Published in final edited form as:

Ophthalmic Surg Lasers Imaging Retina. 2016 April 1; 47(4): 376–379. doi:
10.3928/23258160-20160324-14.

Sutureless Intrasccleral Fixation of Secondary Intraocular Lens Using 27-Gauge Vitrectomy System

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Abstract

Transconjunctival sutureless intrasccleral fixation is an important surgical option for secondary intraocular lens (IOL) implantation. In this report, the authors describe the technique of using a 27-gauge platform to perform pars plana vitrectomy, lensectomy, and sutureless scleral IOL fixation in a patient with crystalline lens dislocation secondary to Marfan's syndrome. Case report and detailed description of the surgical technique are discussed.

INTRODUCTION

Intraocular lenses (IOLs) can be implanted in eyes without adequate capsular support by three mechanisms. An IOL can be placed in the anterior chamber, sutured to the iris, or fixated to the sclera. IOLs can be fixated to the sclera using a sutureless, transconjunctival approach with 25-gauge trocars,¹ a modification of Prenner et al.² and Prasad techniques.³ Herein, we describe a further modification to these sclera IOL fixation techniques using a 27-gauge vitrectomy system.

REPORT OF A CASE

A 25-year-old patient with Marfan's syndrome presented with dislocated crystalline lenses. She had best-corrected visual acuity of 20/100 in both eyes. The patient was provided with surgical options and chose to proceed with pars plana vitrectomy (PPV), pars plana lensectomy (PPL), and IOL implantation. Surgery was performed in entirety with a 27-gauge system (Alcon, Fort Worth, TX) for PPL and the sutureless intrasccleral fixation of the IOL (Figure 1A) (See Video on Healio.com/ophthalmology/journals/osli). Using the 27-gauge vitrectomy probe, the crystalline lens could be easily aspirated without the need for phaco fragmatome (Figure 1B). For IOL fixation, valved 27-gauge cannulas were placed 2 mm posterior to the limbus 180° apart. The sclerotomies were created with a 30° to 45° beveled entry into the sclera (Figure 1C). The resulting scleral tunnels were used for IOL haptic externalization. Next, a triplanar clear corneal wound was created using a surgical keratome (Figure 1D). A folded three-piece MA60AC acrylic IOL (AcrySof; Alcon, Fort

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The remaining authors report no relevant financial disclosures.

Worth, TX) was inserted into the eye. The trailing haptic was temporarily suspended on the iris (Figure 1E, arrows). Under BIOM visualization (Oculus, Wetzlar, Germany), 27-gauge MAXGrip forceps (Alcon, Fort Worth, TX) were used to grasp the leading haptic under direct visualization. Using the forceps, the surgeon brought the haptic tip to internal opening of the cannula, slid the cannula up the shaft of the forceps, and then gently externalized the haptic through the sclerotomy (Figure 1F). Temporarily suspending the IOL from the iris allows for the use of only one MAXGrip for the procedure. Finally, the haptic was repositioned under the conjunctiva. The same technique was repeated 180° away (Figure 1G). The surgeon adjusted each haptic to center the IOL (Figure 1H) and repositioned haptics under the conjunctiva (Figures 2A and 2B). The IOL remained well-centered postoperatively and haptics well-covered by the conjunctiva (Figures 2A–2D).

DISCUSSION

This case demonstrates that known advantages of a sutureless intrascleral surgical (SIS) technique can be achieved with 27-gauge surgical instrumentation. Additionally, it demonstrates the feasibility of lensectomy with 27-gauge platform, albeit in the setting of a lens without significant cataract. This surgery causes minimal damage to the conjunctiva and sclera and creates self-sealing sclerotomy wounds, which usually do not require suture closure and produce less postoperative hypotony. With less tissue manipulation, patients recover from surgery quicker with faster visual rehabilitation and less inflammation and pain. Patients have IOLs that are well-fixated to the sclera and cause fewer anterior segment complications than anterior chamber IOLs or iris-fixated IOLs. Concurrent vitrectomy with lens fragment removal and SIS IOL fixation can be performed for retained lens pieces after complicated cataract surgery, the most common indication for this procedure.

One theoretical advantage of 27-gauge surgery over 25-/23-gauge surgery is a tighter seal around the IOL haptic, decreasing the likelihood of IOL dislocation or postoperative hypotony. This is of particular concern in eyes with thin sclera, such as patients with high myopia or connective tissue diseases as in Marfan's syndrome. We avoid SIS fixation in eyes with history of scleritis, with areas of scleromalacia, significant scleral thinning, and staphyloma from trauma or extremely high myopia. We place fixation trocars away from trabeculectomy blebs and glaucoma drainage devices and ideally in the area of healthy conjunctiva and tenons. Because of the tighter scleral tunnel with 27-gauge sclerotomy in this case, there is a risk of haptic damage or amputation during intraoperative fixation. Surgeons should avoid applying excessive force when externalizing the haptic through the sclerotomy. One way to decrease the force on the haptics is to externalize the haptic through the bare sclera instead of through the cannula as demonstrated in the Video. Furthermore, forceps with broader surface area, such as the MAXGrip forceps, enhance purchase on the tip of the haptic and make its externalization more effective and safe. Care should be taken to purchase the haptic at the tip and pull it through the sclerotomy parallel to the axis of the haptic in order to avoid bending or amputating the end of the haptic during externalization. A modification of this technique using 30-gauge needles has recently been published.⁴

Correct orientation of scleral fixating trocars is critical for proper IOL centration. The placement of the fixating sclerotomies 180° away on an axis through the center of the pupil

will help ensure proper IOL position at the end of the case. One option is to use a toric marker to mark the eye exactly 180° apart. Fine adjustment of the IOL centration can be achieved by manipulating the degree of haptic externalization through the sclerotomies, although this does not fully compensate for initially malpositioned fixation trocars. Therefore, extra time spent marking the trocar position and careful insertion of fixating cannulas in correct orientation at the beginning will maximize optimal IOL positioning at the end of the case.

In conclusion, surgeons can successfully use a 27-gauge trocar system to scleral fixate IOLs. This system should minimize ocular damage and improve postoperative healing.

Acknowledgments

Dr. Woodward receives grant funding from the National Eye Institute (NEI, K23EY023596).

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Figure 1. Intraoperative view showing crystalline lens dislocation (A), during pars plana lensectomy (B), 27-gauge cannula setup for intrascleral fixation (C), intraocular lens (IOL) insertion (D, E), haptic fixation with cannula removal (F, G), and IOL centration at the end of the case (H).

Figure 2.

Postoperative localization of inferior (A) and superior (B) haptic under the conjunctiva with slit lamp photo of the intraocular lens (IOL) centered behind the iris (C). Ultrasound biomicroscopy confirms IOL centration and position posterior to the iris (D).