Calcification of a hydrophilic acrylic intraocular lens: Clinicopathological report

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A 72-year-old man who had phacoemulsification with implantation of an Akreos Adapt Advanced Optics (AO) IOL in the left eye complained of blurring vision 4 months postoperatively. Multiple fine white granules were found within the IOL. Intraocular lens exchange was performed at 7 months, and the explanted IOL was sent for histopathological analysis. Diffuse fine white granules were seen within the explanted IOL material just beneath the surface; they were stained positive by alizarin red and the von Kossa method. Scanning electron microscopy confirmed the presence of calcium deposits in the IOL material. Blood and aqueous were drawn from the patient for biochemical analysis, and the results were normal. We believe this is the first clinicopathological report of calcification of the Akreos Adapt AO IOL.

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Calcification of intraocular lenses (IOLs) is an uncommon complication of IOL implantation following cataract extraction. Over the past decade, reports have documented the formation of calcium deposits on IOLs intraoperatively[1] or immediately or late postoperatively. The condition was initially reported in IOLs made of hydroxyethyl methacrylate and silicone,[2,3] but an increasing number of cases report calcification of hydrophilic acrylic IOLs.[4–10]

We report a case of late postoperative calcification of an aspheric hydrophilic acrylic IOL. The calcified IOL was explanted because of the decrease in visual acuity and sent for histopathological analysis.

CASE REPORT

A 72-year-old man with a history of ischemic heart disease, hypertension, and gout presented in July 2007 complaining of progressive blurring of vision in the left eye. The patient's medical conditions were under optimal control. He had a history of anterior uveitis involving the left eye in April 2005, which was controlled with rimexolone 1% (Vexol) eyedrops.

Uneventful phacoemulsification with implantation of an Akreos Adapt (Bausch & Lomb) +19.5 diopters (D) IOL had been performed in the right eye in June 2006. There were no postoperative complications, and the IOL was clear. Phacoemulsification was performed by the same surgeon in the left eye in late March 2007. Fortified balanced salt solution (BSS Plus) was used as the irrigating solution and sodium hyaluronate 3% (Vitrax) as the ophthalmic viscosurgical device (OVD). The surgery was complicated by a small posterior capsule rupture and was managed accordingly. An Akreos Adapt Advanced Optics (AO) +20.0 D IOL was implanted in the bag. Inferior subluxation of the IOL was noticed 3 weeks postoperatively, and the IOL was repositioned and placed in the sulcus without further complication.

On presentation in 2007, the best corrected visual acuity (BCVA) in the left eye was 6/30. Slitlamp examination showed a stable IOL in the sulcus with multiple white fine granules in two thirds of the superficial area of the IOL material (Figure 1). Both the posterior capsule and the retinal details were visible. The anterior chamber was quiet with no signs of inflammation. The IOL in the right eye was clear.

The patient initially opted for conservative management and was given rimexolone 1% eyedrops. The visual acuity in the left eye continued to deteriorate, and in early October 2007, the BCVA dropped to 6/36. The patient then agreed to an IOL exchange involving explantation of the opacified IOL and implantation of a new IOL. The surgery was performed in mid-October 2007. A small amount (about 0.3 mL) of aqueous was withdrawn and sent for biochemical analysis. The entire IOL was removed as one piece, and a new one (AR40e, Advanced Medical Optics) was implanted in the sulcus. Blood was drawn from the patient at the same time and sent with the aqueous for various biochemical tests.

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The Division of Clinical Biochemistry, Queen Mary Hospital, Hong Kong, performed the biochemical analysis of the aqueous fluid.

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Figure 1. Slitlamp photograph of the opacified IOL in vivo.

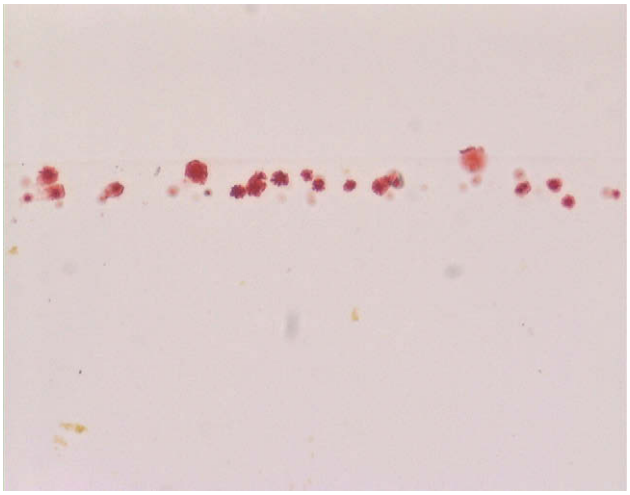

Figure 3. Deposits stained with alizarin red (original magnification ×300).

The explanted IOL was immediately fixed in neutral buffered formalin and sent for histopathological tests. A new Akreos Adapt AO IOL was sent with the explanted IOL as a control. At the laboratory, the explanted IOL was bisected, half stored, and half serially sectioned. After gross examination and serial section, the specimen was processed in the usual way for paraffin embedding. The control acrylic IOL was also embedded. Standard 4 µm sections were cut and stained with hematoxylin and eosin, von Kossa, alizarin red, Perls, rhodanine, and periodic acid-Schiff with diastase stains.

Histopathological analysis of the explanted IOL showed fine white granules of 1 to 6 µm in the superficial substance beneath the IOL surface, up to 0.1 mm deep. No deposit was detected on the external IOL surfaces anteriorly or posteriorly (Figure 2). The deposits in the IOL matrix showed a positive response to alizarin red stain (Figure 3) and the von Kossa method (Figure 4), suggesting that the deposits were calcium and phosphate. The deposits were also tested for copper, iron, and mucoprotein, which were negative. Staining of the control IOL was negative.

The remaining half of the IOL was examined under scanning electron microscopy. Foci of calcium and phosphorous, confirmed by x-ray microanalysis, were seen in the IOL material on the cut side. Essentially, there was no deposit on the IOL surface.

Aqueous analysis was performed using a blood gas analyzer (Rapidlab 1265, Bayer HealthCare) for pH and the Vitros 950 chemistry analyzer (Johnson & Johnson) for other measurements. The aqueous showed a pH of more than 8.0 and 1.3 g/L protein, 1.36 mmol/L calcium, 0.94 mmol/L phosphate, 191.0 µmol/L urate, and 3.7 mmol/L glucose. Laboratory results including complete blood analysis, liver and renal function tests, uric acid level, and random glucose were normal. Arterial blood gas showed a pH of 7.376. There were 69 g/L protein (reference range 65 to 78 g/L), 2.21 mmol/L calcium (range 2.10 to 2.60 mmol/L), 1.04 mmol/L inorganic phosphorous (range 0.8 to 1.5 mmol/L),

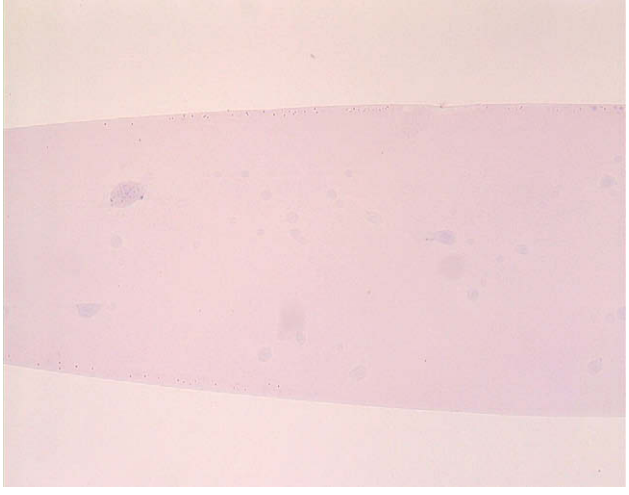

Figure 2. Granular deposits found beneath the anterior and posterior surfaces of the IOL. (original magnification ×40).

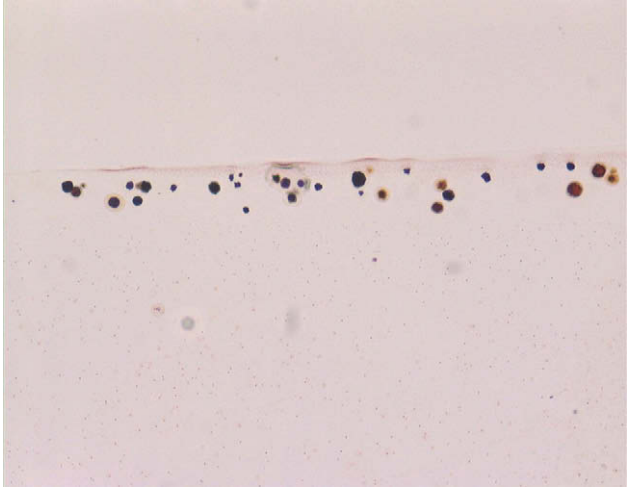

Figure 4. Deposits stained blue-black with the von Kossa method (original magnification ×300).