

Interference of Descemet's Membrane with Aqueous Humor Drainage via an ExPRESS Mini Shunt

Rikiya Tamaki Masahiro Zako

Department of Ophthalmology, Aichi Medical University, Nagakute, Japan

Key Words

Corticosteroid-induced glaucoma · Descemet's membrane · ExPRESS mini shunt

Abstract

Purpose: To describe a case in which Descemet's membrane interfered with aqueous humor drainage through an ExPRESS mini shunt. This problem was successfully solved by Nd:YAG laser membranotomy. **Case Report:** A 70-year-old male, diagnosed with corticosteroid-induced glaucoma in his right eye, presented to our hospital. Topical betamethasone treatment was discontinued, and the patient was treated with intravenous D-mannitol and acetazolamide, followed by oral acetazolamide, oral potassium L-aspartate, topical dorzolamide hydrochloride, topical carteolol hydrochloride, and topical latanoprost. However, his right intraocular pressure (IOP) remained elevated. We performed ExPRESS shunt surgery in the patient's right eye. His postoperative IOP was initially within the normal range, but it reincreased 1 month after surgery. We found that the Descemet's membrane was interfering with both the primary (axial) and reserve orifices at the tip of the ExPRESS mini shunt. Nd:YAG laser membranotomy was performed and the patient's IOP again improved without any other medical treatment. **Conclusion:** Descemet's membrane interfered with aqueous humor drainage via ExPRESS mini shunt, causing an increased IOP, which was resolved by Nd:YAG laser membranotomy.

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Introduction

The ExPRESS (Alcon Laboratories, Inc., Fort Worth, Tex., USA) mini glaucoma shunt – a non-valved, MRI-compatible, stainless steel device – controls intraocular pressure (IOP) by shunting aqueous humor from the anterior chamber to a subconjunctival reservoir, in a similar fashion as trabeculectomy. Dahan and Carmichael [1] proposed implanting this

Masahiro Zako, MD
Department of Ophthalmology
Aichi Medical University
Nagakute, Aichi 480-1195 (Japan)
E-Mail zako@aichi-med-u.ac.jp

device under a scleral flap to avoid complications associated with its placement under the conjunctiva, and other studies concluded that ExPRESS implantation is most appropriate in patients with a high risk of complications, such as hypotony [2, 3]. This case report involved a unique complication, which, to the best of our knowledge, has not been previously reported in relation to ExPRESS implantation.

Case Report

In January 2014, a 70-year-old male experienced painful vision loss in his right eye. Several years earlier, he had been diagnosed with severe allergic conjunctivitis and had since then used topical betamethasone. Following his vision loss, he was diagnosed with corticosteroid-induced glaucoma in his right eye, and his topical betamethasone use was terminated. The patient's right IOP was 35–40 mm Hg. He was treated with intravenous D-mannitol and acetazolamide, followed by oral acetazolamide, oral potassium L-aspartate, topical dorzolamide hydrochloride, topical carteolol hydrochloride, and topical latanoprost. After these treatments, the patient's right IOP was reduced to 25–30 mm Hg. Funduscopy examination revealed a glaucomatous appearance of his right optic disc. The patient's best-corrected visual acuity was 0.15 in his right eye and 1.2 in his left eye. Goldmann perimetry showed advanced glaucomatous visual field loss in his right eye.

Due to the patient's sustained elevated IOP despite maximum medical therapy, it was decided to perform the insertion of an ExPRESS glaucoma filtration device in his right eye in March 2014. A subtenon dose of 1% preservative-free lidocaine was injected superonasally, followed by a fornix-based conjunctival dissection. A rectangular flap with a partial thickness of 3.5 × 3.5 mm was created, and sponges soaked in 0.4 mg/ml mitomycin C were applied to the area for 3 min. The sponges were removed, and the area was irrigated with a balanced salt solution. After 2 × 2 mm deep sclerectomy, the anterior chamber was entered with a 26-gauge needle, inserted under the scleral flap in the center of the blue-gray transition zone, and an ExPRESS drainage device (model P-50) was introduced into the anterior chamber. The scleral flap was subsequently closed with 4 interrupted 10–0 nylon flap sutures, and the conjunctiva and Tenon's fascia were reapproximated to the limbus with 2 10–0 nylon compression sutures.

The patient's postoperative IOP initially remained within the normal range, with a diffuse non-leaking bleb and a deep anterior chamber. However, at 1 month after the surgery, the IOP again increased to 25–30 mm Hg. We found that both the primary (axial) and reserve orifices at the tip of the ExPRESS mini shunt were impeded by Descemet's membrane (fig. 1a). Following the performance of the Nd:YAG laser membranotomy (1.6 mJ, 14 shots) (fig. 1b), the patient's IOP improved to 10–15 mm Hg without any other medical treatment.

Discussion and Conclusion

In the case presently described, Descemet's membrane apparently interfered with aqueous humor inflow into an inserted ExPRESS mini shunt, leading to a reincrease of the IOP. Nd:YAG laser membranotomy promptly resolved this problem. During and immediately after surgery, we did not recognize any embolization of Descemet's membrane into the primary (axial) and reserve orifices at the tip of the ExPRESS mini shunt.

In the present case, a fragment of Descemet's membrane freed itself from the cornea following surgery. The precise mechanism of this device-related complication remains

unclear, but it is thought that the floating membrane fragment was yielded due to an error in the process of inserting the ExPRESS mini shunt into the entry incision. The following actions may have contributed to this occurrence. First, we used a 26-gauge needle (0.455 mm) for preincision, but the manufacturer recommends using a 25-gauge needle (0.405 mm) to enter the anterior chamber. While this 0.05-mm difference may have promoted a tighter fixation of the device and less leakage of aqueous humor around the device, it could also be associated with a greater risk of peeling the Descemet's membrane off the cornea. Second, the position of the pre-incision under the scleral flap was too close to the cornea and may have torn the Descemet's membrane. Third, the direction of the ExPRESS delivery system was too parallel to the Descemet's membrane. Fourth, when the ExPRESS mini shunt penetrated the anterior chamber, involuntary eyeball rotation may have occurred due to insufficient counterpressure applied to the opposite side of the eye or excessive resistance caused by the use of a 26-gauge needle for preincision.

In conclusion, to avoid the presently described complication when setting an ExPRESS mini shunt, one should be aware of the possibility of releasing a fragment of Descemet's membrane.

Disclosure Statement

The authors declare no conflict of interest.

References

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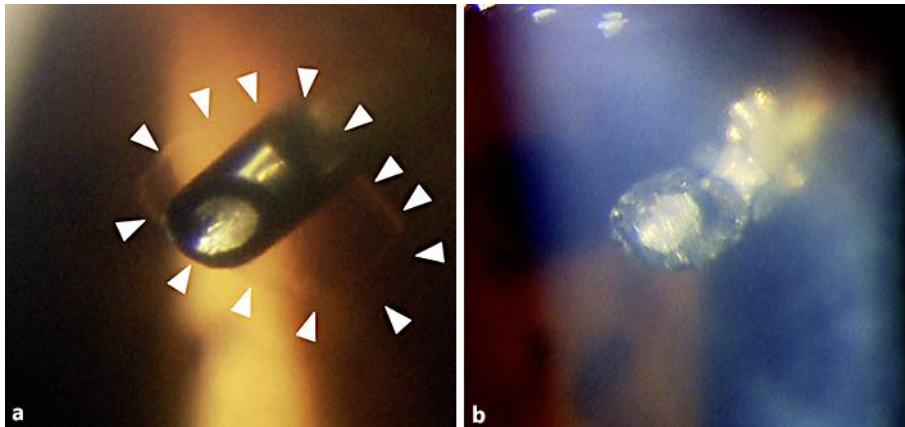


Fig. 1. The penetrating tip of the ExPRESS mini shunt inserted in the patient's right eye. **a** Before Nd:YAG laser membranotomy, both the primary (axial) and reserve orifices at the tip of the ExPRESS mini shunt were impeded by Descemet's membrane (arrowheads). **b** After eliminating the covering Descemet's membrane with Nd:YAG laser membranotomy, the IOP immediately improved.