

CASE REPORT

Tecnics Eyhance Iol as a Solution for Anisometropic Amblyopia Cataract Patient: a Case Report

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ABSTRACT

Background: Amblyopia affects 1-3% of the population, leading to irreversible vision loss in children and adults. Treatment options include refractive correction, occlusion therapy, and atropine penalization. Anisometropic amblyopia, caused by a difference in refractive status between the eyes, can be treated using contact lenses, glasses, ICL implantation, or cataract surgery with intraocular lens implantation. Tecnics Eyhance IOL is a superior solution, improving vision after eye surgery with a low incidence of halo, glare, or starburst. Objective: The aim is to present the case of a patient with anisometropic amblyopia, in whom Eyhance IOL was implanted in both eyes as a solution to refractive error and initial cataract due to intolerance for contact lenses. Case report: A 58-year-old female patient presented to our clinic complaining of blurry vision in her left eye that had persisted for a year. The patient reported intolerance to contact lenses and a history of amblyopia in her right eye. CDVA was 0.20 with -9.00/-1.50 x 25° in her right and 0.80 with +4.00 sphere correction in her left eye, while her CNVA was J9 with +2.50 and J1 with +2.50. Slit-lamp examination revealed early cataracts in both eyes, with otherwise normal findings. A dilated fundus examination showed vitreous liquefaction and myopic macula in the right eye but normal results in both eyes' posterior segments. The IOP was within normal limits, and the eye's axial length was measured. Considering the patient's intolerance to contact lenses, cataract surgery with intraocular lens implantation was deemed appropriate. Given the anisometropic amblyopia, the Eyhance lens was selected to optimize the patient's visual acuity. Following the procedure, the patient's visual acuity improved significantly, with her best CDVA at 0.35 in the right eye and 0.95 in the left eye. With +1.50 sphere correction, the CNVA was also enhanced, with the patient reading at J4 and J1 for her right and left eye, respectively. These improvements may have positively impacted the patient's quality of life and ability to perform daily activities. Conclusion: Anisometropic amblyopia in 58-year-old women was treated successfully with cataract surgery and implantation of Eyhance IOL.

Keywords: anisometropia, amblyopia, cataract surgery, Technics Eyhance IOL

1. BACKGROUND

Amblyopia, a prevalent neurodevelopmental visual disorder, carries a significant risk of bilateral severe visual impairment and disability later in life (1). The prevalence of amblyopia is estimated to be 1-3% (2-4) of the population, and the condition is the leading cause of uncorrectable vision loss in children and adults under 60 (5). Refractive correction, occlusion therapy, and atropine penalization are the mainstays of amblyopia treatment in children, and well-established clinical management paradigms for unilateral

amblyopia now exist (1). Although amblyopia is potentially reversible if detected and treated early, amblyopic eye visual acuity (VA) remains subnormal in 15-50% of children despite extended periods of occlusion therapy (6). Anisometropia, by definition, exists when there is a difference in refractive status between an individual's eyes more than 2 D (7). Anisometropic amblyopia is the second most common cause of amblyopia. Anisometropic amblyopia occurs when unequal focus between the eyes causes chronic blur on one retina. Anisometropic amblyopia

can occur with relatively small amounts of asymmetric hyperopia or astigmatism. Generally, more significant amounts of anisometropia are necessary for amblyopia to develop. Anisometropic amblyopia is an insidious disease because, unlike strabismic amblyopia, the eyes appear normal to an observer. Anisometropic amblyopia is commonly caught by vision screening in a pediatrician's office or the school system (8). In literature, one can find different ways of solving anisometropic amblyopia: contact lenses, glasses, implantation of ICL, or cataract surgery combined with intraocular lens implantation. For example, myopic anisometropic amblyopia in an 8-year-old boy was treated successfully with an Artisan iris-claw phakic anterior chamber IOL implantation (9).

The Tecnis Eyhance™ IOL (Johnson&Johnson Vision, Santa Ana, CA USA), is a product designed to enhance vision after eye surgery. This relatively innovative product functions by extending the depth of focus from distance to intermediate vision, resulting in a continuous increase in power from the periphery to the center of the lens (10). This refractive design enables patients to experience high-quality vision at both intermediate and far distances post-operation, which is a significant improvement compared to a standard aspheric monofocal IOL. Patients can significantly improve their intermediate vision without needing glasses, particularly in low-illumination settings. Moreover, data has revealed that patients who received the Tecnis Eyhance monofocal IOL reported a low incidence of halo, glare, or starburst, comparable to what has been observed with the Tecnis one-piece IOL (11).

2. OBJECTIVE

The aim of this paper is to present the case of a patient with anisometropic amblyopia, in whom Eyhance IOL was implanted in both eyes as a solution to refractive error and initial cataract due to intolerance for contact lenses.

3. CASE REPORT

A 58-year-old female presented to our clinic with a one-year history of blurry vision in her left eye. Her ocular history was unremarkable, except for the intolerance to contact lenses and amblyopia in her right eye. Her best-corrected distance visual acuity (CDVA) was 0.20 with -9.00/-1.50 x 25° in the right eye and 0.80 with +4.00 sphere correction in the left eye. Distance visual acuity was measured using a standard Snellen acuity chart at 6m and presented in decimals. Her best corrected near visual acuity (CNVA) was J9 with +2.50 and J1 with +2.50. The Jaeger eye chart was used in testing near vision acuity. On this card, on which paragraphs of text are printed, text sizes increase from 0.37 mm to 2.5 mm.

Slit-lamp examination revealed incipient cataracts in both

eyes, otherwise normal anterior segment findings. A dilated fundus examination revealed vitreous liquefaction and myopic macula in the right eye, otherwise normal findings of a posterior segment in both eyes. Intraocular pressure (IOP), measured with iCare (Tiolat Oy, Helsinki, Finland), was average at 18/19 mmHg (including correction factor of the corneal thickness). The axial length of the eye measured by the IOL master (IOLMaster 700; Carl Zeiss Meditec) of the right eye was 27.96 mm and 22.44 mm of the left. As a solution to the patient's problem, due to intolerance to contact lenses, we had two possibilities: to implicate implantable collamer lens (ICL) or cataract surgery with intraocular lens (IOL) implantation. ICL implantation was no option due to the incipient cataract that already existed and the possibility of its progress in the future. So we decided on the second option. We wanted to choose an intraocular lens with which she would get the maximum. Considering the anisometropic amblyopia, we decided to implant the Eyhance lens. This type of lens has been designed to improve visual acuity contrast sensitivity and reduce the effects of glare in patients who have undergone cataract surgery. The procedure involved removing the patient's natural lens and replacing it with the Eyhance lens. After a month, the patient's visual acuity significantly improved in both eyes, with her best CDVA of the right eye now at 0.35 and her left eye at 0.95. Near visual acuity also improved, with the patient now able to read at J4 and J1 for her right and left eye, respectively, with +1.50 sphere correction. These improvements in vision have likely improved the patient's quality of life and ability to perform daily activities. It's important to note that cataract surgery carries potential risks

OD right		IOL calculation		OS left	
Eye status					
LS: Phakic Ref: --- LVC: Untreated Target ref.: plano		VS: Vitreous body VA: --- LVC mode: - SIA: +0.00 D @ 0°		LS: Phakic Ref: --- LVC: Untreated Target ref.: plano	
VS: Vitreous body VA: --- LVC mode: - SIA: +0.00 D @ 0°				VS: Vitreous body VA: --- LVC mode: - SIA: +0.00 D @ 0°	
Biometric values					
AL: 27.96 mm (*) ACD: 3.08 mm (*) LT: --- WTW: --- SE: 42.78 D (*) ΔK: -0.54 D @ 58° TSE: --- ΔTK: ---		K1: 42.51 D @ 58° K2: 43.05 D @ 148° TK1: --- TK2: ---		AL: 22.44 mm (*) ACD: 2.67 mm (*) LT: --- WTW: --- SE: 43.02 D (*) ΔK: -0.28 D @ 153° TSE: --- ΔTK: ---	
K1: 42.51 D @ 58° K2: 43.05 D @ 148° TK1: --- TK2: ---		K1: 42.88 D @ 153° K2: 43.16 D @ 63° TK1: --- TK2: ---			
K AMO Tecnis ICB00 Eyhance		K AMO Tecnis ICB00 Eyhance		K AMO Tecnis ICB00 Eyhance	
-SRK®/T- A const.: 119.30 IOL (D) Ref (D) +10.00 -0.63 +9.50 -0.31 +9.00 +0.01 +8.50 +0.31 +8.00 +0.62 +9.01 Emmetropia		-Barrett Universal II- LF: +2.04 DF: Default IOL (D) Ref (D) +10.50 -0.79 +10.00 -0.47 +9.50 -0.15 +9.00 +0.17 +8.50 +0.48 +9.27 Emmetropia		-SRK®/T- A const.: 119.30 IOL (D) Ref (D) +26.50 -0.56 +26.00 -0.21 +25.50 +0.14 +25.00 +0.49 +24.50 +0.83 +25.70 Emmetropia	
K AMO Tecnis ICB00 Eyhance		K AMO Tecnis ICB00 Eyhance		K AMO Tecnis ICB00 Eyhance	
-Holladay 2- ACD: +5.400 IOL (D) Ref (D) +9.50 -0.68 +9.00 -0.36 +8.50 -0.04 +8.00 +0.28 +7.50 +0.59 +8.44 Emmetropia		-Hajiga - A0: +1.508 A1: +0.400 A2: +0.100 IOL (D) Ref (D) +9.50 -0.55 +9.00 -0.20 +8.50 +0.14 +8.00 +0.48 +7.50 +0.81 +8.70 Emmetropia		-Holladay 2- ACD: +5.400 IOL (D) Ref (D) +26.50 -0.85 +26.00 -0.49 +25.50 -0.14 +25.00 +0.21 +24.50 +0.56 +25.30 Emmetropia	
K AMO Tecnis ICB00 Eyhance		K AMO Tecnis ICB00 Eyhance		K AMO Tecnis ICB00 Eyhance	
-Halgs - A0: +1.508 A1: +0.400 A2: +0.100 IOL (D) Ref (D) +27.00 -0.75 +26.50 -0.39 +26.00 -0.02 +25.50 +0.33 +25.00 +0.69 +25.97 Emmetropia					
(I) Borderline value (*) Value was edited manually --- No value measured					
Comment					
ZEISS I Template Version:01_062021 - Copyright 2012 All rights reserved					
IOLMaster 700		Version 1.68.1.64861		Report dated 04/09/2023 11:34 AM; created by Administrator	
				Page 1 of 2	

Image 1. Calculation of Tecnis Eyhance IOL using IOL master 700 (axial lengths of both eyes are presented)

and complications that the doctor should discuss with the pa- **5. CONCLUSION**

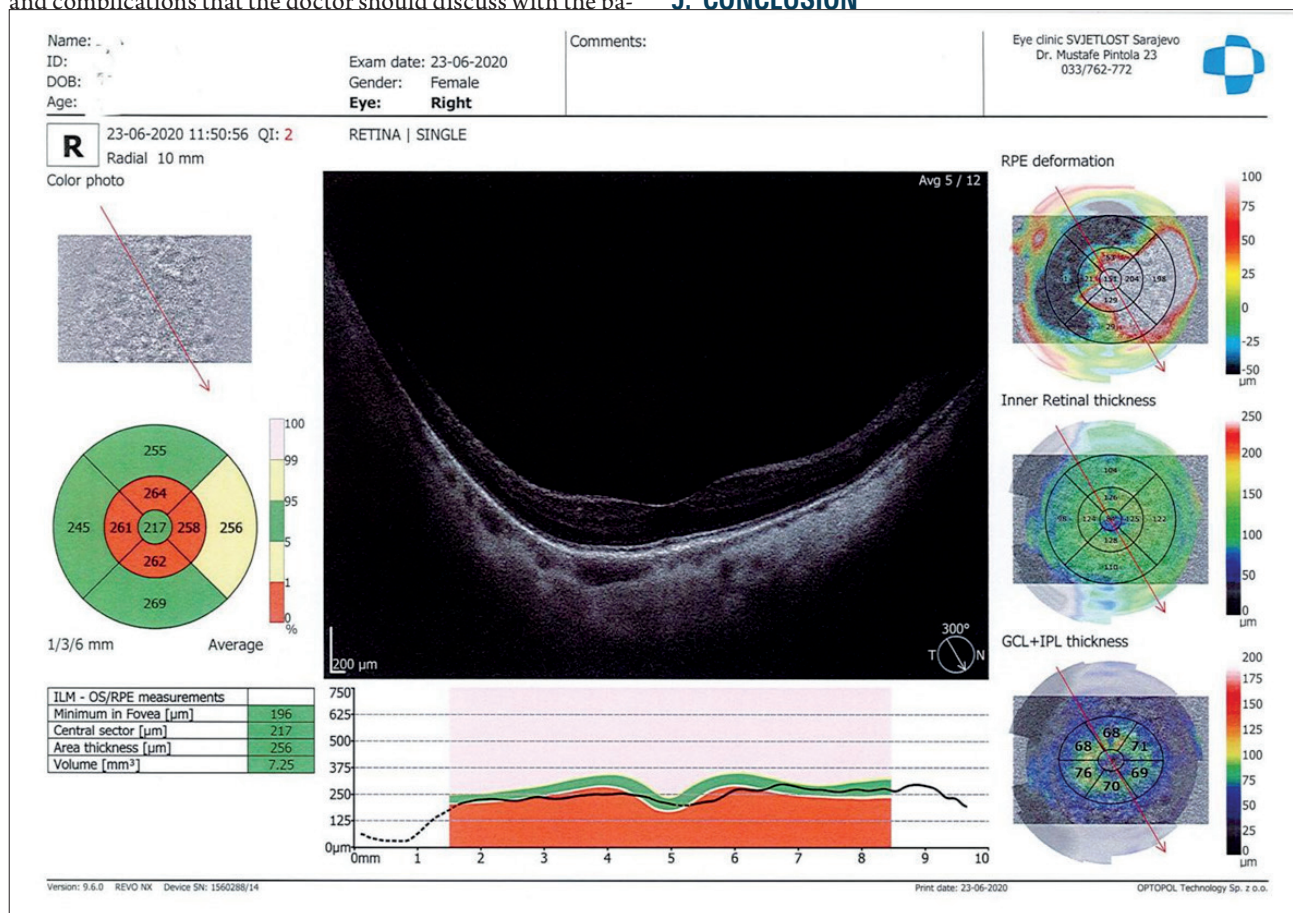


Image 2. The OCT retinal image (macula) of the amblyopic right eye (SOCT Copernicus REVO, Optopol, Zawiercie, Poland)

tient beforehand. For this reason, it’s crucial that patients are well-informed about the procedure and its possible outcomes to make an informed decision about their treatment options.

4. DISCUSSION

As indicated in the medical literature, multiple treatment options are available for anisometropic amblyopia. These include the use of contact lenses, glasses, or ICL implants. However, in the case of an 8-year-old boy with myopic anisometropic amblyopia, the patient could not tolerate contact lenses, and the significant diopter difference between the eyes made glasses unfeasible. Therefore, we had two options: ICL implantation or cataract surgery with IOL implantation. After careful consideration, we decided to pursue the latter option due to the patient’s early-stage cataract. This decision proved successful, as the patient responded positively to the treatment. We considered the various factors at play, such as the patient’s age, medical history, and physical condition, before making our final decision. Regarding the specific IOL implant used, we concluded that the Eyhance IOL provided the most significant benefits for our patient. The procedure was performed with the utmost care and attention to ensure the patient’s safety and well-being. Overall, we are pleased with the outcome of the treatment and believe that it has dramatically improved the patient’s quality of life. We remain committed to providing the best possible care to all our patients and will continue exploring new and innovative treatment options as they become available.

We are pleased to report that successful treatment has been achieved for an anisometropic amblyopia case in a 58-year-old female patient. While there are various methods to address this condition, the most effective approach was found to be a combination of cataract surgery and Eyhance IOL implantation. This outcome is a positive development, demonstrating the efficacy of this particular treatment modality in this individual case.

- **Patient Consent Form:** All participants were informed about subject of the study. .
- **Author’s contribution:** P.A. , B.L. and R.A. gave substantial contributions to the conception or design of the work, data acquisition process, contributed in analysis and data interpretation, gave contribution in drafting the article, and responsible for revising the final version of this article. All authors gave final approval of the version to be published and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.
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 12. Image 1. Calculation of Tecnics Eyhance IOL using IOL master 700 (axial lengths of both eyes are presented)
 13. Image 2. The OCT retinal image (macula) of the amblyopic right eye (SOCT Copernicus REVO, Optopol, Zawiercie, Poland)