

Twinkling Troubles – Understanding Deposits Over Hydrophilic IOLs.

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Abstract:

The Present case report highlights a rare but recognised complication of hydrophilic IOLs implantation—calcium deposits. Clinical observations of calcification of hydrogel IOLs were first reported in 1987. Multiple factors are involved in the pathogenesis like IOL material, host environment, packaging, surgical instruments such as forceps related impressions. After uneventful cataract surgery, a patient came to routine postoperative checkup at 1 month with no ophthalmological complaints. On slitlamp examination LE showed diffuse white powdery deposits over IOL. IOL explantation is the treatment of choice in visually significant IOL deposits. Since the vision is good, no surgical intervention was done in the present case. Calcium deposits on hydrophilic IOLs are a known complication that may not impact vision immediately. While no immediate treatment is necessary in this case, long-term monitoring is crucial.

Keywords: IOL, deposits, calcification, hydrophilic.

Date of Submission: 04-12-2024

Date of Acceptance: 14-12-2024

I. Case Report

A 47-year-old male patient came to the Outpatient Clinic for routine cataract surgery postoperative checkup 35 days following an uneventful Phacoemulsification surgery with hydrophilic IOL implantation in the Left eye (LE). The patient had no complaints in the LE. Vision in Right eye (RE) was 6/18 p and in LE was 6/6. On slit lamp examination [figure 1] Lids and Conjunctiva were normal, The Cornea was clear, no inflammatory cells or flare were noted in the Anterior chamber. The IOL was well centred in the capsular bag and showed diffuse white powdery deposits over it. Rhexis size was 5mm, and the anterior capsular rim covered the IOL optic. There was no PCO. Vitreous was clear and the Fundus was Normal. On postoperative Day 1 IOL is clear with no IOL deposits. Patient used postoperative regimen of ofloxacin eye drops about four times per day for 15 days and dexamethasone eye drops in weekly tapering doses. RE showed nuclear sclerosis grade 2 cataract, other Anterior segment findings were normal in RE. Patient's systemic history was unremarkable.



Figure 1 Anterior segment photograph showing fine white deposits over hydrophilic IOL.

Differential diagnosis are 1. snowflake degeneration^[1], which is a slowly progressive opacification of PMMA IOLs due to prolonged UV radiation, 2. Glistenings over IOL^[2], which are fluid filled microvacuoles that form within the IOL optic when exposed to aqueous environment, seen commonly on hydrophobic IOLs, 3. Posterior capsular opacification 4. Anterior lens epithelial cells proliferation, 5. IOL schisis, which is sharply demarcated round structure that is clear on coaxial illumination and opaque on tangential illumination and is

due to tensile stress from solvents on optic during the manufacturing process. The above findings are most probably suggestive of calcium deposits over IOL. Since the vision is good, no surgical intervention was done in this case. Calcification is due to precipitation of calcium and phosphate on IOL and is seen in hydrophilic IOLs.^[3]

II. Discussion

Calcification of an IOL is a rare multifactorial phenomenon which occurs secondary to both lens material and host environment factors and starts at the surface progressing into the lens matrix.⁴ Based on clinical and microscopic findings of more than 400 explanted IOLs, Neuhann et al identified 3 major types of IOL calcification: (1) primary IOL calcification due to a variety of reasons including improper formulation of the polymer, IOL fabrication, faulty packaging, forceps related impressions and certain viscoelastic substances; (2) secondary calcification which most likely occurs due to an abnormal milieu such as blood-aqueous barrier dysfunction; and (3) pseudo calcification in which other pathology is mistaken for calcification. Since there was no evidence of underlying systemic disease or blood-aqueous barrier dysfunction in the patient presented, the IOL calcification may be regarded as a primary phenomenon in our case.

The prevalence of IOL opacification three years after implantation of Hydroview IOLs (Bausch & Lomb, Rochester, USA) was reported to be 14.5% while 21.8% of eyes with opacification were asymptomatic.⁵ Both early and delayed-onset IOL calcifications have been reported. Bucher and coauthors⁶ described calcification of an IOL one day after surgery. In another report, IOL calcification occurred 4 to 26 months after cataract surgery.⁷ The time to opacification presentation was 1 month in our patient during routine 1 month postoperative follow-up and the patient was asymptomatic at the time of presentation. Yu et al⁷ reported a maximum of 10 Snellen lines of visual loss (mean loss of 2.8 Snellen lines) in eyes with calcified hydrogel IOLs. There was no decline in visual acuity in our case at the time of presentation. The presence of calcium on explanted IOLs can be confirmed by staining with Alizarin red and von Kossa.⁸ Energy dispersive X-ray spectroscopy (EDS) on the internal substance of the opacified IOLs and optical coherence tomography (OCT) have recently been reported as new methods for detecting calcification of hydrogel IOLs.⁹ To our knowledge, no microorganism has ever been reported in calcified IOLs.¹⁰

In our case, diagnosis of calcium deposits is made by differentiating from other IOL deposits clinically by slit lamp. Differential diagnosis includes 1) Snowflake degeneration which is rare progressive PMMA IOL opacification from UV radiation, unlikely here as patient has a hydrophilic IOL 2) Glistenings which are fluid filled microvacuoles in hydrophobic IOLs, unlikely due to diffuse, powdery nature of deposits in present study 3) Posterior capsular opacification: common post cataract surgery complication, ruled out here as the posterior capsule was clear 4) Anterior lens epithelial cells proliferation: migratory cells can form pearls or fibrous plaques, not consistent with present case 5) IOL Schisis: Stress related structural changes within the optic, visible as sharply demarcated round patterns, not observed in this patient. The most likely diagnosis is calcium deposits over hydrophilic IOLs characterised by diffuse white powdery deposits on the optic surface due to calcium phosphate precipitation most common in hydrophilic IOLs.

The limitation of present study was IOL cannot be stained with Alizarin red and von Kossa as the vision was 6/6 at the time of presentation and IOL was not explanted for staining. IOL calcification is an uncommon indication for IOL exchange, with only a few case reports.¹¹ Meticulous dissection of the IOL from the capsular bag with a viscoelastic material is the key to successful explantation. Intraoperative complications include rupture of the posterior capsule and zonular dehiscence. In our case since the patient was asymptomatic, surgical intervention was not required. However close follow-up is advisable to monitor for any progression.

III. Conclusion

IOL calcification is a rare but recognised complication of hydrophilic which is diagnosed by staining methods of explanted IOL. In the present case, no staining was done as there is no decline in the vision and explantation of IOL was not done. Diagnosis in the present case is done clinically by differentiating from other differential diagnosis. Other upcoming techniques for diagnosis include Energy dispersive X-ray spectroscopy (EDS) and OCT. This is a rare but recognised complication of hydrophilic IOL.

References

- [1] Apple DJ, Peng Q, Arthur SN, Werner L, Merritt JH, Vargas LG, Hoddinott DS, Escobar-Gomez M, Schmidbauer JM. Snowflake Degeneration Of Polymethyl Methacrylate Posterior Chamber Intraocular Lens Optic Material: A Newly Described Clinical Condition Caused By Unexpected Late Opacification Of Polymethyl Methacrylate. *Ophthalmology*. 2002 Sep;109(9):1666-75. Doi: 10.1016/S0161-6420(02)01122-3. Pmid: 12208715.
- [2] Werner L. Glistenings And Surface Light Scattering In Intraocular Lenses. *J Cataract Refract Surg*. 2010 Aug;36(8):1398-420. Doi: 10.1016/J.Jcrs.2010.06.003. Pmid: 20656166.
- [3] Neuhann IM, Kleinmann G, Apple DJ. A New Classification Of Calcification Of Intraocular Lenses. *Ophthalmology*. 2008 Jan;115(1):73-9. Doi: 10.1016/J.Ophtha.2007.02.016. Epub 2007 May 11. Pmid: 17498804.
- [4] Buchen SY, Cunanan CM, Gwon A, Weinschenk JI 3rd, Gruber L, Knight PM. Assessing Intraocular Lens Calcification In An Animal Model. *J Cataract Refract Surg*. 2001;27(9):1473-1484. Doi:10.1016/S0886-3350(01)00842-2.

- [5] Balasubramaniam C, Goodfellow J, Price N, Kirkpatrick N. Opacification Of The Hydroview H60m Intraocular Lens: Total Patient Recall. *J Cataract Refract Surg.* 2006;32(6):944-948. Doi: 10.1016/J.Jcrs.2006.02.047.
- [6] Bucher Pj, BüchiEr, DaickerBc. Dystrophic Calcification Of An Implanted Hydroxyethylmethacrylate Intraocular Lens. *Arch Ophthalmol.* 1995;113(11):1431-1435. Doi:10.1001/Archoph.1995.01100110091031
- [7] Yu Ak, Kwan Ky, Chan Dh, Fong Dy. Clinical Features Of 46 Eyes With Calcified Hydrogel Intraocular Lenses. *J Cataract Refract Surg.* 2001;27(10):1596-1606. Doi:10.1016/S0886-3350(01)01038-0
- [8] Apple Dj, Werner L, Escobar-Gomez M, Pandey Sk. Deposits On The Optical Surfaces Of Hydroview Intraocular Lenses. *J Cataract Refract Surg.* 2000;26(6):796-797. Doi:10.1016/S0886-3350(00)00517-4
- [9] Hatou S, Inoue M, Kurosaka D, HidaYr, Shinoda K, Oguchi Y. Evaluation Of Calcification Of A Hydrogel Intraocular Lens By Optical Coherence Tomography. *J Cataract Refract Surg.* 2004;30(7):1590-1592. Doi: 10.1016/J.Jcrs.2003.11.048
- [10] Apple Dj, Rabb Mf. *Ocular Pathology: Clinical Applications And Self-Assessment.* St Louis: Mosby;1998.
- [11] Fernando Gt, Crayford Bb. Visually Significant Calcification Of Hydrogel Intraocular Lenses Necessitating Explantation. *ClinExpOphthalmol.* 2000;28(4):280-286. Doi:10.1046/J.1442-9071.2000.00331.