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Reflux hyphema from transient hypotony after Ozurdex® in eyes with prior GATT

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ABSTRACT

Purpose: To report on delayed-onset hyphema following intravitreal injection of dexamethasone implant Ozurdex® in eyes with a history of gonioscopy-assisted transluminal trabeculotomy (GATT).
Observations: We describe two cases of hyphema occurring within one day following Ozurdex® implantation in eyes that had undergone GATT at least one year prior. One case responded well to medical management, while the other required anterior chamber paracentesis for intraocular pressure (IOP) control. Both patients achieved normalization of IOP following resolution of the hyphema, and have not had recurrence.
Conclusions and importance: We propose that transient hypotony immediately after Ozurdex® injection may lead to a reflux of blood from the episcleral venous network into the anterior chamber in eyes with prior ab interno trabeculotomy. Glaucoma and retina specialists should be aware of this potential complication to guide follow up and management in the post-injection period for these patients.

1. Introduction

Angle-based microinvasive glaucoma surgery (MIGS), such as gonioscopy-assisted transluminal trabeculotomy (GATT), is a surgical option for lowering intraocular pressure (IOP). While MIGS has a more favorable risk profile compared to traditional glaucoma surgery (e.g. trabeculectomy or tube shunt), a common complication of GATT is hyphema.[1] Reflux hyphema can occur intraoperatively, immediately postoperatively, and even in eyes with a remote history of GATT, particularly in circumstances when the IOP is lower than the episcleral venous pressure due to the now patent connection between the anterior chamber (AC) and episcleral venous network.[1–3] Ozurdex® (Allergan, Inc., Irvine, CA) is a biodegradable dexamethasone implant whose applicator employs a 22 gauge needle to facilitate injection into the vitreous. Transient hypotony has been reported immediately following Ozurdex® injection due to egress of vitreous or fluid from the injection site.[4] Herein we describe two cases of transient hyphema in eyes with prior GATT immediately following Ozurdex® injection. This study was approved by the University of Chicago Institutional Review Board, and the need to obtain informed patient consent was waived.

2. Case 1

A 68-year-old female with a history of cystoid macular edema from branch retinal vein occlusion presented to the retina service for Ozurdex® injection in the left eye. She had a history of steroid-induced ocular hypertension, for which she underwent GATT in combination with cataract extraction and intraocular lens placement 1 year prior, and was no longer on any IOP-lowering medications. Immediately prior to the Ozurdex® injection, IOP was 14 mm Hg. Following injection, she reported blurred vision in her left eye. IOP was 6 mm Hg, and she was noted to have a new hyphema and vitreous hemorrhage. She was started on pilocarpine 1 % four times per day and prednisolone acetate four times per day. Five days later, the hyphema and vitreous hemorrhage had resolved, and IOP had stabilized at 18 mm Hg. Pilocarpine was stopped and prednisolone acetate was tapered off to stop.

3. Case 2

A 64-year-old female had a history of neovascular glaucoma secondary to proliferative diabetic retinopathy in both eyes. In the left eye, she was treated with panretinal photocoagulation laser and two

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vitrectomies for recurrent vitreous hemorrhage. She also received multiple injections of anti-VEGF and Ozurdex® in the left eye for diabetic macular edema. She underwent GATT in this eye two years prior and was currently on four IOP-lowering agents: dorzolamide-timolol 2–0.5 % twice daily, brimonidine 0.15 % twice daily, and netarsudil 0.02 % once nightly.

The patient presented for Ozurdex® injection of the left eye, which was performed without complication. The IOP prior to injection was 21 mm Hg, and there was no neovascularization of the iris or angle on slit lamp exam. She presented the following day for Ozurdex® injection of the fellow eye. The IOP was 54 mm Hg in the left eye. Gonioscopy exam revealed a new sliver hyphema in the inferior angle and 2–3+ red blood cells (RBCs) in the AC. Careful examination of the angle at this time revealed no neovascularization. An AC tap was performed with a 30-gauge needle. Afterward, the IOP was 32 mm Hg. The patient was started on pilocarpine 1 % four times per day in this eye. Three days later, the IOP was 21 mm Hg. Inferior angle hyphema was still present on gonioscopy with 1–2+ RBCs in the AC. Two weeks after Ozurdex® injection, the IOP was 17 mm Hg, the hyphema was resolved, and the AC was quiet with rare cell. Pilocarpine was stopped.

4. Discussion

The rate of hyphema after GATT has been reported to be 51 % at POD1, 16–30 % at POW1, and 1–6% at POM1.[5,6] Delayed-onset reflux hyphemas have been reported in eyes with prior angle surgery in the absence of trauma.[2,3,7] Ahuja et al. reported a series of 12 patients with symptomatic hyphema 2–31 months after Trabectome® (NeoMedix Corp., Tustin, CA) surgery, wherein most patients reported preceding physical exertion or sleeping on the operative side.[2] Parekh et al. described a case of intraoperative blood reflux across 90° of the nasal angle at the time of viscoelastic removal during otherwise uncomplicated cataract surgery in an eye with trabecular meshwork ablation 2 years prior. Gonioscopy performed post-operatively confirmed hyphema in the area of previous ablation.[3]

We report two cases of transient hyphema in eyes with remote history of GATT immediately following Ozurdex® injection. The first case had documented hypotony immediately after Ozurdex® injection with an IOP of 6 mm Hg, and was noted to have hyphema. In the second case, the IOP was not measured after injection but hyphema and a significantly elevated IOP were noted the following day. Previous investigation by Alagöz et al. found a rate of hypotony of 8.8 % at minute one in 34 eyes that underwent injection with Ozurdex®. They found that in eyes with visible fluid reflux from the injection site, the mean IOP at minute one following injection was 6.3 ± 4.2 from a baseline IOP of 15.4 ± 2.4 mm Hg. Eyes without visible reflux showed very little variation in IOP following injection. In all cases, IOP recovered rapidly, reaching baseline at hour one.[4] We hypothesize that in eyes with a patent GATT site, this transient drop in IOP may prompt a reflux of blood from the episcleral venous system, sometimes resulting in a clinically significant hyphema. Both of the reported cases resolved with prompt management, although one required an anterior chamber paracentesis to address the resulting elevation in IOP. Neither eye has developed recurrent hyphema following subsequent intravitreal injections to date.

When performing intravitreal injection on eyes that have undergone prior ab interno trabeculotomy, retina providers may take certain precautions to prevent transient hypotony following the procedure, such as avoiding AC paracentesis prior to injection and minimizing fluid loss from the injection site. Intraocular pressure measurement following injection can help stratify risk of this complication and guide follow up. Patients should also be counseled on the risk of hyphema during informed consent prior to injection.

5. Conclusions

When encountering a delayed reflux hyphema in eyes with prior GATT, AC paracentesis can be considered if there is an associated elevation in IOP, and topical pilocarpine can be utilized to encourage outflow from the conventional outflow pathway.[7] These hyphemas are often transient and self-limited, though AC washout can be performed if the hyphema is visually significant in a monocular patient, does not resolve in a timely manner, or if there are risks of other impending complications such as corneal blood staining.

With this report, we aim to draw attention to the particular risk of reflux hyphema in eyes with prior GATT when undergoing intravitreal injections with a relatively larger-bore needle, such as the 22-gauge Ozurdex® injector. Glaucoma and retina specialists should be aware of this clinical entity and work together to anticipate and manage this complication should it occur.

Patient consent

Written consent to publish this case has not been obtained. This report does not contain any personal identifying information.

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Intellectual property

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

Research ethics

We further confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

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References

1. Grover DS, et al. Gonioscopy-assisted transluminal trabeculotomy, ab interno trabeculotomy: technique report and preliminary results. *Ophthalmology*. 2014;121:855–861.
2. Ahuja Y, Malihi M, Sit AJ. Delayed-onset symptomatic hyphema after ab interno trabeculotomy surgery. *Am J Ophthalmol*. 2012;154:476–480.e2.
3. Parekh AS, Weinreb RN, Dorairaj SK. Delayed-onset symptomatic hyphema after ab interno trabeculotomy surgery. *Am J Ophthalmol*. 2013;155:778–779.
4. Alagöz N, Alagöz C, Yılmaz I, et al. Immediate intraocular pressure changes following intravitreal dexamethasone implant. *J Ocul Pharmacol Therapeut*. 2016 Jan-Feb;32(1):44–49. https://doi.org/10.1089/jop.2015.0087. Epub 2015 Nov 5. PMID: 26540554.
5. Patterson I, Avdagic E, Qiu M. Safety and efficacy of resident-performed gonioscopy-assisted transluminal trabeculotomy (GATT). *J Glaucoma*. 2023. https://doi.org/10.1097/IJG.0000000000002171.
6. Ćwiklińska-Haszcz A, Żarnowski T, Wróbel-Dudzińska D, Kosior-Jarecka E. The efficacy and safety of the GATT procedure in open-angle glaucoma-6-month results. *Int J Environ Res Publ Health*. 2023;20:2759.
7. Zimmerman TJ. *Pilocarpine. Ophthalmology*. 1981 Jan;88(1):85–88. https://doi.org/10.1016/s0161-6420(81)35072-6. PMID: 7243232.