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TRABECTOME SURGERY FOR SECONDARY TRAUMATIC GLAUCOMA IN A CHILD

★ INTRODUCTION ★

Traumatic secondary glaucoma due to blunt trauma may occur either as an acute or chronic condition. Two main intraocular mechanisms can lead to this condition. The first is an acute overload of the trabecular meshwork outflow capacity due to intraocular bleeding[1], and the second is posttraumatic scarring within the trabecular meshwork[2] leading to functional loss of the physiologic outflow pathway. Certainly, the downstream intrascleral and episcleral outflow structures can also be damaged, but these structures are not yet accessible to therapy.

To prevent posttraumatic changes leading to secondary glaucoma, topical steroids are given to suppress intraocular inflammation[3]. In addition, topical or even systemic medical therapy might be necessary to lower intraocular pressure and prevent irreversible optic nerve damage.

If these therapies are not sufficient, surgical options need to be evaluated in the medium term. Filtration surgery (either fistulation or even drainage implants) or cyclodestructive laser surgery are usually the treatments of choice. The former is an invasive incisional surgery with a broad spectrum of possibly serious side effects and increased risk of scarring[4,5], and the latter can lead to a vicious cycle of repeated laser surgeries to control intraocular pressure over the long-term, often with little success[6,7].

★ CASE PRESENTATION WITH ILLUSTRATIONS AND FIGURES ★

A 9-year-old Caucasian boy presented with moderately increased intraocular pressure (IOP) after a blunt eyeball trauma with a stone the day before. IOP was 24 mmHg, and he showed a small hyphema. Two days later, his visual acuity was decreased to light perception, and the IOP had increased to 70 mmHg. Because the IOP could not be controlled conservatively, an anterior chamber rinse was performed twice. In the further course of treatment, angle scarring and anterior synechia occurred. The pupil remained mydriatic due to the trauma. IOP fluctuated up to 40 mmHg despite systemic and topical antiglaucomatous therapy. An IOP-lowering surgical procedure was therefore indicated. The pressure profile is shown in Fig. 1. We decided to perform a trabeculotomy with the Trabectome. The scarred trabecular meshwork was removed using an electro-surgical pulse. Postoperatively, pilocarpine was applied to keep the angle clear. However, anterior synechia developed again, and aqueous outflow through the removed trabecular meshwork to Schlemm's canal was blocked (Fig. 2). We therefore performed an iridectomy directly in front of the opened trabecular meshwork to restore aqueous outflow (Figs. 3 and 4). In optical coherence tomography (OCT) of the anterior segment, the opened trabecular meshwork was observed (Figs. 5 and 6).
After one year of follow-up, the patient shows normotensive IOP values without the use topical or systemic antiglaucoma therapy.

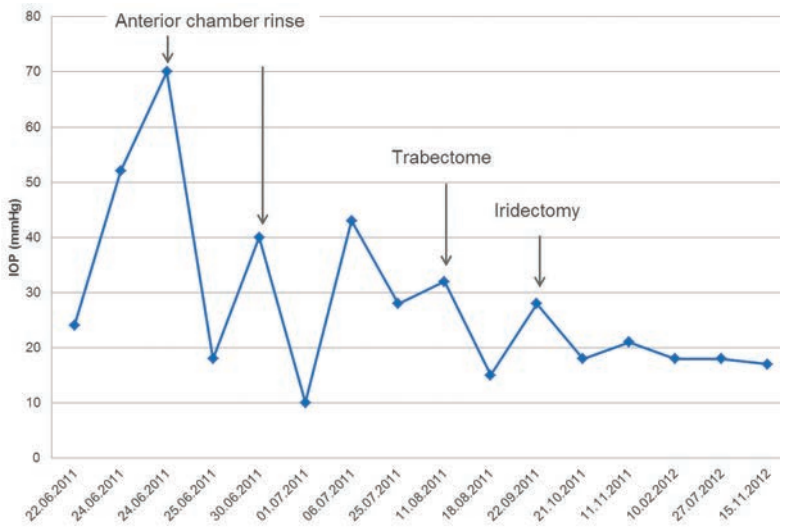

Fig. 1: Pressure Profile of IOP over time, before Trabectome surgery, IOP was only controlled under maximum topical and systemic IOP-lowering medication. Since 10.02.2012 no IOP-lowering medication is used.

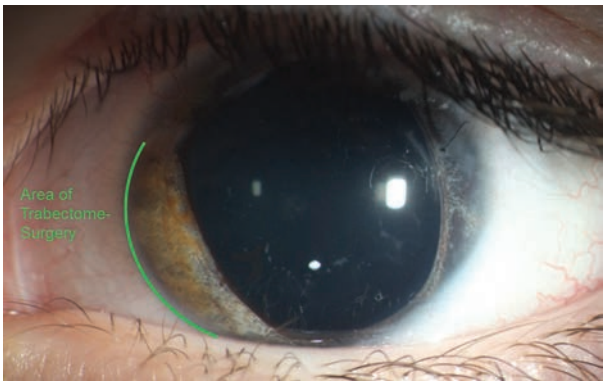

Fig. 2: Slit-lamp examination of the traumatic mydriasis and anterior synechia in front of the Trabectome gap

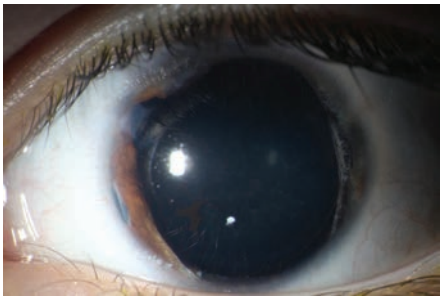

Fig. 3: Slit-lamp examination of the iridectomy at 8:00 in front of the opened trabecular meshwork

Fig. 4: Gonioscopy examination of the iridectomy in front of the opened trabecular meshwork

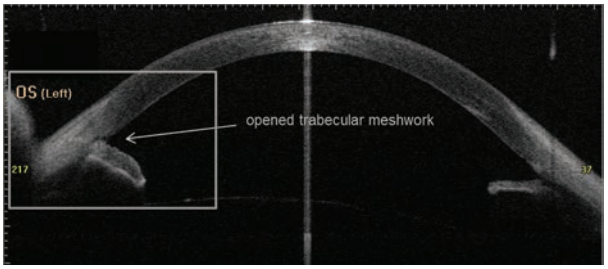

Fig. 5: OCT of the anterior segment of the opened trabecular meshwork

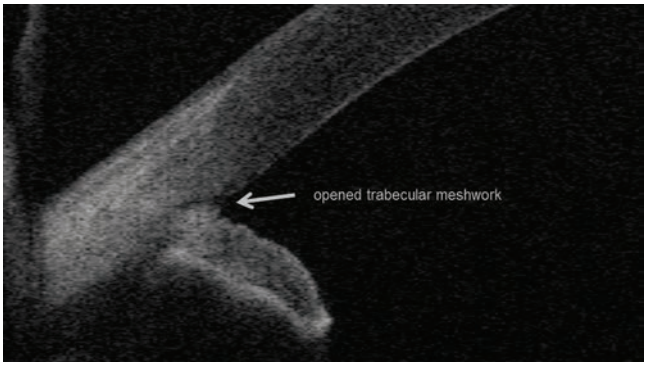

Fig. 6: Enlarged view of the OCT of the anterior segment with the opened trabecular meshwork

★ DISCUSSION ★

Traumatic secondary glaucoma is rare in comparison with other forms of glaucoma. Only 1-7% of all eye injuries are contusion injuries[4]. Although pathologic alterations and injuries in the anterior chamber occur in 50-80% of all eye injuries[8] the prevalence of traumatic glaucoma after blunt trauma is only between 0.5% and 9%[9]. However, the patients are often comparatively young. Therefore, effective management of the glaucoma is even more important to prevent late damage in the form of visual field loss or blindness.

We report the case of a young, phakic boy. Trabeculectomy in patients suffering from secondary glaucoma has been described with an increasing failure rate in the literature[10]. The young age of the patients, previous surgery and lasting changes in the composition of the aqueous humor are risk factors for severe bleb scarring[4,11,12]. The application of additional mitomycin C increases the risk of bleb-related infections[13].

The implantation of a drainage implant in traumatic secondary glaucoma has shown long-term success rates up to 75%[14]. However, 97% of the patients in that study became aphakic or pseudophakic from their trauma before or at the time of the Molteno implant insertion. The boy we report on was phakic, so positioning the tube of a drainage implant without touching the lens or corneal endothelium would have been problematic. If we had used combined phakoemulsification and implantation of a drainage system, he would have lost accommodation. Furthermore, young patients have an increased risk of scarring[5] after implantation of a drainage device.

Alternatively cyclodestructive methods are possible. However, cyclophotocoagulation has a decreased success rate in traumatic secondary glaucoma compared with other forms of glaucoma[6,7]. Moreover, the intervention must be repeated several times to result in successful pressure lowering. However, repeated cyclodestructive interventions increase the risk of postoperative hypotonia after successful implantation of a drainage device.

After blunt eyeball trauma, the secondary glaucoma usually results in scarring of the trabecular meshwork. Therefore, we decided to perform a trabeculectomy using the Trabectome with the idea of removing the scarred trabecular meshwork and thereby restoring the natural outflow pathways.

It was our intension to perform Trabectome surgery early after the trauma, because of our previous experience with limited success in cases where Trabectome surgery was delayed. We postulate that the trauma leads not

only to scarring in the trabecular meshwork itself, but also induces secondary changes in the outflow system behind the trabecular meshwork.

★ CONCLUSION ★

Especially in children, surgical options for traumatic secondary glaucoma need special evaluation. Cataract, one of the major complications after incisional surgery, requires an operation to prevent amblyopia and inevitably leads to the loss of accommodation.
Therefore, improving outflow using a minimally invasive surgical approach appears to be the ideal option with a minimized risk profile for the patient. From a pathophysiological understanding of trabecular meshwork scarring, the Trabectome offers a minimally invasive approach to remove the pathologically altered trabecular meshwork. Cataract formation is minimal, and surgical access to the cornea is clear, so if trabeculectomy is insufficient, then fistulation surgery would be possible without prognostic limitations.

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