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Structural Analysis and Long-Term Surgical Outcomes of the Sutureless Intrascleral Fixation of Secondary Intraocular Lenses in Human Eyes

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OBJECTIVE To describe clinical outcomes and correlation with structural in- and ex-vivo analysis of secondary IOLs fixated using sutureless intrascleral technique.

PURPOSE To comprehensively describe surgical outcomes, and study structural characteristics of secondary IOLs implanted with transconjunctival sutureless intrascleral (SIS) fixation in human eyes.

METHODS We comprehensively reviewed all SIS cases performed from June 2012 through June 2016. We described the procedure, indications, anatomic and refractive outcomes, and the rate of most common peri- and post-operative complications. To investigate the structure of SIS-fixated IOLs *in vivo*, external/anterior segment photography, UBM and intraoperative endoscopy were performed. We then extended the analysis to cadaveric human eyes in which the secondary IOLs were implanted using the same SIS technique. We performed qualitative and quantitative assessments of IOL

optic and haptic position, as well as measured strain on haptic-optic junction produced by different degrees of haptic externalization.

RESULTS A total of 148 patients who underwent SIS-IOL fixation were included in the study with mean follow-up of 1.86 years. All patients had centered IOL at the last follow-up with mean -0.86D SE refraction. Most common complication included vitreous hemorrhage (14.8% patients), most of which resolved spontaneously. The rates of IOL dislocation, IOL decentration, haptic erosion, retinal tears, detachments were low. In patients who underwent UBM, it demonstrated well-centered optic, away from iris and haptic tracking just posterior to the ciliary body processes, which was confirmed endoscopically. Structural study in cadaveric eyes confirmed IOL optic and haptic anatomy observed during live human surgery. Sclerally fixated IOLs showed minimal stretching at the haptic-optic junction, with no rotation around the axis of the IOL. However, the minimal strain on the haptic-optic junction was proportional to the degree of haptic externalization.

CONCLUSION In this comprehensive study, we demonstrated that excellent surgical outcomes can be achieved with SIS fixation of secondary IOLs. The surgical and post-operative complications do occur albeit at a low rate with vitreous hemorrhage being the most common. The structural and anatomic data in this study may help guide SIS placement and further improve long-term surgical outcomes.

TAKE HOME MESSAGE Sutureless scleral fixation (SIS) is an effective surgical technique for secondary IOL placement in aphakic eyes, and eyes with crystalline lens or IOL dislocation.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board

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Posterior Lens Subluxation Managed With Pars Plana Vitrectomy and Scleral Suture or Intrascleral Haptic Fixation of Sulcus Intraocular Lenses

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OBJECTIVE To evaluate the outcomes of scleral fixation of intraocular lenses (IOL) in the management of aphakia correction for posteriorly dislocated lenses in the absence of capsular support.

PURPOSE To review the outcomes of scleral fixation of IOL for aphakia correction in cases of posterior lens dislocation and absent capsular support, and to compare the more established sulcus suture fixation of IOL to the newer technique of intra-scleral haptic fixation of IOL for various aspects including lens stability and complications.

METHODS All cases of posterior lens dislocation into the vitreous cavity treated with pars plana vitrectomy (PPV) and scleral fixation of IOL between 2006-2016 were identified from hospital records. Retrospective, non-randomised, analysis of consecutive cases was performed, and outcomes including lens stability, visual acuity and complications were compared between the older technique of ab externo suture fixation to the newer

technique of intrascleral haptic fixation of intraocular lenses. All cases with absent capsular support and scleral fixation of lens were included. Cases treated with anterior chamber lenses, iris clip lenses, sutured capsular tension ring variants were excluded.

RESULTS Eighty-four eyes of 84 consecutive patients with posterior dislocation of lens treated with PPV and scleral fixation of intraocular lens were enrolled, average follow-up of 2.21 years (range: 0.09 – 6.79). Thirty-eight had sulcus suture fixation of IOL, 46 had intrascleral haptic fixation of IOL. Overall, 69 of 84 eyes (79.7%) had stable IOL position post-operatively, 12 (14.2%) had mild de-centration, most with vision improvement. Five eyes (20.8%) had significant subluxation of scleral fixated IOL, most were initial cases of intrascleral IOL haptic fixation. The average duration between surgery and onset of lens instability was 225 days (range: 1 – 1317 days). The most common post-operative complications were transient (n = 11, 12.9%) and persistent (n = 9, 10.6%) rises in intraocular pressure. Ab externo suture fixation was more likely to have stable, centred IOL compared to intrascleral haptic fixation (chi square test, p=0.04).

CONCLUSION Managing posterior lens subluxation with pars plana vitrectomy and scleral fixation of IOL is relatively safe and effective. Ab externo suture fixation of IOL can be stable up for to 6 years. The newer technique of intrascleral IOL haptic fixation has a definite learning curve with potential to avoid late suture breakage which is associated with ab externo suture fixation.

TAKE HOME MESSAGE Posterior lens subluxation can be successfully treated with pars plana vitrectomy and scleral fixation of intraocular lenses, either with ab externo suture fixation or intrascleral haptic fixation.

HUMAN RESEARCH This study involves human research.
IRB Approval Status: Approved by institutional review board