VISION SCIENCE AND EYE HEALTH JOURNAL

CASE REPORT

Retropupillary Iris-Claw Intraocular Lens Implantation in Aphakia Post-Endophthalmitis

Authors:
Alvi Laili Zahra[1]
Rizna Audina[1]
Dini Dharmawidhiarini[2]
Sahata P. H. Napitupulu[2]

Affiliations:
[1]Internship Doctor, Department of Ophthalmology, Rumah Sakit Mata Undaan, Surabaya, East Java, Indonesia.
[2]Lens, Cornea and Refractive Surgery Division, Department of Ophthalmology, Rumah Sakit Mata Undaan, Surabaya, East Java, Indonesia.

Corresponding author:
Alvi Laili Zahra
alvilailiz@gmail.com

Dates:
Received: 20 March 2024
Revised: 01 July 2025
Accepted: 04 July 2025
Published: 26 July 2025

DOI:
https://doi.org/10.20473/vsehj.v4i3.2025.86-90

Abstract

Introduction: Endophthalmitis is a severe eye disease. Due to the previous condition, selecting the appropriate type of secondary intraocular lens (IOL) is challenging. The Objective of this report is to describe the outcome of retropupillary iris-claw intraocular lens (RP- ICIOL) implantation to treat aphakia in patients with low corneal endothelial cell count, lack of capsular support, and a history of endophthalmitis. **Case Presentation:** A 73-year-old female patient reported experiencing hazy vision in her right eye (RE) for four months following cataract surgery. The patient had previously been diagnosed with aphakia and endophthalmitis RE and was admitted for three days. The visual acuity of the RE was 1/60. On anterior segment examination, the cornea was clear, the anterior chamber was deep, there was no flare or cell, vitreous strands were present in the anterior chamber, and the pupil was irregular with an aphakic lens. Examination of the posterior segment was within normal limits. Specular microscopy showing corneal endothelial cell density (CECD) of RE was 1086 cells/mm^2. The patient then underwent RP-ICIOL implantation. Post-operatively, the visual acuity of the RE improved to 6/25, and the intraocular pressure (IOP) was 11 mmHg, as measured using non-contact tonometry. Three months post-op, the visual acuity was 6/30, the IOP was 17 mmHg in the RE and the CECD was 1108 cells/mm^2. **Conclusions:** Good and appropriate management of endophthalmitis can save a patient's vision. Secondary iris-claw IOL implantation is a viable treatment option for aphakia following endophthalmitis, offering the advantage of maintaining the physiologic posterior position and being minimally invasive.

Keywords: retropupillary iris-claw; endophthalmitis; secondary intraocular lens; aphakia

Introduction

The typical eye surgeries performed today are cataract surgeries.[1] An intraocular lens (IOL) is typically implanted in the capsular bag following cataract surgery.[2] In some cases, it may not be possible to implant an IOL during cataract surgery, so it remains aphakic until secondary intraocular implantation surgery is performed.[3],[4]

A total of 0.65% of patients presented with post-operative aphakia. 87.1% of these cases, however, were unexpected aphakia.[5] The unexpected incidence of aphakia is associated with patients who have poor pre-operative visual acuity, older individuals, and a history of eye disease.[6] Vitreous loss and posterior capsular rupture (PCR) are intraoperative complications associated with the lens capsule that frequently result in unexpected aphakia.[7] The most serious and frightening complication of cataract surgery, which can lead to loss of vision, is acute endophthalmitis.[6] A retrospective study found that posterior capsule rupture (PCR) is one of the things that can cause acute endophthalmitis.[8]

Endophthalmitis is a severe eye condition that requires prompt and appropriate treatment.[9] Following inadequate or no treatment, endophthalmitis can progress to panophthalmitis.[10] The primary objectives of endophthalmitis treatment are the eradication or control of infection, as well as the management of inflammation.[11]

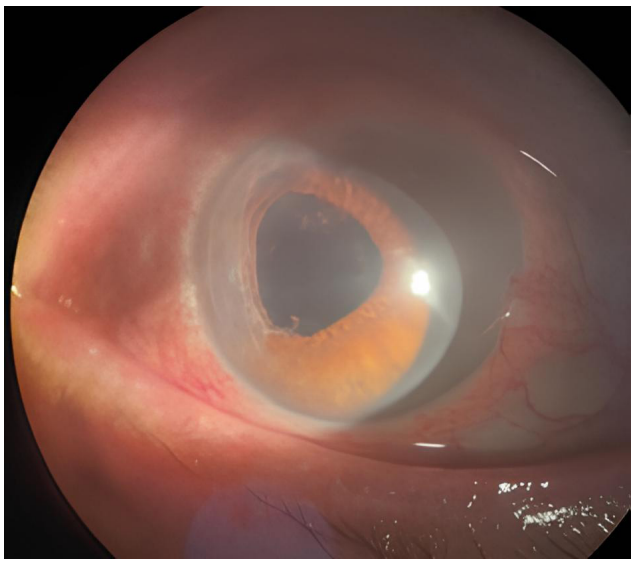

Figure 1. Pre-operative examination of the right eye (RE).

Successful treatment of endophthalmitis is based on an increase in Snellen visual acuity and resolution of infection on ocular examination.[12] Thus, when endophthalmitis has been cured, secondary IOL implantation can be performed. Aphakia is more challenging, controversial, and difficult to treat without intact capsular support. There is still no consensus on the optimal procedure, although several techniques have been described in the literature.

Aphakic patients without sufficient capsular support can be implanted with anterior chamber implantation IOL (AC-IOL), iris fixation IOL (IF-IOL), and scleral fixation IOL (SF-IOL).[13] IF-IOL may be advantageous for patients with sufficient iris support, which can be implanted either prepupillary or retropupillary.[13] Secondary IOL implantation is challenging due to the low number of corneal endothelial cells, non-intact capsular support, and a history of endophthalmitis. We present retropupillary iris-claw IOL (RP-ICIOL) implantation as a viable alternative placement method that is both safe and effective in the present case.

Case presentation

A female patient, who is 73 years old, presented with symptoms of visual impairment in her right eye (RE) for four months after cataract surgery. The complaint was not accompanied by pain or red eye. Vision was never clear after cataract surgery. The history of ocular trauma was denied. She had no history of using eye drops other than those prescribed by the ophthalmologist. The patient had a history of hypertension and diabetes mellitus. She was under regular treatment with an internist and was treated with antihypertensives and insulin.

The physical examination and vital signs were both within normal parameters. At the eye examination, RE's uncorrected visual acuity (UCVA) was found to be 1/60. Best-corrected visual acuity (BCVA) with S+8.00 C-2.00 x 170° to 6/20 using the Snellen chart. Examination of intraocular pressure using non-contact tonometry (NCT) yielded a reading of 18 mmHg. The anterior segment evaluation of RE was clear cornea, deep anterior chamber, negative flare or cell, vitreous strand in the anterior chamber, irregular pupil, and aphakic lens (Figure 1). The examination of the posterior segment revealed a round optic disc, the cup and disc ratio (CDR) of RE was 0.3 without glaucomatous optic neuropathy (GON). Specular microscopy of the RE revealed a low corneal endothelial count (1.086 cells/mm²). The patient was diagnosed with aphakia in the RE.

The patient had previously been referred to Undaan Eye Hospital for the first time on June 2023. It was five days after cataract surgery of the RE at another hospital. The RE had blurred vision and burning pain. The patient was diagnosed with aphakia and endophthalmitis RE and was admitted for three days. Systemic antibiotics (cefotaxime) and steroids (dexamethasone) were administered twice daily. Topical antibiotics (tobramycin, gatifloxacin) were given every hour. Topical artificial tears and atropine sulfate 1% were administered. The patient continued to make regular visits for three months until the inflammation had cleared up.

Since the inflammation was already under control and all examinations were regular, the patient was

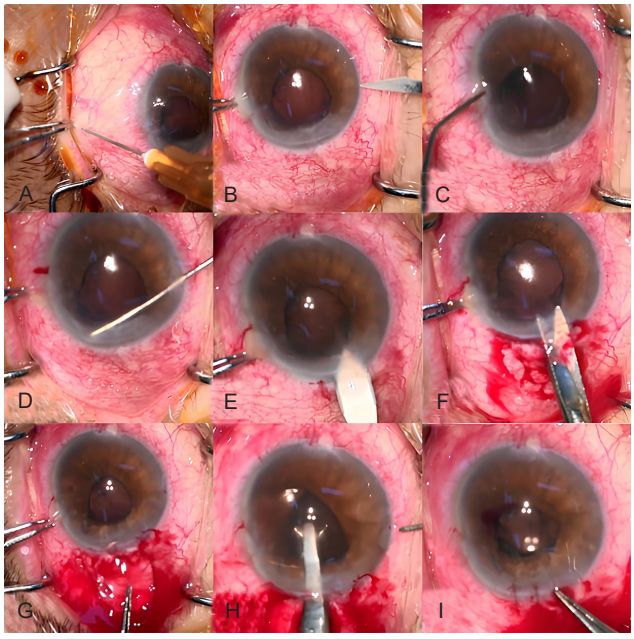

Figure 2. Retropupillary iris-claw intraocular lens implantation; (A) Iris-claw implantation was performed under subconjunctival anesthesia; (B) Two paracenteses were made at the 3 and 9 o'clock positions (clockwise); (C) The anterior chamber was filled with an ophthalmic viscosurgical device (OVD); (D) An iris spatula was used to gently trace the iris; (E) A 6 mm corneal incision was made at the 6 o'clock position using a keratome knife; (F) An anterior vitrectomy was performed; (G) The retropupillary iris-claw intraocular lens was inserted through the clear corneal incision using holding forceps and positioned behind the iris; (H) Lens enclavation was assisted with the iris spatula at the 3 and 9 o'clock positions; and (I) All OVDs were thoroughly removed, and the incision was sutured.

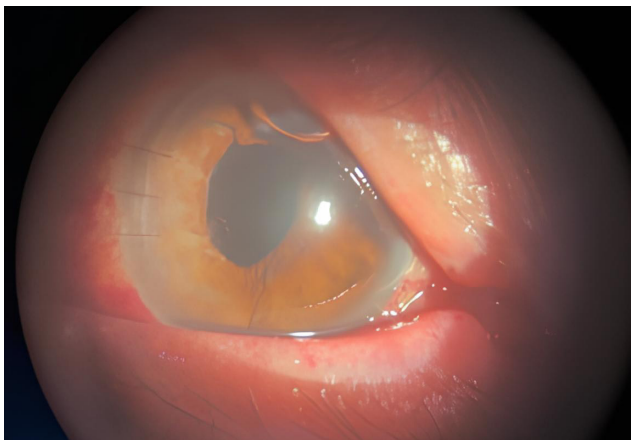

Figure 3. RE on post-operative day one.

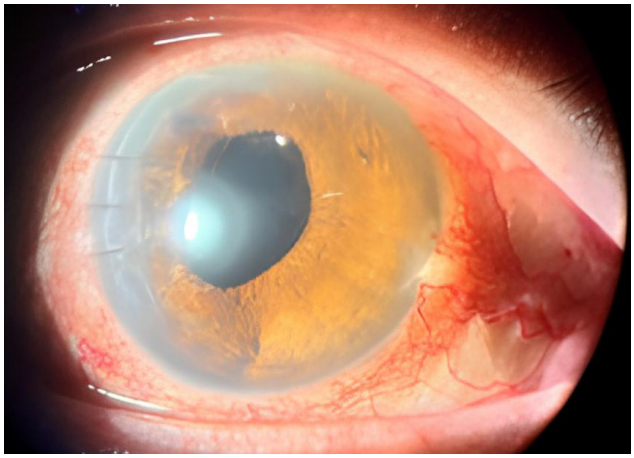

Figure 4. RE at three weeks post-operative.

scheduled for secondary IOL implantation in the RE. In the pre-operative examination carried out with immersion biometry, the axial length of the RE was found to be 24.17 mm, and the anterior chamber depth was 2.89 mm. Lens measurement using the SRK/T formula with target emmetropia +15.5 Diopters, A-constant 117.0 with immersion biometry. The patient then underwent retropupillary iris-claw intraocular lens implantation (Figure 2).

The operation proceeded smoothly without any issues. A day after the surgery, the visual acuity was 6/25 using the Snellen chart, and the IOP was 11 mmHg, as measured by NCT. On examination of the anterior segment of the RE (Figure 3), there is a ciliary injection, impermeable with three intact sutures. There is no corneal edema or Descemet's fold. The patient was treated with topical antibiotics (tobramycin) and steroids (dexamethasone) six times one drop in the RE and methylprednisolone two times 8 mg. After three months post surgery (Figure 4), the UCVA was 6/30 using the Snellen chart, and the IOP was 21 mmHg on the RE using NCT. Specular microscope showing corneal endothelial cell density (CECD) of RE after three months post-surgery was 1.108 cells/mm^2; artificial tears, 6 x 1 drops in the RE were given.

Discussion and conclusions

Acute endophthalmitis, the most severe complication associated with cataract surgery, frequently leads to profound visual impairment.[9] Currently, cataract surgery is a widespread intraocular surgical procedure.[7] During cataract surgery, certain factors can increase the risk of developing acute post-operative endophthalmitis. These include systemic diseases such as diabetes, old age, and immunodeficiency, as well as factors that occur during the procedure, including prolonged surgery time, vitreous loss, and post-operative complications.[14],[15]

Diabetes mellitus is associated with the occurrence of complications after surgery, complications that can occur are infections.[14] Insulin therapy is associated with an increased incidence of postcataract endophthalmitis in patients with type 2 diabetes mellitus compared to those who do not receive insulin treatment.[15] This is relevant to the case considering that the patient, who is 73 years old, has a medical history of insulin-treated diabetes mellitus, a condition that may increase the possibility of developing endophthalmitis.

Aphakia is characterized by the inability to focus images, so patients complain of blurred vision without correction, except for the ability to distinguish light from dark and to see shadows. A slit lamp examination confirms the diagnosis.[16] Post-operative aphakia is associated with age, comorbidities, vitreous loss, and PCR.[17] She complained of blurred vision since four months ago after cataract surgery, anterior segment examination using a slit lamp showed no lens in the patient's RE. The patient presented with a vitreous strand in the anterior chamber, temporal iris retraction, and aphakia. Vitreous strand in the anterior chamber is a sign of a ruptured posterior capsule.[16] Intraoperative PCR is a significant factor in post-cataract endophthalmitis.[6]

Ideally, IOL implantation is performed in the bag position, which is the anatomical location of the lens. However, under PCR conditions, AC-IOL, IF-IOL, and SF-IOL may be viable options. It is challenging to determine the optimal surgical technique for correcting aphakia in patients with PCR due to the lack of consensus on the most effective method.[16],[18]

IOL implantation in the anterior chamber can be performed as a management of aphakia patients without capsular support. Although AC-IOL implantation is easy and faster, problems that can occur as a result of AC-IOL implantation include problems with the structure of the angle and iris, which can lead to chronic inflammation, pseudophakic bullous keratopathy, elevated intraocular pressure, uveitis glaucoma hyphema (UGH) syndrome, corneal endothelial damage, peripheral anterior synechiae and corneal decompensation.[16] The patient

did not undergo AC-IOL due to a low endothelial cell density (1.086 cells/mm²).

The SF-IOL is also one of the implantation techniques used in cases of capsular support insufficiency.[19] In the SF-IOL technique, the lens is positioned well away from the corneal endothelium and the angle structures of the anterior chamber. However, the technique is challenging, and intraoperative time is relatively prolonged.[20] At long-term follow-up, the chance of suture degradation and its interaction with the sclera is correlated with the occurrence of suture erosion. Suture knots of the SF-IOL that are left exposed may also increase the chance of endophthalmitis. Lens dislocation, supracoroidal haemorrhage, and retinal detachment are other complications that can occur in SF-IOLs. Compared to SF-IOL implantation, iris-claw IOL implantation (IC-IOL) has a better selection time.[19]

If there is sufficient iris tissue, IC-IOL can be implanted prepupillary or retropupillary.[16] Prepupillary IC-IOL in the anterior chamber can result in CECD of 9.78% at three years and a decrease of up to 12.35% at five years. Prepupillary iris-claw lens implantation increases the occurrence of cystoid macular edema and increased intraocular pressure when compared with retropupillary iris-claw lens.[20] Meanwhile, RP-ICIOL may be an effective treatment in aphakia with a low corneal endothelial count, due to the physiological advantage of the posterior intraocular lens location.[16]

In this case, RP-ICIOL implantation was selected due to the absence of intact lens capsule support, the anticipated reduction in endothelial cell loss, the presence of intact iris tissue, and the expedited operating time compared to scleral fixation implantation. A liberty iris-claw lens (Model ICA5585) was implanted in this case. It is made of polymethyl methacrylate (PMMA), a rigid, biocompatible material commonly used for intraocular lenses, with a power of 15.50 diopters. The research presented by Liang et al.[20] showed that iris-claw implantation of RP-ICIOL resulted in beneficial visual outcomes and minimal complications in the correction of aphakic eyes with PCR. A one-year follow-up of RP-ICIOL implantation in aphakic patients reveals significant visual improvement, IOL stability, and absence of enclavation leakage.[20] In this case, follow-up after surgery was only conducted for three months. A more extended follow-up period is necessary to evaluate long-term stability and any potential complications that could arise over time.

References

[1] Chen X, Xu J, Chen X, Yao K. Cataract: Advances in surgery and whether surgery remains the only treatment in future. Adv Ophthalmol Pract Res 2021;1:100008. https://doi.org/10.1016/j.aopr.2021.100008.

[2] Lapp T, Wacker K, Heinz C, Maier P, Eberwein P, Reinhard T. Cataract surgery: Indications, techniques, and intraocular lens selection. Dtsch Arztebl Int 2023. https://doi.org/10.3238/arztebl.m2023.0028.

[3] Jing W, Guanlu L, Qianyin Z, Shuyi L, Fengying H, Jian L, et al. Iris-claw intraocular lens and scleral-fixated posterior chamber intraocular lens implantations in correcting aphakia: A meta-analysis. Invest Ophthalmol Vis Sci 2017;58:3530. https://doi.org/10.1167/iovs.16-21226.

[4] Yazdani-Abyaneh A, Djalilian AR, Fard MA. Iris fixation of posterior chamber intraocular lenses. J Cataract Refract Surg 2016;42:1707–1712. https://doi.org/10.1016/j.jcrs.2016.10.008.

[5] Gontarz K, Dorecka M, Mrukwa-Kominek E. Secondary glaucoma associated with aphakia following complicated surgery for senile cataract: A review. Klin Oczna 2022;124:1–6. https://doi.org/10.5114/ko.2021.109973.

[6] Kim SH, Yu MH, Lee JH, Kim SW, Rah SH. Endophthalmitis after cataract surgery in Korea: A nationwide study evaluating incidence and risk factors in a Korean population. Yonsei Med J 2019;60:467. https://doi.org/10.3349/ymj.2019.60.5.467.

[7] Thanigasalam T, Reddy S, Zaki R. Factors associated with complications and postoperative visual outcomes of cataract surgery: A study of 1.632 cases. J Ophthalmic Vis Res 2015;10:375. https://doi.org/10.4103/2008-322X.158892.

[8] Low L, Shah V, Norridge CFE, Donachie PHJ, Buchan JC. Royal college of ophthalmologists' national ophthalmology database, report 10: Risk factors for post–cataract surgery endophthalmitis. Ophthalmology 2023;130:1228–1230. https://doi.org/10.1016/j.ophtha.2023.07.021.

[9] Durand ML. Bacterial and Fungal Endophthalmitis. Clin Microbiol Rev 2017;30:597–613. https://doi.org/10.1128/CMR.00113-16.

[10] Pappuru RR, Dave VP, Pathengay A, Gangakhedkar S, Sharma S, Narayanan R, et al. Endophthalmitis progressing to panophthalmitis: Clinical features, demographic profile, and factors predicting outcome. Semin Ophthalmol 2018;33:671–674. https://doi.org/10.1080/08820538.2017.1416411.

[11] Verma L, Chakravarti A. Prevention and management of postoperative endophthalmitis: A case-based approach. Indian J Ophthalmol 2017;65:1396. https://doi.org/10.4103/ijo.IJO_1058_17.

[12] Xu H, Fu B, Lu C, Xu L, Sun J. Successful treatment of endogenous endophthalmitis with extensive subretinal abscess: A case report. BMC Ophthalmol 2018;18:238. https://doi.org/10.1186/s12886-018-0908-x.

[13] Vounotrypidis E, Schuster I, Mackert MJ, Kook D, Priglinger S, Wolf A. Secondary intraocular lens implantation: A large retrospective analysis. Graefes Arch Clin Exp Ophthalmol 2019;257:125–134. https://doi.org/10.1007/s00417-018-4178-3.

[14] Sun J, Guo Z, Li H, Yang B, Wu X. Acute infectious endophthalmitis after cataract surgery: Epidemiological

characteristics, risk factors and incidence trends, 2008–2019. Infect Drug Resist 2021;Volume 14:1231–1238. https://doi.org/10.2147/IDR.S304675.

[15] Silpa-Archa S, Papirachnart A, Singhanetr P, Preble JM. Risk factors for endophthalmitis after cataract surgery in diabetic patients: A case control study. Int J Ophthalmol 2019;12:417–423. https://doi.org/10.18240/ijo.2019.03.11.

[16] Randleman J, Ahmed I, editors. Intraocular Lens Surgery. 1st ed. New York: Thieme Medical Publisher; 2016.

[17] Lundström M, Brege KG, Florén I, Lundh B, Stenevi U, Thorburn W. Postoperative aphakia in modern cataract surgery. J Cataract Refract Surg 2004;30:2111–2115. https://doi.org/10.1016/j.jcrs.2004.01.044.

[18] Gurney NT, Al-Mohtaseb Z. Intraocular lens implantation in the absence of capsular support. Saudi J Ophthalmol 2022;36:157–162. https://doi.org/10.4103/sjopt.sjopt_186_21.

[19] Shahid SM, Flores-Sánchez BC, Chan EW, Anguita R, Ahmed SN, Wickham L, et al. Scleral-fixated intraocular lens implants: Evolution of surgical techniques and future developments. Eye 2021;35:2930–2961. https://doi.org/10.1038/s41433-021-01571-5.

[20] Liang I-C, Chang Y-H, Hernández Martínez AH, Hung C-F. Iris-claw intraocular lens: Anterior chamber or retropupillary implantation? A systematic review and meta-analysis. Medicina (B Aires) 2021;57:785. https://doi.org/10.3390/medicina57080785.