Commentary: Intraoperative optical coherence tomography-guided management of post-laser-assisted in situ keratomileusis epithelial ingrowth

Post-LASIK epithelial ingrowth (PLEI) is uncommon but visually threatening complication of LASIK, with incidence ranging from 0%–3.9% in primary treatment cases to 10%–20% in retreatment cases.[1] However, clinically significant PLEI requiring removal was noted in only 0.92%–3.2%.[1] Epithelial ingrowth occurs due to the implantation of basal epithelial cells under the flap, which is mechanically dragged during keratectomy by the microkeratome blade. It has also been stated that poor adherence of flap to the underlying stroma can cause epithelial cell migration.[2] Risk factors include trauma, intraocular surgeries, excessive instrumentation and interface manipulation, hyperopia, and increased patient age. Based on the location, clinical features, and severity, PLEI can be categorized into four grades using the Probst/Machat classification.[3] This classification serves as a useful aid for consistent and standardized grading/assessment and provides guidance on the treatment strategies. Early diagnosis and proper management are necessary to prevent visually threatening complications. The most common treatment is flap lifting and scraping of epithelium from the stromal bed and underside of the flap. However, a high recurrence rate of 44% was observed with this technique.[4] Thus, many adjunct techniques were used to prevent recurrence, such as the use of alcohol, mitomycin C, fibrin glue, phototherapeutic keratectomy, flap suturing, and amniotic membrane graft. In more severe cases, flap amputation and transepithelial topography-guided ablation have been described. In less severe cases, Nd:YAG lasers have been used in an attempt to bypass a surgical approach. Lifting the flap has the disadvantage of nonuniform trauma to the flap edge, which can be sufficient to introduce epithelial cells beneath the flap or increase edema at the edge, coinciding with a higher incidence of epithelial ingrowth after enhancement compared to initial LASIK. The disruption of ingrown epithelium via Nd:YAG laser using low energy (0.6 mJ on average) offers a safe and effective alternative to other treatments for epithelial ingrowth after LASIK treatment and enhancement.[5]

Swept-source AS-OCT is useful for diagnosis and management of eyes with LASIK flap-related complications by allowing noninvasive, noncontact, and real-time acquisition of cross-sectional AS images.[6] It is one of the diagnostic modalities in epithelial ingrowth. It shows hyperreflectivity in the LASIK interface flap in this region with a darkened shadow below it. However, this diagnostic modality has not been used intraoperatively in the management of epithelial ingrowth. Theoretically, it should improve surgeons’ ease and enable less manipulation of flaps, thereby decreasing the recurrence.

The review article is a novel initiative to use the concept of real-time acquisition in the management of PLEI. They concluded that iOCT guided management of post-LASIK epithelial ingrowth enables real-time dynamic monitoring of intraoperative surgical steps, aids in decision making regarding completion of ingrowth removal, and allows precise surgical dissection with minimal intraoperative manipulations.

The study results had good immediate visual recovery unlike with other adjuvant modalities such as flap suturing.

Mechanical debridement of epithelial ingrowth with additional application of alcohol 70.0% and MMC 0.02% along with tissue glue use for flap closure appears to be a safe and effective treatment for recalcitrant cases of clinically significant epithelial ingrowth.[7] It cannot be concluded that minimal tissue handling while flap lifting using iOCT is alone sufficient to reduce the risk of recurrence while other factors such as mitomycin come into play in the above study. Thus, the use of mitomycin in this study is a confounding factor.

Availability of IOCT is one of the limiting factors when cost-benefit is taken into consideration.
This technique of using real-time acquisition in flap lifting and scraping may reduce the recurrence; however, large sample size and considering control group will be more reliable to extrapolate this new initiative in the management of post-LASIK epithelial ingrowth and can pave the way for future studies on this matter.\(^9\)

Hariprasad V Hebri, Ramya Nayak\(^1\), Roopashree Rao

Department of Cornea and Anterior Segment, ShreeHari Netralaya, \(^1\)Department of Cornea and Anterior Segment, PRAYAG, Shivamogga, Karnataka, India

Correspondence to: Dr. Hariprasad V Hebri,
ShreeHari Netralaya, Karthik Estate Building, Ground Floor,
Ambalpady, Udupi - 576 101, Karnataka, India.
E-mail: hariprasad.vokuda@gmail.com

References

1. Ting DS, Srinivasan S, Danjoux JP. Epithelial ingrowth following laser in situ keratomileusis (LASIK): Prevalence, risk factors, management and visual outcomes. BMJ Open Ophthalmol 2018;3:e000133.

2. Naoumidi I, Papadaki T, Zacharopoulos I, Siganos C, Pallikaris I. Epithelial ingrowth after laser in situ keratomileusis: A histopathologic study in human corneas. Arch Ophthalmol 2003;121:950-5.

3. Neff KD, Probst LE. LASIK complications. In: Krachmer JH, Mannis MJ, Holland EJ, editors. Cornea: Surgery of the Cornea and Conjunctiva. 3rd ed. St. Louis, MO: Mosby; 2011. p. 1861-82.

4. Henry CR, Canto AP, Galor A, Vaddavalli PK, Culbertson WW, Yoo SH. Epithelial ingrowth after LASIK: Clinical characteristics, risk factors, and visual outcomes in patients requiring flap lift. J Refract Surg 2012;28:488-92.

5. Ayala MJ, Alió JL, Mulet ME, De La Hoz F. Treatment of laser in situ keratomileusis interface epithelial ingrowth with neodymium: yttrium-aluminum-garnet laser. Am J Ophthalmol 2008;145:630-4.

6. Abdelazeem K, Sharaf M, Saleh MGA, Fathalla AM, Soliman W. Relevance of swept-source anterior segment optical coherence tomography for corneal imaging in patients with flap-related complications after LASIK. Cornea 2019;38:93-7.

7. Wilde C, Messina M, Dua HS. Management of recurrent epithelial ingrowth following laser in situ keratomileusis with mechanical debridement, alcohol, mitomycin-C, and fibrin glue. J Cataract Refract Surg 2017;43:980-4.

8. Kaur M, Nair S, Mazumdar SA, Titilaj JS. Intraoperative optical coherence tomography-guided management of post-laser-assisted in situ keratomileusis epithelial ingrowth. Indian J Ophthalmol 2022;70:288-91.