Case Report

Visual Improvement following Trabeculectomy in a 17-Year-Old

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Abstract

Glaucoma is a leading cause of blindness globally; however, in terms of the irreversibility of blindness, it is the number one cause. Glaucoma treatment aims at slowing the progression and reducing the risk of further structural and functional damage as much as possible. A rare subset of glaucoma is juvenile open-angle glaucoma (JOAG) diagnosed in individuals between 3 and 40 years of age. The JOAG tends to have rapid progression and it is associated with higher intraocular pressure (IOP) and fluctuations compared to primary open-angle glaucoma. The IOP also tends to be refractory to medical therapy control and often requires surgical intervention. In the treatment of glaucoma, functional improvement is not an expectation. This is a case report of a JOAG patient with visual improvement following trabeculectomy. A 17-year-old female presented with a 4-year history of gradual visual loss in both eyes. Diagnosed elsewhere to have glaucoma with no known baseline IO*P* value and is already on travoprost. Visual acuity (VA) at presentation was counting finger (close to face right eye, 2 m left eye) and IOP were 22 and 19 mmHg, respectively. The patient subsequently underwent trabeculectomy with mitomycin C in both eyes at a single sitting. She had a marked improvement in vision postoperatively. At 6 weeks postoperative review, VA was 6/36 and 6/18 in the right and left eyes, respectively, and pressures were 9 and 8 mmHg, respectively. There is currently no proven mechanism to explain visual recovery; however, visual improvement may have resulted from some reversal of retinal ganglion cell damage following significant IOP lowering. Improvement in vision is not an expectation following treatment for glaucoma; however, some case reports have reported this occurrence following trabeculectomy. Hence, even in very advanced presentations, especially in young individuals as in this case, there should not be hesitation with surgical intervention following appropriate counseling.

Keywords: Glaucoma, juvenile open-angle glaucoma, trabeculectomy, visual improvement

Introduction

Glaucoma is a group of optic neuropathies with a common neurodegenerative process that causes optic nerve changes and characteristic progressive visual field loss.[1] Early field loss includes an arcuate (Bjerrum) scotoma in the central visual field and ends with irreversible blindness.[2] Glaucoma pathogenesis is not fully understood. The current evidence suggests glaucoma pathogenesis depends on the interplay of pathogenetic mechanisms. These mechanisms include mechanical effects by an increased intraocular pressure (IOP) and decreased neutrophil supply.[3,4] Others include low cerebrospinal fluid pressure, hypoxia, oxidative stress, excitotoxicity, and the involvement of autoimmune processes.[4-6] Glaucoma treatment is primarily focused on reducing the IOP,[7] which leads, even in patients with normal tension glaucoma, to at least slow the disease progression.

Juvenile open-angle glaucoma (JOAG) is a rare subtype of primary open-angle glaucoma and is diagnosed mostly in individuals between 5 and 35 years old, rarely after 40 years.[8] JOAG is an autosomal dominant inherited condition characterized by significantly elevated IOP.[9] The IOP elevation in JOAG tends to be refractory to medical therapy, thus, often requires surgical intervention for its control.[10] Surgical intervention is aimed at reducing the risk of further deterioration in visual function, as improvement in vision is not expected.

The purpose of this article is to report a case of bilateral advance JOAG who showed marked improvement in vision following bilateral trabeculectomy.

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Case Report

A 17-year-old female student presented to us with complaints of painless progressive reduction in vision for 4 years duration. There was a history of bumping into objects and no other complaints of note. Past ocular or medical history was not remarkable. She had no previous history of ocular surgery or trauma and was not using any systemic medications, such as corticosteroids. Positive family history of glaucoma in her father was present.

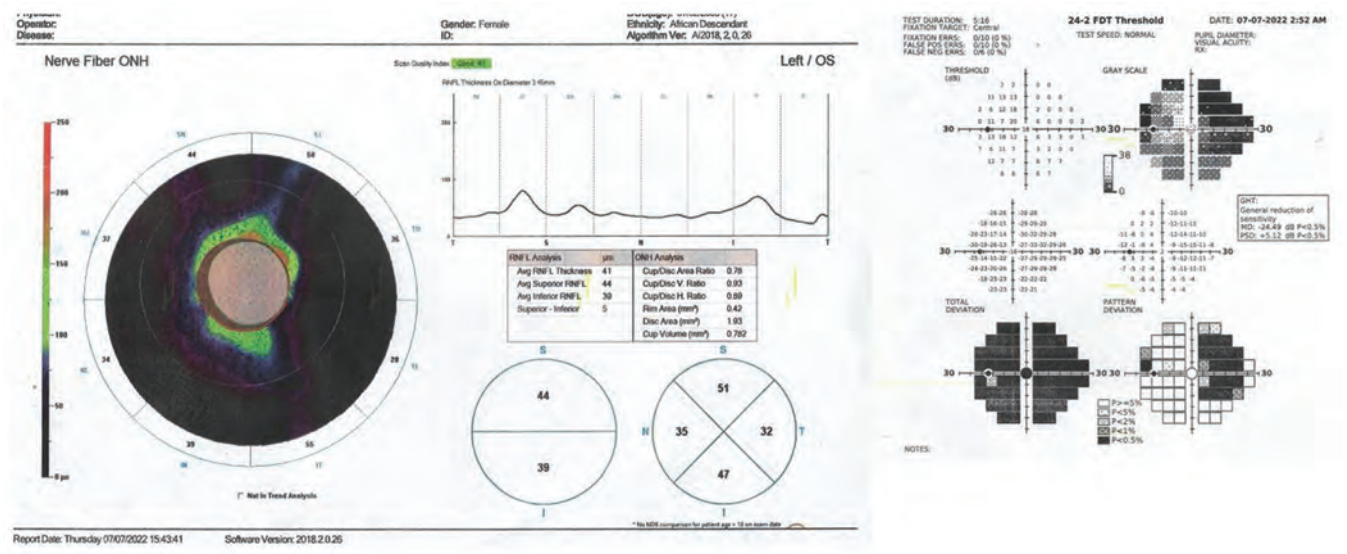
On examination, corrected visual acuity (VA) was counting finger (CF) close to face and CF at 2-m right and left eye, respectively. The slit-lamp evaluation revealed no conjunctivae injection; corneas were clear and anterior chambers quiet and deep. The right pupil was round and had a relative afferent pupillary defect, whereas the left was round and sluggishly reactive. Goldmann applanation tonometry readings were 22 and 19 mmHg in the right and left eye, respectively. Gonioscopy revealed open angles in both eyes up to the ciliary body in all quadrants (Shaffer's Grade IV). Central cornea thickness (CCT) measured 562 µm in the right eye and 543 µm in the left. This CCT value has little effect on the corrected IOP; for the right eye from 22 to 21 mmHg and no change in the left eye IOP. On dilated fundoscopy, both discs were of moderate size and had complete loss of the neuroretina rim cup-to-disc ratio (CDR 1.0 × 1.0). Optical coherence tomography (OCT) and visual field could not be performed due to poor vision.

A diagnosis of bilateral advance JOAG was made. At the presentation, she was already on travoprost eye drop nocte in both eyes in the past 3 months given from the referring centre. Medication was continued and the patient was worked up for bilateral trabeculectomy with 0.4 mg/ml mitomycin C and releasable sutures. Surgery was performed within 4 weeks of presentation. A peribulbar anaesthesia of 2 ml of plain lignocaine (2%) was used for each eye and there was no complication intraoperatively. On the 1st day of postoperative review, VA was hand movement (HM) and CF at 2 m on the right and left eyes, respectively, bleb was diffuse, of good height and Siedel's test was negative. The IOP was 03 and 02 for the right and left eyes and the anterior chamber was well formed with cells of +1. The patient was placed on the following topical postoperative medications; dexamethasone (0.1%) hourly, moxifloxacin (0.5%) two hourly, and atropine (1%) twice daily. At 2 weeks postoperative, VA was CF at 2 m and 6/18 with good bleb quality and IOP was 3 and 3 mmHg, right and left eye, respectively.

At 6 weeks postoperative review, VA was 6/36 and 6/18, good functioning bleb and IOP was 9 and 8 mmHg, right and left eye, respectively. Vision and IOP have remained stable and at last review; 4 months postsurgery, VA were 6/36 and 6/18 right and left eye, respectively, with no significant improvement with corrections. She had diffused, good height, and functioning blebs, and IOP was 8 mmHg in both eyes. The left eye OCT displayed some remnant neuroretina rim which may indicate recovery and the visual field revealed advanced field loss (fig below); this was in keeping with a fundus finding of a cup-to-disc ratio of 0.95 by 0.95, as against 1.0 by 1.0 preoperatively.

Discussion

This patient had advanced JOAG at presentation in both eyes with vision, evident by the complete loss of the neuroretina rim seen on dilated fundoscopy and severe visual deficit on examination. This severity connotes a poor prognosis and requires a low target IOP. IOP control in JOAG often requires surgical therapy for good sustained control, because it tends to be refractory to medical therapy. This patient had bilateral trabeculectomy under guarded visual prognosis due to the very severe visual deficit at presentation. The aim of the surgery was



Left eye OCT and FDT

to attempt to prevent loss of residual vision. Postoperatively, pressures were very low initially and few weeks later, it stabilized at the higher single digits. Furthermore, the vision was worse immediately postoperatively, especially in the right eye which may be explained by the cycloplegic effect of atropine and the slight possibility of a hyperopic shift in the early postoperative period that could occur. However, the patient surprisingly had marked improvement in her vision in the later postoperative weeks. What is expected following trabeculectomy is the patient vision returning to its preoperative state after the discontinuation of atropine eye drop.

The possible mechanism of visual improvement in this patient is not known and evidence of functional improvement following glaucoma surgery is rare. However, there are few case reports of this finding. Foulsham *et al*.[11] reported a case of a patient with right advanced primary open-angle glaucoma who had significant visual improvement following trabeculectomy from HM to 6/18 vision. Leung *et al*.[12] also reported a single case of a 20-year-old with JOAG who recovered from inferotemporal visual field defect following trabeculectomy.

Although the mechanism of visual improvement in this patient cannot be ascertained, it may be that the IOP reduction may have caused an improvement in retinal ganglion cell function. Thus, allowing for the recovery of dying ganglion cells. However, contributing factors to this may have included the patient's young age and possibly high IOP premedication.

Conclusion

Improvement in vision is not an expectation following treatment for glaucoma; however, this was observed in our patient. In very advanced glaucoma even with VA affectation, especially in younger individuals as in this case, surgical intervention following appropriate counseling should be considered.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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