Marshall B. KETCHUM UNIVERSITY
Southern California College of Optometry

Correction of High Hypermetropia with Intralimbal Rigid Gas Permeable Contact Lenses

Jessica Sun, OD, FAAO and Katherine Zhang, OD, FAAO

BACKGROUND

This case discusses the design of intralimbal rigid gas permeable (RGP) corneal contact lenses for optimal visual correction in a patient with isoametropic amblyopia associated with high hyperopia. Although RGP contact lenses provide superior optical quality compared to spectacles or soft lenses, fitting can be technically challenging due to inferior decentration from increased lens thickness with high lens powers. Intralimbal RGP lenses are fit to align with the corneal periphery and typically implement reverse geometry to fit oblate corneal profiles (i.e. pellucid marginal degeneration, iatrogenic ectasia). This case describes the adaptation of these pan-corneal lenses to optimize vision, fit, and ocular health using a multi-curve prolate lens design.

CASE HISTORY

Demographics	MV, 15 year-old Hispanic female.
Chief Complaint	New contact lens fit – interested in trying soft lenses
Ocular History	Shallow isoametropic amblyopia, allergic conjunctivitis
Medical History	None

CLINICAL FINDINGS

Visual/Refractive Data	OD	OS
Habitual SRx	+7.50-2.00x002	+7.75-2.00x178
DVA (cc SRx)	20/25-1	20/25-1

Slit Lamp Evaluation	OD	OS
Cornea	Clear	Clear
Conjunctiva	1+ papillae	1+ papillae

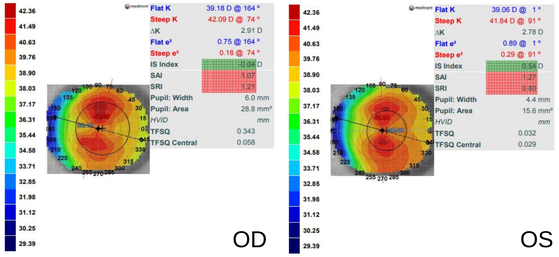

Fig 1. Corneal topography. 2.75D of regular With-the-Rule toricity OU

TREATMENT & MANAGEMENT

Trial #1: Standard diameter (9.4 mm) bitoric corneal RGP lenses were ordered empirically due to significant corneal toricity noted.

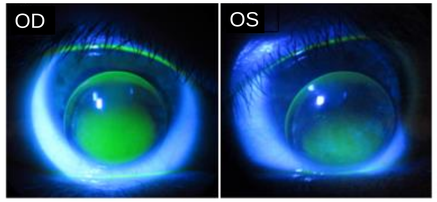

Fig 2. Inferior decentration noted with corneal RGP lenses

Bitoric RGP	OD	OS
DVA (cc)	20/30	20/30

Fit: Significant inferior decentration was noted OU. Manual centration of each lens confirmed adequate lens-cornea fitting relationship and appropriate back optic zone radius with fluorescein pattern analysis.

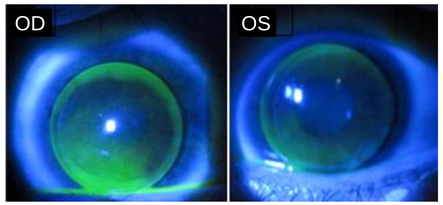

Fig 3. Lens fitting relationship after manual centration

Trial #2: The patient was re-fit into a prolate intralimbal lens design.

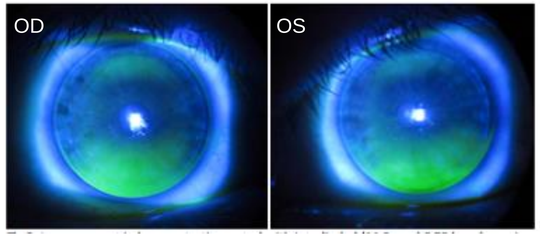

Fig 4. Improvement in lens centration noted with intralimbal (11.2 mm) RGP lens – covering >90% of the horizontal visible iris diameter

Intralimbal RGP	OD	OS
DVA (cc)	20/25	20/20-2

Fit: Improved overall lens position and tear exchange improved. Good overall comfort and corneal integrity was maintained, with no signs of punctate staining or neovascularization.

Comparison of lens parameters

OD	Bitoric Corneal RGP Lens	Spherical Intralimbal RGP Lens
Overall Diameter (OAD)	9.4 mm	11.2 mm
Optic Zone (OZ)	7.6 mm	9.4 mm
Base Curve	8.23 x 8.77 mm (41.00D / 38.50 D)	8.54 mm (39.50 D)
Power	+ 6.75 D / + 8.75 D	+ 7.75 DS
Secondary Curve	9.20 mm	9.00 mm
Tertiary Curve	12.00 mm	12.00 mm

OS	Bitoric Corneal RGP Lens	Spherical Intralimbal RGP Lens
Overall Diameter (OAD)	9.4 mm	11.2 mm
Optic Zone (OZ)	7.6 mm	9.4 mm
Base Curve	8.23 x 8.77 mm 40.75 D / 38.75 D	8.54 mm (39.50 D)
Power	+ 7.25 D / +9.00 D	+ 8.00 DS
Secondary Curve	9.20 mm	9.00 mm
Tertiary Curve	12.00 mm	12.00 mm

CONCLUSIONS

- Intralimbal RGP lens designs can improve visual performance and provide a consistent visual experience for patients with high hyperopic refractive error.
- Implementation of a wider optic zone and increased stability with a larger overall diameter can potentially improve the lens fitting relationship compared to a smaller corneal lens
- Intralimbal contact lenses exhibit adequate on-eye movement and sufficient tear exchange to avoid complications associated with lens stagnation (i.e. desiccation, accumulation of tear film debris).
- Prescribing intralimbal RGP lenses can have significant clinical implications for ensuring optimal correction of refractive error to maximize visual outcomes in patients with isoametropic amblyopia associated with high hyperopia.

REFERENCES

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