

Case report

# Transient intraocular lens opacification during phacoemulsification surgery

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## Abstract

**Purpose:** To report an interesting case of intraoperative opacification of intraocular lens (IOL).

**Methods:** This study is a report of a 61-year-old male patient who suffered from nuclear sclerosis cataract and had undergone phacoemulsification surgery. During surgery, intraoperative opacification of IOL (Cristal, Cristalens), which was a foldable, 13 mm, one piece, square edge and hydrophilic acrylic IOL, occurred. This phenomenon caused a surprise and a decision to explant the IOL, but the surgeon decided to keep the IOL in place. After a day, it was completely clear.

**Results:** The surgery was completed successfully without any complications, and the IOL was completely clear the day after surgery.

**Conclusion:** Acute, transient IOL opacification with unproven etiology may occur during cataract surgery.

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**Keywords:** Intraocular lens; Phacoemulsification; Discoloration; Opacification

## Introduction

Each year, about 6 million cataract surgeries with intraocular lens (IOL) implantation are accomplished.<sup>1</sup> Since its development by Sir Harold Ridley, IOL implantation into the human eye during this surgery has been an enormously successful procedure,<sup>2</sup> and the success rate is rarely seen in other implanting foreign material processes of medicine.<sup>3</sup> However, like any other surgery, this method has its own complications, one of which is IOL opacification or discoloration which could happen intraoperatively or postoperatively. Different causes such as the patient's related conditions, the manufacturing course, and the process of IOL storage, the surgical technique, or sometimes a combination of these factors may lead to clinically significant opacification. The lack of information about these different mechanisms of IOL opacification may enforce surgeons to do unnecessary surgical procedures, such

as neodymium:YAG (Nd:YAG) posterior capsulotomies, vitrectomies, or even sometimes IOL explantation.<sup>1</sup>

Here, we report an interesting case of intraoperative opacification of IOL which caused a surprise during surgery and a decision to explant the IOL. However, the surgeon decided to put the IOL in place, and after a day, it was completely clear.

## Case report

A 61-year-old male was admitted to Shahid Rajaei Hospital, Daran, Isfahan University of Medical Sciences, Iran in December 2017 with the chief complaint of decreased visual acuity since several months before. His ocular examination finding included best corrected visual acuity of 3 m counting fingers for both eyes (Snellen chart), and ocular surface, fundus examination, and intraocular pressure were normal. In slit-lamp examination, nuclear sclerosis cataract was found in both eyes, which induced severe myopic shift (right eye refraction was  $-4.5, -1.00 \times 10$  and the left eye was  $-5.00, -0.75 \times 165$ ).

According to the findings, we decided to perform the phacoemulsification surgery with  $+19.5$  D IOL implantation.

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On the day of surgery, the weather was snowy, and the temperature was about  $-10^{\circ}\text{C}$ . The IOL was stored in the hospital storage room (outside the hospital) in the  $-10^{\circ}\text{C}$  temperature and was brought immediately before surgery. The fluid around the IOL was macroscopically clear, and it was not frozen. After phacoemulsification and complete cortical material removal with irrigation/aspiration probes, the anterior chamber was filled with ocular viscoelastic material (Ocucoat<sup>®</sup>, Bausch + Lomb) consisted of 2% hydroxypropyl methylcellulose solution. After that, the IOL (Cristal<sup>®</sup>, Cristalens, France) which was a foldable, 13 mm, one piece, square edge and 25% hydrophilic acrylic IOL was injected into the eye via a 3.2 mm corneal incision. Surprisingly, the IOL optic discolored to milky white immediately after entering into the anterior chamber (one haptic was still out of the eye) (Fig. 1). After several seconds, its color changed to dense white. At first, we decided to explant the IOL (because it was not positioned completely in the capsular bag), and so the main incision was opened more. However, according to the appearance of the lens and the absence of any visible material or deposition, we decided to put the IOL in the posterior chamber capsular bag and wait for future changes before explanting of the IOL. So after positioning of the IOL, the anterior and posterior chambers were completely irrigated for removal of the viscoelastic material, and the main corneal wound was sutured with two 10-0 Nylon sutures.

One day after surgery, the patient was evaluated. Ocular surface examinations were normal except mild conjunctival hyperemia and mild corneal edema (Fig. 2). Fortunately, the IOL was completely clear and the patient's visual acuity was about 7/10. Topical ciprofloxacin and betamethasone drops were prescribed every 6 hours.

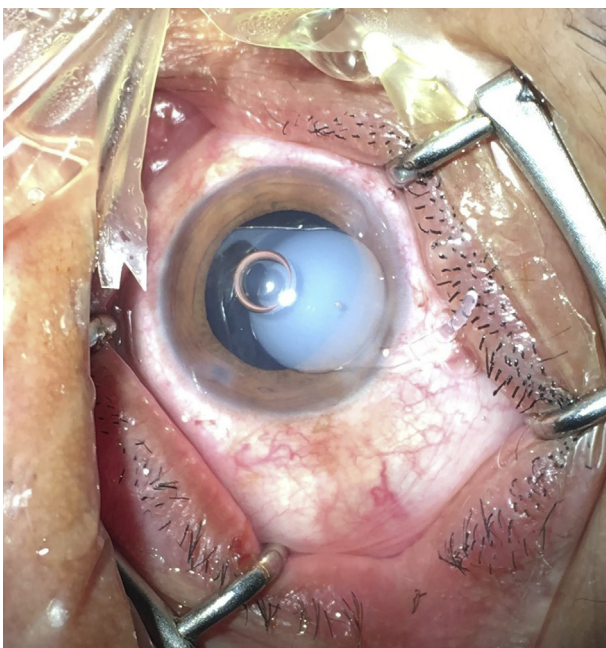


Fig. 1. Intraocular lens (IOL) opacification during the surgery.

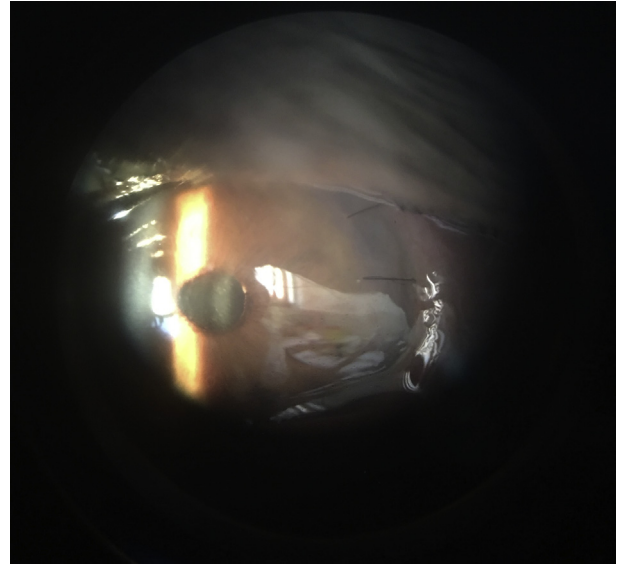


Fig. 2. The day after surgery, the intraocular lens (IOL) was clear.

The patient was followed for 1 week for possible complications, but everything was in normal range, and the patient's visual acuity was 9/10. After that, the patient was followed for about 1 month. In follow-up visits, the patient's eye was completely normal. The patient was satisfied, and the drops were discontinued gradually. After about 2 months, the corneal sutures were removed, and the patient was admitted again for the other eye cataract surgery, which was completely successful with no opacification.

Written informed consent was obtained from the patient before surgeries and also for publication of this case report and any accompanying images.

## Discussion

IOL opacification or discoloration which could happen intraoperatively or postoperatively is known as an important complication of cataract surgery. The causes of this phenomenon were evaluated in previous studies. According to these studies, the opacification could be categorized according to its position, its timing, and also its cause.

Based on its position,<sup>3,4</sup> IOL opacification could be classified as: anterior (such as anterior capsule opacification<sup>5</sup> or silicone oil adherence<sup>6</sup>); surface changes on the optical piece of IOLs (such as calcification of the Bausch & Lomb Hydroview IOL<sup>7</sup>); changes within the IOL [such as disintegration of ultraviolet absorber material<sup>8</sup> or glistening of the AcrySof IOL<sup>9</sup> or Snowflake alteration of polymethyl methacrylate (PMMA) IOL<sup>10</sup>]; between IOLs (such as opacification between piggyback IOLs<sup>11</sup>); and posterior to the IOL [such as posterior capsule opacification (PCO)<sup>12</sup>].

Based on the time of IOL opacification, it could be categorized into intraoperative, early postoperative, and late postoperative types. Any of these categories has its own specific causes. According to our case, in which an intraoperative

“within the lens” opacification occurred, we focused on intra and early postoperative types.

The main cause of intraoperative IOL opacification is known to be the crystalline deposits on IOL surfaces. Several studies reported intraoperative opacification. Jensen et al.<sup>13</sup> mentioned the formation of crystalline deposits, which lasted a long time and had a significant effect on visual acuity, on the surface of IOLs during cataract surgery in 11 patients. The authors assumed that the phosphate constituents of the ophthalmic viscosurgical device (OVD) preparation could be reacted with calcium in the irrigating solutions or the aqueous humor and precipitated onto the IOL surfaces, especially silicone IOLs. In another study, calcium-containing depositions on the IOL was reported.<sup>14</sup> The third study reported two cases of single-piece hydrophobic acrylic IOL (SA60AT, Alcon), significant surface deposits during implantation, and immediately after injection. In this study, the presence of components that may be a normal part of OVD preparations or normal protein components of the anterior chamber found during surgery, such as hemoglobin and albumin, were reported. Also, it may be possible that the OVD itself dried out and precipitated on the IOL while still inside the cartridge or residues from the cartridge coating deposited on the IOL.<sup>15</sup>

The causes of early postoperative opacification could be summarized as follows: early opacification of silicone IOLs by hydration, IOL interaction with capsular dyes, and IOL coating with ophthalmic ointments like antibiotic/steroid ointments and pilocarpine gel.<sup>1</sup>

In this study, we assumed that storing of IOL in low temperature (−10 °C), and its sudden injection into the eye (37 °C) may temporarily cause it to become discolored. After a time, its status changed to the original color. The IOLs were stored in the storage room outside the hospital, and the staff brought the one that they did not have in the operation room stock from this storage room immediately before surgery. Therefore, we recommend that providing the IOL before surgery and slowly raising the temperature to room temperature before implantation may prevent this phenomenon. One study was also suggested that acute opacification may occur due to rapid temperature change, and in this situation, there is no need to replace the IOL.<sup>16</sup> This and some other studies mentioned the storage conditions.<sup>1,16</sup> Most IOLs are surrounded in semi-permeable packages to permit sterilization by ethylene oxide. Storage facilities which are sprayed with aerosolized volatile chemicals may unintentionally present

chemicals through packages and onto the IOLs and may cause changes in the IOL.<sup>1</sup>

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