

# IOL ADJUSTABILITY



Research sheds light on the present and projects into the future.

BY MARK A. KONTOS, MD

## CLINICAL OUTCOMES OF THE LIGHT-ADJUSTABLE LENS IN EYES WITH A HISTORY OF PRIOR CORNEAL REFRACTIVE SURGERY

Jones M, Terveen DC, Berdahl JP, Thompson V, Kramer BA, Ferguson TJ<sup>1</sup>  
*Industry support: RxSight*

### ABSTRACT SUMMARY

A retrospective, consecutive case series evaluated the visual and refractive outcomes of the Light Adjustable Lens (LAL; RxSight) in 76 eyes of 70 patients with a history of laser corneal refractive surgery. Surgeries were performed at a single center, and emmetropia (plano) was targeted in all cases. IOL power calculations were performed with optical biometry and the Barrett True K formula. Patients had undergone at least one laser corneal refractive procedure. Individuals who had a history of radial keratotomy were excluded.

No intra- or postoperative complications occurred. Postoperative light adjustments began at 3 weeks, with a maximum of three treatments per eye followed by two lock-in

treatments. Visual acuity measurements were collected 3 months after surgery. The uncorrected distance visual acuity (UDVA) and refractive outcome in each eye were evaluated.

In terms of visual outcomes, 36% of eyes achieved 20/15 UDVA or better, 74% of eyes achieved 20/20 UDVA or better, and 88% of eyes achieved 20/25 UDVA or better. The overall UDVA logMAR was the equivalent of 20/20. The corrected distance visual acuity was 20/20 in 93% of eyes and 20/25 in 100% of eyes.

In terms of refractive outcomes, 66% of eyes were within 0.25 D of target, 86% of eyes were within 0.50 D, and 99% of eyes were within 1.00 D. The results of astigmatism correction were similar, with the mean amount of postoperative cylinder at  $0.30 \pm 0.30$  D.

Results were also stratified by the number of prior corneal procedures. Of the eyes with a history of only one corneal procedure ( $n = 45$ ), 84% achieved 20/20 UDVA or better. Of the eyes with a history of two or more corneal procedures, 58% achieved 20/20 UDVA or better.

The eyes in this study underwent 1.5 light treatments on average followed by two lock-in treatments. The time to the completion of treatment was  $66 \pm 20$  days from the date of surgery.

### DISCUSSION

Once a rarity, patients with a history of laser corneal refractive surgery now present routinely to ophthalmology practices. Not a week goes by when this author does not operate on several eyes with a history of radial keratotomy, LASIK, or PRK. Many of these patients desire some level of spectacle independence after cataract surgery. Achieving this refractive goal remains challenging despite advances in IOL formulas. Most studies using modern IOL technology and formulas have reported refractive results of 0.50 D or better in approximately 60% to 70% of patients who have a history of laser corneal refractive surgery. An IOL exchange and additional corneal laser treatment have been the only strategies for fine-tuning their postoperative outcomes. The LAL is therefore an intriguing option for these individuals.

The results reported by Jones and colleagues indicate that LAL implantation is likely to provide most of this patient population with spectacle independence at distance. Although not included in this study, mini and full monovision with the LAL might increase these patients' chances of achieving spectacle independence.

Like any technology, the LAL is not without challenges. The time required for postoperative light adjustments and refractions can be a burden on patients and practices. Cost is another significant barrier for patients.

## STUDY IN BRIEF

A retrospective, consecutive case series evaluated the visual and refractive outcomes of the Light Adjustable Lens (RxSight) in 76 eyes of 70 patients with a history of laser corneal refractive surgery. The procedure demonstrated excellent predictability in achieving emmetropia.

### WHY IT MATTERS

This is the largest study to date of Light Adjustable Lens implantation in eyes with a history of laser corneal refractive surgery. The results are the best reported to date in this patient population, with 86% of eyes achieving refractive outcomes within 0.50 D of emmetropia.

**NITINOL-BASED THERMOMECHANICALLY ADJUSTABLE IOL TECHNOLOGY**

Lapid-Gortzak R, Kohnen T, Israeli N, Mitsel P, Shmukler V<sup>2</sup>

Industry support: None

**ABSTRACT SUMMARY**

This study evaluated the feasibility of a new adjustable IOL technology. The foldable VaLens (EyeMed Technologies) features a nitinol mechanism in the haptic-IOL cradle. By heating the nitinol mechanical actuators in the cradle with an argon green laser, controlled movement of the mechanism and optic was achieved. Actuators connected to a ratcheting system allowed clockwise or counterclockwise rotation of the lens. The IOL could be rotated in 1° steps over 360°. Anterior and posterior movement could also be achieved in 0.25 D steps via a separate set of nitinol actuators.

The IOL system was successfully tested in vitro using a water bath system. It was also tested in a rabbit model undergoing lens phacoemulsification and implantation of the nitinol IOL. Both radial and anterior to posterior movement was achieved.

**DISCUSSION**

More than 5 years of clinical use of the LAL has demonstrated the utility of postoperative power adjustability. The VaLens, however, is adjusted via a different type of technology than the LAL. The following unique aspects

of the VaLens are intriguing. First, postoperative power adjustments are made with an argon laser, a device that is readily available in most ophthalmologists' offices. Second, adjustments to the IOL could theoretically be made indefinitely. If that holds true, the IOL could be adjusted to address small changes in a patient's refraction throughout their lifetime.

Much refinement of the VaLens prototype evaluated by Lapid-Gortzak et al is required before human implantation can be considered. This study, however, showed that the technology functioned as intended and adjustments were repeatable. ■

1. Jones M, Terveen DC, Berdahl JP, Thompson V, Kramer BA, Ferguson TJ. Clinical outcomes of the light-adjustable lens in eyes with a history of prior corneal refractive surgery. *J Cataract Refract Surg.* 2024;50(9):936-941.  
 2. Lapid-Gortzak R, Kohnen T, Israeli N, Mitsel P, Shmukler V. New nitinol-based thermomechanically adjustable IOL technology. *J Refract Surg.* 2023;39(10):662-667.

**SECTION EDITOR EDWARD MANCHE, MD**

- Director of Cornea and Refractive Surgery, Stanford Laser Eye Center, Stanford, California
- Professor of Ophthalmology, Stanford University School of Medicine, Stanford, California
- edward.manche@stanford.edu
- Financial disclosure: Equity owner (RxSight)

**MARK A. KONTOS, MD**

- Senior Partner, Empire Eye Physicians, Spokane, Washington, and Coeur d'Alene and Hayden, Idaho
- Member, CRST Executive Advisory Board
- mark.kontos@empireeye.com
- Financial disclosure: Consultant (RxSight)

**STUDY IN BRIEF**

A study evaluated the feasibility of a novel IOL system (VaLens, EyeMed Technologies). Its power was found to be adjustable postoperatively in vitro and in vivo through precise, repeatable modification of its position.

**WHY IT MATTERS**

Clinical use of the Light Adjustable Lens (RxSight) has demonstrated that the ability to adjust IOL power postoperatively can be beneficial. The novel VaLens technology has the potential to be adjustable throughout a patient's lifetime.