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CASE REPORT

Management of aphakia with low corneal endothelial cell count after complicated cataract surgery in a middle-age patient

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ABSTRACT

Background: secondary intraocular lens implantation becomes more challenging due to pre-existing conditions. **Objective**: To report the outcome of retropubic iris-claw intraocular lens (RP-ICIOL) to corrects aphakia with low corneal endothelial cell count following previous complicated cataract surgery. **Case**: A 32-year-old male was referred to Undaan Eye Hospital with a chief complaint of blurred vision in his left eye (LE). Previously, the patient was diagnosed with a mature subluxated cataract and has undergone cataract extraction on the LE. Visual acuity of LE was 1/60 with raised intraocular pressure (31,8 mmHg with Schiotz Tonometry). On anterior segment examination, there was a clear cornea with an oval pupil and aphakia. The examination of the posterior segment was within normal limits. Specular microscopy of LE was 1140 cells/mm2. After IOP was controlled by medication, the patient then underwent retropubic iris-claw intraocular lens implantation. Post-operatively, the visual acuity of the LE was 2/10 and the IOP was 11 mmHg using non-contact tonometry. Six weeks post-op, the best visual acuity (BCVA) was 9/10 and the IOP was 15 mmHg and the CECD was 1110 cells/mm2 on the LE. **Discussion**: The RP-ICIOL was maintaining the physiological condition of the IOL location posteriorly, thus minimizing the risk of corneal decompensation and increased postoperative intraocular pressure, while at the same time trying to achieve a good refractive outcome. **Conclusion**: The implantation of RP-ICIOL is safe and effective management of aphakia with a low corneal endothelial cell coun secondary intraocular lens implantation becomes more challenging.

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Highlights

1. When the intraocular lens is impossible to implant in the capsular bag after performing cataract surgery, it remained aphakic, and the management is debating, with several implantation methods available.
2. The RP-ICIOL was maintaining the physiological condition of the IOL location posteriorly.

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BACKGROUND

An intraocular lens is usually implanted in the capsular bag after performing cataract surgery, but in some cases for example, in subluxation lentils, traumatic lens dislocation, and zonular weakness with insufficient capsular support, this method is impossible to implant a conventional posterior chamber intraocular lens (IOL), so it remains aphakic until secondary intraocular implantation surgery is performed (Yazdani-Abyaneh et al., 2016). The management of aphakia without capsular support is still debated. Studies have described many techniques, but no consensus on the ideal method was reached.

Several lens implantation methods can be performed in aphakia cases that do not have a lens capsule support, namely angle support anterior chamber intraocular lens (AC-IOL), scleral fixed posterior intraocular lens (SF-PIOL), and iris-claw intraocular lens (IC -IOL) (Hazar et al., 2013; Vounotrypidis et al., 2019). The posterior chamber intraocular lens (PC-IOL) implantation is more advantageous than the anterior chamber lens implantation. PC-IOL lowers the corneal endothelial damage risk, better superior visual outcomes, and less damage to anterior chamber angle structures.

One of the methods of the implantation of PC-IOL in the absence of capsular support is retropubic iris claw intra-ocular lens (RP-ICIOL), which is claimed to be an effective option for aphakic correction with several advantages such as easy to implant, minimal invasive, with short operation time, and having fewer complications (Anbari and Lake, 2014; Helvaci et al., 2016; Jare et al., 2016). Secondary intraocular lens implantation becomes more challenging due to pre-existing conditions such as low corneal endothelial count and deficiency of capsular support. In this case, we report retropubic iris-claw intraocular lens implantation as a safe and efficient alternative method of placement.

OBJECTIVE

To report the outcome of retropubic iris-claw intraocular lens (RP- ICIOL) to correct aphakia with low corneal endothelial cell count following previous complicated cataract surgery.

CASE ILUSTRATION

A 32-year-old male was referred to Undaan Eye Hospital with a chief complaint of blurred vision in his left eye. In the previous hospital, the patient was diagnosed with a mature subluxated cataract and had undergone cataract extraction without intraocular lens implantation a month before. There was no history of trauma and he has a history of diabetes mellitus with controlled blood glucose in recent months (random blood glucose 175 mg/dl, HbA1C was 6.5 %) by consuming metformin 500 mg three times a day.

Vital signs and general physical examination were within normal limits. On ophthalmological examination, his left eye's visual acuity was 1/60 with raised intraocular pressure (31,8 mmHg with Schiotz Tonometry). The anterior segment evaluation of the left eye was clear cornea, deep anterior chamber, negative flare/cell, oval pupil, and aphakia lens. The examination of the posterior segment was oval optic disc, the cup and disk ratio (CDR) of the left eye was 0.4 without glaucomatous optic neuropathy (GON). Specular microscopy of the left eye showed a low corneal endothelial count (1140 cells/mm^2).

The patient was diagnosed with secondary glaucoma and aphakia in the left eye. We treated the patient with topical and oral glaucoma medication and planned to be evaluated after 2 weeks of the drug use. He got timolol Maleate 0.5% eye drop two times a day for the left eye and acetazolamide 3 x 250 mg orally. On the next visit two weeks later, the visual acuity on the right eye was 1/60 and the IOP on the left eye decreased to 15. Medical therapy of timolol Maleate 0.5% eye drops and acetazolamide oral continued for 2 more weeks. In the next visit, because the IOP was already controlled and all examinations showed normal then the patient was planned to have secondary intraocular lens implantation on the left eye.

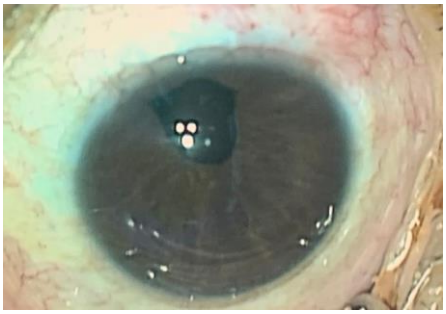

Figure 1. Pre Operative Examination

In preoperative examination carried out with an IOL Master 700, found axial length of the left eye was 25.20 mm, anterior chamber depth of 5.92 mm. Lens measurement using the SRK/T formula with target emmetropia = +16.5 Diopters, Constant 117.0. The patient then underwent retropubic iris-claw intraocular lens implantation. Retro pupillary iris claw performed under local anesthesia. The clear corneal incision tunnel was made 5.5 mm long at 12 o'clock using a crescent knife. Two parasyntheses were made at 3 and 9 o'clock wise positions and an intracameral injection of 0.5% pilocarpine. Then the anterior chamber is filled with Ophtalmic Viscosurgical Device (OVD), and anterior vitrectomy can be performed if necessary. The retropubic iris-claw intraocular lens is inserted through the scleral tunnel using holding forceps and positioned behind the iris. Then gently clamp the posterior surface of the iris in the claw section of the iris-claw intraocular lens at 3 and 9 o'clock using a Sinskey hook. All OVDs were cleaned and sutured with nylon 10.0.

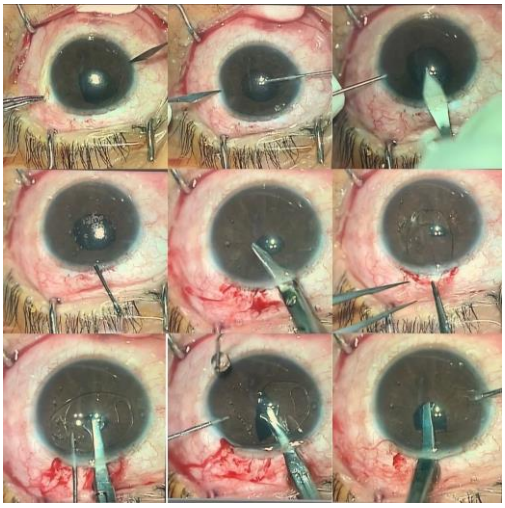

Figure 2. Clinical Photograph of RP-ICIOL implantation

The surgery went well without any obstacles. A day after the surgery, the visual acuity was 2/10 using the Snellen chart and the IOP was 11 mmHg using non-contact tonometry. On examination of the anterior segment of the right eye (Figure 3), there is a ciliary injection, tunnel is impermeable with 5 intact sutures. There is no corneal edema and descent folds. VH grade III anterior chamber depth. The patient was treated with topical antibiotic eye drops 6x1 drops on the left eye. After six weeks post-surgery, the best visual acuity (BCVA) was 9/10 and the IOP was 15 mmHg on the left eye. Specular microscopy of the left eye was 1110 cells/mm2 with a clear cornea and deep anterior chamber. Prednisolone acetate eye drops 4 x 1 drops in the left eye and artificial tears 4 x 1 drops in the left eye were given.

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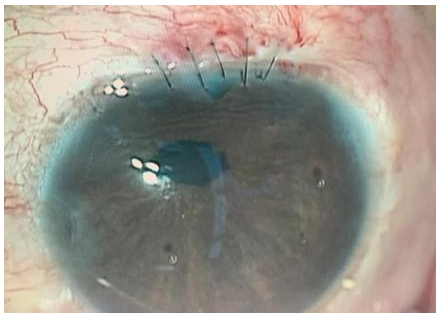

Figure 3 Post-operative condition day-1

Figure 4. Post-operative condition-week 6

DISCUSSION

Aphakia is the absence of the lens of the eye. The major symptom of aphakia was blurred vision because, without lens, the eye is out of focus which is following our patient's chief complaint. Several situations contribute to the incidence of aphakia with insufficient or absent capsular support, such as trauma, lens subluxation, IOL dislocation, capsule loss during cataract extraction, or complicated phacoemulsification for senile cataracts (Hazar et al., 2013). Based on the examination in the previous hospital, there was a mature cataract with lens subluxation on the patient's left eye. Even though the cataract has already been extracted but insufficient capsular support made it unfeasible to implant convectional IOL. Aphakia without capsular support makes it difficult for a patient to get their best vision due to capsular inability to be implanted in a conventional IOL, for this reason, there have been many surgical methods introduced to get maximum vision results such as AC-IOL, SF-IOL, and IC-IOL (Hazar et al., 2013; Vounotrypidis et al., 2019). Until now there is still no consensus stating which method of surgery is the best method, so to choose a better surgical technique to correct aphakia eyes with inadequate capsular support is still challenging.

In AC-IOL surgical technique it may be faster to perform but several studies have stated that it has a risk of endothelial cell loss which can later become corneal decompensation. A suitable size of IOL is required to maintain the position and avoid complications. Due to rotation or dislocation, a small-diameter IOL could damage corneal endothelium and anterior chamber angle, while a large-diameter IOL gives too much pressure to the root of the iris leading to damage of the anterior chamber angle, the formation of peripheral anterior synechiae, and an increase in intraocular pressure. The complication that may occur in AC-IOL implantation including chronic inflammation, corneal decompensation, cystoid macular edema, and hyphema (Brunin et al., 2017; Khan et al., 2018; Tejero et al., 2007; Woo et al., 2022).

SF-IOL has a more biological location in the eye, closer to the plane of the crystalline lens, but away from the cornea than AC-IOL, which minimizes the risk of corneal endothelial damage. However, SF-IOL has disadvantages: the method is relatively difficult, the longer duration of operation, the high possibility of causing macular edema (Madhivanan et al., 2018), and there are possibility of retinal detachment and vitreous hemorrhage may occur (Jing et al., 2017).

Iris claw intraocular lens (ICIOL) can be placed pre-pupillary (PP-ICIOL) and retro-pupillary (RP-ICIOL) (Chen et al., 2012; Touriño Peralba et al., 2018). The study conducted by Peralba et al. demonstrated that ICIOL implantation in both locations was safe for the corneal endothelium but pre-

pupillary fixation still had a small risk of endothelial touch in the shallow anterior chamber so the decrease in the number of corneal endothelial cells was greater in the prepupillary group than in the retropupil ICIOL group (Drolsum and Kristianslund, 2021; Touriño Peralba et al., 2018). The patient's corneal endothelial cell count was 1140 cells/mm2 so RP-ICIOL was chosen.

The patient was successfully treated with RP-ICIOL. Six weeks after, it showed that the best corrected visual acuity (BCVA) was 9/10 using the Snellen chart and intraocular pressure was 15 mmHg on the left eye. This condition is associated with the study by Forlini et al. stated that RP-ICIOL provides favorable visual outcomes (Forlini et al., 2015). The patient's corneal endothelial cell was also examined and the result was 1,110 cells/mm2. Endothelial Cell Loss (ECL) is one of the complications of RP-ICIOL implantation. In this case, the successful rate of ECL was 2.6%. Studies on RP-ICIOL have shown a considerable success rate in ECL ranging from 2% to 43% (Fouda et al., 2016; Gonnermann et al., 2014; Kounser et al., 2019). The successful ECL especially showed in the case of zonular dialysis (pseudo-exfoliation), vitreous loss, and hard cataracts (Thulasidas, 2021; Yazdani-Abyaneh et al., 2016).

Strengths and Limitations

Long-term follow-up needs to be done to further evaluate long-term visual acuity and complications that arise.

CONCLUSION

Retropupillary iris-claw IOL is one of the treatment choices for aphakia with inadequate capsular support and low corneal endothelium cell count. The implantation provided better refractive results and less endothelial damage because the technique was maintaining the physiological condition of the IOL location posteriorly, thus minimizing the risk of corneal decompensation and increased postoperative intraocular pressure, while at the same time trying to achieve a good refractive outcome.

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Conflict of Interest

All authors have no conflict of interest.

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None.

Author Contribution

The authors contributed to all processes in this study, including preparation, data gathering and analysis, drafting, and approval for the manuscript's publication.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his images and other clinical information to be reported in the journal. The patient understands that their names and initials will not be published and due efforts will be made to conceal their identity.

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