Total Opacification of Intraocular Lens Implant After Uncomplicated Cataract Surgery: A Case Report

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Abstract
The introduction a few years ago of hydrophilic acrylic intraocular lenses (IOLs) a few years ago constituted a major advance in the field of Cataract Surgery. These lenses have become increasingly popular, thanks to the ease with which they can be folded and implanted in the capsular sac through a small incision; their good medium and long-term tolerance attributable to the great biocompatibility of the material employed; and the ease with which YAG laser capsulotomy can be performed where required, without damaging the lens and thus minimizing certain complications. Different models have been developed, generally offering good short- and middle-term vision performance, though little is known of their potential long-term results and complications. These complications include opacification of IOLs, which has been recognized for several years. Most reported cases have been late opacification of hydrophilic acrylic IOLs. Opacification reduces visual acuity (VA) and it requires some intervention. We report the clinical history and management of a case of progressive opacification in hydrophilic yellow acrylic IOLs.

Keywords: Hydrophilic acrylic intraocular lenses, Explantation, Opacification

Introduction
The opacification of hydrophilic acrylic IOLs is a serious complication of unknown etiology, with the only effective treatment being lens explantation and replacement, preferably involving a lens of some different material.

Since the incidence of lens clouding is much greater among diabetics, we consider that such patients should be subjected to more frequent and prolonged follow-up, particularly if they are wearing lenses for which opacification has been documented in the literature. On the other hand, caution is required with new lenses, avoiding their generalized use until they have successfully passed the test of time. Implantation should moreover be avoided in young patients with known risk factors (diabetes associated with retinopathy, uveitis), since these eyes are more prone to blood–aqueous barrier rupture following surgery, with increased postoperative inflammation.

Case Report
A 52 year old man had uneventful left eye phacoemulsification with a posterior chamber hydrophilic, 360 degree square edge yellow foldable IOL implantation in October 2016 in our hospital. Best-corrected visual acuity (BCVA) preoperatively was 6/60 OS. Postoperative BCVA in December 2016 was 6/9 OS with a quiet eye. The patient was discharged. This patient came again 15 months later in March 2018 in our OPD with blurred vision of about 6 months duration, which was progressive in nature. The BCVA was FC close to face with PL/PR accurate in all quadrants. Anterior segment was WNL on slit lamp examination. Posterior segment was not visualized due to total opacification of the lens. The IOP was 17.3 mm Hg by Shiotz tonometer in both eyes. After full dilation of pupil, total opacification involving the optics and both haptics was diagnosed (Figure 1). The patient didn’t give any history of Yag laser capsulotomy. After all routine investigations including USG B Scan, which was normal, the patient was scheduled for IOL exchange.

The IOL was explanted through a small incision like cataract surgery. After visco-separation of foldable IOL from the capsular bag, the lens was removed carefully with IOL holding forceps (Figure 2). The capsular bag was the site for the new lens. The patient had an IOL exchange with a rigid posterior chamber PMMA IOL through a small incision in March 2018 without any intraoperative complications (Figure 3). Gross (macroscopic) analysis of the explanted IOL showed that the IOL optic was completely opacified. When the IOL came in contact with external environment outside the eye after explantation, it became yellow (Figure 4). Opacification had begun to involve both haptics. 

Figure 1: Total opacification of the IOL
Discussion

The number of IOL implantations is growing daily worldwide, but fortunately, complications related to foldable acrylic IOL itself are rare. Each IOL is manufactured from a different copolymer acrylic material. Loss of IOL transparency is a potential problem that results in gradual deterioration of vision. Therefore, this clinical problem must be considered when evaluating the long-term biocompatibility of the lens material. Changes in the IOL material have been reported as fogging or glistening. Glistening is related to the formation of vacuoles inside the lens body because of raised temperature beyond the glass transition temperature and water entrance to the vacuoles. As a result, glistening is related to thermal effects inside the lens rather than structural changes. In our case, no evidence of glistening of the lens was detected.

Protein absorption to the IOL surface is another cause of opacification. There is a hypothesis that immunological response of the eye (Antigen-antibody complexes) would bring on proteins to the IOL.

UV radiation is harmful to the retina and for protection, UV-C radiation (200-290 nm) is absorbed in the cornea, UV-B radiation (290-320 nm) is absorbed by the lens capsule and UV-A radiation (320-400 nm) is absorbed by stroma of the lens. By removing the lens, eye loses one of the protection filters and the manufactured IOLs have a UV-blocking agent for this purpose. This blocking is much higher in some IOLs and the origin of opacification can be aging process of the UV-blocking agent. This may be the reason of opacification in our case.

One major cause of IOL opacification can be calcification. The formation of calcium deposits consisting of calcium phosphate salts may be attributed to the fact that aqueous humour is supersaturated with calcium crystalline. Calcification may be on the outer surface or in the inner part of the IOL.

Calcium content of normal aqueous humour is low and is half of the serum level. Any cause of a localized increase in calcium and phosphorus may result in dystrophic calcification which can be derived from residual cataractous lens material and inadequate cortex cleaning during cataract surgery. Biological calcification is the deposition of calcium phosphate salts on tissues of living organisms. Calcification occurs on foreign surfaces such as implants as well as vessel walls after a long contact because of a supersaturated phenomenon in the biological fluids and formation of nucleus and crystals of calcium phosphates. Super saturation of aqueous humour may be the mechanism of crystalline lens late calcification. Previous studies reported IOL discoloration after exposure to intraocular dye. Such exposure did not occur in our case. Systemic diseases such as diabetes were implied in the pathogenesis of IOL calcification but the mechanism is not clear whether changes in blood aqueous barrier is responsible for the phenomenon or there is another mechanism. We did not find any probable predisposing factors in our case but the possibility of an induced mechanism, such as a metabolic imbalance, cannot be ruled out. No attempt has been made to determine whether one particular material or design of IOL is better than the other but the surgeons that use a special type of IOL should be alert about the complications and secondary interventions that may be needed. Further investigations on calcification process in different types of IOL will improve safety and efficacy of IOLs and special care must be taken to avoid nucleation of mineral deposits on the surface of IOL. It is important for the surgeons to know the possible complications of implanted IOLs. However the mechanism of some IOL opacifications is not really understood but this cannot be generalized to all IOLs used in the field of cataract surgery. Surgical intervention for removal of IOLs is required in cases of vision threatening opacification. The technique is usually
hazardous and challenging due to the tight adherence of the IOL to the capsular bag. Cutting the haptics before removal of the opacified IOL is sometimes required. Careful removal of implanted IOL from pre-existing capsulorrhexis is a critical step during surgery and minimum traction on the capsule would reduce the risk of zonular dehiscence or posterior capsule rupture. Complications include zonular dehiscence, rupture of the posterior capsule and corneal decompensation.

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