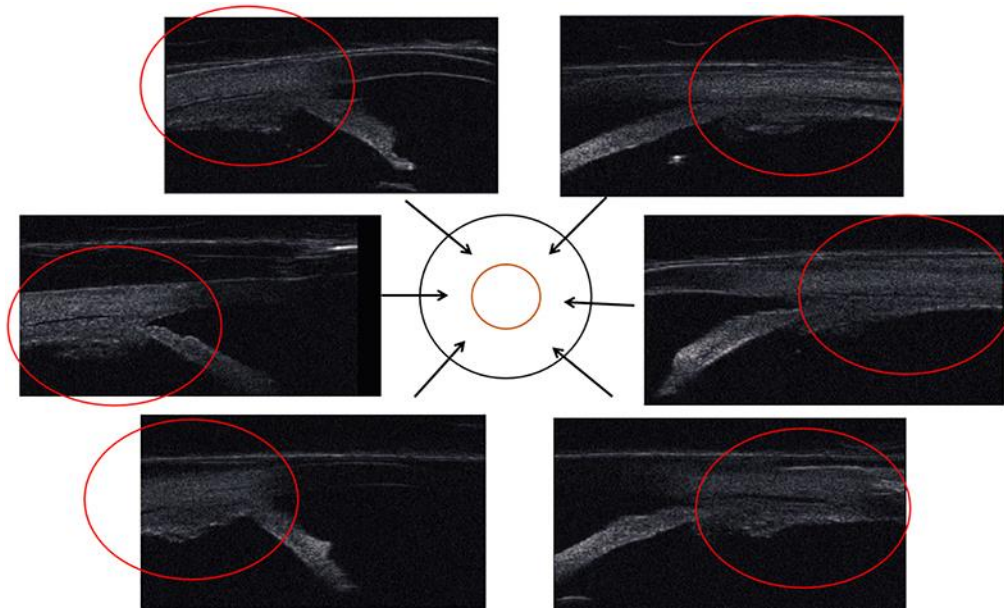


Fig. 6. Ultrasound biomicroscopic findings after reoperation. The ciliary body detachment had almost disappeared.