

A case of hypermature cataract formation following implantation of an implantable collamer lens with an Aquaport

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Dear Editor,

To improve humor circulation the latest V4c Visian implantable collamer lens (ICL) was designed with a 0.36-mm Aquaport^[1-2]. This design also eliminates the need to perform peripheral iridectomy before ICL implantation. Several authors reported rates of secondary surgical intervention related to insufficient vault in the presence or absence of cataract formation and excessive vault in the presence or absence of elevated intraocular pressure (IOP) after ICL insertion^[1]. Here, we report a case of rapid progression of a cataract to a hypermature state after implantation of an ICL with an Aquaport.

A 29-year-old man, who had undergone implantation of bilateral ICLs with an Aquaport at another eye clinic 4mo earlier, was referred to our hospital with a complaint of progressive blurring of vision in the left eye. The white-to-white diameter of his left eye by caliper was 12 mm and the size of implanted ICL was 12.6 mm. The ICLs had been inserted at a superior corneal incision. Uncorrected distance visual acuity (UDVA) in both eyes was 20/20 on postoperative day 7, and his medical records showed no intraoperative surgical complications.

On his initial visit to our clinic, the right eye had normal vision and no cataract formation. The best spectacle-corrected visual acuity (BCVA) in the left eye was 20/50, and slit-lamp examination showed an anterior subcapsular opacity and swelling of the lens. The vaulting of the ICL was three quarters of the corneal thickness in the right eye and one quarter in the left eye. The Aquaport was well centered in the right eye and ICL was decentered inferonasally and in a vertical position in the left eye. The anterior chamber was clear in both eyes (Figure 1). Figure 2 shows the Pentacam Scheimpflug image of left eye. After one month, the subcapsular opacity progressed rapidly to a hypermature cataract in the left eye and the ICL was rotated to 60 degrees from the horizontal meridian (Figure 3). There was flare of 1+ in the anterior chamber of the left eye. BCVA was determined by hand motion. We immediately performed cataract surgery and removed the ICL and inserted an Acri LISA[®] (Carl Zeiss Meditec., Oberkochen, Germany) intraocular lens under the anterior capsule with staining by indocyanine green (ICG) dye in the left eye. The lens capsule under ICG staining was intact and no perforation was observed. On the first postoperative day, UDVA was 20/25 and uncorrected near visual acuity (UNVA) was J2. The pro-inflammatory cytokine interleukin 6 (IL-6) in the anterior chamber that was obtained during surgery was 69.6 pg/mL by ELISA (normal values, 0-46 pg/mL). Slit-lamp examination demonstrated whitish infiltrates on the ICL surface (Figure 4). At 3mo after surgery, UDVA was 20/20 and UNVA was J2. There was no inflammatory reaction in the anterior chamber. Several studies of ICLs with Aquaport reported low postoperative complication rates compared with conventional ICLs due to the possible flow of the aqueous humor through the Aquaport^[3-5]. In a literature review of 2592 eyes, the occurrence of cataract formation with the latest ICL models without Aquaport was 5.2%^[6]. Most cataracts were reported as nonprogressive or slowly progressive and asymptomatic and were placed under surveillance.

The patient who presented at our clinic had a cataract that rapidly progressed to the hypermature state within 1mo. Five months earlier he had ICL with Aquaport implantation in both eyes. Rapid progression cataract within 1mo has not been reported even in conventional ICL cases. According

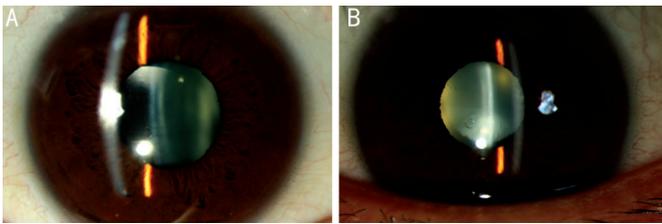


Figure 1 Slit lamp findings of right (A) and left (B) eyes at initial visit.

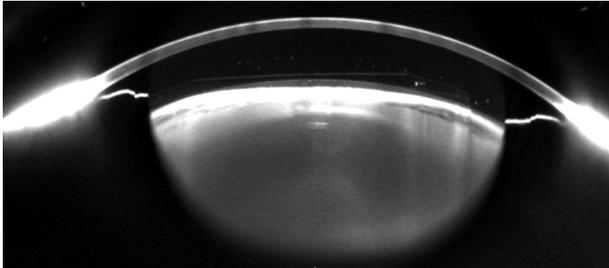


Figure 2 Pentacam Scheimpflug image of left eye.

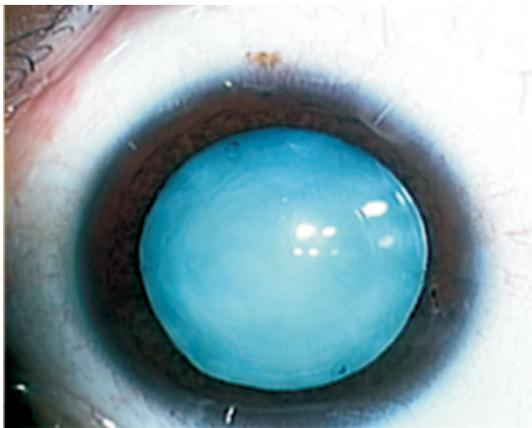


Figure 3 Hypermature cataract at surgery.

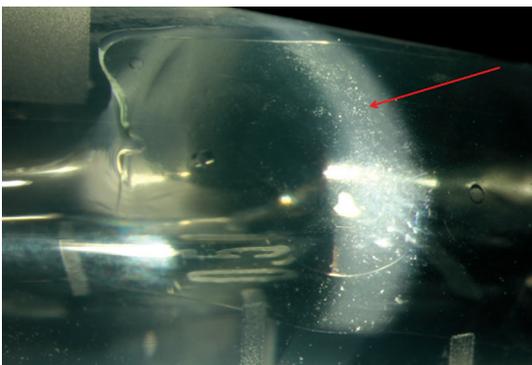


Figure 4 Whitish infiltrates on explanted ICL surface by slit lamp microscopy.

to the patient's medical records, the preoperative anterior chamber depth was 3.05 mm and there were no intraoperative complications such as the lens touching the cornea or intraoperative bleeding due to inadequate manipulation. Gradual subcapsular opacity and swelling of the lens was detected at presentation. During cataract surgery, the lens capsule was shown to be intact under ICG staining, indicating no penetrating trauma to the lens capsule when the ICL was implanted.

The reason for the rapid cataract progression in an eye with an ICL and Aquaport is not clear. A low vault and decentration of an Aquaport might lead to disturbances in the aqueous flow, interfering with lens nutrition and causing metabolic disturbances to the crystalline lens^[6-7]. Although Aquaport improve circulation of aqueous humor to the anterior surface of the crystalline lens, the rapid flow might lead to rapid progression of cataracts, especially in low vaulting cases. Kawamorita *et al*^[2] showed that the flow velocity 0.25 mm in front of the center of the crystalline lens was 1.52×10^{-1} mm/s for an ICL with an Aquaport and 1.21×10^{-5} mm/s for a conventional ICL. Finally, a decentered Aquaport might prevent adequate circulation of the aqueous humor and increase the pro-inflammatory cytokine IL-6 in the anterior chamber and whitish infiltration on the ICL surface.

This case of rapid progression of a cataract in a patient with an ICL with an Aquaport shows the need for close monitoring to detect rapid progression of cataracts after ICL implantation.

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