

# Photophobia management through light refocusing, using scleral lenses in case of corneal trauma and iris coloboma

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# Disclaimer

1. EYEART's fitting center owner
2. EYEART Laboratories, cowner

# Patient history

**Patient:** 30 yrs old Female

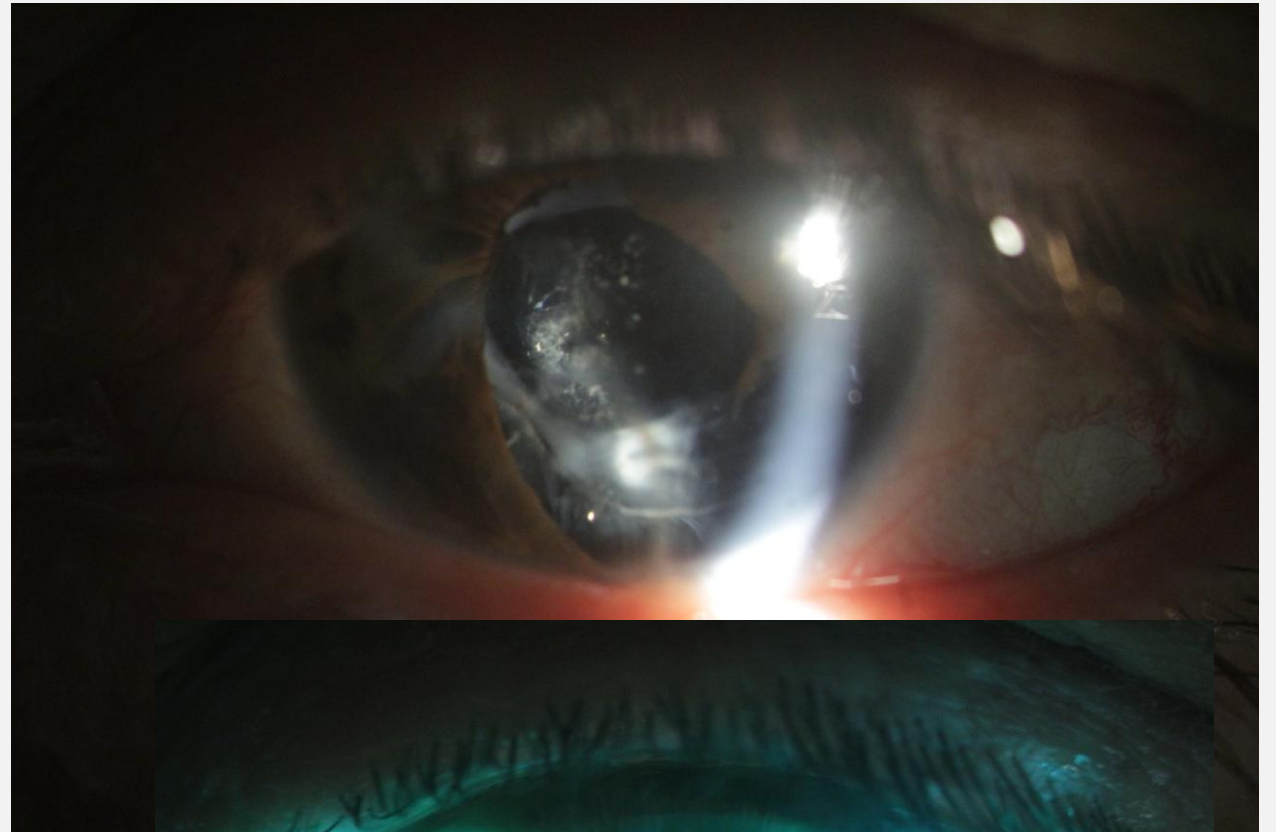
**Ocular history:** Corneal perforation with iris impaction

**Surgical treatment:**

Corneal suturing, IOL

Corneal trauma and iris coloboma can induce intense photophobia for the following reasons:

1. Lack of circular optical diaphragm
2. Localised partial opacities following suturing
3. Optical opacities in the optical media



**Anterior corneal topography only, reveals steeper irregular areas.**

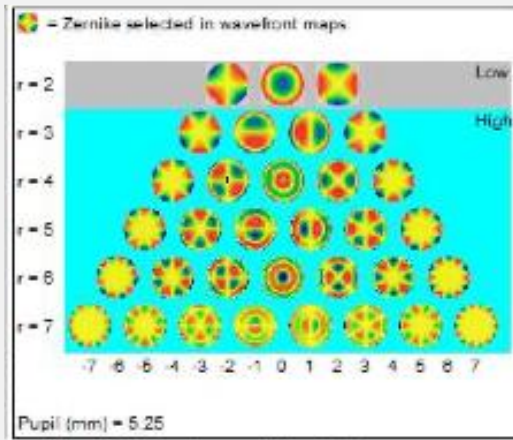
Despite the absence of highly irregular cornea, high order aberrations at **5.00 mm pupil**, present extremely high values as follows:

**3rd order Vertical coma: 9.10 microns**

**3rd order Trefoil: 7.00 microns**

**4<sup>th</sup> order Spherical: 3.68 microns**

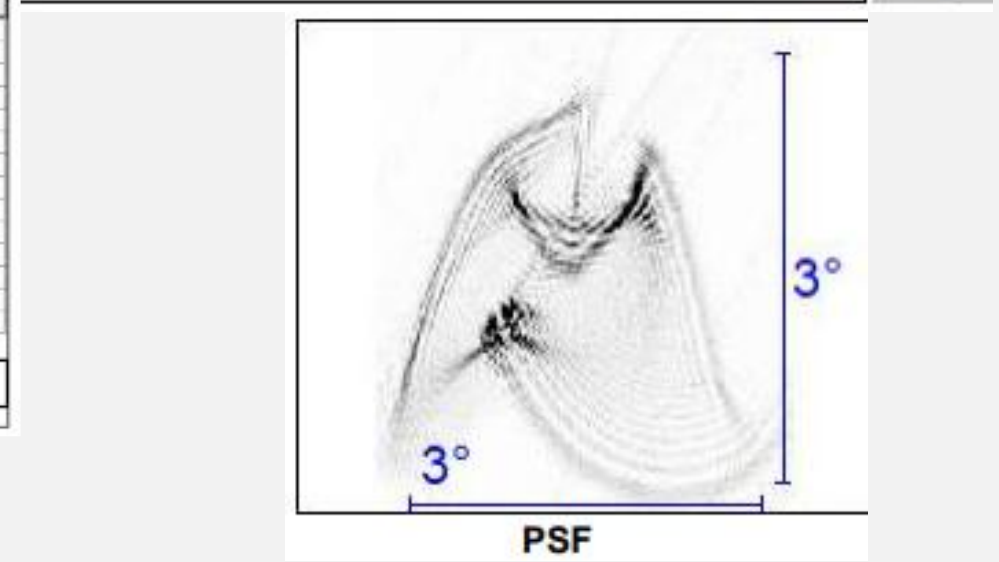
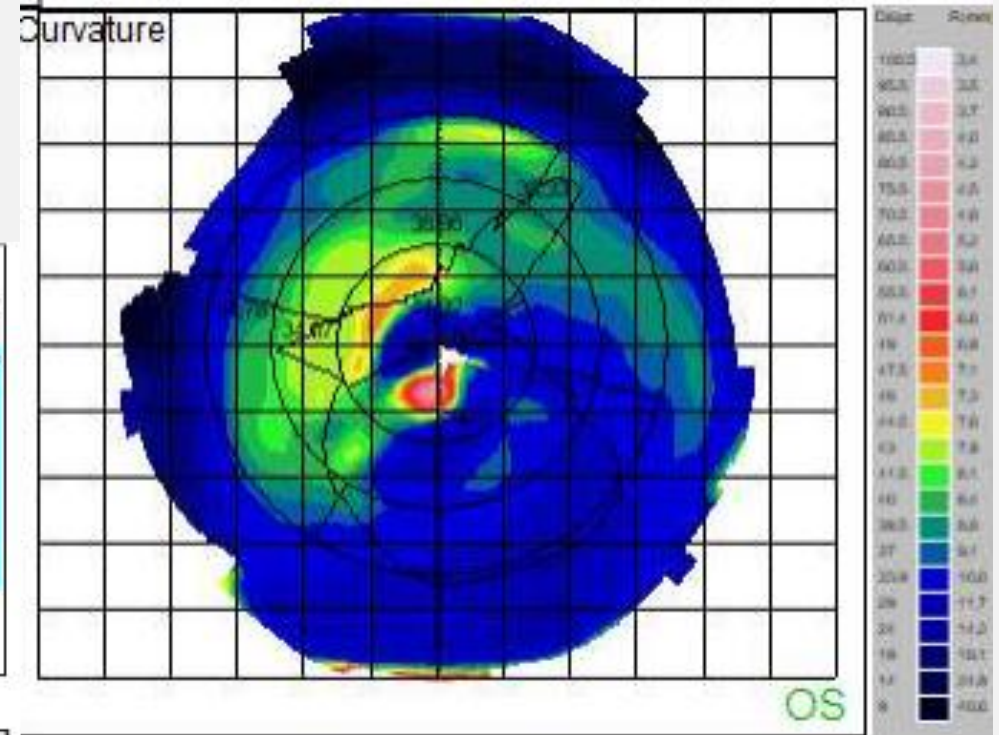
*As expected, Point Spread Function (PSF) evidence high irregularity*



**Selected Zernike and Pupil size**

Zernike	Micron	Dioptr	Axis°	Aberration description
$Z(2, 0)$	-8.041	-0.05		Defocus
$Z(2, \pm 2)$	8.548	0.05	165	Astigmatism
$Z(3, \pm 1)$	9.076	0.05	302	Coma
$Z(3, \pm 3)$	7.042	0.05	81	Trefoil
$Z(4, 0)$	-3.08	0.03		Spherical aberration
$Z(4, \pm 2)$	6.979	0.05	121	Secondary astigmatism
$Z(4, \pm 4)$	4.972	0.03	28	Quatrefoil
$Z(5, \pm 1)$	3.34	0.03	312	Secondary Coma
$Z(5, \pm 3)$	3.884	0.03	70	Secondary trefoil
$Z(5, \pm 5)$	3.781	0.03	16	Pentafoil
$Z(6, 0)$	0.936	0.01		Secondary Spherical
$Z(6, \pm 2)$	1.387	0.01	125	6th order astigmatism
$Z(6, \pm 4)$	2.427	0.01	37	6th order quatrefoil
$Z(6, \pm 6)$	3.038	0.01	4	Hexafoil

**NOTE: Normality highlights are under investigation.**



Point spread function: How the light is focussing on patient's retina

## **PATIENT SYMPTOMS & ETIOLOGY**

Irregular PSF combined with optical media irregularities has resulted in intense photophobia and disturbing photopic phenomena at lights, for the patient.

Two different strategies/options have been examined with the patient, aiming to minimise his symptoms, with the criteria below.



## **1st option:**

Soft prosthetic lens with double opaquing layers, forming a clear circular pupil.

The iris would have been hand painted, matching the fellow eye.



Example of hand painted hydrogel lens, with transparent pupil

## **ADVANTAGES**

1. Pupil diaphragm reconstruction
2. Rehabilitation of aesthetic symmetry

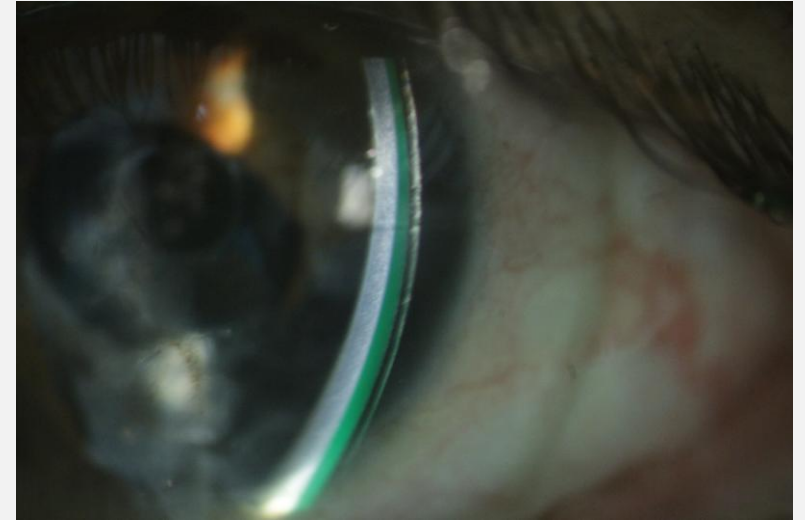
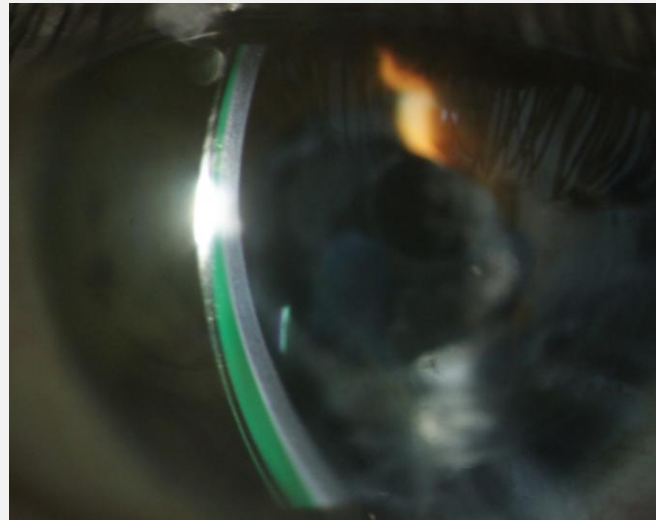
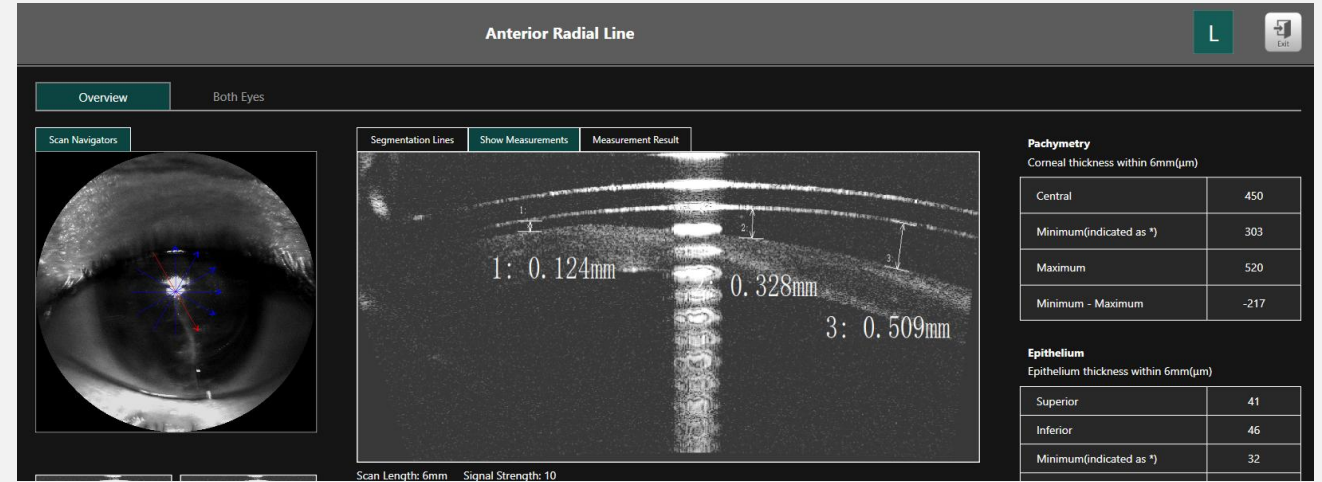
## **DISADVANTAGES**

1. No correction of high order aberrations
2. Corneal contact

*Due to the disadvantages described, this solutions has been abandoned*

## 2nd option: Scleral transparent lens

This is the indicated solution, that has finally implemented, due to main patient symptoms and ocular surface physiology



### ADVANTAGES

1. No corneal contact
2. Correction of high order aberrations

### DISADVANTAGES

1. No pupil diaphragm reconstruction
2. No rehabilitation of aesthetic symmetry

# DISCUSSION

- Focusing incoming light to the eye with a scleral contact lens can drastically reduce photosensitivity.
- This modality focuses incoming light in a precise way, provide stable optics and correcting irregular astigmatism.
- The absence of corneal touch, is a major advantage in cases of unstable corneal epithelium.
- Scleral lens fitting, in cases combining irregular astigmatism, iris coloboma and optical media opacities, can successfully reduce photophobia and provide increased functional vision, when possible.
- Patient, has to be clearly informed that this lens does not rehabilitate the aesthetic asymmetry, if present.