

Case Report

# Refractive Management of Surgical-Induced Presbyopia in a Young Patient with Vision-Related Quality of Life Complaints: A Case Report

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## Keywords

Presbyopia · Refractive surgery · Intraocular lens · Photorefractive keratectomy

## Abstract

Visual difficulties can negatively impact life quality. Our purpose was to report the refractive surgical planning and outcomes of a young patient with mixed astigmatism and phacoemulsification-induced presbyopia due to congenital cataracts who was unsatisfied with her vision-related quality of life. A 32-year-old woman, submitted to phacoemulsification with implantation of a monofocal intraocular lens (IOL) and Nd:YAG laser posterior capsulotomy 3 years before, due to congenital cataracts, was referred to the Refractive Surgery Unit of Centro Hospitalar Universitário de Santo António. She had mixed astigmatism ( $+1.00-4.00 \times 10^\circ$  in the right eye [RE] and  $+0.50-1.75 \times 180^\circ$  in the left eye [LE]) and surgical-induced presbyopia, was intolerant to contact lenses, and felt that her vision significantly impaired her life quality. A trifocal Sulcoflex® (Rayner) IOL was implanted to correct the spherical and near refractive errors. In a second surgical time, a photorefractive keratectomy was performed to correct the residual astigmatism ( $-3.50 \times 10^\circ$  in the RE and  $-1.50 \times 170^\circ$  in the LE). In the last visit, distance and near uncorrected visual acuity were 20/20 (Snellen) and Jaeger 1, respectively, in both eyes, and the patient was very satisfied. When assessing the surgical options of young, working-age patients, clinicians should, when possible, consider alternative solutions to monofocal IOLs. In this patient, the combination of corneal and intraocular procedures allowed the correction of both the distance and near refractive errors, with a subsequent significant improvement in the patient's quality of life.

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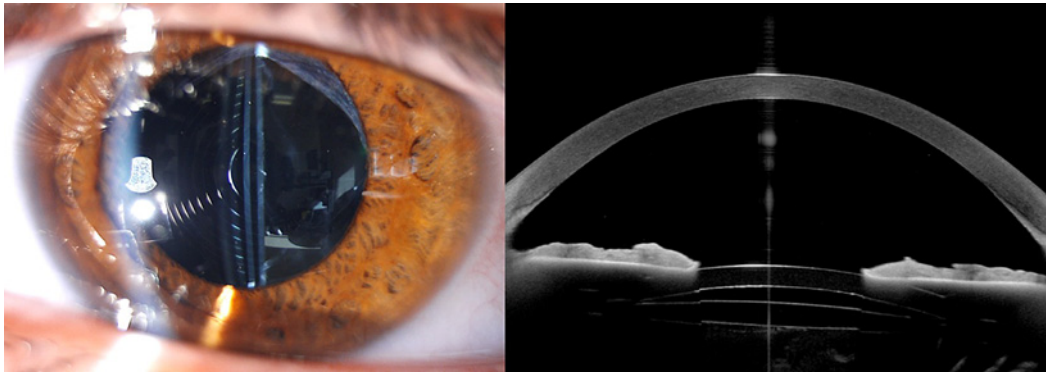
## Introduction

Visual difficulties can impact quality of life, and patients with refractive errors often report worse quality of life scores than emmetropic patients or patients who have undergone surgical refractive correction [1–3]. Besides distance refractive errors, presbyopia has also been associated with a worse quality of life, even in patients treated with reading glasses [4].

Our purpose was to report the refractive surgical planning and outcomes of a young patient with mixed astigmatism and phacoemulsification-induced presbyopia due to congenital cataracts who was unsatisfied with her vision-related quality of life. The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000534431>).

## Case Report

A 32-year-old healthy woman was referred to the Refractive Surgery Unit of Centro Hospitalar Universitário de Santo António in January 2022 to achieve eyeglass independence. She had a history of congenital cataracts and had been submitted to bilateral phacoemulsification 3 years before, with monofocal intraocular lens (IOL) implantation, followed by Nd:YAG laser posterior capsulotomy, in another institution. The best-corrected visual acuity was 20/20 (Snellen) in the right eye (RE) and in the left eye (LE). In addition to the surgical-induced presbyopia, the patient had mixed astigmatism ( $+1.00\text{--}4.00 \times 10^\circ$  in the RE and  $+0.50\text{--}1.75 \times 180^\circ$  in the LE) and used progressive glasses. The patient did not tolerate contact lenses, had difficulties playing sports with her glasses, felt that her vision significantly impaired her life quality, and wished for glasses independence. Due to the presence of the posterior capsulotomy, lens explantation would be technically difficult, and, therefore, the surgical team decided to implant a trifocal Sulcoflex<sup>®</sup> IOL (Rayner Intraocular Lenses Lda, East Sussex, UK; RE:  $-1.00\text{D}$ , near add  $+3.50\text{D}$ ; LE:  $0.00\text{D}$ , near add  $+3.50\text{D}$ ) to correct the spherical refractive error and the presbyopia. After surgery, best-corrected visual acuity was 20/20 in both eyes, with an astigmatism correction of  $-3.50 \times 10^\circ$  in the RE and  $-1.50 \times 170^\circ$  in the LE, and the patient had a good adaptation to the multifocal IOL. Three months after the Sulcoflex<sup>®</sup> implantation, a photorefractive keratectomy (PRK) was performed with the WaveLight<sup>®</sup> EX500 Excimer<sup>®</sup> Laser (Alcon Laboratories, Inc., Fort Worth, TX) to correct the astigmatism. In the last visit, distance and near uncorrected visual acuity were 20/20 and Jaeger 1, respectively, in both eyes. Figure 1 shows the slit lamp photography and the Anterior<sup>®</sup> (Heidelberg Engineering, Inc, Heidelberg, Germany) image, showing the relative position of both IOLs. Contrast sensitivity was evaluated after the implantation of the Sulcoflex<sup>®</sup> IOL and after the PRK. After the Sulcoflex<sup>®</sup> implantation, contrast sensitivity was below the normal range under both photopic and mesopic conditions, with worse performances at higher spatial frequencies. After the PRK, there was an improvement in the contrast sensitivity under both photopic and mesopic conditions, reaching normal values under binocular photopic conditions (shown in Fig. 2). Under binocular mesopic conditions, the contrast sensitivity was within the normal range at lower spatial frequencies, worsening at higher spatial frequencies. At the last follow-up visit, the patient did not have any dysphotopic symptoms and felt that her life quality had significantly improved.



**Fig. 1.** Left side – slit lamp photography showing the reflex of both IOLs. Right side – Anterior<sup>®</sup> (Heidelberg Engineering, Inc, Heidelberg, Germany) image showing the relative position of both IOLs.

## Discussion

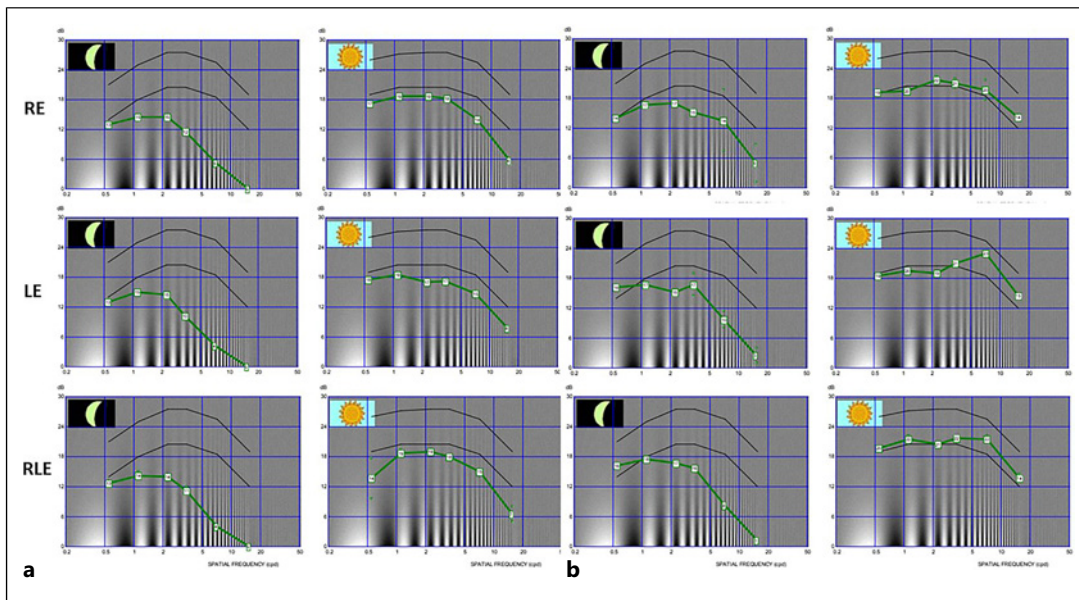
This is a case report of a 32-year-old woman previously submitted to phacoemulsification with the implantation of a monofocal IOL, who was dissatisfied with her current vision and wished for eyeglass independence. As a posterior capsulotomy had already been performed, the IOL explantation could be technically challenging, with the risk of damage to the capsular bag and the consequent need to position the IOL in the sulcus or perform a scleral fixation [5]. In the presence of a posterior capsulotomy, exchanging the IOL would also, most likely, be associated with vitreous prolapse and the need for a vitrectomy [6]. Moreover, as the phacoemulsification had been performed 3 years before, fibrosis and adhesions could be present, adding further surgical technical difficulties.

As an alternative to IOL exchange, placing an add-on IOL presented as a good option. Sulcoflex<sup>®</sup> IOL implantation allows the correction of both distance and near refractive errors while being a reversible procedure. This easy reversibility would be advantageous if our patient could not adapt to the multifocal IOL [7]. However, although both spherical multifocal and toric monofocal Sulcoflex<sup>®</sup> IOLs were available, the multifocal toric model was not, and simultaneous correction of distance and near refractive error would not be possible.

Other surgical options were considered. Implantation of a toric monofocal Sulcoflex<sup>®</sup> IOL with monovision could be a possibility. However, the patient did not tolerate monovision in a trial with contact lenses. The idea of performing presbyLASIK was also considered. However, although there are many studies evaluating laser correction of presbyopia in phakic eyes, only one small study, to our best knowledge, evaluated presbyLASIK in pseudophakic eyes [8]. Furthermore, presbyLASIK is usually performed in older patients, and there is, to our best knowledge, no evidence regarding its outcomes and safety profile in young patients.

In this patient, the surgical team decided to implant a spherical multifocal Sulcoflex<sup>®</sup> IOL, followed by PRK to correct the residual astigmatism. PRK was chosen as the corneal procedure given that the patient had occupational risk for trauma. Furthermore, some studies suggest that PRK induces fewer aberrations than *laser in situ keratomileusis* (LASIK), which is an important consideration in a patient who already has two IOLs [9, 10].

Despite the discussed advantages of the Sulcoflex<sup>®</sup> IOL, it is important to note that it may not be a suitable option for all patients. The preoperative assessment should include an evaluation of the anterior and posterior chamber depths. It is also important to take into consideration that there are risks associated with these lenses, such as iris chafing, pigment dispersion, and uveitis-glaucoma-hyphema syndrome [11]. Nevertheless, previous studies report a good safety profile [12,



**Fig. 2.** Contrast sensitivity evaluation. **a** After Sulcoflex® (Rayner Intraocular Lenses Lda, East Sussex, UK) implantation. **b** After PKR. RE, right eye; LE, left eye; RLE, binocular.

13]. In this patient, an ultrasound biomicroscopy was also performed to exclude anomalies or masses in the ciliary sulcus.

This case reflects the challenges associated with unsatisfactory vision after phacoemulsification with monofocal IOL implantation in young patients. It also illustrates the importance of careful preoperative planning to avoid surgical complications and achieve optimal patient satisfaction. Furthermore, it reinforces the importance of ensuring that the patient is satisfied before undergoing a posterior capsulotomy as it increases the complexity of a subsequent IOL exchange, if necessary. In this patient, the combination of both corneal and intraocular procedures allowed full glass independence, resulting in a significant improvement of her quality of life. Regardless of the known association between multifocal IOL implantation and reduction in contrast sensitivity, this does not necessarily imply that the quality of life will be negatively affected, as seen in this patient's case [14].

In conclusion, when assessing the surgical options of young, working-age patients, clinicians should consider, when possible, alternative solutions to monofocal IOLs as the resultant visual outcomes may not be satisfactory. Additionally, when considering correction procedures for patients who already have a monofocal IOL, it is important to consider all the available options to reach the best refractive outcomes and ensure patient satisfaction.

### Statement of Ethics

Written informed consent was obtained from the patient for publication of the details of their medical case and any accompanying images. Proper anonymization was guaranteed. Ethical approval is not required for this study in accordance with local guidelines.

### Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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### Author Contributions

Catarina Castro, Ana Carolina Abreu, Sílvia Monteiro, and Maria do Céu Pinto evaluated the patient and participated in the decision-making process. Paulo Sousa performed the exams necessary for surgical planning and follow-up. Catarina Castro, Paulo Sousa, Ana Carolina Abreu, Sílvia Monteiro, and Maria do Céu Pinto participated in the data collection and analysis. Catarina Castro wrote the original draft. All authors reviewed and approved the final version.

### Data Availability Statement

All data analyzed is included in this case report. Further inquiries can be directed to the corresponding author.

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