

Clear lens extraction in angle–closure glaucoma patients

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Abstract

• **AIM:** To describe the results of 5 consecutive cases of clear lens extraction in angle closure patients for the treatment of elevated intraocular pressure (IOP).

• **METHODS:** Retrospective observational case series. All angle closure patients were on two or more topical glaucoma medications and had prior laser iridotomy. Eyes underwent clear lens extraction by phacoemulsification with intraocular lens implantation.

• **RESULTS:** All five patients in this case series carried the diagnosis of angle –closure glaucoma and had uncontrolled IOP prior to surgery despite topical medications. After clear lens extraction three of the cases had good IOP control (IOP < 22mmHg) without the need for topical medications. In one case the IOP was better controlled after surgery, however, topical medications were required. The desired IOP was not met in one case despite restarting maximum topical therapy.

• **CONCLUSION:** This case series suggests that there may be a role for therapeutic clear lens extraction in select cases of angle–closure glaucoma.

• **KEYWORDS:** clear lens; glaucoma; cataract; angle closure

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INTRODUCTION

Primary angle-closure glaucoma (PACG) is estimated to affect 26% of people with glaucoma worldwide and is responsible for almost half the number of bilateral blindness caused by glaucoma. Primary angle closure (PAC) is when appositional closure of the angle causes formation of

peripheral anterior synechiae and/or an elevation in intraocular pressure (IOP). Currently, laser peripheral iridotomy (LPI) is the standard treatment for angle closure together with topical medication for reducing the intraocular pressure. Incisional glaucoma surgery can offer an alternative treatment when laser procedures and topical medications fail, but patients with PACG have a higher rate of complications with these surgeries as compared to those with primary open-angle glaucoma^[1].

The role of an anteriorly positioned lens in angle closure has been well established and recent studies have demonstrated that cataract extraction can help open the iridocorneal angle by deepening the anterior chamber, which can be beneficial in cases of PAC and PACG^[2].

We present a consecutive case series of five patients who underwent clear lens extraction and intraocular lens implantation as a treatment option for PAC and PACG, between May 2012 and December 2012.

CASE 1

A 64-year-old woman presented with pain in her left eye. Her past ocular history was unremarkable. Her visual acuity (VA) was 20/40 and 20/50 in the right eye (OD) and left eye (OS), respectively. IOP was 18mmHg OD and 49mmHg OS. Examination revealed a fixed mid-dilated pupil, microcystic corneal edema, and 1+cell in the anterior chamber OS. She had clear lenses in both eyes (OU). Gonioscopy showed narrow angles superiorly and inferiorly and closed angles temporally and nasally OD. The left eye had closed angles 360 degrees. The optic nerves had cup-to-disc ratios of 0.3 OU.

The patient underwent placement of LPIs OU and was placed on maximal topical therapy OS (timolol, dorzolamide, brimonidine and latanoprost) for IOP control. She returned two months later with increased IOP in the left eye (27mmHg) and closed angles in both eyes. Peripheral anterior synechiae (PAS) had developed in the left eye.

Uncomplicated clear lens extraction with placement of an intraocular lens was performed in the left eye. One month after the procedure, the IOP was 15mmHg OS without medications. The angle was no longer occludable on gonioscopy, however, a few areas of PAS were present.

CASE 2

A 41-year-old female previously followed as a glaucoma suspect, started complaining of discomfort and blurry vision

in the right eye for a three-month duration. She had no significant past medical history and was not using any topical medications. Best-corrected visual acuity was 20/50 and 20/30 in the right and left eyes, respectively. IOP was 68mmHg OD and 20mmHg OS. Ocular examination showed corneal edema and a shallow anterior chamber OD. She had clear lenses OU. Gonioscopy OD showed a closed angle nasally, temporally and superiorly. Anterior trabecular meshwork (TM) could be identified inferiorly. The left eye was narrow but trabecular meshwork could be identified for 360 degrees. Ocular fundus examination showed cup-to-disc ratios of 0.7 OD and 0.6 OS. LPIs were performed in both eyes and topical medical therapy (timolol, dorzolamide, brimonidine and pilocarpine) was started in the right eye. After LPI OU and topical medications OD her pressures were 23 OD and 16 OS after four weeks of treatment. The anatomical opening of the angles did not improve after LPI OU. Ultrasound biomicroscopy (UBM) was performed which showed an anteriorly positioned ciliary process with a flat iris configuration. She was therefore diagnosed with plateau iris configuration. She returned one month later with an IOP of 50 mmHg in the right eye.

Clear lens extraction was then performed with IOL implantation OD. After four months her IOPs were 16mmHg OD and 18mmHg OS without medications. Her angles OD were no longer occludable on gonioscopy.

CASE 3

A 69-year-old woman was being followed for ocular hypertension and narrow angles that were diagnosed four years previously. She was also followed for a pituitary tumor resected in 2008. Humphrey visual field 24-2 perimetry performed after the tumor removal showed no visual field defects. Uncorrected visual acuity was 20/40 OU. Her intraocular pressures measured 38mmHg OD and 30mmHg OS, using dorzolamide and timolol in both eyes. Ocular examination showed shallow anterior chambers and patent LPIs in both eyes, with mild nuclear sclerosis OD and a clear lens OS. Fundus examination was unremarkable with a 0.4 cup to disc ratio in both eyes. Gonioscopy showed narrow but occludable angles OD and non-occludable angles OS.

The patient underwent uncomplicated clear lens extraction with IOL implantation OD. After surgery her corrected VA improved to 20/25 OD and her IOP decreased to 21mmHg on the same medications. Gonioscopy now showed an open angle with scleral spur visible 360 degrees OD.

CASE 4

A 69-year-old woman with a past medical history of diabetes and hypertension presented with blurry vision and mild pain in both eyes. Her uncorrected VA was 20/80 OD and 20/60 OS. IOP measured 26mmHg OD and 31mmHg OS. Ocular examination revealed a shallow anterior chamber in both eyes with mild nuclear sclerotic cataracts. Gonioscopy

revealed occludable angles OU. Ocular fundus examination revealed 0.3 cupping OD and 0.4 cupping OS.

The patient was treated with latanoprost and underwent placement of LPIs OU. Her pressures remained unchanged and no alteration was seen in the angle appearance. Topical timolol and brimonidine were added, but they were unsuccessful in controlling IOP (25 mmHg both eyes).

The patient underwent clear lens extraction with IOL implantation in both eyes. After surgery her IOP was 16mmHg OD on timolol and latanoprost and 18mmHg OS on no medications. Her angles were more open on gonioscopy as compared to preoperative gonioscopy.

CASE 5

A 57-year-old female had been followed for several years for chronic angle closure glaucoma secondary to plateau iris syndrome. Her best-corrected visual acuity was 20/30 OD and 20/25 OS. She was using brimonidine, timolol, dorzolamide and latanoprost OU. Despite maximal medical therapy, LPIs, and laser peripheral iridoplasty her intraocular pressures were 22mmHg OD and 14mmHg OS. Humphrey perimetry showed a progressing superior arcuate defect OD and no defects OS. Fundus examination showed advanced cupping of 0.8 OD and 0.7 OS. Gonioscopy revealed almost 180° of PAS OU.

Given the progression of the visual field defect in the right eye, the decision was made to proceed with cataract extraction in the right eye. After clear lens extraction with IOL implantation her VA improved to 20/25, but unfortunately her IOP did not change and even with the maximum topical medications she ultimately underwent glaucoma surgery for control of her intraocular pressure OD.

DISCUSSION

The standard of care for PAC and PACG is laser peripheral iridotomy in conjunction with medical treatment. If plateau iris syndrome is suspected or confirmed, use of pilocarpine or argon laser peripheral iridoplasty is sometimes pursued. Although these treatments can assist in lowering the IOP, they do not always lower the IOP to an appropriate level in some patients [3-5]. Given that the crystalline lens can play an important role in narrowing of the iridocorneal angle, lens extraction can help control IOP.

Some studies have already demonstrated the IOP-lowering effect of cataract extraction on patients without glaucoma. Matsumura *et al* [6] performed a prospective analysis of 93 patients undergoing cataract surgery. There was an average IOP reduction of 1.5mmHg at 3 years. In 1997, Jahn *et al* [7] reported a consistent 2mmHg reduction in IOP at 5 years in 80% of patients and Suzuki *et al* [8] showed a persistent IOP decrease at 10 years if the preoperative IOP was over 20mmHg. In 2008, Poley *et al* [9] found a similar IOP lowering effect of cataract extraction on ocular hypertensive and normotensive patients. They found that the higher the

preoperative IOP the greater the postoperative IOP lowering effect. However, the results of the IOP lowering effect of cataract extraction on open angle glaucoma patients have been mixed. Pohjalainen *et al*^[10] showed an IOP drop as well as need for fewer topical glaucoma medications to control IOP. In 2006, a Cochrane review reported that there was no evidence from good quality randomized trials or non-randomized studies of the effectiveness of lens extraction for chronic primary angle-closure glaucoma^[11]. However, some recent studies have addressed the issue of cataract extraction in angle closure patients since that report. Lam *et al*^[12] found superior results of cataract extraction in preventing IOP rise with fewer medications as compared to LPI in acute angle closure patients. In 2010 Tham *et al*^[13] studied chronic angle closure glaucoma patients who underwent phacoemulsification as compared to phacoemulsification and trabeculectomy. They found that while the IOP was slightly lower in those with a combined procedure, patients who underwent phacoemulsification alone experienced fewer complications and had no significant differences in visual field progression compared to those with the combined procedure.

The mechanism responsible for IOP decrease after cataract extraction is not completely understood, but in 2011 Huang *et al*^[2] described a correlation between IOP reduction and angle widening after cataract extraction. They showed that narrow angle patients had lower IOP after phacoemulsification compared to patients with open angles preoperatively. In 2012 Huang *et al*^[14] described the association between preoperative lens vault and IOP reduction after cataract surgery. The authors concluded that preoperative lens vault could be a predictor for angle widening and intraocular pressure lowering after cataract surgery. In another study with 56 primary angle closure glaucoma patients who underwent phacoemulsification, Liu *et al*^[15] demonstrated that preoperative measures of IOP and anterior chamber depth are positively correlated with long-term IOP control.

Despite evidence that lens extraction can improve intraocular pressure control in patients with narrow angles, use of clear lens extraction as a treatment option is still debatable. If the patient has a visually significant cataract it is a more widely accepted method of treatment. Four of our cases had considerable decreases in IOP after surgery and improvement in the iridocorneal angle after surgery. Only one case had uncontrolled IOP, likely due to more widespread PAS seen in the iridocorneal angle at the time of surgery. It is possible the patient would have had better IOP control if the cataract surgery been performed earlier, before development of PAS. This case series highlights some outcomes when treating angle closure patients with early lens extraction and may suggest a role for therapeutic clear lens extraction when

conventional treatment fails. We believe that after lens extraction our cases benefited from wider anterior chambers and iridocorneal angles, which facilitated aqueous outflow leading to lower IOP.

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