Case Report: Fitting of a Mini-Scleral Lens on a Post-RK and Post-LASIK Irregular Cornea

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Abstract

BACKGROUND: The Blanchard Onefit™ lenses are mini-scleral lenses designed to be supported by the conjunctiva and tear film. The lens vaults the entire area of the cornea and limbus. The lens material offers a minimum permeability of 100 Dk. Ideally the central corneal clearance is 150-175 microns, with a limbal clearance not greater than 40 microns. These lenses have been utilized in patients with keratoconus, irregular corneas, and post refractive surgery.
CASE REPORT: A 53 year old Caucasian female with a past history of RK and four LASIK surgeries presented for a contact lens fitting with a chief complaint of severe daily fluctuating blur, distortion, and glare that worsened throughout the day. Our goal was to obtain a functioning visual system to regain the patient's activities of daily living, and to provide an example of how an irregular cornea can be enhanced using a mini-scleral lens to improve a compromised visual system's performance.
CONCLUSION: The Onefit™ mini-scleral lens proved to be an effective treatment modality for distortion, blur, and glare induced by an irregular post-refractive cornea. The lenses restored the patient's visual system allowing her to perform activities of daily living. The lenses even improved the stability of her vision post lens removal for 3-4 hours.

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Background

A 53 year old Caucasian female presented for a contact lens fitting with a chief complaint of severe daily fluctuating blur, distortion, halos, and glare that worsened and fluctuated throughout the day. She reported a secondary complaint of intermittent moderate dry eye in both eyes for the past few years. She had been unsuccessful in soft contact lenses in the past and spectacles did not correct for the daily fluctuation in blur. The patient's ocular history was significant for Radial Keratometry (RK) in 1992 and four LASIK refractive surgeries between the years 2007-2009. Review of personal medical history disclosed panic attacks and insomnia. Macular degeneration and hypertension was identified in the

patient's mother. Arthritis, hypertension, and cancer were identified in her father. All other family medical history was unremarkable. Current medications included Concerta, Xanax, vitamin D, and Estrogen.

Upon ocular examination the best corrected visual acuities were 20/20 OU (both eyes) with distortion. Best corrected visual acuities were attained with +0.50 -0.50 x 097 OD (right eye) and -1.00 DS OD (left eye). Pupils were equal, round, and reactive to light with no afferent defect in either eye. Extraocular muscles of both eyes were full in range and smooth in motion. Visual fields were full to finger counting in all quadrants.

Biomicroscopy examination of the anterior segment was unremarkable except for the cornea OU. Eight RK scars and a LASIK flap were noted in each eye along with a decreased tear film. See Figure 1 below for corneal scar images.

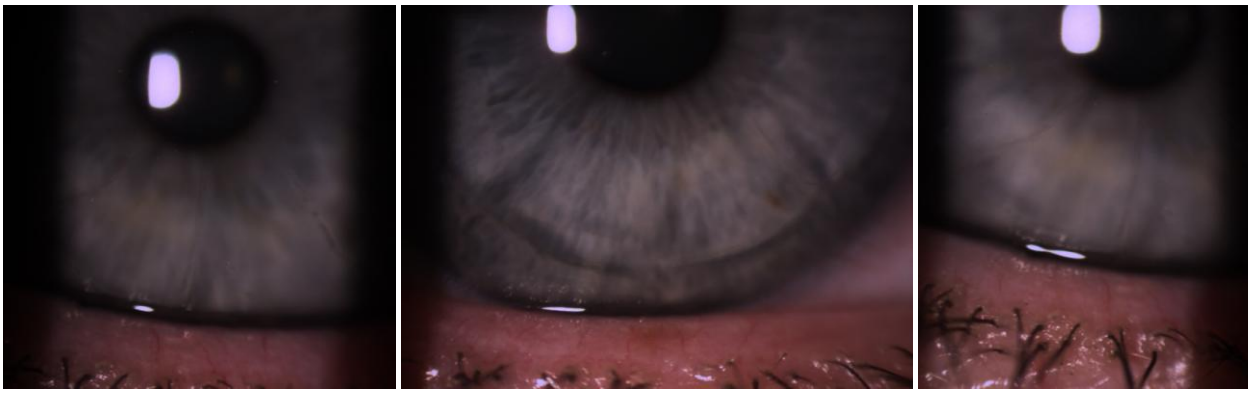

Figure 1 Photography of the corneal RK and LASIK scars.

Goldmann Applanation Tonometry and the dilated fundus exam were deferred at this visit due to a recent complete ocular health exam by her referring doctor.

Test Procedures, Fitting/Refitting, Design & Ordering

Keratometry and topography were obtained via the Medmont Topographer. Keratometry readings were 40.8D/40.2D@115 OD and 40.9D/39.9D091 OS. Initially the patient was fit into Blanchard's Onefit™ diagnostic lens in the following parameters:

OD: 7.70 BC, 14.3 mm diameter, -2.00 sph, standard edge

OS 7.90 BC, 14.3 mm diameter, -1.00 sph, standard edge

The OD lens had an area of excessive edge lift from 6 – 8 which caused a persistent influx of bubbles even after allowing adequate time for the lens to settle. The OS lens had several areas of touch. A second diagnostic lens was trialed. Parameters were as follows:

OD: 7.20 BC, 14.3 mm diameter, -4.50 sph, standard edge

OS: 7.30 BC, 14.3 mm diameter, -4.00 sph, standard edge

The OD lens continued to show an area of edge lift from 6 – 8 with an influx of bubbles to a lesser degree than diagnostic lens 1. The OS lens showed good central and limbal clearance, but also had an area of excessive edge lift from 4 – 8 with an influx of bubbles. Over refraction in the left eye was -4.25 sph and the distance acuity was 20/20. A third diagnostic lens was trialed in the right eye; parameters were 6.9 BC, 14.3 mm diameter, -6.00 sph, and standard edge. Diagnostic lens 3 in the right eye showed good edge and limbal clearance, but continued to show edge lift from 6 – 8:30 with a persistent influx of bubbles. Over refraction OD was -5.50 sph with distance acuity of 20/20. The patient reported good vision and comfort with the final diagnostic lenses. Due to persistent edge life and influx of bubbles despite the otherwise good fit, the Blanchard lab was consulted for fitting suggestions. Based on the consultant's advice, the following lens parameters were ordered:

OD: Onefit™ 6.9 BC, 14.3 mm diameter, -11.12 sph, and customized edge lift of 2 steep

OS: Onefit™ 7.3 BC, 14.3 mm diameter, -8.00 sph, and customized edge lift of 2 steep

At dispensing acuities were 20/25+2 OD and 20/20- OS at distance. The right lens showed a central clearance of 225 microns and good limbal clearance around 50 microns. No excessive edge lift was noted and no influx of bubbles was present. Over refraction was Plano with acuity of 20/25+2 at distance. The left lens also showed a good central clearance of 175 microns and a limbal clearance around 60 microns. Again no excessive edge lift was present and no influx of bubbles was observed. Acuity of 20/20 at distance was obtained with an over refraction of -0.50 DS. The lenses were dispensed to the patient for full-time wear with a gradual increase in wear time over the course of the first few days of lens wear. The patient was directed to return in one week for lens evaluation. Images of the lenses at dispense are shown below in Figures 2, 3, and 4.

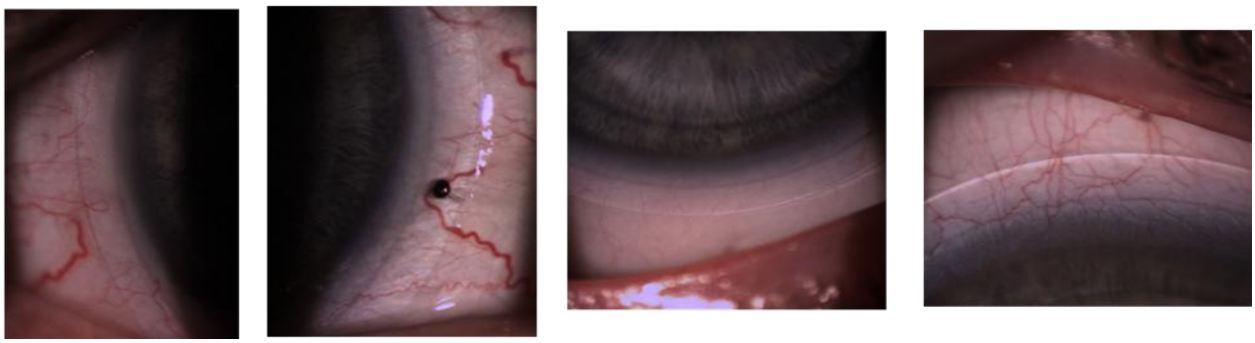

Figure 2 OD lens at dispense.

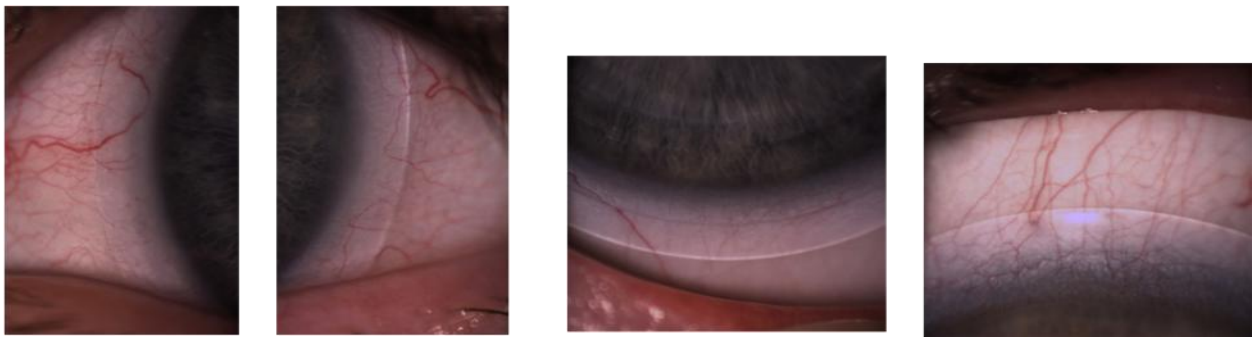

Figure 3 OS lens at dispense.

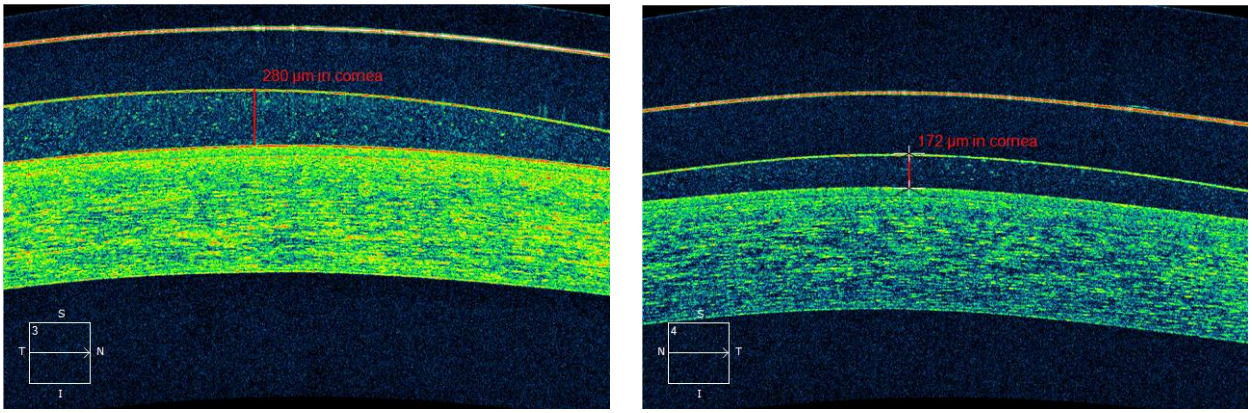

Figure 4 Anterior segment OCT images illustrating central clearance of lenses at dispense. OD lens (left) with a central clearance of 280 and OS lens (right) with a central clearance of 172.

Patient Consultation and Education

The patient was educated on the effects cornea ectasia as a result from post surgical treatment. Insertion and removal techniques were demonstrated and proper contact lens hygiene was thoroughly

discussed. The importance of the use of non-preservative saline solution to fill the bowl of the contact lens was stressed. We discussed using over the counter readers for improved near vision and the use of non-preservative artificial tears over the contact lens for lubrication. A contact lens schedule was set-up with a gradual increase in contact lens wear-time over the course of the first week to allow her eyes to get accustomed to contact lens wear.

Follow-Up Care/Final Outcome

One week later the patient presented with acuities of 20/20- OD and 20/20 OS at distance. She reported an average wear time of nine hours, good comfort and vision, and mild dryness at the end of the day. She also reported good night vision that seemed to last for up to four hours post lens removal. Good edge lift, central clearance, and limbal clearance was noted OU. No bubbles were observed OU. Over refraction OD was +0.25 DS with distance acuity of 20/20- and plano OS. Refraction without lenses was +0.25 DS OD with 20/20 acuity and +0.75 DS OS with acuity of 20/20. Due to the mild fluctuation in vision we directed the patient to continue with full time wear and return in another week to reevaluate the stability in refraction. We recommended bifocals or over the counter readers for improved near acuities and recommended non-preservative artificial tears over the contact lens as needed for the dryness.

The patient returned for her two week post lens dispense evaluation with acuities of 20/20 OD and OS at distance. Acuities at near were 20/200 OU without an add. The patient reported good vision and comfort with a drastic decrease in fluctuating vision, glare, and distortion even up to 3 – 4 hours post lens removal. She reported satisfaction with over the counter readers for near work. Mild impingement without constriction was noted nasally OU. Good central and limbal clearance and edge lift was noted OU. Over refraction was Plano in both eyes with lenses. Refraction without lenses was +0.50 -1.00 X 006 OD with 20/20 acuity at distance and +0.75 DS OS with 20/20 acuity at distance. Topography was obtained via Medmont, images are shown in Figure 5 below. The lens prescription was finalized in both eyes and the patient was directed to revisit in one year or sooner if any issues presented.

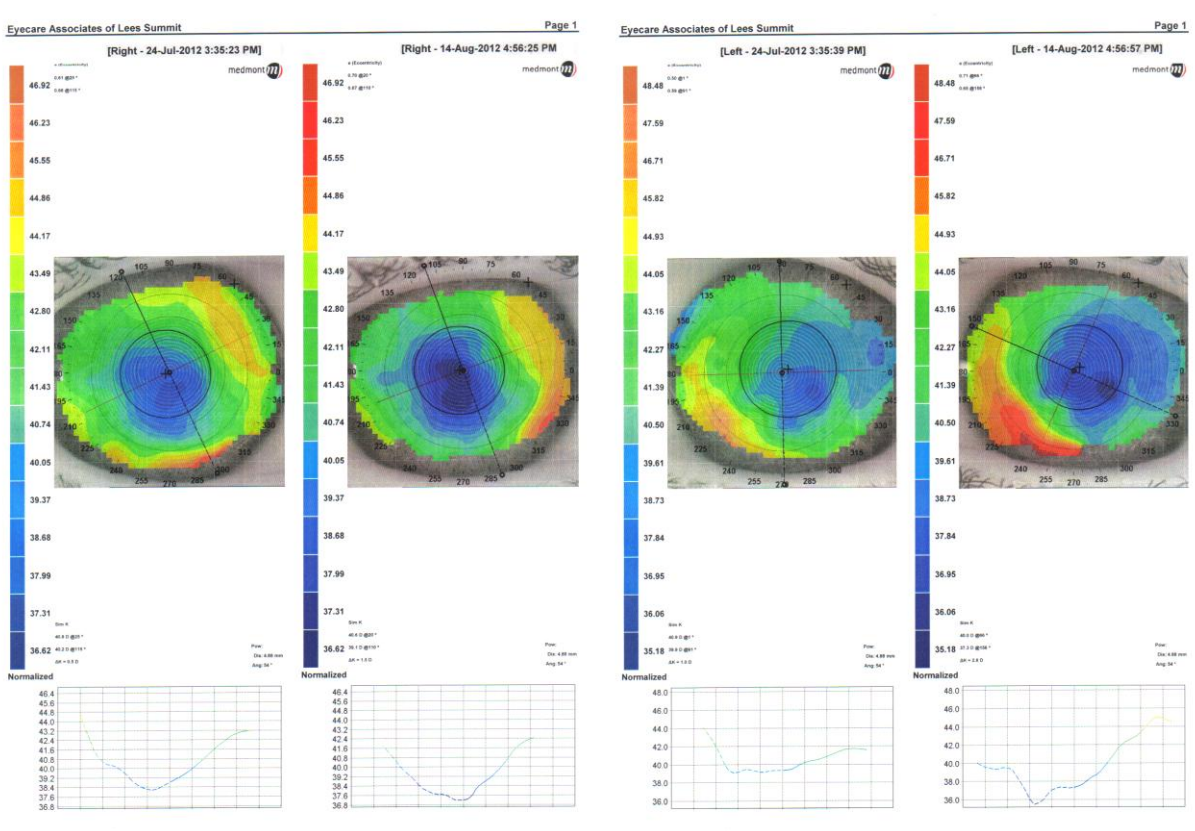

Figure 5 Medmont topography of pre-fitting and post-fitting corneas. Initial topography showed keratometry readings of 40.8D/40.2D@115 OD and 40.9D/39.9D@091 OS with cylindrical powers of 0.5D OD and 1.0D OS. Two week post-lens topography showed keratometry readings of 40.6D/39.1D@110 OD and 40.0D/37.3D@156 OS with cylindrical powers of 1.5D OD and 2.8D OS.

Discussion

The discovery of the reported excellent vision post lens removal was a surprise. A corneal reshaping or reverse geometry effect may account for the improved vision after removing the lenses. Topography showed a central flattening and peripheral corneal steeping after two weeks of lens wear; however, there was no significant change in topography that may account for the improvement in vision. The stability of the patient's vision also significantly improved with the lenses. The patient no longer experienced a daily fluctuation in vision and only complained of blur at near, which was correctable with a bifocal prescription. No significant change in over refraction was identified after one and two weeks of contact lens evaluations, and no significant change was noted when comparing the morning over refraction at the one week lens evaluation versus the afternoon over refraction at the week two evaluation.

The goal to obtain a functioning visual system to regain the patient's activities of daily living was met and exceeded due to the unexpected continued improvement in vision after lens removal. An irregular cornea can be enhanced using mini-scleral lenses to improve a compromised visual system's performance. When providing care for patients with irregular corneas suffering from fluctuating vision and blur, mini-scleral lenses, such as Blanchard's Onefit™ lens, should be considered.

Scleral lenses are not only good for irregular corneas, but they have also been shown to be successful in other corneal diseases such as keratoconus where one study found 90.9% of their severe keratoconic patients achieved 20/40 or less acuity via Snellen.[1,4,6] Post PRK patients have also proved to be successful 81.8% of the time, obtaining an acuity of 20/40 or better via Snellen.[6] Over the years studies have continued to show sclerals to be a good therapeutic treatment for severe corneal disease patients. It is important to continue these studies in order to determine the long term effects these lenses may provide.[2,3,5]

Conclusion

The Onefit™ mini-scleral lenses proved to be an effective treatment modality for distortion, blur, and glare induced by an irregular post-refractive surgical cornea. The lenses restored the patient's visual system allowing her to perform activities of daily living she otherwise could not complete due to her drastic and debilitating daily fluctuation in vision. The lenses also improved the patient's mental state, as she was suffering from severe depression from all the failed surgical refractive enhancements. To improve the patient complaint of dryness, Optive™ Refresh non-preservative tears were prescribed. This improved patient comfort and decreased the dryness. A bifocal prescription of +2.25 was prescribed to the patient to correct for the uncorrected blur at near.

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