

Refractory intraocular hypertension after dexamethasone-implant intravitreal injection treated with Preserflo MicroShunt implantation

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Dear Editor,

Herein, we report a case of a patient who presented with refractory ocular hypertension (OHT) after a dexamethasone implant (DEX-I) injection. Intraocular pressure (IOP) was finally managed after Preserflo MicroShunt implantation, allowing the continued use of dexamethasone implant. IOP elevation is a well-known side effect of intravitreal steroid treatment, which is indicated in the management of post-surgical macular edema (PSME)^[1]. Numerous studies have investigated IOP elevation following DEX-I injection^[2], with 30% of patients requiring IOP lowering treatment after injection, and less than 1% of patients requiring glaucoma surgery^[2-3]. In recent years, surgical techniques for the treatment of OHT have expanded with the advent of minimally invasive glaucoma surgery (MIGS). Compared to traditional glaucoma filtering surgery, namely trabeculectomy and non-penetrating deep sclerectomy, MIGS aim for a safer and less traumatic surgery and seem to provide comparable long-term results^[4-5]. Preserflo[®] MicroShunt is a 8.5 mm long tube, made of flexible polymer, that drains aqueous humour into the subconjunctival space^[6]. Our team

previously reported cases of DEX-I induced OHT managed with XEN45 implantation^[7-8].

A 78-year-old man with a history of bilateral open angle glaucoma was previously treated with IOP-lowering eyedrops. Optical coherence tomography (OCT) of the optic disc showed retinal nerve fibre layer (RNFL) thinning above and below the disc in both eyes corresponding superior and inferior arcuate scotoma in the visual field. In 2013, he underwent a combined phaco-vitreotomy for cataract and epiretinal membrane which was complicated with PSME in the left eye. Macular edema was treated initially with steroid and non-steroid anti-inflammatory eye drops. Acetazolamide was contraindicated due to a history of renal colic. As maximal topical medication was ineffective, DEX-I intravitreal injection (IVI) was scheduled. Before the first DEX-I injection, IOP was sufficiently controlled with a single monotherapy treatment (timolol 5 mg/mL once a day) and IOP was 12 mm Hg. No OHT occurred after the first two DEX-I injections. After the third IVI, IOP increased to 24 mm Hg, requiring two additional IOP-lowering topical medications (dorzolamide 20 mg/mL and apraclonidine 0.5% twice a day) to reduce IOP to 10 mm Hg. To reduce the risk of uncontrolled OHT, macular edema was undertreated with subconjunctival betamethasone in addition to the topical treatment and IOP was 12 mm Hg. In 2018, after failure of subconjunctival injection no alternative to the DEX-I was available and OHT was not controlled despite maximal topical medication, he underwent an XEN implantation. Initial IOP response was 11 mm Hg, but the filtering bleb became encapsulated at one year, and despite two needling surgeries, the IOP remained too high (25 mm Hg). Trabeculectomy with mitomycin C, was performed, and IOP was well-controlled for 6mo, allowing injection of two DEX-I with no adverse events nor addition of any IOP lowering topical treatment. Maximal IOP after the two DEX-I injections was below 10 mm Hg without any antiglaucoma topical medication.

One year after trabeculectomy, conjunctival fibrosis and decreased filtering bleb activity was noted, leading to increased IOP despite two different lowering IOP eyedrops

(dorzolamide 20 mg/mL and timolol 5 mg/mL twice a day) and one surgical needling. There was no obstacle in the scleral ostium on gonioscopy. Laser trabeculoplasty was performed to reduce the therapeutic burden. OCT and visual field showed a progression of glaucomatous damage. The PSME topical treatment, steroid and non-steroid anti-inflammatory eye drops, was unsuccessfully reintroduced in order to avoid the DEX-I injections as well as subconjunctival betamethasone. With controlled IOP after laser trabeculoplasty and a fixed combination of dorzolamide 20 mg/mL and timolol 5 mg/mL twice a day, another DEX-I was injected for severe and persistent PSME. Prostaglandin eye drops were not used to avoid worsening severe macular edema.

Two weeks after the injection, IOP rose to 30 mm Hg despite maximal topical treatment with the same combination of dorzolamide, timolol and apraclonidine 0.5% three times a day. The patient was scheduled for a Preserflo® MicroShunt implantation. Surgery was performed in the superotemporal quadrant using per-operative subconjunctival injection of 0.1 mL of 0.02% mitomycin C. Two hours after surgery, IOP decreased to 10 mm Hg. Post-operative treatment included dexamethasone 1 mg/mL five times a day and an eye ointment with dexamethasone 0.267 mg/mL and oxytetracycline 1.335 mg/mL three times a day. One week after surgery, IOP was 7 mm Hg and the filtering bleb was functional (Figure 1). IOP lowering treatments were stopped without any recurrence of OHT in the next 6mo. One recurrence of moderate OHT at 25 mm Hg occurred two months after a DEX-I injection, and was successfully managed by timolol 0.5% once a day. No recurrence of OHT occurred despite six subsequent DEX-I injection over the following year, with an IOP peak of 17 mm Hg under the same monotherapy (Figure 2).

As it was shown in previous studies, male sex and pre-existing glaucoma under dual therapy were some of OHT risk factors in this patient^[3,9]. It has been shown that patients with glaucoma or history of OHT had poor pressure tolerance after DEX-I injections^[3]. In these circumstances, the European Glaucoma Society and the French Glaucoma Society do not recommend the use of DEX-I because of the risk of uncontrolled OHT. Even if trabeculectomy is the gold standard in management of non-controlled DEX-I induced OHT, a Preserflo MicroShunt implantation was performed herein because of the patient's history of failed trabeculectomy complicated at one year with conjunctival fibrosis. No adverse event occurred and no needling was required in the 17mo follow-up. Because of the superior nasal localisation of the Preserflo, subsequent DEX-I were injected through the inferior sclera.

In this patient, as DEX-I was the only effective therapy to treat PMSE, this treatment was truly needed to maintain the best visual acuity possible, despite the risk of possible rise of IOP

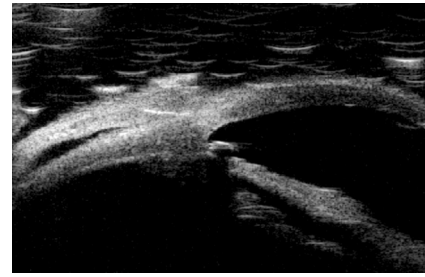


Figure 1 Ultrasound biomicroscopy of filtering bleb after Preserflo MicroShunt implantation.

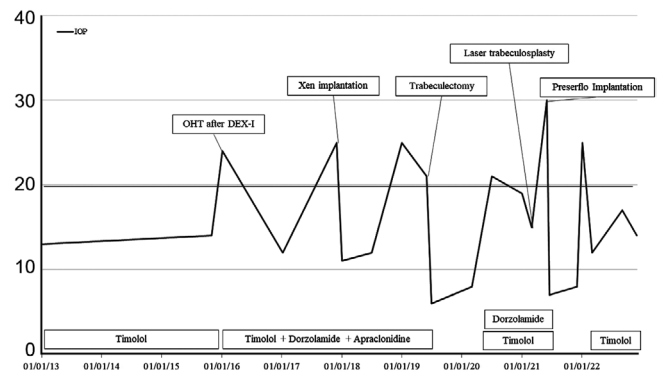


Figure 2 IOP fluctuations over time with therapeutic adjustment
 OHT: Ocular hypertension; IOP: Intraocular pressure.

under steroids. A under treatment of macular edema would have led to a permanent vision loss and the risk benefit balance was in favour of DEX-I.

The use of Preserflo MicroShunt in corticosteroid responders is off-label, and to our knowledge, this is the first case to report Preserflo MicroShunt implantation to manage a refractory OHT induced by DEX-I, after failure of other glaucoma surgery including MIGS and conventional filtering surgery. The place of MIGS in OHT induced DEX-I is unknown, but it could be an effective and safe way to treat patients with history of multiple filtering surgeries. Other studies and are needed to determine the use of Preflerflo MicroShunt in the management of steroid-induced OHT, but it could allow for continued use of DEX-I in high responders with rise in IOP, with a stringent follow of IOP.

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REFERENCES

1 Bellocq D, Pierre-Kahn V, Matonti F, *et al.* Effectiveness and safety of dexamethasone implants for postsurgical macular oedema including Irvine-Gass syndrome: the EPISODIC-2 study. *Br J Ophthalmol* 2017;101(3):333-341.
 2 Boyer DS, Yoon YH, Belfort R, Bandello F, Maturi RK, Augustin AJ, Li XY, Cui H, Hashad Y, Whitcup SM. Three-year, randomized, sham-controlled trial of dexamethasone intravitreal implant in patients with diabetic macular edema. *Ophthalmology* 2014;121(10):1904-1914.

- 3 Malclès A, Dot C, Voirin N, Vié AL, Agard É, Bellocq D, Denis P, Kodjikian L. Safety of intravitreal dexamethasone implant (ozurdex): the safodex study. incidence and risk factors of ocular hypertension. *Retina* 2017;37(7):1352-1359.
- 4 Caprioli J, Kim JH, Friedman DS, Kiang T, Moster MR, Parrish RK 2nd, Rorer EM, Samuelson T, Tarver ME, Singh K, Eydelman MB. Special commentary: supporting innovation for safe and effective minimally invasive glaucoma surgery: summary of a joint meeting of the American glaucoma society and the food and drug administration, Washington, DC, February 26, 2014. *Ophthalmology* 2015;122(9):1795-1801.
- 5 Schlenker MB, Gulamhusein H, Conrad-Hengerer I, Somers A, Lenzhofer M, Stalmans I, Reitsamer H, Hengerer FH, Ahmed IIK. Efficacy, safety, and risk factors for failure of standalone ab interno gelatin microstent implantation versus standalone trabeculectomy. *Ophthalmology* 2017;124(11):1579-1588.
- 6 Pinchuk L, Riss I, Batlle JF, Kato YP, Martin JB, Arrieta E, Palmberg P, Parrish RK 2nd, Weber BA, Kwon Y, Parel JM. The development of a micro-shunt made from poly(styrene-block-isobutylene-block-styrene) to treat glaucoma. *J Biomed Mater Res B Appl Biomater* 2017;105(1):211-221.
- 7 Rezkallah A, Kodjikian L, Barbarroux A, Laventure C, Motreff A, Chacun S, Matonti F, Denis P, Mathis T. Intra-ocular pressure response to dexamethasone implant injections in patients with a history of filtering surgery: the TRABEX study. *Pharmaceutics* 2022;14(9):1756.
- 8 Rezkallah A, Mathis T, Denis P, Kodjikian L. XEN gel stent to treat intraocular hypertension after dexamethasone-implant intravitreal injections: 5 cases. *J Glaucoma* 2019;28(1):e5-e9.
- 9 Rezkallah A, Mathis T, Abukhashabah A, Voirin N, Malclès A, Agard É, Lereuil T, Denis P, Dot C, Kodjikian L. Long-term incidence and risk factors of ocular hypertension following dexamethasone-implant injections: the safodex-2 study. *Retina* 2021;41(7):1438-1445.