

Original research

Visual management of aphakia with concomitant severe corneal irregularity by mini-scleral design contact lenses

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Abstract

Purpose: To evaluate visual results, comfort of use, safety, and efficacy of mini scleral contact lenses in optical management in patients with traumatic aphakia and severe concomitant irido-corneal injury.

Methods: In a case series, eight eyes with post traumatic aphakia and severe concomitant irido-corneal injury that were evaluated at the Contact Lens Clinic of Farabi Eye Hospital, Tehran, Iran for contact lens fitting and could not be corrected with conventional corneal RGP contact lenses were fitted with miniscleral contact lenses. Uncorrected visual acuity (UCVA), best spectacle corrected visual acuity (BSCVA), and BCVA (Best corrected visual acuity) with miniscleral lens were recorded. Slit lamp examination, comfortable daily wearing time, and any contact lens-related complication were documented in each follow-up visit.

Results: The mean UCVA and BSCVA of the cases was >2.7 and 0.41 LogMAR, respectively (BSCVA could not be assessed in one case due to severe corneal irregularity). The mean final BCVA with the miniscleral lens was 0.05 LogMAR (range from 0.4 to -0.04 LogMAR). The mean follow-up period was 14.6 months. The mean comfortable daily wearing time (CDWT) was 11.6 h, ranging from 8 to 16 h. The only contact lens-related complication was mild redness and irritation that was observed in 2 patients during the follow-up visits. All patients were comfortable with handling these lenses.

Conclusion: Miniscleral contact lenses can be considered a safe and effective option in aphakia patients with concurrent corneal scarring secondary to ocular injury for whom surgical intervention would be complicated.

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Keywords: Mini-scleral contact lens; Aphakia; Irregular cornea

Introduction

Utilization of the scleral family (full or mini) contact lenses is rapidly finding its way in various indications. The usefulness

of these lenses have been shown in many situations such as severe dry eye, advanced corneal ectasia, and post corneal inlay implantation.^{1–3} By considering the causes of corneal neovascularization,⁴ the limbus-friendly design of miniscleral lenses might lead to lower rates of corneal neovascularization at least in theory, compared to soft contact lenses, as they pass the limbal area without any direct continuous limbal irritation. On the other hand, scleral family lenses are relatively thick compared to other lenses that theoretically reduce the oxygen supply.⁵ Visual outcomes are comparable or even better than conventional RGP lenses in many patients.^{1,6,7} Scleral and semiscleral lenses have proven to be extremely beneficial for patients with highly irregular and/or asymmetric keratoconic corneas, especially large diameter (13.5 – 16.0 mm)

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semiscleral lens designs.⁷ Schornack showed a dramatic improvement in visual acuity by using scleral lens in a study.⁸

The lack of the corneal touch in these lenses makes them favorable-regarding safety and efficacy-for highly irregular corneas and ectatic corneal disorders.^{1,9} Corneal RGP lenses might be difficult or impossible to fit in eyes with severe corneal scars and coarse opacities. Fitting of these modern larger diameter contact lenses can be a good option for visual acuity and quality improvement. Patients with penetrating injury occasionally have extensively irregular corneal lacerations, severe iris injury or loss, and concurrent traumatic cataract. In many of the patients, after primary repair and lensectomy, it is impossible to insert the intraocular lens (IOL) in the remnants of the capsular bag if any remnant exists. Occasionally, in traumatic aniridia, iris fixation is even impossible, and scleral fixation remains the only surgical option in these cases; however, visual acuity remains poor because of the concomitant irregular astigmatism that would not be eliminated by IOL implantation.¹ The safety and efficacy of miniscleral contact lenses in visual improvement have been demonstrated in other settings, mostly for addressing patients with highly irregular corneas such as the cases with ectatic corneas, keratoglobus, and Terrien's marginal degeneration.^{1–3,10} On the other hand, highly gas permeable RGPs have been used for correcting aphakic patients with an excellent efficacy and safety profile.^{2,11} Considering the ability of miniscleral (MSD) contact lenses to correct high levels of corneal irregularity and their high permeability to oxygen, we decided to use them for visual rehabilitation of the patients with concomitant aphakia and severe irido-corneal injury. We present the visual rehabilitation outcomes of eight cases with a history of severe ocular trauma following the use of miniscleral contact lenses.

Methods

The protocol of this case series study was approved by the Eye Research Center Ethics Committee of Farabi Eye Hospital, Tehran, Iran. Aphakic patients with a history of concomitant irido-corneal injury were referred to the Contact Lens Clinic, at a tertiary referral center, Farabi Eye Hospital, Tehran, Iran. Among these patients, consecutive patients with severe corneal irregularity that could not be fitted by conventional corneal RGP lenses were included. The measurement of uncorrected visual acuity, manual Javal keratometry, auto kerato-refractometry, objective refraction by means of retinoscopy in dim light, subjective refraction, and best spectacle corrected visual acuity (BSCVA) were recorded. Visual acuity was measured with Snellen charts and converted to LogMAR units. Manual Javal keratometry was performed three times on each eye, and the mean of the three measurements was used for lens power estimation. These patients underwent MSD contact lens fitting (non-fenestrated; diameter 15.8 mm) (Blanchard Contact Lens Inc., Manchester, Canada). The material of the lenses was Boston XO with DK of 100 ISO, 141 gas to gas. Best corrected visual acuity with the MSD contact lens was assessed, and retinoscopy was

performed once again with the MSD lens fitted on the eye. Slit lamp examination was used to evaluate fitting and fluorescein pattern by one contact lens practitioner experienced in this field (FA), and the pattern was evaluated as three groups:

- *Ideal fit*: no touch over the entire cornea in the fluorescein pattern viewed by Cobalt light, vaulting between 100 and 200 μm evaluated by 30-degree oblique slit lamp beam, no impingement over conjunctival vessels.
- *Acceptable*: no corneal touch and minimal conjunctival/scleral impingement (less than three clock hours) with only small conjunctival vessels being under pressure.
- *Unacceptable*: corneal touch with maximum available sagittal vault or more than three clock hours conjunctival/scleral impingement and reported subjective dissatisfaction

After fitting the optimal lens in our cases, they were followed at regular intervals every other month. Comprehensive ophthalmic examinations including slit lamp examination and assessment of visual acuity were performed at each follow-up visit. The patients were asked about their comfortable daily wearing time, any redness, irritation, fluctuation in the quality of vision, and any other problem with these lens in a form. Complications and subjective and objective visual outcomes were investigated and recorded in follow-up sessions.

Results

The age range of the 8 patients was between 11 and 59 years old. Keratometry readings ranged from 6.8 to 10 mm. Objective spherical equivalent ranged from +11.00 to +15.00. Seven patients used glasses or RGP lenses in the past for refractive correction. One patient had a history of an unsuccessful attempt for secondary IOL insertion, had difficulty with RGP fitting trial, and used no mode of vision correction. These cases were not candidates for the IOL implantation procedure or corneal keratoplasty to improve vision, at the discretion of Cornea Department. The low quality of the spectacle corrected visual acuity was the chief complaint of all of our patients. High amounts of visual aberrations and glare were remarkable in 5 patients. Clinical findings and past surgical history of the cases are demonstrated in [Tables 1 and 2](#). Characteristics of the fitted MSD lenses are listed in [Table 3](#).

All of the patients were followed closely every other month. Aside from examinations, they were asked about subjective issues they had with the lenses, by means of a checklist, in each session. The mean follow-up period was 14.6 months, ranging from 12 to 18 months, and the follow-up sessions are ongoing.

Uncorrected visual acuity ranged from finger count at 10 cm (2.7 LogMAR) to 1.3 LogMAR (20/400 or 1/20). The power of the MSD lenses ranged from +4.0 to +16.0 D. The mean of the BCVA (Best corrected visual acuity) with MSD lenses, was 0.05 LogMAR (range from 0.4 to -0.04 LogMAR). Most of the patients were comfortable with handling these lenses. However, in one of the patients, the MSD lens tear occurred on handling the lens at home. The lens was ordered again, and the

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