

# Steep Corneas and Severe Distance Blur? Step Away From the Minus.

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## BACKGROUND

A 30 y/o Hispanic female presented with a chief complaint of longstanding bilateral severe blur uncorrected at distance and near. Her ocular history was only remarkable for refractive error and soft contact lens use. The combination of her complaint and steep keratometry values initially anticipated the diagnosis of some form of corneal ectasia.

## CASE DESCRIPTION

Tomographic scans exhibited asymmetric regular astigmatism, steep keratometry values, and mildly thicker than average pachymetry. High hyperopia during the manifest refraction supported the differential diagnosis of aphakia; however, the patient had both intraocular lenses with clear visual axes. With the exclusion of aphakia, the remaining diagnoses to highly consider were microphthalmos and microcornea. Her corneas were clear and absent of any corneal ectasia signs including apical steepening and corneal thinning. Her small HVIDs of 11.1mm OU measured via Pentacam AXL technically did not categorize her as having microcornea. Finally, A-Scan Ultrasonography images revealed impressively shortened axial length measurements, confirming the diagnosis of microphthalmos OU. Considering this patient's small HVIDs and high hyperopia, a specialty contact lens would provide optimal fitting success compared to a standard soft lens. The excessive coverage with a standard soft lens raised a few concerns such as late onset tightening/steepening, decreased tear exchange, and excessive rotation with blinks.<sup>3</sup> She was empirically fit into a quarterly replacement 12.5mm diameter SpecialEyes custom soft toric contact lens OU with good comfort, inferior decentration, and best corrected distance vision of 20/100 OD, 20/60-1 OS, and 20/60-2 OU. The patient was refit into a 12.8mm diameter OU to improve the centration. An over-refraction was also incorporated in order to obtain 20/60 OD, 20/50 OS, and 20/50+2 OU best corrected distance acuities.

	OD	OS
K values (D)	47.9/50.8 @ 173o	48.6/50.8 @ 009o
K max (D)	52.2	52.7
HVID (mm)	11.1	11.1
A scan (mm)	16.30	16.45
Gonioscopy	Grade 2 (TM)	Grade 2 (TM)
Manifest Refraction	+13.75-1.00x169	+13.50-0.75x027
BCVA (spectacles)	20/40	20/30
BCVA (CL)	20/60	20/50
Final CL parameters	6.9BC/12.8 dia/+18.00-1.50x170	7.0BC/12.8 dia/+16.00-3.25x005

FIGURE 1: Pertinent clinical values pertaining to this patient.

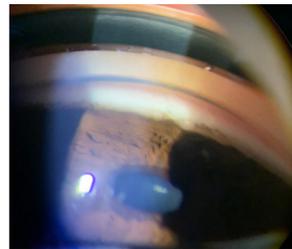


FIGURE 2: Slit lamp image of a Grade 2 angle utilizing the Schaffer Grading System indicating a shallow anterior chamber.

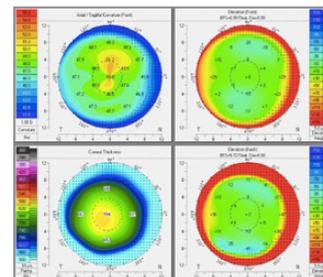


FIGURE 3: Pentacam AXL axial tomography map displaying asymmetric corneal astigmatism of the patient's right eye.

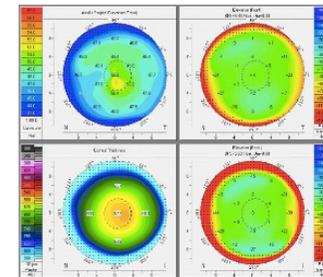
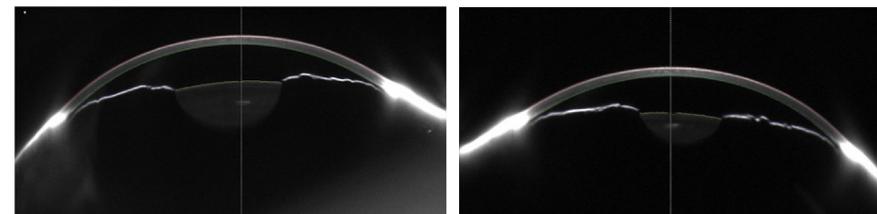


FIGURE 4: Pentacam AXL axial tomography map displaying asymmetric corneal astigmatism of the patient's left eye.



FIGURES 5-6: Horizontal Scheimpflug OCT images from the Pentacam AXL of the right and left eye, respectively, displaying expected narrow angles and a shallow anterior chamber.

## DISCUSSION

Microphthalmos is a congenital ocular malformation with a wide spectrum of phenotypic presentations, the commonality between them being an axial length of 18.5mm or shorter.<sup>1</sup> The average axial length of an adult eye is approximately 25mm.<sup>1</sup> Microphthalmos eyes are underdeveloped, have significantly reduced ocular volume, and shallow anterior chambers.<sup>2</sup> Pathological findings seen in this condition include glaucoma, retinal dystrophy, retinal/optic nerve hypoplasia, cataracts, and significantly high refractive error that is usually hyperopia.<sup>1,2</sup> The etiology is associated with either genetic mutations or environmental insult during gestation resulting in terminated primary optic vesicle development.<sup>2</sup> The combination of significantly high hyperopia and presence of microcornea typically seen in these patients<sup>1</sup> warrants a specialty contact lens fitting. This patient's HVID of 11.1mm did not meet the <10mm requirement to be classified as having microcornea. It is essential to note that smaller HVIDs tend to also have steeper keratometry values.<sup>3</sup> Even with optimal correction in a specialty lens, best corrected vision will still be reduced in patients with microphthalmos.

## CONCLUSIONS

This case highlights the importance of evaluating all tests before assuming the presence of corneal ectasia when confronted with steep corneas and complaints of severe blurry vision. Fundamental contact lens considerations with microphthalmos include Dk value of the material and the diameter.

## REFERENCES

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3. Lizsegre. (2020, October 22). Webinar: Custom Soft Lens Update. Retrieved from <https://www.gpli.info/webinar-2020-10/>