

# Customized Bitoric Corneal Rigid Gas Permeable Lenses for High Astigmats: A Case Report

BSc (Hons) in Optometry  
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## Background

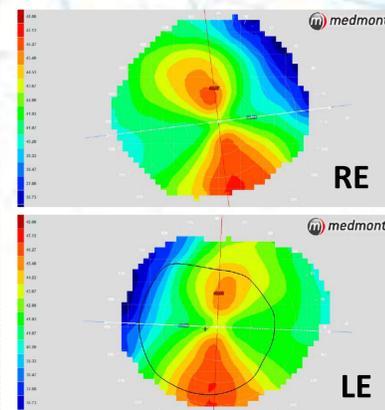
To report a case of a Chinese lady who had toric corneal surfaces fitted with bitoric rigid gas permeable (RGP) lenses. She has been wearing spectacles with adjusted prescription which failed to provide acceptable vision and comfort. Owing to her highly toric corneal contour, satisfactory comfort and fitting cannot be achieved with regular spherical RGPs. Tailor-made soft contact lens (SCL), scleral and mini-sclerals were also rejected due to complexity in handling and price concern. Eventually, a customized bitoric RGP with 3-4D of toricity was fitted. During follow-up visits, ocular condition and lens fitting was found stable.

## Case Report

A 59 year-old Chinese female presented to the Optometry Clinic of the Hong Kong Polytechnic University for a comprehensive eye examination. She wanted to try contact lenses so as to get rid of spectacles (habitual vision: R 6/12 L6/9.5<sup>-2</sup>). She had no previous history of ocular trauma, surgery, infection or inflammation.

The patient was found to be hyperopic and astigmatic. Subjective refraction (BCVA in Snellen) was R +5.50/-6.00 x 17 (6/9.5) L +6.25/-4.75 x 165 (6/7.6). Vision and visual comfort with her habitual spectacles with adjusted prescription was unsatisfactory. She was eager to seek for other refractive correction methods. Corneal topography revealed with-the-rule corneal astigmatism of 5-6D in both eyes (fig. 1). Pachymetry findings were normal. She had mild oily tears. Other ocular health findings were unremarkable except mild cataractous changes and few drusens at the paramacular region in both eyes.

She returned to clinic later for contact lens fitting. Several types of trial lenses were fitted and the reasons of rejection were listed in table 1.



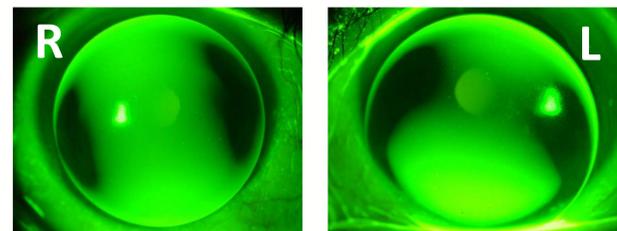
[Fig. 1] Medmont topography (axial power map) showing asymmetrical regular limbal-to-limbal with-the-rule corneal astigmatism in both eyes.

R 41.18@7/46.87@97  
L 41.08@178/45.98@88  
Corneal cylinder was approximately 5.69D and 4.9D for RE and LE respectively.

Lens Type	Fitting Performance	Reason of Rejection
Tailor-made SCL	Acceptable fit	Unsatisfactory visual quality (compared with rigid lens)
Spherical corneal RGP	Vertical dumb-bell fluorescein pattern	Excessive vertical dumb-bell
Mini-scleral Lens	Poor edge fit and lens stability	Px found lens handling complex & price concern
Scleral Lens	Poor lens stability; excessive edge lift vertically and blanching horizontally	Px found lens handling complex & price concern

[Table. 1] Types of trial CL (with standard design) tried and the reason of rejection.

Fig. 2 and 3 showed the vertical dumb-bell fluorescein pattern with a corneal spherical RGP and a large bubble with a scleral lens on eye respectively.



[Fig. 2] Fitting performance of spherical RGP.

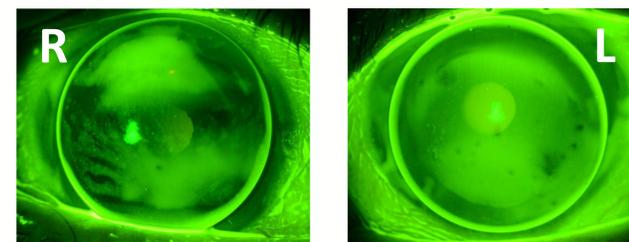


[Fig. 3] Significant edge lift (L) with large bubble (R) which re-occurs despite of re-insertions.

Due to the poor alignment with the previous lens, a pair of customized bitoric corneal RGP lens was ordered (*Achievement*<sup>®</sup> bitoric XO).

The initial lens failed to provide satisfactory corneal alignment and stability. Therefore, further adjustments were made including base curve modification, overall lens diameter reduction (from 9.6 mm to 9.3 mm) and lens edge steepening (table. 2). To further enhance visual quality, front toricity was included in the final lens to correct the residual refractive error revealed in RE.

The final dispensed lens provided central alignment with mild vertical dumb-bell, adequate movement and edge fit (fig. 4). Vision was R 6/7.6<sup>+</sup> L 6/7.6<sup>+2</sup>. As the patient was also presbyopic, a pair of on-top spectacles (+2.00DS OU) was prescribed for near tasks. Ocular health condition and fitting was stable in following aftercare visits.



[Fig. 4] Fitting performance of the final lens. Proper lens care procedures and use of unit-dose ocular lubricants were advised to improve pre-lens tear film stability.

Trial	Base Curve	DIA.	Edge
1	RE 44.25@+1.25/41.75@+5.25	9.6	Standard
	LE 44.25@+3.25/42.25@+4.00		
2	RE 41.16@+5.50/45.16@+1.50	9.6	Standard
	LE 41.67@+4.00/45.17@+0.75		
3	RE 41.16@+5.50/45.16@+1.50	9.3	RE .3/9.00 & .3/10.75
	LE 41.67@+4.00/45.17@+0.75		LE .3/8.90 & .3/10.50
4	RE 41.16@+6.25/45.16@-0.25	9.3	Same as above

[Table. 2] Summary of the lens parameter modifications.

## Discussion

- Bitoric RGP lens contains of two different base curves. It is usually fitted for patients with corneal cylinder exceeding 2.00DC (1) or when spherical GP lens failed to provide a good fitting performance and centration over a toric corneal surface.
- In this case, as the corneal cylinder was 5-6D, definitely back bitoric lens design could achieve better alignment and stability over spherical lenses. The final dispensed lens offered 3-4D of toricity, which was about two-third of that of the corneal cylinder. Bitoric lenses providing at least two-third of the corneal toricity usually offer better stability with minimal rotation (2), which is important for bitoric lenses with cylinder power effect design.
- Compared to soft contact lenses, GP lens is considered as a better option for patients with significant amount of corneal astigmatism. It is believed to be associated with the tolerance of soft contact lens rotation, which was found reduced in cases with greater astigmatic component than spherical (3).
- Corneal and scleral asymmetry and toricity were found related in eyes with astigmatism (5). In this case, scleral and mini-scleral lenses with standard edge design may not be able to align well with the toric scleral profile. Toric periphery will be utilized for a better edge lift. However, as the patient was concerned about the economic expenses of scleral lens, no further amendments were made.

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## Contacts

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