

Analysis of the effects of different intraocular lenses on visual quality under different light conditions: a pilot study

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INTRODUCTION AND OBJECTIVE

Cataract is the opacity of the crystalline and is the leading cause of blindness and visual impairment worldwide.¹ **Cataract surgery** is currently the **only treatment** to restore vision.²

In addition, said surgery is being performed earlier and earlier due to the visual demands that require **good vision** at all distances.³ Especially, in intermediate distances due to the appearance of **new technologies** and the continuous work on screens. For this reason, there is a continuous evolution of **IOL designs**.⁴

The **aim** of this study is to compare the effects on **visual function** and **quality of life** in cataract patients undergoing **cataract surgery** between different Extended depth of focus (**EDOF**) lenses, when subjected to **different illumination** conditions (mesopic and photopic)

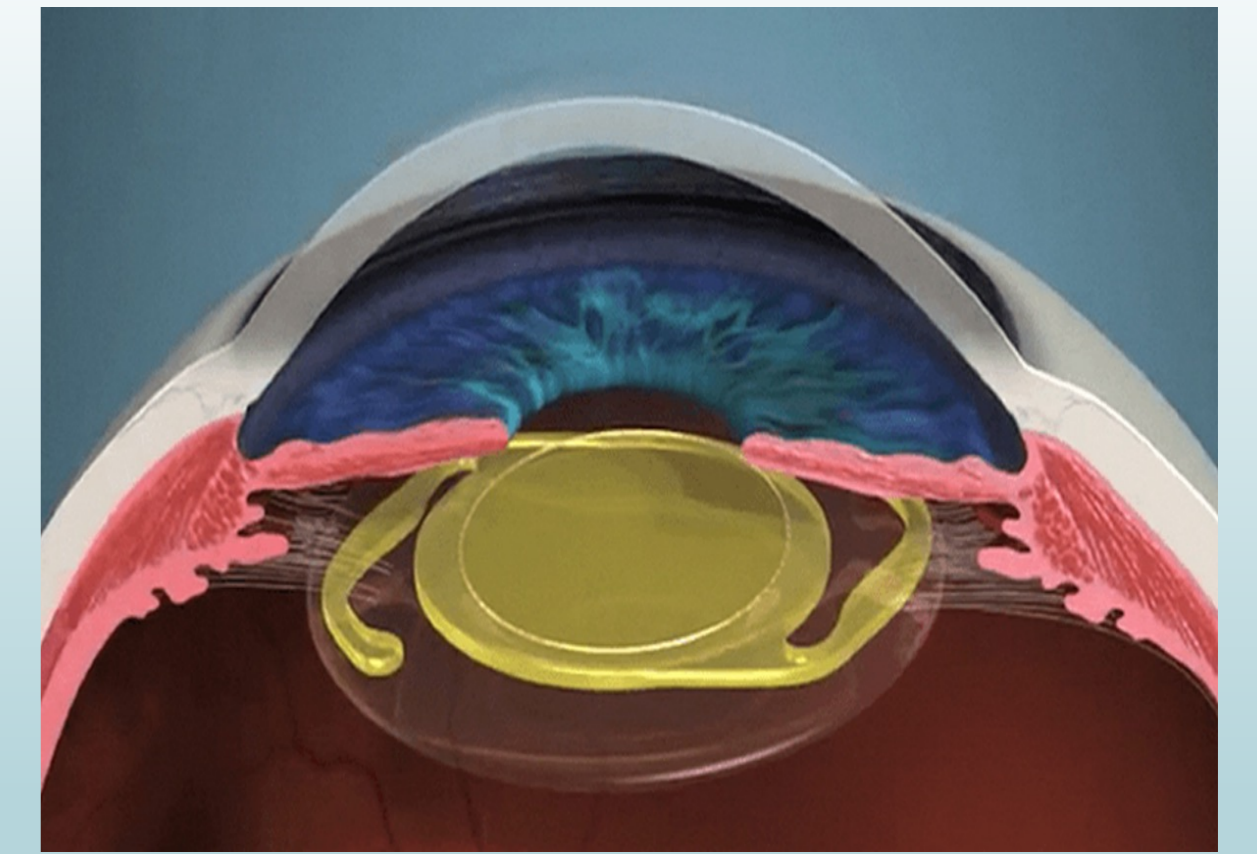


Fig 1: Cataract surgery with intraocular lens

MATERIALS AND METHODS

STUDY DESIGN: Observational, prospective, cross-sectional pilot study.

SAMPLE: 31 eyes of 15 patients (70,5 ± 8,6) years, undergoing uncomplicated phacoemulsification cataract surgery.

MATERIALS:

- Test ETDRS → CORRECTED DISTANCE VA (4m)
- Test CSV-1000 → CORRECTED INTERMEDIATE VA (66cm)
- Halometer (Software Halo v1.0)
- Pupilometer mesopic (Power Refractor II, Plusoptix)
- Questionnaire VF-14
- Light condition → PHOTOPIC (< 10 cd/m²)
- → MESOPIC (10 - 0,01 cd/m²)

Intraocular lens (IOL):

- **Tecnis Eyhance** (Johnson & Johnson Surgical Vision)
- **Isopure 123** (PhylOL sa/nv)
- **Vivity** (Alcon Laboratories)

STATISTICAL METHOD:

Software SPSS

DESIGN OF THE IOL

EYHANCE:
DIFRACTIVE,
(MONOFOCAL
PLUS)

ISOPURE 123:
ISOFOCAL
ASPHERICAL
(EDOF)

VIVITY: NON-
DIFRACTIVE (EDOF)



Figura 2: Room and material used in the study

RESULTS

Table 1: Data of the results obtained for distance (CDVA), intermediate (CIVA) and near (CNVA) vision with correction in the different IOL models through mean, standard deviation, range and p-value.

PHOTOPIC CONDITION		EYHANCE n=5	ISOPURE 123 n=5	VIVITY n=5	P-value
	CDVA (LogMar)	-0,04 ± 0,10 [-0,14 , 0,12]	-0,08 ± 0,09 [-0,20 , 0,02]	-0,12 ± 0,06 [-0,18 , 0,08]	---
	CIVA (LogMar)	0,19 ± 0,09 [0,10 , 0,30]	0,14 ± 0,08 [0,00 , 0,30]	0,09 ± 0,09 [0,00 , 0,20]	0,02
CNVA (LogMar)	0,12 ± 0,10 [0,16 , 0,00]	0,12 ± 0,06 [0,14 , 0,00]	0,11 ± 0,09 [0,10 , 0,00]	---	

Table 2: Data of the results obtained for distance (CDVA), intermediate (CIVA) and near (CNVA) vision with correction in the different IOL models through mean, standard deviation, range and p-value.

MESOPIC CONDITION		EYHANCE n=5	ISOPURE 123 n=5	VIVITY n=5	P-value
	CDVA (LogMar)	0,03 ± 0,15 [-0,16 , 0,32]	0,01 ± 0,07 [-0,10 , 0,12]	-0,01 ± 0,09 [-0,16 , 0,12]	---
	CIVA (LogMar)	0,41 ± 0,17 [0,20 , 0,68]	0,53 ± 0,17 [0,30 , 0,64]	0,29 ± 0,09 [0,14 , 0,54]	0,001
CNVA (LogMar)	0,34 ± 0,23 [0,10 , 0,60]	0,42 ± 0,13 [0,20 , 0,64]	0,44 ± 0,13 [0,20 , 0,66]	---	

Table 3: Comparison of the results obtained for intermediate VA with correction (CIVA) in the different IOL models between the photopic and mesopic illumination condition through the p-value.

CORRECTED INTERMEDIATE VA		EYHANCE	VIVITY
			0,021

DIFFERENCE CONDITION (MESOPIC-PHOTOPIC)

Table 4: Data of the results obtained for pupillometry and halometry in the different IOL models through mean, standard deviation, range and p-value.

MESOPIC CONDITION		EYHANCE n=5	ISOPURE 123 n=5	VIVITY n=5	P-value
	Pupillometre (mm)	4,04 ± 1,00 [2,90 , 5,50]	3,78 ± 1,21 [2,20 , 6,00]	3,54 ± 0,40 [3,10 , 4,30]	---
Halometre	0,82 ± 0,23 [0,66 , 0,98]	0,96 ± 0,05 [0,89 , 1,00]	0,96 ± 0,09 [0,90 , 1,00]	---	

CONCLUSIONS

- All three intraocular lenses provided excellent distance vision in both photopic and mesopic conditions
- Isopure lens has worse intermediate VA values in mesopic than the other lenses
- There were no clinically significant differences in pupillometry and halometry

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