

Microscopic analysis of an opacified OFT CRYL[®] hydrophilic acrylic intraocular lens

Análise microscópica de uma lente intraocular acrílica hidrofílica OFT CRYL[®] opacificada

BRUNA VIEIRA VENTURA^{1,2}, KYLE DOUGLAS MACLEAN³, WAGNER LIRA¹, DANIELE MENDES DE OLIVEIRA¹, CAMILA VIEIRA VENTURA¹, LILIANA WERNER³

ABSTRACT

A 51-year-old patient underwent posterior vitrectomy with perfluoropropane gas injection, phacoemulsification, and implantation of an Oft Cryl[®] hydrophilic acrylic intraocular lens (IOL) because of traumatic retinal detachment and cataract in the right eye. On the first postoperative day, gas was filling the anterior chamber because of patient's non-compliance in terms of head positioning, and was reabsorbed within one week. Eight months later, the patient returned complaining of a significant decrease in vision. IOL opacification was noticed by slit-lamp examination. The lens was explanted to undergo gross and light microscopic analysis. The lens was also stained with the alizarin red method for calcium identification. Light microscopic analysis confirmed the presence of granular deposits, densely distributed in an overall circular pattern in the central part of the lens optic. The granules stained positive for calcium. This is the first case of the opacification of this type of hydrophilic lens. Surgeons should be aware of this potential postoperative complication, and the use of hydrophilic IOLs should be avoided in procedures involving intracameral gas because of the risk of IOL opacification.

Keywords: Vitrectomy; Intraocular lens; Lens implantation; Hydrophilic contact lens; Capsule opacification

RESUMO

Uma paciente de 51 anos foi submetida à vitrectomia posterior com injeção de gás perfluoropropano, facoemulsificação e implante de lente intraocular (LIO) acrílica hidrofílica Oft cryl[®] devido a descolamento traumático da retina e catarata. No primeiro dia pós-operatório, o gás estava ocupando a câmara anterior pois a paciente não manteve o decúbito ventral restrito, tendo sido absorvido ao longo de uma semana. Oito meses depois, a paciente retornou com baixa da acuidade visual. Ao exame foi evidenciado opacificação da lente intraocular. A lente foi explantada e submetida à análise macroscópica e sob microscopia óptica. Também, foi corada pelo método de vermelho de alizarina, que identifica cálcio. A análise sob microscopia óptica evidenciou depósitos granulares, densamente distribuídos em padrão circular na parte central da óptica da lente intraocular, que coraram positivo para cálcio. Esse é o primeiro relato de opacificação dessa lente hidrofílica. Os cirurgiões devem estar atentos para esta potencial complicação pós-operatória.

Descritores: Vitrectomia; Lentes intraoculares; Implante de lente intraocular; Lentes de contato hidrofílicas; Reoperação; Remoção de dispositivo; Opacificação da cápsula; Microscopia; Relatos de casos

INTRODUCTION

Postoperative optic opacification of hydrophilic acrylic intraocular lenses (IOLs) has a multifactorial origin, including factors related to IOL manufacturing, patient metabolic and ocular conditions, and surgical techniques and adjuvants used⁽¹⁾. Recently, opacification associated with the presence of gas or air in the anterior chamber has been reported⁽²⁻⁹⁾.

Since 2005, the single-piece hydrophilic acrylic Oft Cryl[®] IOL (Oft Vision, São Paulo, Brazil) has been largely used in Brazil; however, no case of lens opacification has been reported in the peer-reviewed scientific literature. The purpose of this study was to report data from microscopic analysis of the first case of opacified Oft Cryl[®] IOL occurring in a patient who presented with gas in the anterior chamber in the early postoperative period of phacoemulsification and posterior vitrectomy with perfluoropropane gas injection.

CASE REPORT

A 51-year-old female patient presented with cataracts in both eyes (OU), and traumatic retinal detachment in the right eye (OD). She had no known associated systemic diseases. In November 2013, she underwent an uneventful posterior vitrectomy with perfluoropropane gas injection, endolaser, phacoemulsification, and Oft Cryl[®] IOL (Lot 27113; Serial number 205039031T) implantation in OD at the Altino

Ventura Foundation, Recife, Brazil. The patient was non-compliant in terms of head positioning, and on the first postoperative day the gas was filling the anterior chamber, being reabsorbed within a week. On April 2014, the patient underwent an uneventful phacoemulsification in the left eye (OS) by the same surgeon with an Oft Cryl[®] IOL (Lot 10B14; Serial number 210072454T) implantation. Her postoperative best-corrected visual acuity (BCVA) was 20/100 in OD and 20/20 in OS.

Eight months after OD surgery, the patient returned with decreased vision in OD. Her spectacle-corrected visual acuity (SCVA) was counting fingers at 50 cm in OD and 20/20 in OS. Slit-lamp examination revealed haziness of the IOL in OD and no alterations in OS. The lens in OD was explanted and sent to the Intermountain Ocular Research Center (John A. Moran Eye Center, University of Utah, USA) in the dry state. A hydrophobic acrylic Type 7B (Alcon, Inc., Forth Worth, USA) IOL was implanted in the capsular bag. There were no intraoperative or postoperative complications. The patient's final BCVA in OD was 20/40.

LABORATORY ANALYSIS

Gross examination was performed and gross pictures were recorded using a digital camera (D40 with a 55 mm lens, Nikon Corp., Tokyo, Japan). The unstained specimen was evaluated and photographed under a light microscope (Olympus Optical Co., Ltd., Tokyo, Japan).

Submitted for publication: May 19, 2015
Accepted for publication: October 1, 2015

¹ Fundação Altino Ventura (FAV) - Recife, PE, Brazil.

² Hospital de Olhos de Pernambuco (HOPE) - Recife, PE, Brazil.

³ Intermountain Ocular Research Center, John A. Moran Eye Center, University of Utah, Salt Lake City (UT), USA.

Funding: No specific financial support was available for this study.

Disclosure of potential conflicts of interest: None of the authors have any potential conflict of interest to disclose.

Corresponding author: Bruna V. Ventura. Fundação Altino Ventura (FAV). Rua do Progresso, 71 - Recife, PE - 50070-020 - Brazil - E-mail: brunaventuramd@gmail.com

The specimen was then rinsed in distilled water, immersed in 1% alizarin red solution (a special stain for calcium) for 20 minutes, rinsed again in distilled water, and reexamined under the light microscope.

Gross laboratorial analyses of the explanted IOL showed a localized round area of whitish discoloration in the central part of the lens optic, within the pupillary and anterior capsulorrhexis margins (Figure 1 A). Light microscopy revealed the presence of granular deposits within the area of gross whitish discoloration, densely distributed in an overall circular pattern (Figure 1 B). The granules were present on the anterior surface and subsurface of the lens, and stained positive for calcium (Figures 1 C and 1 D).

DISCUSSION

Previous papers have described cases of IOL opacification in hydrophilic acrylic IOLs from different manufacturers⁽²⁻¹¹⁾. However, to the best of our knowledge, this is the first peer-reviewed report on Oft Cryl® IOL opacification. Microscopic analysis of the opacified lens revealed calcium granular deposits on the surface and subsurface of the lens.

Similarly to the pattern seen in the Oft Cryl® IOL, calcification within the pupillary and anterior capsulorrhexis margins has been described in eyes in which gas or air 1) was injected intracamerally to treat Descemet's membrane detachment, to aid in graft adherence in endothelial transplants; 2) was injected to treat hypotony following trabeculoplasty; or 3) went into the anterior chamber after injection in the vitreous cavity to treat retinal detachment and ocular hypotony⁽²⁻⁸⁾. In these lenses, calcium granules were also found on the surface and subsurface of the IOLs.

Werner et al.⁽²⁾ proposed three possible explanations for IOL calcification after procedures involving intracameral air or gas: 1) direct contact between the IOL surface and the exogenous gas/substance;

2) intracameral metabolic change because of the presence of an exogenous gas/substance; and 3) exacerbated inflammatory reaction after multiple surgical procedures. The formation of calcium deposits appears to depend both on the material of the IOL and on the local chemical microenvironment of the aqueous humor⁽¹²⁾. The Oft Cryl® IOL is composed of a poly-hydroxyethylmethacrylate copolymer. The first two hypotheses can possibly explain the etiology of the Oft Cryl® IOL opacification observed in the present case because the characteristically round area of whitish discoloration on the center of the IOL optic suggests that the presence of the gas in the early postoperative period was a determining trigger of calcium deposition. Furthermore, our patient had no associated systemic disease, intraoperative complication, or significant or persistent postoperative inflammation that could justify IOL calcification. In addition, the Oft Cryl® IOL implanted in OS did not opacify throughout the follow-up period.

Since 2012, approximately 26,300 Oft Cryl® IOLs have been implanted at Altino Ventura Foundation in eyes with no co-morbidities, eyes undergoing combined phacoemulsification and vitrectomy, and eyes subject to combined phacoemulsification and trabeculectomy or endothelial transplants. This was our first case of opacification. Thus, this IOL should not be discredited based on the current report, which supports the hypothesis that intracameral gas can act as a trigger of hydrophilic lens calcification⁽²⁻⁹⁾. Together with previous articles⁽²⁻⁹⁾, the present report suggests that hydrophilic IOLs should be avoided in eyes that require procedures associated with intracameral presence of air or gas.

In conclusion, microscopic analysis of the opacified Oft Cryl® IOL showed calcium deposits on the anterior surface/subsurface of the lens optic, restricted to the pupillary and anterior capsulorrhexis margins. This suggests that opacification was triggered by intracameral gas in contact with the IOL in the early postoperative period.

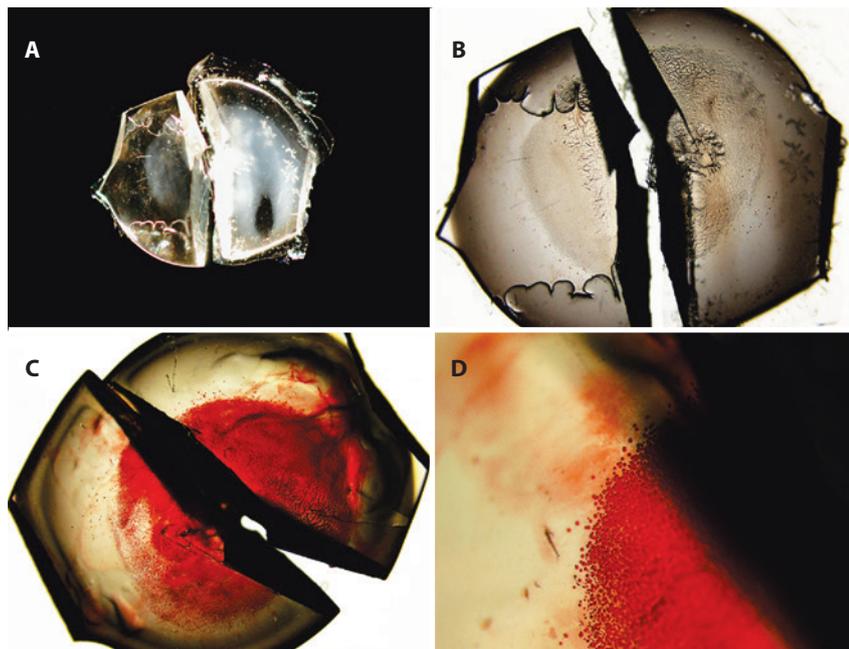


Figure 1. Gross photograph and light photomicrographs of the explanted lens. A) Gross photograph showing central opacification of the lens optic in a round configuration, with a diameter of approximately 4.0 mm. B) Light photomicrograph of the unstained specimen, showing granular deposits in the center of the optic as well as dry viscoelastic material (original magnification, $\times 20$). C and D) Light photomicrographs showing positive (red) staining of the granules after staining with alizarin red (original magnification, $\times 20$ and $\times 100$, respectively).

REFERENCES

1. Werner L. Calcification of hydrophilic acrylic intraocular lenses. *Am J Ophthalmol.* 2008;146(3):341-3. Comment in: *Am J Ophthalmol.* 2008;146(3):395-403.
2. Werner L, Wilbanks G, Nieuwendaal CP, Dhital A, Waite A, Schmidinger G, et al. Localized opacification of hydrophilic acrylic intraocular lenses after procedures using intracameral injection of air or gas. *J Cataract Refract Surg.* 2015;41(1):199-207.
3. Dhital A, Spalton DJ, Goyal S, Werner L. Calcification in hydrophilic intraocular lenses associated with injection of intraocular gas. *Am J Ophthalmol.* 2012;153(6):1154-60.
4. Saeed MU, Singh AJ, Morrell AJ. Sequential Descemet's membrane detachments and intraocular lens haze secondary to SF6 or C3F8. *Eur J Ophthalmol.* 2006;16(5):758-60.
5. Werner L, Wilbanks G, Ollerton A, Michelson J. Localized calcification of hydrophilic acrylic intraocular lenses in association with intracameral injection of gas. *J Cataract Refract Surg.* 2012;38(4):720-1.
6. Fellman MA, Werner L, Liu ET, Stallings S, Floyd AM, van der Meulen IJE, et al. Calcification of a hydrophilic acrylic intraocular lens after Descemet stripping endothelial keratoplasty: case report and laboratory analyses. *J Cataract Refract Surg.* 2013;39(5):799-803.
7. Patryn E, van der Meulen IJ, Lapid-Gortzak R, Mourits M, Nieuwendaal CP. Intraocular lens opacifications in Descemet stripping endothelial keratoplasty patients. *Cornea.* 2012;31(10):1189-92.
8. Neuhann IM, Neuhann TF, Rohrbach JM. Intraocular lens calcification after keratoplasty. *Cornea.* 2013;32(4):e6-e10.
9. Schmidinger G, Pemp B, Werner L. [Opacification of an intraocular lens: calcification of hydrophilic intraocular lenses after gas tamponade of the anterior chamber]. *Ophthalmologe.* 2013;110(11):1066-8. German.
10. Tsinopoulos IT, Lamprogiannis LP, Tsaousis KT, Dimitrakos SA. Imaging characteristics of delayed surface calcification in hydrophilic intraocular lens models. *Int Ophthalmol.* 2013;33(5):601-4.
11. Ventura BV, Ventura M, Werner L, Santhiago MR. Calcium deposits on hydrophilic acrylic intraocular lenses. *J Cataract Refract Surg.* 2013;39(1):142-3.
12. Gartaganis SP, Kanellopoulou DG, Mela EK, Panteli VS, Koutsoukos PG. Opacification of hydrophilic acrylic intraocular lens attributable to calcification: investigation on mechanism. *Am J Ophthalmol.* 2008;146(3):395-403. Comment in: *Am J Ophthalmol.* 2008;146(3):341-3.

Simpósio Internacional do Banco de Olhos de Sorocaba

27 a 29 de outubro de 2016

Sorocaba - SP

Informações:

Tel.: (15) 3212-7077

E-mail: sinbos@bos.org.br