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CASE REPORT **OPEN ACCESS**

Long-Term Reversibility of Epikeratophakia: A Case Report

Matthew Thompson[1] and Reid Pietila[2,*]

[1]*Tower Clock Eye Center, Green Bay, United States*
[2]*Medical College of Wisconsi, Milwaukee, United States*

Abstract:

Introduction: Epikeratophakia is a corneal refractive surgical procedure that has largely been replaced by intraocular lenses and newer refractive surgical techniques. In this procedure, the recipient corneal epithelium is denuded, and a prelathed lamellar donor corneal lenticule is sutured onto the surface of the recipient cornea. The primary pitfall of this technique is the limited predictability of refractive outcomes. The primary advantages include low risk and long-term reversibility. Published cases of successful epikeratophakia lenticule removal with preserved visual acuity are sparse. The long-term reversibility of epikeratophakia and the details of the technique used for successful removal need to be demonstrated. This information could be valuable for future patients and practitioners.

Case Presentation: The case herein demonstrates the successful removal of an epikeratophakia lenticule that had been in place for 38 years, with minimal damage to the underlying host cornea. The patient regained stable corrected vision of 20/70.

Conclusion: This case demonstrates the exceptional reversibility of epikeratophakia after 38 years. Successful reversibility of this procedure has been demonstrated up to 14 years, and reversibility with corneal changes has been demonstrated up to 29 years.

Keywords: Case report, Epikeratophakia, Refractive surgery, Lenticule.

*Address correspondence to this author at the Medical College of Wisconsi, Milwaukee, United States;
E-mail: rpietila@mcw.edu

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1. INTRODUCTION

Epikeratophakia is a corneal refractive surgical procedure introduced in 1980 by Kaufman *et al*. for the correction of aphakic vision, but it has since been utilized in the treatment of keratoconus, hyperopia, and myopia [1-5]. The technique gained popularity in the 1980s but has since been replaced mainly by newer surgical techniques, such as secondary IOL placement, Laser-Assisted *In Situ* Keratomileusis (LASIK), and Photo-Refractive Keratectomy (PRK) [6]. In this procedure, the recipient corneal epithelium is denuded, and a prelathed lamellar donor corneal lenticule is sutured onto the surface of the recipient cornea [5]. Disadvantages of the surgery include limited predictability of both short- and long-term refractive outcomes, a relatively lengthy recovery time, and lenticule-related complications, including epithelial ingrowth that can lead to corneal deterioration [6-8]. Advantages include its low risk and the ability to achieve large dioptric corrections [6, 8]. Long-term stability of the graft and preserved visual acuity has also been demonstrated [9]. Another advantage of epikeratophakia is its reversibility upon removal of the lenticule [1, 6]. However, literature regarding visual outcomes after long-term lenticule removal is limited and inconsistent. This case demonstrates the successful removal of a lenticule that had been in place for 38 years with preserved visual acuity. To

the best of our knowledge, this is the longest reported case of epikeratophakia reversibility.

2. CASE PRESENTATION

A male in his early 50s presented to an outpatient eye clinic with 3 days of constant and worsening right eye pain. He had an ocular history significant for right eye open globe injury at age 13, necessitating retinal detachment repair with lens removal, followed by subsequent right eye epikeratophakia in 1984. Years later, he had strabismus surgery at an unknown age. The patient did not achieve satisfactory visual acuity in the right eye following the epikeratophakia procedure. On presentation, his spectacle-corrected visual acuity (plano +0.25 x 7 OD) was 20/400 OD and 20/20 OS. Intraocular pressure was 8 mmHg bilaterally. Pupils, extraocular motility, and visual fields were normal. On slit lamp exam, he was found to have a small corneal abrasion with central thinning located over the area of his epikeratophakia lenticule. A diagnosis of corneal ulcer was made, and treatment was initiated.

He was prescribed erythromycin 0.5% eye ointment three times daily, prednisolone acetate 1% eye drops three times daily, and preservative-free artificial tears, and he was scheduled to follow up in 3 days. Before his follow-up, he developed severe photophobia, and his prednisolone was changed to 6 times daily. He was then referred to the cornea service and was switched to topical moxifloxacin 0.5% three times daily with a bandage soft contact lens placed. He had several follow-ups over the next 3 weeks for the management of his ulcer, with steady improvement. The ulcer resolved, but he was left with a central corneal scar.

Two weeks after the resolution of his corneal ulcer, he underwent an operation for epikeratophakia lenticule removal (Fig. **1**). Under topical anesthesia, the central epithelium was removed, and a Sinskey hook was used to find the groove where the transplant had been placed. The groove was opened with the Sinksey hook, and the lenticule was gradually undermined. Once the entire peripheral aspect of the transplant was freed, a 0.12 forceps was used to peel the lenticule away from the corneal surface. The area of scarring and ulceration was completely contained within the donor lenticle, and the underlying corneal surface appeared normal. The entire groove and dissection plane were irrigated, and a bandage soft contact lens was placed. Postoperative medications were moxifloxacin 0.5% eye drops administered three times daily and prednisolone acetate 1% eye drops 6 times daily.

Four days after surgery, his right eye visual acuity was 20/300, which improved to 20/80 with a pinhole assessment. He still had light sensitivity, tearing, and pain in his right eye. He was continued on topical prednisolone 1% eye drops, administered six times daily, and started on atropine 1% eye drops, administered once daily. At 6 weeks after epikeratophakia removal, his symptoms showed improvement, and he was able to stop topical moxifloxacin and atropine and begin tapering off topical prednisolone. His visual acuity was 20/400 in the right eye, with pinhole improvement to 20/200. He declined a lens implant or contact lens and elected to follow up with an optometrist closer to his home for further evaluation. Two years after his epikeratophakia removal procedure, his corrected visual acuity was 20/70 with a refraction of +3.25 +0.75 x 055.

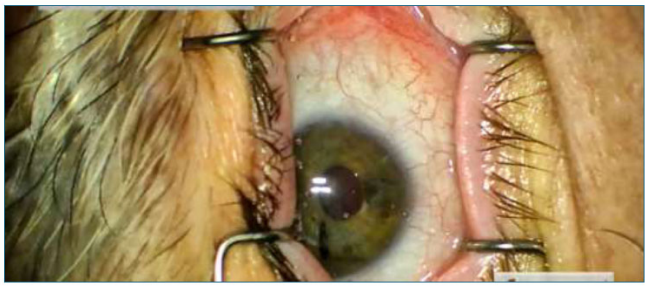

Fig. (1). Surgical image of epikeratophakia lenticule removal procedure.

3. DISCUSSION

This case supports the theory of long-term reversibility of the epikeratophakia procedure. The lenticule was removed easily after 38 years with minimal damage to the underlying cornea. Records from the time of the patient's original surgery are no longer available, which limits our ability to compare present-day visual acuity and refraction with preoperative measurements. Therefore, limited conclusions can be drawn regarding the change in visual acuity from baseline following lenticule removal. Four days after surgery, the right eye's visual acuity improved to 20/80 with pinhole correction. However, at 6 weeks postoperatively, the visual acuity of the patient's right eye improved only to 20/200 with pinhole. This is likely due to the addition of atropine 1% drops at his first post-operative visit, which he continued taking until his 6-week post-operative appointment. Furthermore, 6 weeks of prednisolone acetate 1% drops may have contributed to his decreased visual acuity.

Published cases of long-term epikeratophakia removal and outcomes are sparse, and reversibility of the cornea after removal of the lenticule has also been inconsistently demonstrated. A series of 3 case reports in 2007 on the reversibility of epikeratophakia after 7-14 years demonstrated good reversibility of the cornea and restoration of best corrected visual acuity after lenticule removal [6]. In 2021, a retrospective study demonstrated the removal of epikeratophakic lenticules up to 29 years after placement; however, significant corneal changes were identified after lenticule removal, including steepening or flattening and astigmatism, indicating limited reversibility of the cornea [1]. This same study also revealed a potential complication of abnormal epithelial ingrowth into the remaining corneal groove after lenticule removal, which can lead to corneal deterioration [1]. Using the described technique, epikeratophakia lenticules can be removed, yielding successful visual outcomes, especially when combined with newer refractive surgeries, such as LASIK and PRK [10].

CONCLUSION

This case highlights the exceptional long-term reversibility of epikeratophakia, with successful lenticule removal 38 years post-implantation and preservation of both corneal integrity and functional visual acuity. It extends the docu-

mented duration of viable reversibility beyond previously reported timelines and affirms the procedure's role as a safe, low-risk, and reversible option for refractive correction in selected cases. This surgical approach, characterized by meticulous dissection and preservation of host tissue, offers a valuable reference for ophthalmic surgeons who may encounter similar cases in the future. By detailing the technique and postoperative outcomes, this report contributes to a limited but growing body of evidence that can inform preoperative counseling, guide decision-making in patients with prior epikeratophakia, and support surgical planning when lenticule removal is considered due to changing visual needs or ocular comorbidities.

AUTHORS' CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: M.T.: Data collection; R.P.: Writing the paper. All authors reviewed the results and approved the final version of the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

Informed consent was obtained from the participant.

STANDARDS OF REPORTING

CARE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

All data generated or analyzed during this study are included in this published article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

REFERENCES

[1] Jung Y, Kim MK. Clinical outcomes in post-epikeratophakic eyes after removal of epikeratoplasty lenticule. BMC Ophthalmol 2021; 21(1): 350. http://dx.doi.org/10.1186/s12886-021-02109-9 PMID: 34587920

[2] McDonald MB, Klyce SD, Suarez H, Kandarakis A, Friedlander MH, Kaufman HE. Epikeratophakia for myopia correction. Ophthalmology 1985; 92(10): 1417-22. http://dx.doi.org/10.1016/S0161-6420(85)33849-6 PMID: 4069604

[3] Reidy JJ, McDonald MB, Klyce SD. The corneal topography of epikeratophakia. J Refract Surg 1990; 6(1): 26-31. http://dx.doi.org/10.3928/1081-597X-19900101-07 PMID: 2248901

[4] Zhao J, Shang J, Zhao Y, *et al*. Epikeratophakia using small-incision lenticule extraction lenticule addition combined with corneal crosslinking for keratoconus. J Cataract Refract Surg 2019; 45(8): 1191-4. http://dx.doi.org/10.1016/j.jcrs.2019.03.010 PMID: 31272775

[5] Greenbaum A, Kaiserman I, Avni I. Long-term reversibility of epikeratophakia. Cornea 2007; 26(10): 1210-2. http://dx.doi.org/10.1097/ICO.0b013e318154acdd PMID: 18043178

[6] Werblin TP, Kaufman HE, Friedlander MH, Granet N. Epikeratophakia: The surgical correction of aphakia. III. Preliminary results of a prospective clinical trial. Arch Ophthalmol 1981; 99(11): 1957-60. http://dx.doi.org/10.1001/archopht.1981.03930020833002 PMID: 7028010

[7] Busin M, Cusumano A. Modified surgical technique for repeated epikeratophakia surgery in aphakic eyes. J Refract Surg 1992; 8(5): 382-4. http://dx.doi.org/10.3928/1081-597X-19920901-10 PMID: 1450121

[8] Grabner G. Complications of epikeratophakia in correction of aphakia, myopia, hyperopia and keratoconus. Fortschr Ophthalmol 1991; 88(1): 4-11. PMID: 2045024

[9] Kang J, Cabot F, Yoo SH. Long-term follow-up of epikeratophakia. J Cataract Refract Surg 2015; 41(3): 670-3. http://dx.doi.org/10.1016/j.jcrs.2014.11.035 PMID: 25535108

[10] Wendelstein JA, Freller K, Riaz KM, Seiler TG. Addition by subtraction: Reversing epikeratophakia and stromal scarring in a patient with myopia magna. Cornea 2025; 44(5): 646-52. http://dx.doi.org/10.1097/ICO.0000000000003797