

Extended Depth of Focus Hybrid Lens Improves Visual Function and Contrast Sensitivity in Presbyopic Soft Contact Lens Wearer

Stacy Zubkousky OD, FSLs, Thuy-Lan Nguyen OD, FAAO, FSLs, Crystal Victor OD

Nova Southeastern University College of Optometry, Fort Lauderdale, Florida

Purpose

This case report details a presbyopic patient fit with the new, extended depth of focus (EDOF) hybrid contact lens. The patient was previously fit in soft multifocal contact lenses, but was not fully satisfied with his visual function, specifically his intermediate vision. This report compares distance vision, intermediate vision (100cm) and near vision (40cm), as well as contrast sensitivity between the patient's habitual soft multifocal lenses and the EDOF hybrid lenses.

Background

The patient is a 61-year-old male attorney with high visual demands. His habitual correction was distance center soft multifocal contact lenses in both eyes for preferred good distance vision, with only subjective adequate intermediate and near vision. The patient was willing to sacrifice compromised intermediate and near vision for good distance vision in previous fittings. He has a history of trialing multiple soft contact lens multifocal and mono-vision lenses to arrive at his habitual lenses.

Exam Findings

Manifest refraction:

OD: -3.75-0.75x095 VA: 20/20 ADD: +2.50

OS: -3.50-0.75x105 VA: 20/20 ADD: +2.50

Habitual soft CLs:

OD: -4.00 sph/+2.50D/8.4/14.30

OS: -3.50 sph/+2.50D/8.4/14.30

Distance VA with habitual CLs:

OD: 20/25, OS: 20/20, OU: 20/20

Intermediate VA OU (at 100 cm): 1.0/0.8M (20/16)

Near VA OU (at 40 cm): 20/20

Contrast Sensitivity with habitual CLs via Pelli Robson Chart:

OD: 1.50, OS: 1.50

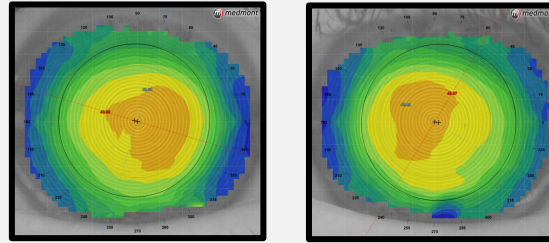


Figure 1: Medmont topography of patient's right and left cornea, respectively.

Keratometry Readings: OD: 45.43/45.89@059, OS: 45.49/45.87@059

HVID: OD: 12mm, OS: 12mm

Contact Lens Empirical Fitting

The patient was fit with an EDOF hybrid contact lens in both eyes. Each lens was empirically designed using:

1. Manifest refraction
2. Keratometry readings from topography
3. Horizontal Iris Diameter (HVID)

EDOF hybrid trial #1 lenses:

OD: -4.00 sph/7.39/14.50/OZ: 8.5mm/FSOZ: 6.5mm/44SC

VA: 20/20, OR: -0.25 sph VA: NI

OS: -3.50 sph/7.39/14.50/OZ: 8.5mm/FSOZ: 6.5mm/44SC

VA: 20/20, OR: -0.25 sph VA: NI

Follow-up Visit/Contact Lens Dispensing

Distance VA: OD: 20/20, OS: 20/20, OU: 20/20

Intermediate VA OU (100 cm): 1.0/0.50M (20/10)

Near VA OU (40 cm): 20/20

Contrast Sensitivity with EDOF hybrid CLs via Pelli Robson Chart:

OD: 1.65, OS: 1.65



Fit:

OD: Well centered, aligned GP, 0.5 mm movement of soft skirt with blink
(-) fluting (-) impingement of vessels (-) bubbles under GP

OS: Well centered, aligned GP, 0.5 mm movement of soft skirt with blink
(-) fluting (-) impingement of vessels (-) bubbles under GP

Results

The patient had both improved intermediate vision and contrast sensitivity with reported improved subjective visual function. After several days of neuroadaptation, he reported sharp distance vision with no need for reading glasses, as well as all day comfort.

Discussion

Extended depth of focus technology allows for clear vision at all distances, mimicking non-presbyopic vision. A series of smooth, non-monotonic, aperiodic power variations across the front surface optic zone manipulates higher order aberrations.^{1,2} This technology provides a smoother transition between focal points and helps reduce common multifocal contact lens symptoms such as halos and ghosting.

Conclusion

Extended depth of focus hybrid lenses are a new, innovative contact lens option for presbyopic patients, with and without corneal astigmatism, who are seeking better visual function. The technology can offer excellent vision at distance, intermediate and near with improved contrast sensitivity, as observed in this case.

References

1. Tilia D, Bakaraju RC, Chung J, Sha J, Delaney S, Munro A, Thomas V, Ehrmann K, Holden BA. Short-Term Visual Performance of Novel Extended Depth-of-Focus Contact Lenses. *Optom Vis Sci*. 2016 Apr;93(4):435-44. doi: 10.1097/OPX.0000000000000806. Erratum in: *Optom Vis Sci*. 2016 Jun;93(6):656. PMID: 26808384.
2. Tilia D, Munro A, Chung J, et al. Short-term comparison between extended depth-of-focus prototype contact lenses and a commercially-available center-near multifocal. *J Optom*. 2017;10(1):14-25. doi:10.1016/j.optom.2016.04.003