

Phacoemulsification with single-pass four-throw pupilloplasty and pre-Descemet's endothelial keratoplasty for management of cosmetic iris implant complication

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Placement of an anterior chamber iris implant for cosmetic reasons has been associated with development of various complications. Even after the implant has been explanted from the eye, it leaves a trail of after effects that necessitate surgical management. We describe a technique that comprises of performing phacoemulsification with single-pass four-throw pupilloplasty and a pre-Descemet's endothelial keratoplasty procedure for this eye with cosmetic iris implant complication.

Key words: Cosmetic iris implants, iris implant complications, PDEK, phacoemulsification, pre-Descemet's endothelial keratoplasty, pupilloplasty, SFT, single-pass four throw

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Artificial iris implants were originally designed for providing relief to patients with ocular albinism and in iris defect cases with coloboma, aniridia, iris atrophies, and iridoschisis.^[1] These implants are available as iris diaphragm implants that are placed anterior to the iris and the other types are the iris-lens diaphragm implants that are placed either in the capsular bag or in sulcus or are sutured to the scleral wall.^[2] The cosmetic iris implants are iris diaphragm implants that are thin flexible, colored medical grade silicone implants designed for placement in the anterior chamber. Complications have been reported [Fig. 1a] following the placement of these iris implants, and various techniques have been described to explant these implants from the eye to prevent further deterioration of vision.

We hereby describe a technique which when performed concurrently helps to reverse endothelial decompensation along with managing cataract and raised intraocular pressure (IOP) by performing the triple procedure of phacoemulsification with pre-Descemet's endothelial keratoplasty (PDEK)^[3-6] and single-pass four-throw (SFT) pupilloplasty^[7,8] with optimal results. The triple procedure was performed in 1 eye (right eye; RE) of the female patient aged 23 years who had undergone an iris implant placement by another surgeon in both the eyes and also underwent the explantation of the same after development of complications after 18 months of getting it implanted. The

case was referred for management of complications in both the eyes that were associated with the eye, namely, cataract formation, raised IOP, endothelial decompensation, and severe ciliary congestion.

Surgical Technique

Preoperatively, injection mannitol 20% was administered intravenously (dose of 1 g/kg body weight over a period of 30 min) to decrease the IOP and to facilitate the surgery. All surgeries were performed under peribulbar anesthesia with 4 mL lidocaine hydrochloride (xylocaine 2%) and 2 mL bupivacaine hydrochloride 0.5% (Sensorcaine).

The corneal epithelium was debrided to enhance the intraoperative view during surgery. A routine cataract surgery was performed wherein 2.8 mm corneal tunnel incision was made followed by capsulorhexis [Fig. 1b], nuclear emulsification, and irrigation-aspiration (I/A) and in the bag placement of a foldable intraocular lens. I/A was done and viscoelastic was removed from the eye.

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A trocar anterior chamber maintainer (ACM) was inserted at 4 o' clock meridian [Fig. 1c] and a paracentesis incision was made for SFT pupilloplasty. Alternatively, an ACM can also be employed and placed in position. SFT procedure was performed wherein a 10-0 polypropylene suture attached to the long arm of the needle was passed from the proximal and distal iris leaflets, and the tip of the 10-0 needle was docked into the lumen of 26 G needle [Fig. 1d] introduced from the paracentesis incision on the opposite side. A Sinskey hook was passed, and a loop of suture was withdrawn [Fig. 1e] from the eye. The cut end of the suture was passed through the loop four times taking care to always pass it in the same direction. Both the suture ends were pulled and this led to sliding of the approximating loop inside the eye, thereby apposing both the cut edges of the iris [Fig. 1f]. The suture was then cut with a micro-scissors, and the entire procedure of SFT was performed in opposite quadrant.

Fluid infusion was stopped, and air was infused inside the AC from the trocar ACM. Descemetorhexis was performed [Fig. 2a] and the diseased endothelium-Descemet's membrane complex was removed. A PDEK graft was made by staining the Type 1 bubble (bb) with trypan blue and cutting the edges all around the bubble [Fig. 2b and c]. The graft was inserted inside the AC [Fig. 2d] and was unfolded using air and fluidics. Once the graft had unfolded, air was injected beneath the graft to facilitate graft adhesion to the host endothelium [Fig. 2e, f and Video 1].

Postoperatively, the patient was advised to lie supine for the most part of the day. The standard postoperative protocol followed was dosing with ofloxacin 0.3% four times a day for initial 2 months' postoperative period and topical prednisolone acetate 1% every 2 h for the initial 2 weeks, four times daily for 1 month, twice daily for 2 months, and once daily thereafter for 3 months.

Results

The preoperative specular count in RE could not be assessed due to severe corneal edema whereas the endothelial cell count (ECC) in the left eye (LE) was 1750 cells/sq. mm. Hence, the procedure of PDEK was not indicated for the LE that underwent only cataract extraction with SFT. The donor ECC was 3250 cells/sq. mm whereas the postoperative cell count was 2595 cells/sq. mm with a 20.15% reduction in ECC at 3-month follow-up.

The preoperative best-corrected visual acuity (BCVA) in RE and LE improved from 20/800 and 20/400 on Snellen chart to 20/20 and 20/60, respectively, at 6 months follow-up postoperatively [Fig. 3]. At 6-month follow-up, the slit-lamp examination revealed no sign of active inflammation with deep AC. Corneal haze resolved completely in RE whereas Grade 1 haze remained in LE at last follow-up. The preoperative IOP was recorded to be 40 mmHg in RE and 30 mmHg in LE whereas the postoperative IOP in both eyes was recorded to be 17 and 15 mmHg in RE and LE, respectively.

Intraoperatively, difficulty was observed while performing pupilloplasty due to thin friable iris tissue that tore during the procedure. No other complication such as hyphema, graft detachment, or any other issue with graft handling was noted.

Discussion

Several cases of complications with implantation of cosmetic iris implants have been reported worldwide. The complications associated with cosmetic iris implants are believed to be

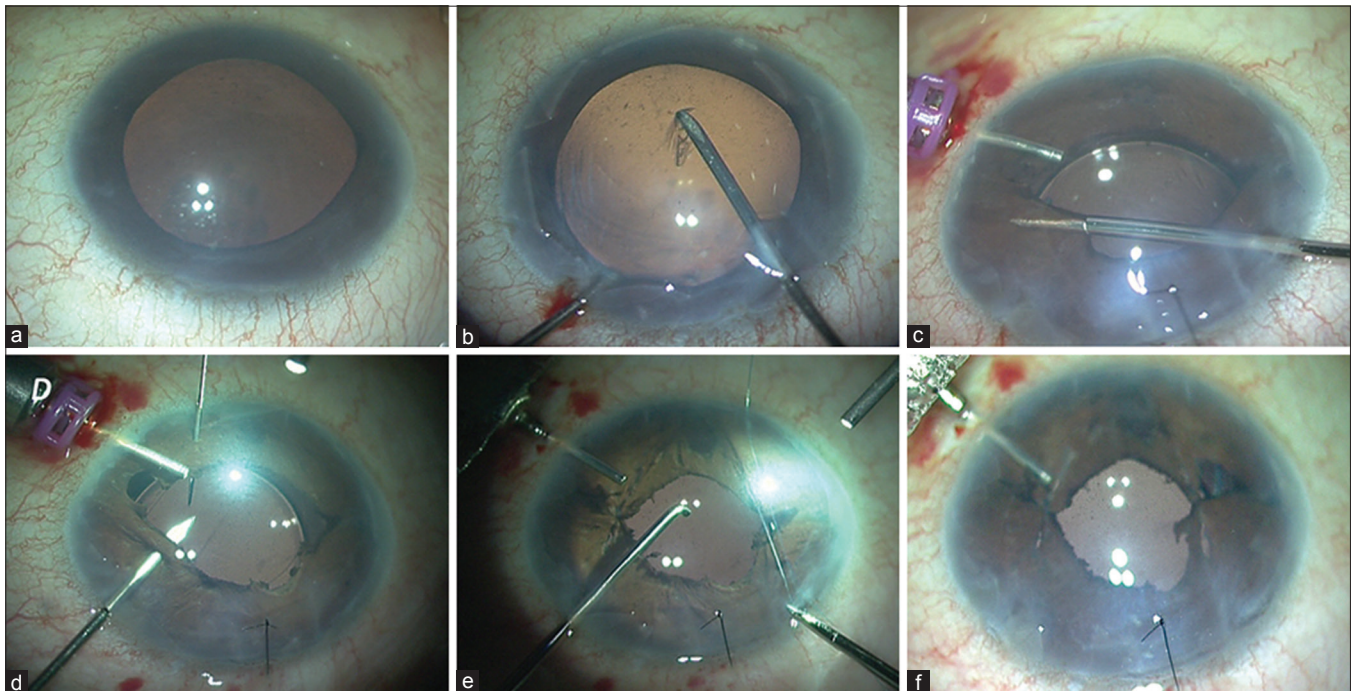


Figure 1: The combined procedure of phacoemulsification with single-pass four-throw with pre-Descemet's endothelial keratoplasty. (a) Cataract with dilated fixed pupil with corneal decompensation. (b) Capsulorhexis is initiated. (c) Intraocular lens inserted. (d) Single-pass four-throw is being performed. (e) A suture loop is withdrawn with the help of Sinskey hook and is held with an end opening forceps. (f) The suture end is passed through the loop four times and both the suture ends are pulled

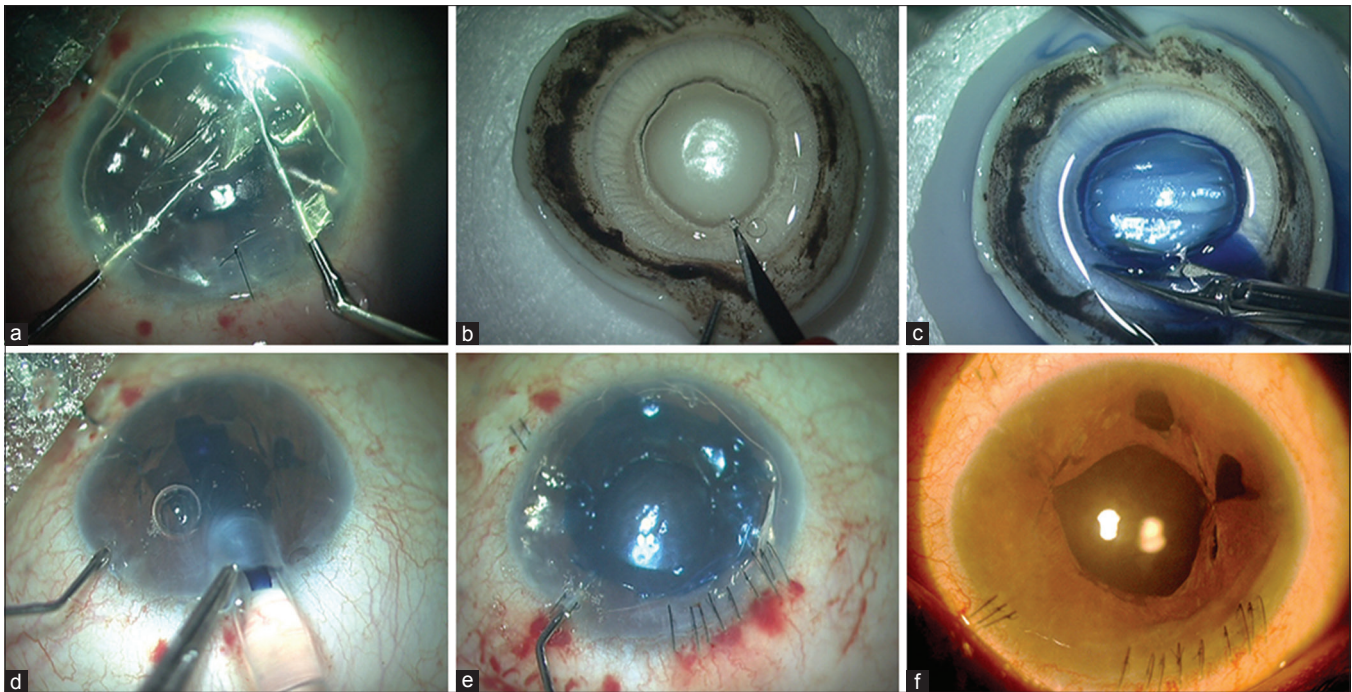


Figure 2: The combined procedure of phacoemulsification with single-pass four-throw with pre-Descemet's endothelial keratoplasty. (a) Descemetorhexis is done. (b) Type 1 bubble is formed. (c) The graft is stained with trypan blue. (d) The graft is injected. (e) The graft is unrolled using air and fluidics. (f) Postoperative image at 3-month follow-up

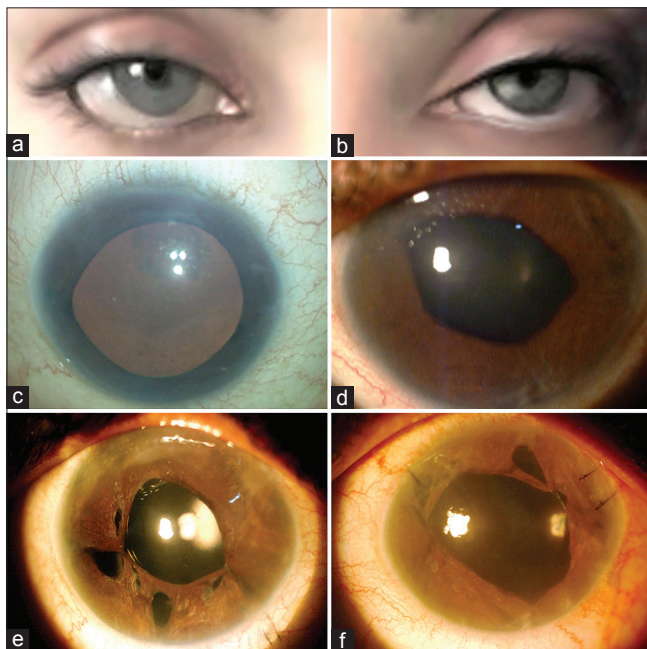


Figure 3: Clinical images of both the eyes. (a) Image of the right eye with cosmetic iris implant. (b) Image of the left eye with cosmetic iris implant. (c) Preoperative image of the right eye after removal of cosmetic iris implant. (d) Preoperative image of the left eye after removal of cosmetic iris implant. (e) Postoperative image of the right eye after triple procedure. (f) Postoperative image of the left eye

due to mechanical defects on the trabecular meshwork, due to mechanical damage to ECC, due to contact with the iris

leading to its atrophy and pigment dispersion, or due to the inflammatory reaction to the implant.

The patient presented with a persistently dilated pupil that did not constrict even after lowering of IOP with medications that can probably be attributed to the mechanical trauma of the placed iris implant and the sphincter damage due to raised IOP. SFT was performed to narrow down the pupil size and prevent photophobia in the postoperative period.

IOP was controlled within the normal range in the postoperative period without the use of IOP-reducing medications probably due to the opening of the AC angle as demonstrated on anterior segment optical coherence tomography (AS-OCT) analysis [Fig. 4a-c]. This can be attributed to the removal of the cataractous lens and also to the SFT procedure that mechanically pulls the iris from the peripheral angle.^[8] The preoperative AS-OCT image of RE could not be assessed due to immense corneal haze and hazy media. The postoperative image depicts wide anterior chamber angles in both the eyes [Fig. 4a and c]. The opening of the angles was confirmed on gonioscopy imaging too in both preoperative and postoperative period.

The severity of vision loss can be variable as it depends on various factors such as the duration of implant lying in the eye, severity of symptoms on presentation, and the duration between the symptoms and the surgical intervention and also on the type of the procedure performed. Early surgical intervention should be aimed for to minimize the complications that may ensue.

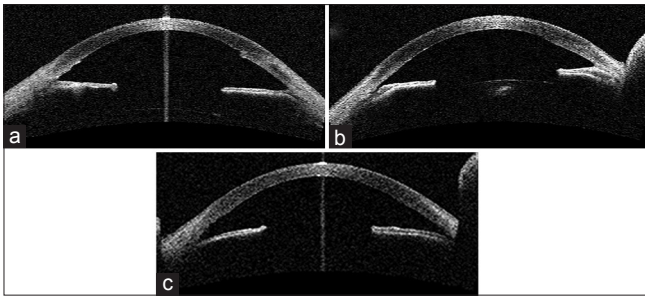


Figure 4: Anterior segment optical coherence tomography image. (a) Postoperative anterior segment optical coherence tomography of the right eye demonstrating a clear graft-host interface and wide anterior chamber angles. (b) Preoperative anterior segment optical coherence tomography demonstrating narrow anterior chamber angle in the left eye. (c) Postoperative image of the left eye demonstrating widening of the anterior chamber angle

Descemet's stripping endothelial keratoplasty and Descemet's stripping automated endothelial keratoplasty have been reported in peer-reviewed literature for overcoming corneal decompensation. We performed PDEK with the advantage that a comparatively thinner donor graft was implanted that probably leads to early resolution of the corneal edema. Second, PDEK also allows a young donor graft to be employed that probably theoretically translates into introduction of grafts with greater Endothelial cell density (ECD) counts. A trocar ACM^[9] was used in the surgery; alternatively, a routine ACM can also be employed for the same. The additional advantage with using a trocar ACM is that the tip of the cannula does not hinder with donor graft unrolling as the trocar ACM is introduced 0.5 mm away from limbus. The combined procedure can be performed as a single stage or as a two-stage procedure [Fig. 3e and f]. Taking into consideration the complications associated with cosmetic iris implants and difficulty in managing these cases with variable outcomes, the implant procedure should not be performed in eyes with normal irides. The surgeons should guide the patients appropriately and probably advocate other safer options as cosmetic contact lenses. Although the triple procedure was performed in one eye, the other eye underwent the dual procedure of phacoemulsification and SFT pupilloplasty. PDEK was not performed initially and was reserved for later stage if indicated. Yet, it is essential to state that long-term results with more cases are necessary to validate the outcomes of the procedure. Second, the procedure might not be effective for end-stage cases that develop neovascular glaucoma and severe uveitis–glaucoma–hyphema syndrome.

Conclusion

The triad of phacoemulsification with SFT and PDEK procedure helps to manage some of the possible major complications that can occur following an iris implant for cosmetic purpose.

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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