

Case Report

# Secondary implantation of implantable collamer lens (ICL) for correction of anisometropic hyperopia in a 3-year-old pseudophakic child



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## Abstract

We report the first case of secondary implantation of implantable collamer lens (ICL) for correction of anisometropic hyperopia in a 3-year-old pseudophakic child. The ICL implantation was considered in our patient due to parental noncompliance for contact lens and spectacles use for one year. In terms of efficacy, the preoperative refractive error of +7.00–1.75 diopter (D) reduced to +1.00–1.75 D. The uncorrected distance visual acuity (UDVA) significantly improved from 20/400 (preoperatively) to 20/50 (postoperatively). In terms of safety, after an uneventful implantation surgery, the ICL was well tolerated, and remained well centered, with no serious postoperative complications encountered over a 22-month follow-up.

**Keywords:** Implantable collamer lens (ICL), Anisometropia, Amblyopia, Pseudophakia, Children

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## Introduction

Despite growing number of intraocular lens (IOL) power calculation formulas, there is no evidence that these formulas have good predictive accuracy in pediatrics, whose eyes are still undergoing rapid growth and refractive changes.<sup>1</sup> High anisometropia after cataract surgery in children may lead to amblyopia and disruption of binocular fusion. Therefore, strict compliance with spectacle correction or, ideally, contact lens therapy is essential for successful amblyopia treatment and restoration of sensory binocular fusion.<sup>2</sup> In some instances, the conventional therapy may fail because of the child/parental noncompliance. Hence, other means of correction are needed. In this report, we describe the first case of secondary implantation of implantable collamer lens (ICL;

STAAR Surgical) for correction of pseudophakic anisometropia in a child.

## Case report

In November 2012, a 2-year-old healthy boy underwent cataract surgery for a unilateral total cataract in the right eye (RE). Preoperatively, the axial length determined by contact method was 21.59 mm in the RE and 20.99 mm in the left eye (LE). Lensectomy, posterior capsulotomy, anterior vitrectomy, and posterior chamber IOL implantation were performed uneventfully. An AcrySof IQSN60WF IOL (Alcon Laboratories Inc.) of 20.5 diopter (D) was used for an intended refraction of +4.00 D using the SRK-II formula.

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One month after the surgery, a hyperopic error of +6.25–1.75 D was observed in the operated RE; refraction in the LE was +1.5–2.25 D. Rehabilitation with contact lens and spectacles failed because of parental noncompliance.

The patient was lost to follow-up and returned at the age of 3 years (on June 2013) for examination. Uncorrected distance visual acuity (UDVA) measured with Sheridan Gardiner chart was 20/400 in the RE and 20/63 in the LE. Cycloplegic refraction of the RE was +7.00–1.75 D and +1.25–1.00 D in the LE. Slit-lamp examination of the RE revealed mild opacification of the peripheral anterior and posterior capsules. In the LE, mild lens opacity started to develop.

For reversal of the anisometropic hyperopia, posterior chamber IOL explantation was considered to be a high-risk procedure because of the capsular fibrosis. After discussing the issue with the child's parents, the secondary implantation of ICL (STAAR Surgical, Nidau, Switzerland) in the RE was considered to be the better option. Preoperative biometric measurements including anterior chamber depth of 3.52 mm, central corneal thickness of 479  $\mu\text{m}$ , and keratometric (K) values ( $K_1 = 43.5$  D and  $K_2 = 45.5$  D) were obtained using Pentacam (Oculus Optikgeräte GmbH, Wetzlar, Germany). The white-to-white distance of the limbus was 11.5 mm (measured with calipers).

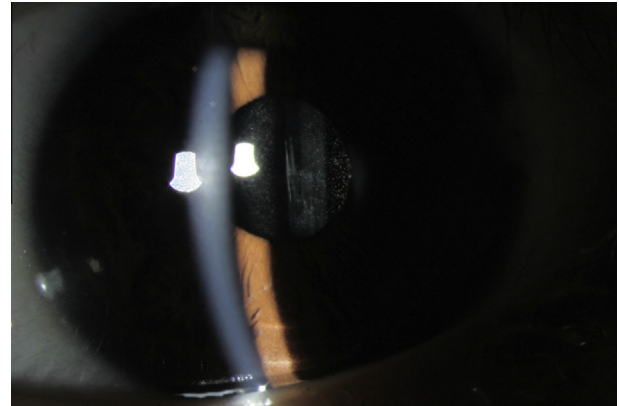
Under general anesthesia, two superior and inferior paracentesis incisions were performed, and a cohesive viscosurgical device (Microvisc 1%; Bohus BioTech AB, Sweden) was injected into the anterior chamber. A temporal clear corneal 2.7-mm incision was created to inject the ICL. After insertion of the lens, the four haptics were placed under the iris. Viscoelastics were then irrigated using the Simcoe's cannula, and the correct positioning of the ICL was verified. A small superior peripheral iridectomy was performed at the end of procedure. Finally, the wound was closed with two interrupted 10–0 nylon sutures.

The implantation surgery was uneventful. Because parents were more compliant postoperatively, part-time occlusion of the LE one month after the procedure was begun. After surgery the patient has undergone multiple examinations under anesthesia, which revealed a well positioned IOL, clear cornea, deep anterior chamber and an intraocular pressure ranged from 13 to 18 mmHg. 22-months later, UDVA of the RE improved to 20/50, and the cycloplegic refraction was +1.00–1.75 D. The ICL was well tolerated, and remained well centered, with no serious postoperative complications encountered (Fig. 1). Anterior segment Scheimpflug-enhanced images (Pentacam) showed good ICL vaulting (Fig. 2). During this period parents were compliant for part time occlusion to the LE, with improvement of vision during follow-ups.

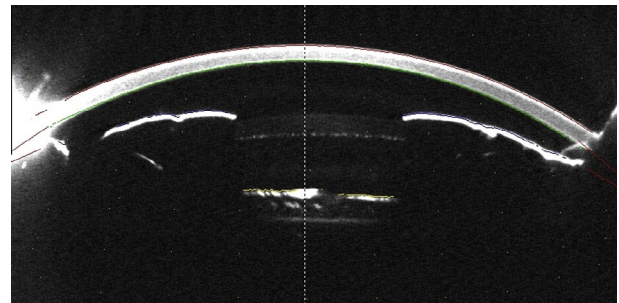
## Discussion

We report the use of ICL (STAAR Surgical) as an alternative method to correct anisometropic hyperopia in a 3-year-old pseudophakic child. Currently there are only a handful of peer-reviewed published reports in the literature on the use of ICL for correction of pseudophakic anisometropia.<sup>3–5</sup> As far as we are aware, all these reports have included eyes of adult patients.

Conventionally, in pseudophakic children who failed rehabilitation by contact lens/spectacle wear for postoperative



**Figure 1.** Slit-lamp photograph of the right eye showing the ICL and in-the-bag IOL (15 months after implantation).



**Figure 2.** Scheimpflug image of the right eye showing well-positioned ICL and in-the-bag IOL with good vaulting (15 months after implantation).

anisometropia, IOL exchange and piggyback insertion of another lens are the available surgical options. IOL exchange can be difficult, especially if the primary surgery was performed more than 1-month earlier as the anterior and posterior lens capsules will be adherent around the IOL, increasing the risk of capsular damage with subsequent vitreous loss. Piggyback insertion of a conventional in-the-bag IOL offers a mean of overcoming such an obstacle. However, because the IOL optics are located close to one another, interlenticular opacities can occur.<sup>5</sup>

Alternative surgical methods of treatment were also considered in our patient but found to be inferior. Corneal refractive surgery for the treatment of anisometropic amblyopia in children has been well documented in the literature,<sup>6,7</sup> but was clearly not an option in our patient given his level of hyperopia (+7.00–1.75 D). Anterior chamber (iris-fixated IOL) implantation was also a possibility<sup>8</sup>; however, we chose to implant an ICL because there is potentially less-risk of corneal endothelial cell loss than with anterior chamber IOL.

Our patient had a high anisometropic hyperopia one-month after the cataract surgery. Correction with contact lens and spectacles was tried but failed due to parental noncompliance. Therefore, the decision of a secondary ICL implantation was made. In terms of efficacy, the refractive error reduced postoperatively to the level of isometropia, and the UDVA significantly improved from 20/400 to 20/50. In terms of safety, the most common concerns regarding postoperative ICL complications are related to the vault value. An insufficient vault increases the risk of cataract formation;

which is evidently not a concern in our patient, whereas excessive vault may cause secondary glaucoma resulting from angle closure, pupillary block, or pigment dispersion.<sup>9</sup> After an uneventful implantation surgery, we did not observe any postoperative serious complications over a 22-month follow-up. The ICL was well tolerated, and remained well centered. Furthermore, anterior segment Scheimpflug-enhanced images (Pentacam) showed a well-positioned ICL with good vaulting.

### Conclusion

The secondary implantation of ICL may be considered safe and effective treatment option for children with pseudophakic anisometropia noncompliant to conventional therapy. Further evaluation of differences in the efficacy and safety between secondary ICL implantation and other currently proposed and existing surgical options is warranted.

### Conflict of interest

The authors declared that there is no conflict of interest.

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