Case report

Optic shrinkage and retraction in opacified hydrophilic acrylic intraocular lens: an anterior segment optical CT-based observation

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Accepted 23 August 2019

SUMMARY

Intraocular lens (IOL) opacification is a rare phenomenon noted with hydrophilic acrylic IOLs. We report a case of advanced IOL opacification appreciated on anterior segment optical CT (ASOCT) as a shrunken biconcave optic retracted away from the posterior capsule (PC), unlike the other eye which had a clear biconvex IOL of similar material abutting the PC. After IOL exchange, the affected eye was noted to have more folds and Elschnig's pearls on the PC when compared with the other eye. Our case points towards rare IOL changes seen in advanced cases of opacification, their association with posterior capsular changes and the aid of ASOCT as a non-invasive tool in diagnosing them correctly.

BACKGROUND

Intraocular lens (IOL) opacification is a rare phenomenon noted with hydrophilic acrylic IOLs. It can cause significant visual deterioration necessitating IOL explantation and exchange. Anterior segment optical CT (ASOCT) is a useful modality to differentiate this condition from capsular bag distension syndrome and vitreous haemorrhage. Various histopathological and ASOCT changes have been reported in opacified IOLs. However, optic shrinkage and retraction in opacified IOLs have never been reported, and to the best of our knowledge this is the first clinicopathological case study reporting similar changes in delayed IOL opacification.

CASE PRESENTATION

A 65-year-old systemically healthy woman presented with slowly progressive diminution of vision in the right eye (RE) for 6 months. She gave history of phacoemulsification followed by implantation of single-piece hydrophilic acrylic IOL in both eyes. The patient had similar grade of cataract in both eyes, and the surgeries were done 10 years ago by the same surgeon with a time gap of 2 months (RE followed by the left eye (LE)). The surgery was uneventful in both eyes with an equal gain of vision (20/30) in both eyes. At presentation, the visual acuity was hand motion in the RE and 20/30 in the LE. Slit lamp biomicroscopic examination revealed an opacified IOL ([figure 1A](#)) that precluded examination of the posterior capsule (PC) or the posterior segment in the RE, and an optically clear IOL and normal posterior segment in the LE.

INVESTIGATIONS

B-scan was grossly anechoic in the RE. ASOCT (RTVue 1000, Optovue, Fremont, California) revealed a biconcave-shaped IOL optic with hyper-reflective deposits within its substance ([figure 1B](#)). The optic was also decreased in thickness (50 µm) and retracted away from the PC. ASOCT imaging of the other eye showed clear biconvex IOL with a thickness of 878 µm. Also, the PC was abutting the posterior surface of the IOL optic.

DIFFERENTIAL DIAGNOSIS

IOL opacification may be commonly confused with posterior capsular opacification and vitreous haemorrhage. They were ruled out in our case by a thorough slit lamp examination, anechoic ultrasound, and by the presence of IOL optic shrinkage and retraction on ASOCT.

TREATMENT

A diagnosis of RE IOL opacification was made, and after obtaining written informed consent explantation of single-piece IOL through the superior clear corneal incision followed by implantation of three-piece foldable IOL (AcrySof, Alcon Laboratories, Fort Worth, Texas) in the ciliary sulcus was carried out. Intraoperatively, the adhesions between the IOL haptics and the PC were released with the aid of Sinskey hook and the PC was found intact. No PC polishing was done to avoid inadvertent damage to the PC.

OUTCOME AND FOLLOW-UP

In the immediate postoperative period, the visual acuity was 20/40 RE (which was well maintained at 1 month), and few PC folds and Elschnig's pearls could be seen in the visual axis ([figure 2A](#)). Repeat ASOCT confirmed the presence of PC folds in the RE ([figure 2B](#)), while these were absent in the other eye. Also, there was no posterior capsular opacification (PCO) in the LE.

DISCUSSION

IOL opacification is a rare complication associated with hydrophilic acrylic IOLs. The opacification usually has a late onset, is irreversible and may be severe enough to necessitate IOL explant. It may be related to the process of manufacturing and storage of IOL or the surgical technique.^{1 2} In our case, the

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To cite: Agarwal R, Bhardwaj M, Chetan C, et al. *BMJ Case Rep* 2019;**12**:e231545. doi:10.1136/bcr-2019-231545

Figure 1 Preoperative slit lamp photograph showing intraocular lens (IOL) opacification. (A) Anterior segment optical CT through the IOL shows optic shrinkage and retraction (B).

primarily implanted IOL was a single-piece hydrophilic foldable acrylic IOL, and opacification was appreciated 10 years after primary surgery. This may point towards lack of manufacturing and storage defect of IOL in our patient.

Various other risk factors associated with delayed IOL opacification include hypertension, diabetes, glaucoma, elevated intraocular calcium concentrations or breakdown of the blood–aqueous barrier secondary to postoperative inflammation and uveitis.^{3–5} Our patient was a systemically healthy patient and reported no underlying systemic comorbidities. The presence of IOL opacification without any associated risk factors has also been previously reported by Vannadil and Sati.⁶

Numerous mechanisms have been proposed for IOL opacification. These include excess influx of water in the hydrophobic lenses, coating by substances such as capsular dyes, ophthalmic ointment/medications, silicone oil and also progressive degradation of the IOL biomaterial.^{1,2,4} Among these, the most commonly accepted cause of IOL opacification is deposition of calcium precipitates either on the surface or within the IOL substance, and the latter is considered a more severe form of IOL opacification.^{1,2,4} While histopathological examination could not be conducted in our case (as the patient desired IOL back after surgery), we believe long-standing precipitates of calcium within the IOL substance could have caused the contraction of its optic. As already discussed, this may represent an advanced form of IOL opacification and may be detrimental to the eye.

ASOCT is a useful non-invasive tool employed for the management of various corneal disorders. It has already been suggested that this modality can prevent misdiagnosis of IOL opacification as posterior capsular opacification and vitreous haemorrhage. The use of ASOCT can therefore prevent unnecessary therapeutic interventions such as capsulotomy or vitrectomy associated with misdiagnosis of opacified IOL.⁷ Not only this, as seen in our case, ASOCT performed preoperatively can also help in determining the location and density of calcified deposits in the IOL, which

can thereby aid in determining the severity of IOL opacification. Various ASOCT changes reported in opacified IOLs include hyper-reflectance on the anterior and/or posterior surface of the IOL, clear internal structure of the IOL and circular irregularity on the posterior surface of the IOL.^{3,7–9} In our case, the opacified IOL had a shrunken biconcave optic retracted away from the PC, unlike the other eye which had a clear biconvex IOL of similar material abutting the PC. Clinically these changes were missed by us and ASOCT helped us in identifying them correctly. To the best of our knowledge, such changes in opacified IOLs have never been reported to date. These changes may represent advanced forms of IOL opacification secondary to extensive calcium deposits in the IOL substance.

Although there was acceptable visual recovery after IOL exchange, clinically the PC was noted to have more folds and Elschnig's pearls in the visual axis of the involved eye compared with the other eye. These findings were also confirmed on ASOCT. We believe that coalescence of both surfaces of the optic and its shrinkage secondary to severe IOL opacification resulted in retraction of IOL optic away from the PC, thereby decreasing the barrier effect of IOL optic against lens epithelial cell migration.¹⁰ This could have resulted in PCO in the affected eye. This hypothesis may be supported by lack of similar findings in the other eye despite the presence of IOL of similar material in our case.

However, it is to be remembered that both increased rates of IOL opacification and PCO have been independently associated with postoperative inflammation and hydrophilic IOLs, and there may be chances that an advanced form of IOL opacification and formation of Elschnig's pearls in our patient could have occurred due to these common underlying factors.^{4,11} Nevertheless, it is unlikely that such asymmetrical PC changes and IOL opacification occur due to the same material in the same patient operated by the same surgeon. This may again point towards IOL opacification as a cause of PCO in the affected eye in our case. As already discussed, these changes can go easily

Figure 2 Postoperative photograph after intraocular lens exchange showing the posterior capsule folds as seen on slit lamp retroillumination (A) and on anterior segment optical CT (B).

unnoticed by clinical examination, and ASOCT may serve as a useful modality in confirming them especially in centres lacking facilities for histopathological analysis.

The definitive treatment of IOL opacification involves IOL explant/exchange, as done in our case.⁴⁻⁷ The surgery has to be performed with utmost care and caution to avoid inadvertent damage to the PC. The exchanged IOL can be placed either in the bag or the ciliary sulcus depending on the health of the bag. In our case, the IOL haptics were found adhered to the bag, and the opacified IOL was exchanged for a three-piece IOL in the ciliary sulcus. Our patient had a satisfactory and comparable gain of vision after IOL exchange. As the PC folds and opacification

did not affect our patient's vision, they were left undisturbed until 1-month follow-up.

To the best of our knowledge, this is the first case reporting optic shrinkage and contraction in an opacified IOL and correlating IOL opacification to changes in the PC. However, our study is limited by lack of histopathological evidence and mandates further studies to confirm our findings.

Acknowledgements The authors would like to thank their institute for allowing them to do this research work.

Contributors RA: manuscript writing. MB: data collection. CC: manuscript writing. NS: manuscript editing.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Patient's perspective

I had difficulty in seeing in the recent time. My doctors informed me that my lens (IOL) had become white and advised me surgery. I had IOL removed and replaced by a new IOL. I am extremely happy to regain my previous vision. I had previously heard about 'jhilli' (posterior capsule opacification) and did not know even IOLs could become white. All over, I am extremely happy to regain my vision back.

Learning points

- ▶ Intraocular lens (IOL) opacification is a rare complication associated with hydrophilic acrylic IOLs.
- ▶ Anterior segment optical CT (ASOCT) is a useful non-invasive tool that can prevent misdiagnosis of IOL opacification as posterior capsular opacification and vitreous haemorrhage.
- ▶ Advanced form of IOL opacification may be associated with shrunken biconcave optic with retraction away from the posterior capsule (PC).
- ▶ Retraction of the IOL optic away from the PC secondary to coalescence of both surfaces of the optic and its shrinkage associated with severe IOL opacification may result in posterior capsular opacification (PCO) by decreasing the barrier effect of IOL optic against lens epithelial cell migration.

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