Case Series

Ocular Hypertension and Glaucoma after Traumatic Angle Recession

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ABSTRACT

Ocular hypertension and glaucoma can occur after blunt trauma to the eye. Careful gonioscopic examination of the anterior chamber angle will reveal angle recession with widened ciliary body.

We describe three cases of blunt trauma to the eye resulting in raised intraocular pressure (IOP) with and without damage to the optic disc. Two of these patients with high IOP were controlled medically while third patient required surgical intervention. The risk of high IOP after trauma can occur earlier or in the later part of the life. Patients with history of blunt injury to the eye should therefore be educated and counselled to get their eyes periodically examined for an early diagnosis of increased IOP.

Key Words: Ocular hypertension, glaucoma, trauma, Angle recession.

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INTRODUCTION

Angle Recession (AR) is a common sequel of blunt ocular trauma with or without glaucoma. Though splitting of ciliary band seen on gonioscopy as a wedge between circular and longitudinal fibers of the ciliary muscles, it is a damage inflicted on the trabecular meshwork as a result of trauma which is responsible for the rise in intraocular pressure (IOP).[1] AR is reported to occur in 20% – 94% of the eyes after blunt trauma and can be masked initially due to presence of hyphema. Five to twenty percent of these eyes will develop ocular hypertension with raised IOP or angle recession glaucoma (ARG) with optic disc changes.[2]

ARG is a secondary type of open angle glaucoma and patients with an increased IOP can present up to many years after the onset of blunt trauma. It can be under diagnosed because of delayed onset and forgotten history of eye injury. Patients with AR are usually detected clinically on routine ocular examination later in life. Cataract especially unilateral in a young or middle age adult, even when the history is negative should raise the suspicion of remote trauma. Like with other forms of open angle glaucoma, a patient may present with no specific eye or visual complaint as until the late stage of glaucoma, visual acuity may not be affected. Anterior segment angle examination by gonioscopy shows an irregular wide ciliary body band more commonly present in the supero-temporal quadrant.

There is wide variety of abnormalities of anterior segment that can occur with angle recession. These include iridoschisis, cyclodialysis, iridodialysis, tears in sphincter pupillae, anterior synechiae, dilated pupil, iris atrophy, zonular breaks, trans illumination defects, iritis, phacodonesis, subluxated lens and cataract formation.[3] This warrants meticulous ocular examination in a patient with history of blunt trauma.

The rationale for reporting these cases is to recognize the features of angle recession on gonioscopic examinations and associated factors with optimal management ranging from medical treatment to surgical intervention.

Case No. 1

A 29-year-old male attended our clinic with complaint of reduced vision in his right eye. He gave history of blunt trauma with stone about 6 months ago. On examination, his visual acuity was 6/24 in the right eye improving to 6/9 with + 2.00 Diopter sphere while left eye had visual acuity of 6/6 unaided. His right pupil was larger than left, eliciting afferent pupillary response. His IOP measured 26 mm Hg and 12 mm Hg in the right and left eye respectively. The right eye showed tears in sphincter pupillae with areas of Iris atrophy and lens opacities while examination of left anterior segment was within normal limits. Gonioscopy with Goldmann two mirror lenses revealed 360 degrees of AR in the right eye and normal wide angle in the left eye. Fundus examination of patient showed right pale disc with cup disc ratio of 0.9 and cup disc ratio of 0.3 in the left eye. Patient was diagnosed with ARG in his right eye. OCT showed extensive retinal nerve fiber layer (RNFL) thinning while left eye appeared normal. Visual field of right eye showed double arcuate scotoma (Figures 1 and 2). Patient was prescribed combination of Dorzolamide 2% and Timolol 0.5% drops twice a day in his right eye. At 1-month follow-up his visual acuity was 6/9 and IOP measured 14 mm Hg in his right eye. He has been followed up for last 4 years with well-maintained IOP in his right eye at 13 – 14 mm Hg with combination therapy and 11 – 12 mm Hg in the left eye without any treatment.

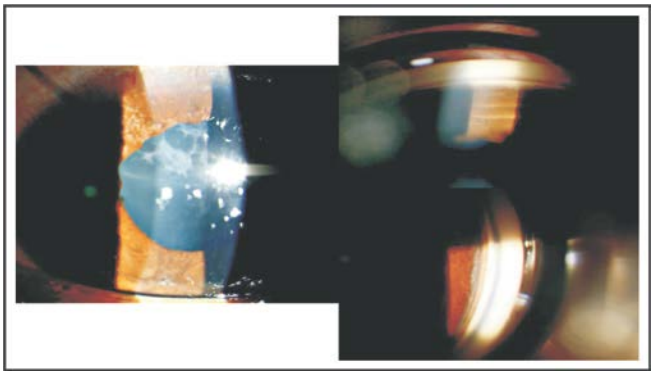

Figure 1: Right pupil of patient 1 has traumatic mydriasis, cataract, sphincter tears and areas of Iris Atrophy. Gonioscopic view of anterior chamber angle shows Angle recession in vertical and horizontal meridians.

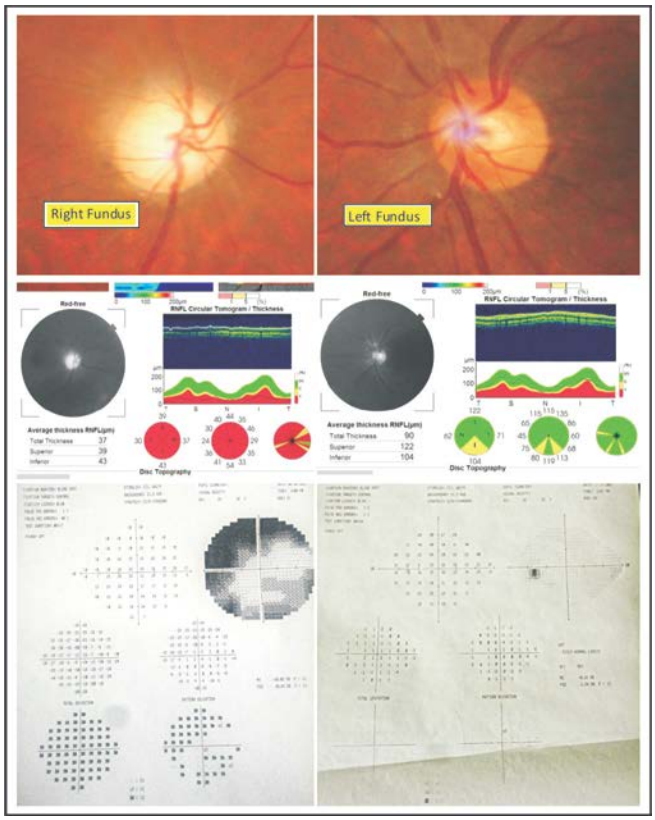

Figure 2: Fundus photographs and OCT RNFL of right and left eye of patient 1. Right optic disc looks pale and cupped. Severe RNFL damage is seen in the right eye. Visual Fields of Right Eye Showing double arcuate scotoma and left eye is normal

Case No. 2

A 26 years old male presented with blurred vision in his left eye with history of blunt trauma with cricket ball 6 months ago. On examination, his visual acuity was 6/6 in right eye and 6/7.5 in left eye. Right anterior segment appeared normal while left eye showed mid-dilated pupil, tears in sphincter pupillae, sunflower traumatic cataract and an IOP of 30 mm Hg (Figure 3). Gonioscopy in his left eye showed AR involving nasal and superior quadrant. Fundus examination revealed normal appearing discs, OCT RNFL was normal and visual fields were full in both eyes on Humphry perimeter. A diagnosis of AR with ocular hypertension was made and patient was suggested Latanoprost eye drops in the left eye at night time. Subsequent ocular examinations after 1 month showed stable vision at 6/7.5 (unaided) and IOP of 13 mm Hg in his left eye. IOP is well controlled on medical treatment for last 4 years. We have tried to take him off from Latanoprost drops but his IOP rises. Last examination showed IOP of 15 mm Hg in right eye and 16 mm Hg in left eye. He continues to use Latanoprost in his left eye.

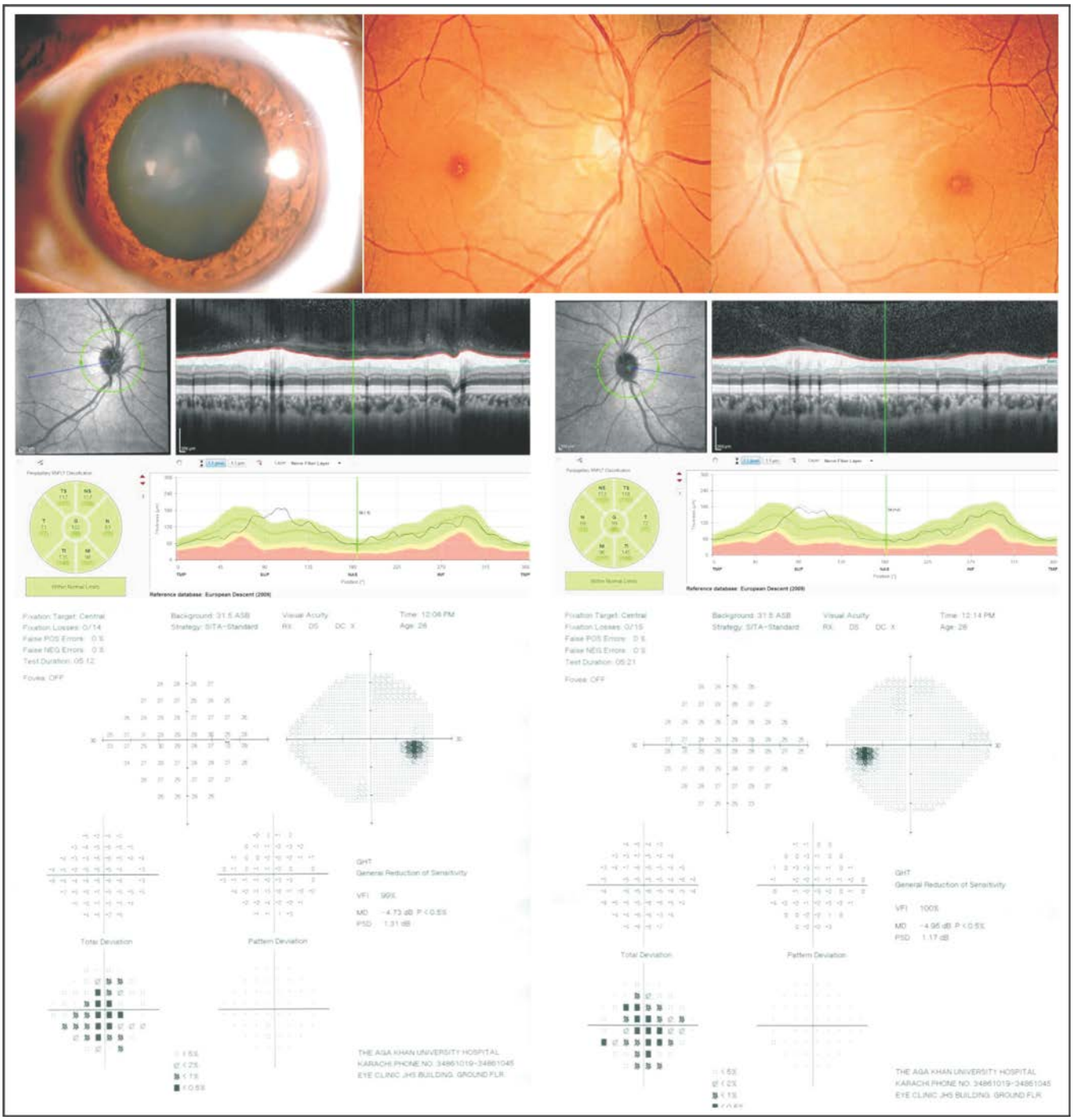

Figure 3: Left pupil of patient 2 showing mid-dilated pupil, sphincter tears and sunflower cataract. Fundus Photographs of Right and Left Eye. OCT and visual fields of both eyes are normal.

Case No. 3

A 20 years old male presented with decreased vision from his right eye for last 2 months. He had history of blunt trauma due to fall two months ago. He was diagnosed with traumatic cataract in right eye. After cataract surgery by his primary ophthalmologist he had raised IOP in the right eye and was referred to us for glaucoma management.

On presentation, his visual acuity was counting fingers (CF) at 2 feet in the right eye and 6/6 unaided in the left eye. IOP was 46 mm Hg in his right eye and 14 mm Hg in left eye. On Gonioscopy, there was ARin

all quadrants of right eye while angle of left eye was open. His right fundus showed advanced cupping and left fundus was normal with cup-disc ratio of 0.2. This patient was already on maximum medical treatment for his right eye including topical prostaglandin analogue, combined beta-blocker and carbonic anhydrase inhibitor and alpha agonist eye drops. He was advised glaucoma drainage device surgery which was carried out by implanting Ahmed Glaucoma Valve (Figure 4). After the two years follow up, his IOP was reduced to 14 mm Hg.

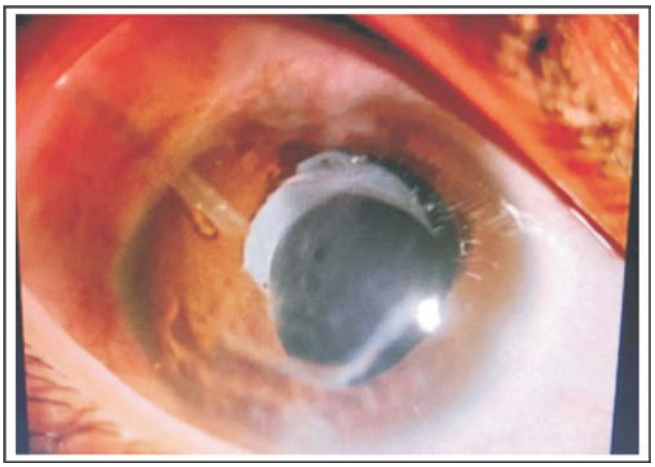

Figure 4: Ahmed Glaucoma Valve in Patient No. 3.

DISCUSSION

Collins in 1892 first described AR, seen in eyes that suffered from blunt trauma often in association with hyphema, iridodialysis, tears in iris sphincter and trans-illumination defects of the iris.[4] Multiple processes appear to be involved in the mechanisms of AR-associated glaucoma.[5] Initially sudden blunt force compresses the globe axially and expands it equatorially. Sudden indentation of the cornea can rapidly displace aqueous humor laterally which in turn deepens the anterior chamber and subsequently increases the corneo-scleral limbal ring diameter causing anterior chamber angle damage. The ciliary body is damaged in such a way that the longitudinal ciliary muscle fibers still remain attached to its insertion at the scleral spur while the circular muscle along with pars plicata and iris gets detached with posterior displacement. During this traumatic shear and tear process branches of the anterior ciliary arteries mayget crushed and result inhyphema. The anterior chamber is seen to be abnormally deepened in the meridian of recessed angle explained by the relaxed iris-lens diaphragm deviating posteriorly. There may be an early rise in IOP seen as a result of damage to trabecular meshwork and Schlemm's canal. However, in the long run scarring and fibrosis of the trabecular meshwork/Schlemm's canal can lead to elevated pressure. The elevated pressure, if chronic, leads to optic nerve damage clinically seen as progressive optic disc cupping with visual field defects.[5]

There are several other mechanisms proposed to explain elevated IOP including loss of rigidity and tone of ciliary muscle on the scleral spur resulting in narrowing of Schlemm's canal.[5] When quantitatively assessed by Anterior Segment-OCT, Schlemm's canal has been reported to have decreased mean meridional and mean coronal diameters in ARG eyes in comparison to the normal eyes. The Schlemm's canal parameters were also found to be reduced in the fellow non traumatized eyes of ARG patients when compared to the normal population.[6] One interesting finding observed by Tesluk & Spaeth suggested that up to 50% of patients who suffered from glaucomatous optic neuropathy secondary to angle recession would develop glaucoma in their fellow uninjured eye in their lifetime.[6] This is attributed to the abnormal width of Schlemm's canal on the anterior segment OCT.

Reviewing the literature, it has been discovered that up to 60% of patients with history of ocular trauma will develop some degree of AR with 5 – 20% of them progressing to ARG depending upon the clock hours of ciliary body damage.[7]

Although blunt eye trauma is invariably seen to precede angle recession, the patient may often present with no recall memory of the traumatic event. As it is seen with other types of glaucoma, patient may present with no specific eye symptoms or complaints. Visual acuity remains normal until the late stages of glaucoma. Gonioscopy aids in the diagnosis of angle recession where an irregularly widened ciliary body band is observed with retro-placement of the iris root. This is most likely documented in the supero-temporal quadrant of the angle. Comparing the angles of both the eyes is important where subtle signs of asymmetry points towards the diagnosis.

The treatment response in seen to vary widely in ARG particularly being related to the nature and extent of the damage to the angle structures. The more the damage, the less the response is to the treatment. The preferred first line therapy is the use of topical aqueous

suppressants such as beta blockers, alpha-agonists and carbonic anhydrase inhibitors (CAI). Theoretically, the prostaglandin analogues which increase the alternative uveo-scleral outflow may have a beneficial role in angle recession as trabecular meshwork is thought to be damaged in these eyes. Our first case had his IOP controlled successfully on aqueous suppressants drops while our second case had controlled IOP with prostaglandin analogue. A paradoxical rise in IOP in AR has been reported by pilocarpine presumably due to decreased uveo-scleral outflow.[8]

Laser trabeculoplasty in general has been found to be ineffective in ARG eyes. The Intelligent Research in Sight (IRIS) Registry by American Academy of Ophthalmology has reported 47.5% failure of laser trabeculoplasty at 18 months follow up in eyes with ARG.[9] Argon Laser Trabecultoplasty (ALT) has so far not been able to produce satisfactory results and fails to lower the IOP in the long term. Although not formally studied, Selective Laser Trabeculoplasty (SLT) is likely to be ineffective. Although Al-Obaida et al, in a small case series, reported 20% reduction of IOP in treating patients of ARG with SLT for the first time.[10] However, larger studies are needed to validate these results.

ARG management is complicated by the fact that medical therapy is frequently found to be ineffective making this disease a multifaceted challenge requiring either filtration procedures or glaucoma drainage devices. Mermoud et al,[11] compared standard trabeculectomy with and without Mitomycin-C (MMC) and Molteno device in patients with uncontrolled IOP in ARG. Trabeculectomy with MMC was by far the most effective procedure in controlling IOP, but bleb-related infection rate was also reported to be highest in this study group. However, Senthile et al,[12] has described trabeculectomy with MMC as a safe and efficacious method of significantly controlling IOP in ARG with stable visual acuity and bleb survival in medium term follow up with few intraoperative complications.

Kaushik et al reported successful IOP control in Indian patients who had medically uncontrolled post traumatic ARG by implanting Ahmed Glaucoma Valve (AGV) with lesser rates of post-operative complications.[13] Our 3rd case had uncontrolled IOP on maximum medical therapy. As he was pseudophakic also, it was decided to insert AGV in his eye resulting in successful outcome in controlling IOP. Similar successful outcomes in controlling IOP with AGV is reported by other workers in ARG.[14] One particular case report by De Klerk et al,[15] suggests effective IOP control in two of his patients with medically uncontrolled ARG who were treated with I-Stent combined with phacoemulsification. I-Stent, a relatively newer modality bypasses trabecular meshwork, thus increasing the aqueous outflow. This can be considered as an option for patients with ARG; however, a larger study is still required to validate these results in the longer run. Cheng and co-workers[16] described clinical outcomes of penetrating canaloplasty in ARG patients claiming successful reduction in IOP.

In this case report, two of our patients remained well controlled on topical ocular hypotensive medications for 4 years. They were examined at regular intervals and so far, there has been no significant deterioration noticed. Third patient had successful AGV implant with control of IOP.

Treatment of AR resulting in increased IOP can be variable as discussed in our case series. Patients presenting with significant elevated IOP with no changes in optic disc can be safely treated with ocular hypotensive drops and followed up regularly that they should not develop glaucomatous disc changes. Patients with established glaucoma are started with medical treatment and in case intra ocular pressure cannot be controlled pharmacologically, surgical intervention may be required.

CONCLUSION

Angle recession can have devastating complications like glaucomatous optic neuropathy following blunt ocular trauma. Diagnosing it early and treating it aggressively is of utmost importance. Since there is a lifetime risk of developing glaucoma after blunt injury, it is of vital importance that the physicians must educate patients so that they develop an understanding of their injury and its complications. As glaucoma is an asymptomatic disease, careful monitoring of IOP and examination of optic disc is recommended for patients with documented angle recession.

Conflict of Interest: Authors declared no conflict of interest.

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P.S. Mahar; Professor: *Concepts, Manuscript Review.*