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CASE REPORT

Flap Striae: Managing and Understanding Post-LASIK Complication

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Abstract

Introduction: Flap striae is the most common postoperative complication, with a frequency ranging from 0.033% to 3.5%, according to studies involving over 1000 ocular cases. There is only one case in our hospital in 2023. In this case report, we will present a case of flap striae in a tertiary hospital because our findings are unusual and essential in symptomatic therapy and visual rehabilitation. **Case Presentation:** A 19-year-old female came with a chief complaint of impaired vision in her left eye for the past two weeks, followed by inability to focus, discomfort of the eye, a sensation of foreign body, and glare that occurred three days after she underwent bilateral myopia laser in situ keratomileusis (LASIK) surgery. A post-LASIK assessment found that both eyes had visual acuity 10/10, and the left eye's visual acuity dropped to 6/10. Slit lamp examination revealed flap striae were running from the superonasal to the inferolateral quadrant. The thickness disparities were measured using optical coherence tomography (OCT), ranging from 653 to 689 µm. The OCT pictures revealed a gap on the temporal side as well. This patient was diagnosed with flap striae and a flap repositioning procedure was performed. **Conclusions:** A flap repositioning surgery was performed to increase visual acuity and eliminate striae.

Keywords: flap striae; LASIK; blurred vision; flap reposition

Introduction

Laser in situ keratomileusis (LASIK) represents the most frequently performed refractive surgical intervention.[1] Many benefits come with LASIK, including quicker visual recovery, minimal patient discomfort, a lowered chance of scarring and recurrence, less pain following surgery, reduced stromal haze, and a shorter time spent taking medication after surgery.[2],[3] The success rate of LASIK is notably elevated; however, intraoperative and/or postoperative complications may occur. Examples of intraoperative complications include suction loss, free cap, flap tear, buttonhole flap, decentered ablation, central island, interface debris, and problems from femtosecond lasers. While flap striae, flap dislocation, microbial keratitis, diffuse lamellar keratitis, epithelial ingrowth, refractive regression, and corneal ectasia are examples of postoperative complications.[4],[5],[6] Among the complications that can transpire is the occurrence of flap striae.[7],[8] Striae in a lamellar corneal flap are wrinkling of the tissue seen under biomicroscopy. It can significantly reduce eye acuity by causing internal (nontopographic) irregular astigmatism.[9]

Flap striae constitute are the most prevalent postoperative complication, with an incidence ranging between 0.033% and 3.5%, as substantiated by investigations encompassing over 1000 ocular cases.[10] Only one flap striae incidence was discovered in 2023 at Undaan Eye Hospital Surabaya.

Flap striae can cause a significant reduction in corrected distance visual acuity (CDVA) and incite photophobic symptoms. Most striae materialize during the initial days through the first week after surgery. Risk factors predisposing to the development of flap striae encompass corneal flap misalignment, postoperative flap migration, discrepant separation between the flap and the ablated stromal bed, excessive irrigation, and excessively thin flaps.[7],[11]

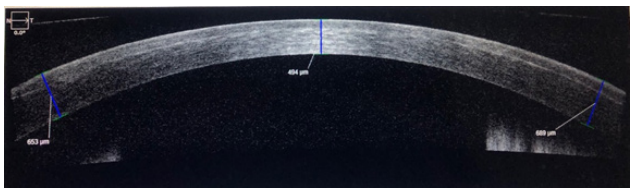

Figure 1. Optical Coherence Tomography (OCT) showed the thickness of left eye was 653-689µm.

Based on their dimensions, flap striae are classified into macrostriae and microstriae. Microstriae refers to microscopic folds situated superficially, most of which remain asymptomatic. Microstriae involves the basal membrane of the corneal epithelium and/or the Bowman layer. On the other hand, macrostriae consists of thicker corneal folds that frequently impede visual acuity and typically necessitate surgical intervention.[12]

Managing flap striae are entails lifting and refloating the flap, accompanied by flap irrigation and repositioning. Wrinkles identified in the early stages can be flattened using microsponges. The flattening procedure is conducted under a slit lamp or surgical microscope.[12]

Case presentation

A 19-year-old female was presented to the LASIK center complaining of blurred vision in her left eye. The eye was unable to focus for the past two weeks. This condition occurred three days after she underwent bilateral myopia using full correction microkeratome LASIK surgery. Additionally, she reported experiencing discomfort, a sensation of foreign body presence, and glare. No complications were noted during the surgery. The patient mentioned her left eye being exposed to wind while riding a motorcycle, leading to frequent blinking and inadvertent eye rubbing.

Before LASIK was carried out on this patient, left eye visual acuity was 2/60, examination of the left eye with autorefraction was -5.50 C-1.00 x 179, keratometry K1 examination was 44.60, K2 was 45.30 K2 axis 97. Post-LASIK examination revealed visual acuity of 10/10 in both eyes. Seven days after surgery, the left eye visual acuity examination results were 8/10, autorefraction examination of the left eye was -0.50 C-1.00 x 17, keratometry examination K1 was 40.47, K2 was 41.31 K2 axis 90. Slit lamp examination identified the presence of flap striae were extending from the superonasal to the inferolateral quadrant. A fluorescein test examination revealed striae, so that bandage contact lens was installed.

After the onset of symptoms, the visual acuity of the left eye declined to 6/10. Optical coherence tomography (OCT) assessment revealed thickness discrepancies ranging from 653 to 689 µm. The OCT images also indicated a gap on the temporal side (Figure 1).

Thirteen days after LASIK surgery, the result of the left eye visual acuity examination of 5/10 was obtained. The contact lens bandage was removed, and visual acuity to 6/10. Autorefraction examination +0.25 C-1.00 x 40, and keratometry examination K1 was 39.20, K2 was 40.56 axis 126. The flap was repositioned because the patient's visual acuity with the contact lens bandage was deteriorating, and the striae were still present.

A flap repositioning procedure was performed to improve visual acuity and eliminate the striae. On this patient, we performed the following surgical procedures: using 2% pantocaine as a local anesthetic, re-lifting flap with LASIK flap lifter, rehydrating and restretching flap with balancing salt solution assisted with irrigating cannula, topical tobramycin and dexamethasone application, and place a bandage contact lens. Seven days following the repositioning, slit lamp examination revealed a reduction of striae. The patient's visual acuity was restored to 10/10 (Figure 2).

Discussion and conclusions

Based on medical history, the patient exhibited reduced visual acuity and glare symptoms three days after LASIK. Regression, decentred ablation, under or overcorrection, and the formation of irregular astigmatism due to folds or micro striae flaps are among the complications following LASIK surgery. The quality of vision or visual acuity deteriorates due to this condition.[13] This aligns with the findings of Wallerstein et al.[10], which stated that striae can induce corneal irregularities, subsequently leading to diminished visual acuity, optical aberrations, refractive changes, monocular diplopia, contrast sensitivity loss, reduction in uncorrected and corrected distance visual acuity (UDVA and CDVA), as well as symptoms of glare, halos, and foreign body sensations.

Seven days after LASIK surgery, examination with fluorescein test found striae, so a bandage contact lens was installed to reduce the risk of flap dislocation.[2] It is essential to keep watch on epithelial defects and interface debris in the first week after LASIK since these can cause focal infiltrates that need flap refloatation.[13]

The patient underwent OCT examination prior to the surgery to assess the presence of a gap between the flap and stromal bed, a condition challenging to evaluate using slit lamp microscopy. This approach aligns with the findings of Salaroli et al.[14], which affirmed that utilizing OCT with a corneal adaptor module (CAM) serves to quantify levels of flap displacement that often go

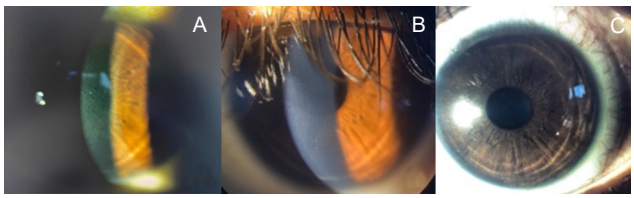

Figure 2. Clinical presentation patient. (A) On the day of flap reposition; (B) The day after flap reposition, and (C) Seven days after flap reposition..

unnoticed with slit lamp examination. The OCT images revealed the presence of a gap between the flap edge and the bed rim.

The patient's eye-rubbing behavior three days post-LASIK and lack of eye protection were identified as risk factors for developing flap striae. It concurs with previous research indicating that inadvertent eye rubbing often results in flap displacement. Additionally, contributing factors to flap striae include the absence of nighttime eye protection, dry eye conditions, thin flaps, and excessive hydration during surgery.[15] After LASIK, patients are required to wear protective eyewear for one to seven days. Eye protection was necessary only at night. It is essential to warn the patient not to rub their eyes.[16]

Thirteen days after LASIK surgery, the flap was repositioned because the patient's visual acuity with the contact lens bandage was deteriorating, and the striae were still present. Various techniques can be employed to manage flap striae, with early detection paramount. Lifting and refloating the flap within 24 hours post-LASIK have effectively resolved striae.[7]

A spectrum of management modalities exists, including refloating, stretching and smoothing, hypotonic saline irrigation, flap massage, hyperthermia, the sandwich compression maneuver, epithelium removal, Bowman's layer phototherapeutic keratectomy (PTK), and flap suturing. These techniques span a range from non-invasive to highly invasive, selected based on the severity and duration of the striae.[7]

References

[1] Lim EWL, Lim L. Review of laser vision correction (LASIK, PRK and SMILE) with simultaneous accelerated corneal crosslinking - Long-term results. Curr Eye Res 2019;44:1171–1180. https://doi.org/10.1080/02713683.2019.1656749.

[2] Moshirfar M, Basharat NF, Bundogji N, Ungricht EL, Darquea IM, Conley ME, et al. Laser-assisted in situ keratomileusis (LASIK) enhancement for residual refractive error after primary LASIK. J Clin Med 2022;11. https://doi.org/10.3390/jcm11164832.

[3] Shah DN, Melki S. Complications of femtosecond-assisted laser in-situ keratomileusis flaps. Semin Ophthalmol 2014;29:363–375. https://doi.org/10.3109/08820538.2014.959194.

[4] Sahay P, Bafna RK, Reddy JC, Vajpayee RB, Sharma N. Complications of laser-assisted in situ keratomileusis. Indian J Ophthalmol 2021;69:1658–1669. https://doi.org/10.4103/ijo.IJO_1872_20.

[5] Galvis V, Tello A, Guerra AR, Rey JJ, Camacho PA. Risk factors and visual results in cases of LASIK flap repositioning due to folds or dislocation: Case series and literature review. Int Ophthalmol 2014;34:19–26. https://doi.org/10.1007/s10792-013-9776-9.

[6] Linke SJ. Complications in Corneal Laser Surgery. New York: Springer; 2016.

[7] Abdelazeem K, Nassr MA, Abdelmotaal H, Wasfi E, El-Sebaity DM. Flap sliding technique for managing flap striae following laser in situ keratomileusis. J Ophthalmol 2020;2020:5614327. https://doi.org/10.1155/2020/5614327.

[8] Mimouni M, Vainer I, Assad N, Nemet A, Sela T, Munzer G, et al. Incidence, indications, and outcomes of eyes needing early flap lifting after LASIK. Cornea 2018;37:1118–1123. https://doi.org/10.1097/ICO.0000000000001617.

[9] Buratto L, Slade S, Tavolato M. LASIK: The Evolution of Refractive Surgery. Thorofare: SLACK; 2011.

[10] Wallerstein A, Gauvin M, Adiguzel E, Singh H, Gupta V, Harissi-Dagher M, et al. Clinically significant laser in situ keratomileusis flap striae. J Cataract Refract Surg 2017;43:1523–1533. https://doi.org/10.1016/j.jcrs.2017.09.023.

[11] Waring IV G, Garg S, Gupta P, Lee B, Reeves S, Rocha K, et al., editors. Refractive Surgery. 2022-2023 Basic and Clinical Science Course, Section 13, San Francisco: American Academy of Ophthalmology; 2022.

[12] Nabil KM. Flap double twist technique for prevention of LASIK flap striae. Clin Ophthalmol 2016;10:2325–2328. https://doi.org/10.2147/OPTH.S121237.

[13] Naroo SA. Refractive Surgery: A Guide to Assessment and Management. Oxford: Butterworth-Heinemann; 2004.

[14] Rosas Salaroli CH, Li Y, Huang D. High-resolution optical coherence tomography visualization of LASIK flap displacement. J Cataract Refract Surg 2009;35:1640–1642. https://doi.org/10.1016/j.jcrs.2009.04.025.

[15] Pinto GMQ V, Sampaio LP, Santhiago MR. Early LASIK flap displacement without signs of infection. J Cataract Refract Surg 2022;48:1475–1477. https://doi.org/10.1097/j.jcrs.0000000000001089.

[16] Feder RS. The LASIK Handbook: A Case-Based Approach. Philadelphia: Lippincott Williams & Wilkins; 2013.