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Changes in Scleral Lens Fittings from Post-Penetrating Keratoplasty Suture Removal

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INTRODUCTION

Corneal suture manipulation defined as suture adjustment or removal is often used to reduce the magnitude of irregular astigmatism resulting from post-penetrating keratoplasty. Despite these efforts, residual astigmatism still poses a challenge and can be the limiting factor towards visual rehabilitation regardless of a clear graft. In these cases, scleral contact lenses may be indicated to help improve visual potential. However, lens fittings can be complicated further if the surgeon is still actively removing sutures during the lens fitting process.

CASE DESCRIPTION

Chief Complaint: An 85 year-old Caucasian female presented to the Moran Eye Center for a scleral contact lens fitting s/p penetrating keratoplasty OD.

Ocular hx:

1. Keratoconus OD s/p PKP x 2; most recent PKP 07/2021
2. Prosthetic OS

Over the course of the next 8 months, the patient had corneal sutures removed 6 times all while undergoing the lens fitting process. With each suture removal, her corneal topography pattern shifted influencing her contact lens evaluations. Each follow-up after a suture removal had resulted in a different fit of the lens on the eye and a change of visual acuity.

CONTACT LENS SELECTION

	Initial Lens – 01/2022	After 2 suture removal – 04/2022	Final Lens – 09/2022 After 6 suture removals
VAs	20/80+1	20/80+1	20/50+1
Base Curve	35.50 D	34.00 D	37.50 D
SAG	4200	Same as initial	4750
Dia	16.0	Same as initial	16.0
Power	+12.00 DS	Same as initial	+10.00 DS
APS	H: Flat 3/V: Steep 4	Same as initial	H: Flat 1/ V: Steep 6
Fit	300 central AC, nearly bearing in several spots at the graft host junction (Figure 1)	100 um central clearance, touching at graft host junction inf-nasal and close to touch at sup and temp (Figure 2)	250 um central clearance, good uniform clearance throughout midperiphery (Figure 3)

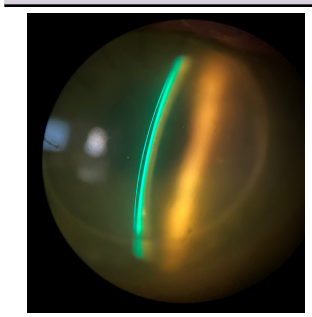

Figure 1.

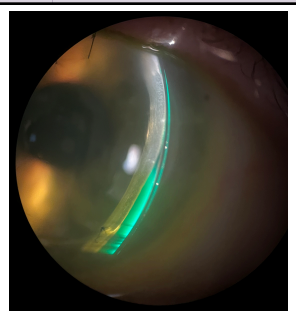

Figure 2.

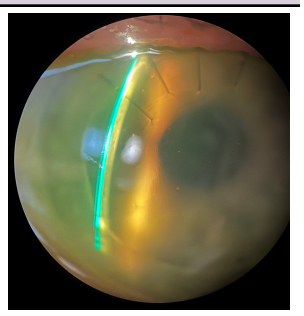

Figure 3.

DISCUSSION

Post-keratoplasty astigmatism can be a result of many different factors[1]. For one, donor tissue from younger eyes are more likely to induce higher astigmatism than adult donor eyes. Additionally, hosts with pre-existing forces such as those with keratoconus or are aphakic have a higher degree of astigmatism due to graft-host thickness discrepancies. Intraoperative techniques can play a part as well depending on the trephination of the donor button and host bed or suture technique. Various suture techniques and their role on astigmatism are still under debate but some studies have shown that interrupted suture technique could result in the greatest amount of astigmatism.

Corneal suture manipulation becomes crucial to reduce subjective and topographical astigmatism and bring the eye towards hyperopization[2]. By doing so, an improvement of visual acuities can be achieved. Often, early post-operative single suture removal technique in a single visit is preferred over multiple suture removal, because the former results in a greater reduction of astigmatism in a shorter period of time[3]. After suture removal, an oblate topographical shape is more commonly seen than a prolate shape in keratoconus eyes as there is an increase in midperipheral steepening and central flattening. The effects of astigmatism reduction from suture removal can best be predicted based on the amount of pre-suture removal astigmatism. For every diopter of corneal astigmatism present before suture removal, there is an increased change in astigmatism by 1.05D[4].

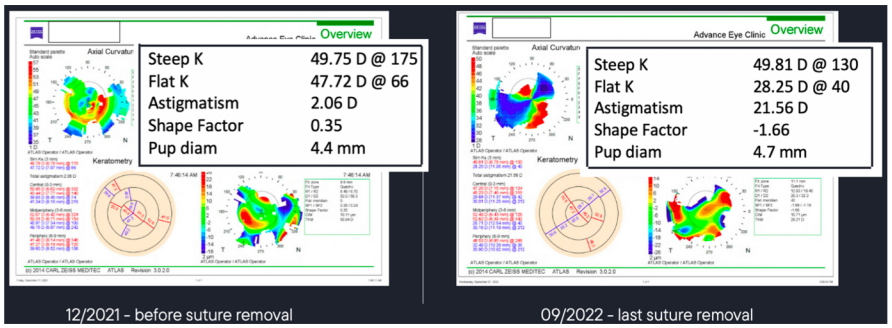

Figure 4. Topographical changes before and after completion of suture removal revealing a large change in astigmatism and a negative shape factor.

CONCLUSION

Post-keratoplasty astigmatism may be inevitable and can leave patients with poor visual results. Contact lenses such as scleral lenses may be indicated for post-penetrating keratoplasty patients to achieve their greatest visual potential. However, it can pose as a challenge if the patient is still undergoing suture removal as each suture modification induces changes in both corneal topography and refractive power; thus, requiring significant modifications in lens designs at each follow-up. However, contact lens fittings should not be delayed in order to avoid lens fitting changes as contact lenses are vital towards early visual rehabilitation. Fittings can be performed as early as 6 months post-surgery as long as the wound margins are stable. Complete healing can take up to 24 months after surgery and further delay can be visually impairing for the patient. Because of the vulnerable nature of these eyes, patients must be monitored carefully when undergoing contact lens fittings. Clinicians should look for signs of corneal hypoxia, neovascularization or transplant rejection at each follow-up visit.

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