

CASE REPORT

Late-onset Post-lasik Ectasia with no Apparent Risk Factor except Eye Rubbing: A Case Report and Literature Review

^{1,2}Adel Barbara, ³Ramez Barbara

ABSTRACT

Post-lasik ectasia is the most feared complication following lasik, occurring in majority of cases within 1 year of surgery. Furthermore, it is reported many years after surgery. In this case report, we describe and analyze a post-lasik ectasia case in one eye which was diagnosed after 11 years without any risk factor or apparent reason except eye rubbing.

Keywords: Corneal biomechanics, Eye rubbing, Flap thickness, Keratoconus, Keratoectasia, Lasik, Post-lasik ectasia, Residual stromal bed.

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INTRODUCTION

Corneal ectasia is the most feared complication after laser *in situ* keratomileusis (lasik) surgery. It was first reported in 1998 by Seiler and Quurke¹ in a case of *forme fruste* keratoconus. The visual rehabilitation of these patients, the irregular astigmatism, the need for contact lenses, or even corneal transplantation make the prevention of this complication imperative in refractive surgery candidates. The proved value of collagen corneal crosslinking (CXL) in arresting the progression of the ectasia² makes early diagnosis crucial to prevent deterioration of vision. In this case report, we describe a case of post-lasik ectasia in the left eye (LE) which was diagnosed 11 years after surgery without any preoperative risk factor. Intensive eye rubbing was reported by the patient only in one of his two operated eyes, i.e., the LE.

CASE REPORT

A 44-year-old male underwent lasik in our medical center on July 3, 2005 by an external doctor who performs surgery for his patients in our medical center, IVISION Refractive Surgery Center, since he suffered from low myopia and astigmatism. The anterior segment, the lens, the fundus, and the intraocular pressure were normal in both eyes, as reported by his doctor.

The corneal topography by TOPCON KR 700 P topographer (TOPCON, Japan) was normal in both eyes (Fig. 1); the corneal topography (Figs 2 to 3) performed by the Orbscan II (Bausch & Lomb, USA) was normal too in both eyes; and no signs of forme fruste keratoconus were noted. The corneal thickness was 631 μm in the RE and 621 μm in the LE as measured by the Orbscan II.

The corrected refraction was -2.75 sphere (S) = -2.64 cylinder (CYL) at 24° in the RE, -2.02 S = -0.27 CYL at 106° . The total ablation depth was 55 and 37 μm in the RE and LE respectively. The laser was performed by VISX S4 customized ablation with iris registration (VISX, California, USA).

The flap thickness done by the Hansatome (Bausch & Lomb, USA) was 160 μm in both eyes. No intra- or postoperative complications were noted. Six months postoperatively the TOPCON KR 700 topography was normal with central flattening of the cornea (Fig. 4). The red area in the LE is an artifact (Fig. 5).

Almost 11 years after surgery he was referred to us by an ophthalmologist because of deterioration of his visual acuity (VA) in his LE which started 2 years prior to his

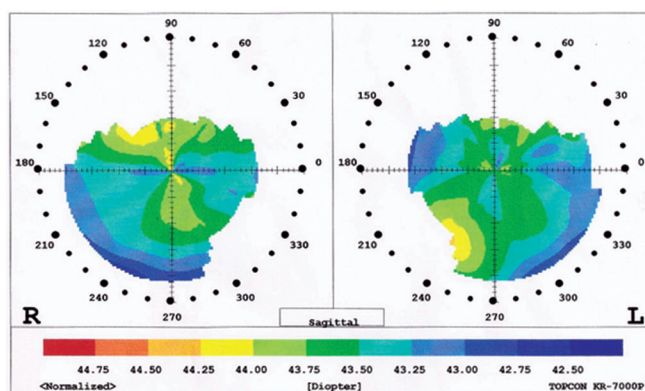


Fig. 1

^{1,2}Medical Director

¹The National Center for the Treatment of Keratoconus, Haifa Israel

²IVISION Refractive Surgery Center, Haifa, Israel

³Ophthalmologist at Southampton Eye Unit, Southampton General Hospital, Southampton, UK

Corresponding Author: Adel Barbara, Medical Director, The National Center for the Treatment of Keratoconus, Haifa, Israel
e-mail: Adelbarbara@yahoo.cpm

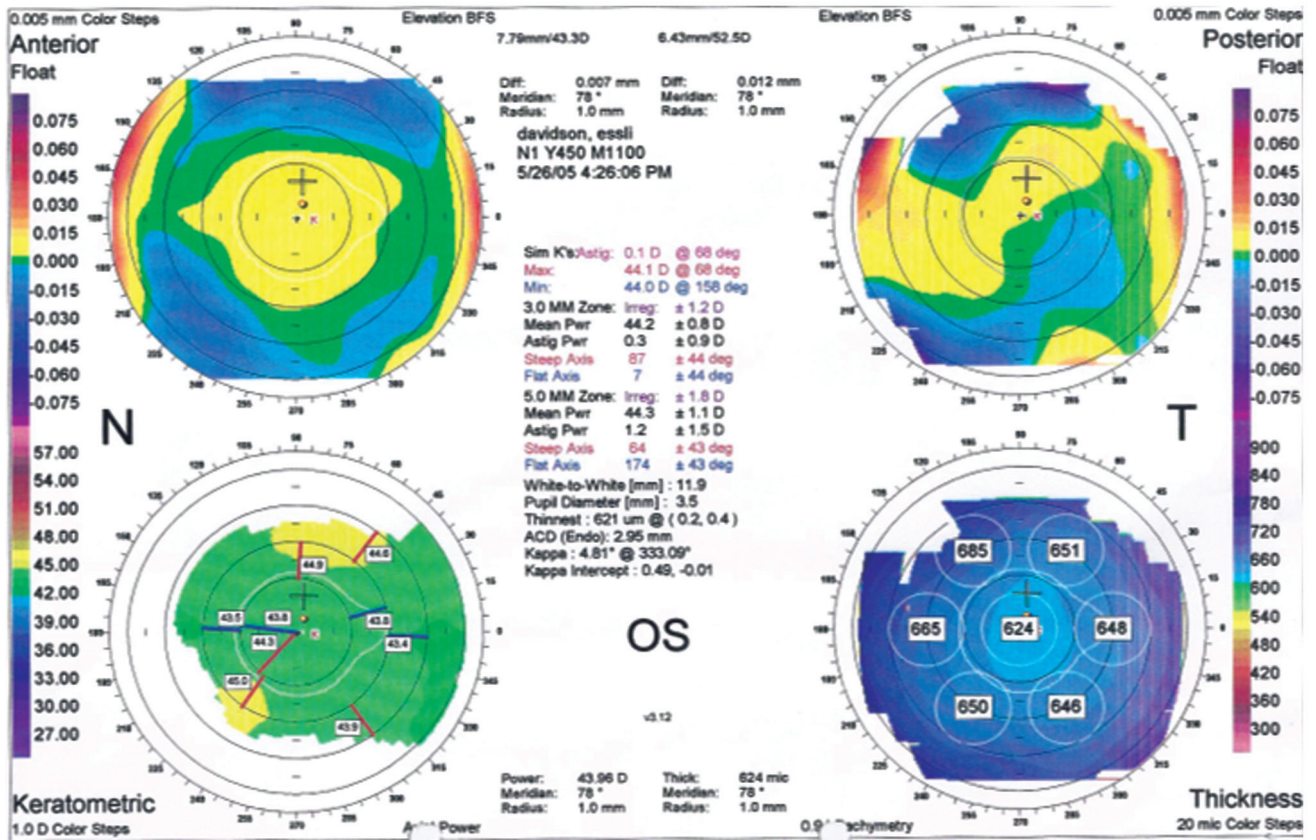


Fig. 2

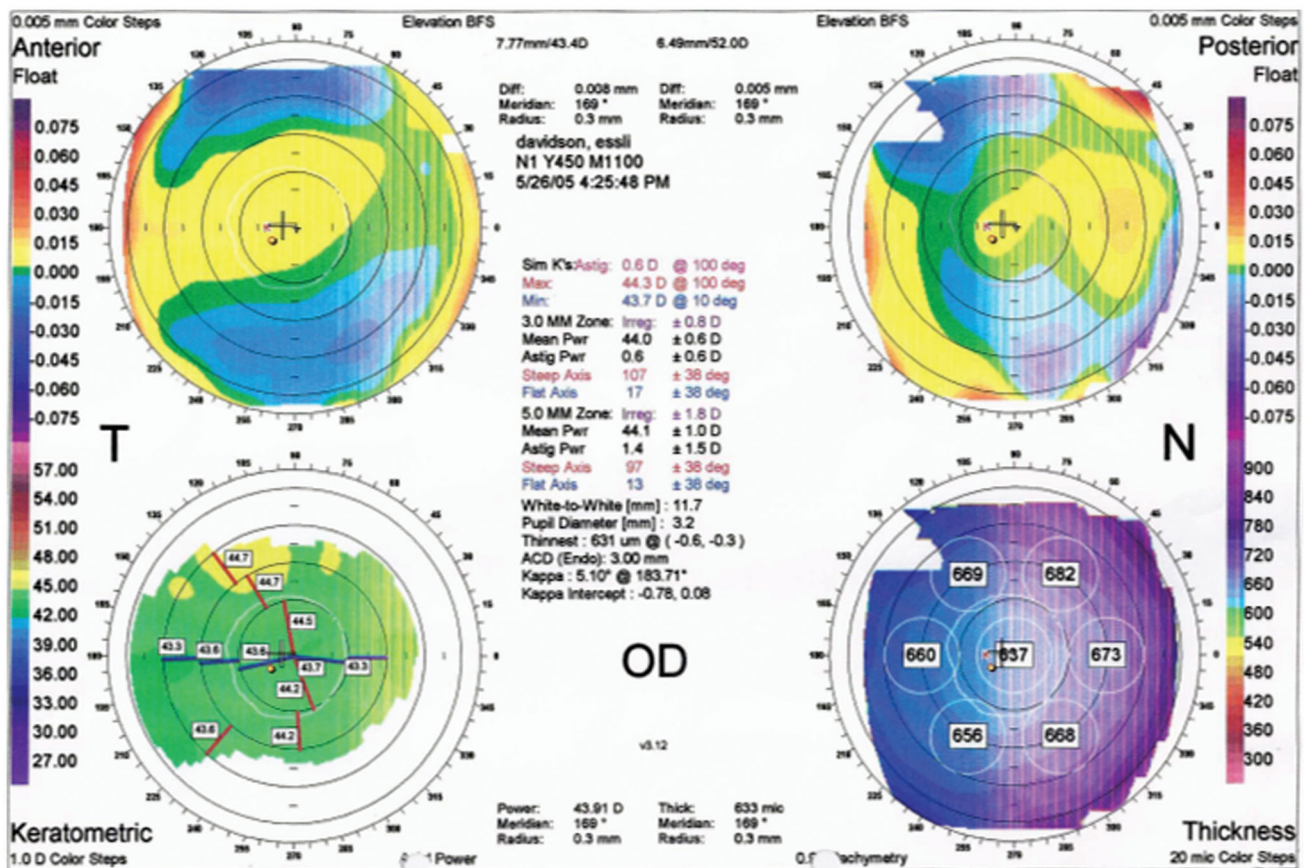


Fig. 3

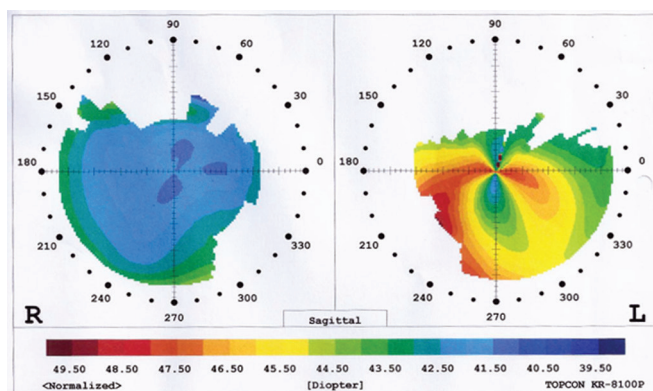


Fig. 4

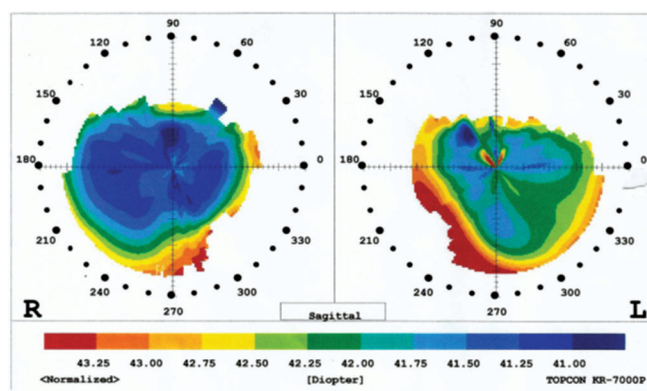


Fig. 5

examination, and on suspicion of post-lasik ectasia, he was examined on June 28, 2016.

His uncorrected visual acuity (UCVA) was 6/6 in the RE, 6/18 in the LE, his best spectacle corrected visual acuity (BSCVA) was 6/7 in the LE, and the refraction was in the LE: Plano = -3.5 CYL at 80°. The anterior segment of both eyes was normal, the lens clear in both eyes, and the fundus examination was normal in both eyes.

The TOPCON KR 700 topography (Fig. 4) shows an ectasia in his LE and a normal post-lasik topography in the RE; the same appears (Figs 6A and B) in the TMS 5 topography (TOMEY, Japan) and the CASIA II topography (TOMEY, Japan) (Figs 7A and B).

The corneal thickness in the RE as measured by the CASIA II is 613 μm in the RE and 595 μm in the LE, and 611 μm in the RE and 578 μm in the LE as measured by the TMS 5.

The flap thickness as measured by the CASIA II does not exceed 220 μm in both eyes (Figs 8A and B).

He reported vigorous eye rubbing 3 years earlier only in the LE for almost 3 months 3 years before my examination, 1 year prior to the deterioration of his vision in the LE.

We suggested to the patient the following treatments:

- Partial correction of his VA by glasses, or full correction by contact lens and a follow-up; CXL to be performed in case of further deterioration of his VA.
- Photorefractive keratectomy (PRK) combined with CXL.
- Intrastromal corneal ring (ISCR) and follow-up; CXL to be performed in case of further deterioration of his VA.

DISCUSSION

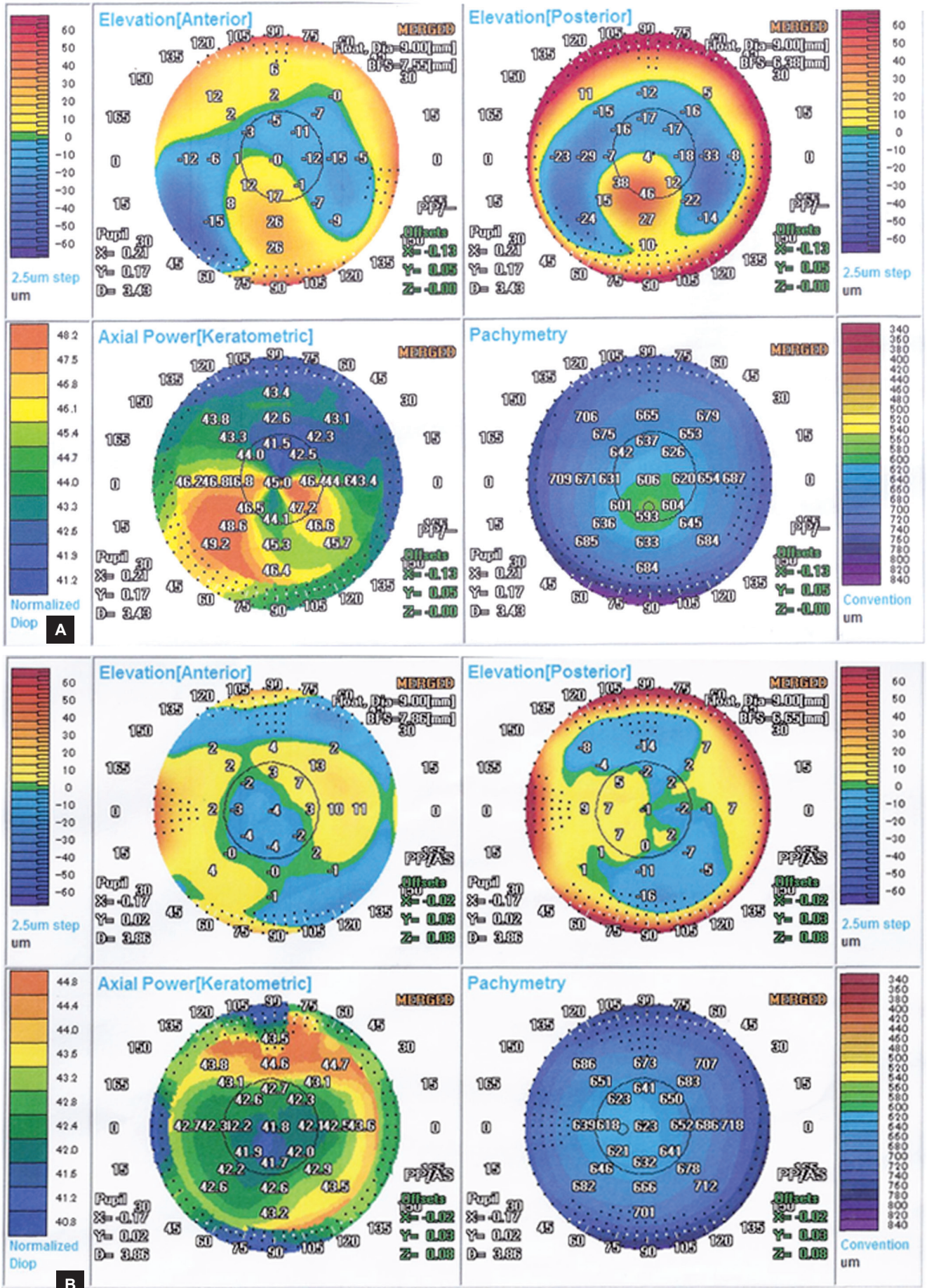
Since first reported by Seiler and Quurke,¹ many papers reported on post-lasik ectasia.³⁻¹¹ Randleman et al³ reported in 2003 on 43 eyes with average time of ectasia onset at 16.3 months (1-45 months) postsurgery. Randleman et al⁴ reported in a review on risk factors

for the development of ectasia in 171 ectasia cases; including 158 published and 13 unpublished cases which were evaluated at the authors' institution; 164 post-lasik ectasia and 7 post-PRK ectasia. One-third of cases developed ectasia within 6 months, 50% of cases by 12 months, and 75% by 18 months. Average time to the development of ectasia was 15.3 months.⁴ Young age (<30 years) is a risk factor for the development of ectasia, in addition to abnormal topography (forme fruste keratoconus), high myopia, thin cornea, and low residual stromal bed.⁴

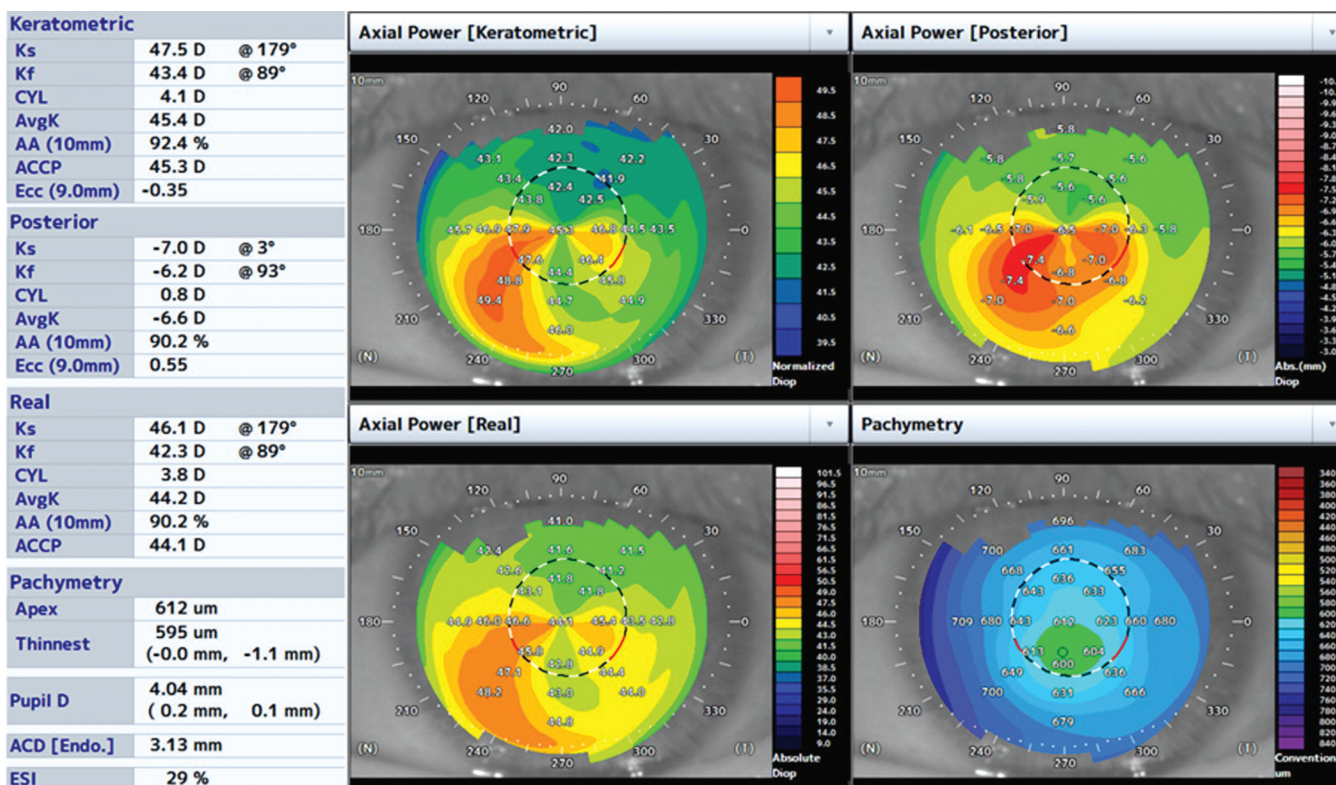
Klein et al⁵ reported on 27 eyes of 25 patients who developed ectasia. Mean time to diagnosis was 14.2 months (3-27 months). Randleman et al⁶ reported on 50 eyes that had an onset of ectasia less than 3 years post-lasik surgery. Brenner et al⁷ reported on 96 eyes between 1996 and 2010, of which 72 had mean time to diagnosis of 4.79 years. Said et al⁸ reported on 29 eyes of 19 patients, with mean time of onset of 57 ± 24 months (24-120 months) post-lasik surgery. Spadea et al⁹ reported on ectasia in 0.57% of 4,027 eyes at 7 years follow-up. The authors divided patients into two groups according to date of surgery. The time to ectasia onset after lasik was 2.57 ± 1.04 (1-4 years) in group 1 and 2.64 ± 1.29 (0.5-5 years) in group 2. Pallikaris et al¹⁰ reported on 19 eyes of 14 patients of 2,873 operated eyes (0.66%). The mean follow-up was 16.32 months (6-42 months). Hafezi et al¹¹ reported on five patients who were stable for years post-lasik surgery and only developed ectasia after pregnancy. The authors attributed that to massive increase in estrogen levels. Ectasia was diagnosed in 2 eyes 4 years after lasik, one after 5 years, one after 6 years, and one after 9 years.

The main risk factors are: young age, high myopia, thin corneas, retreatments, and forme fruste keratoconus.¹²

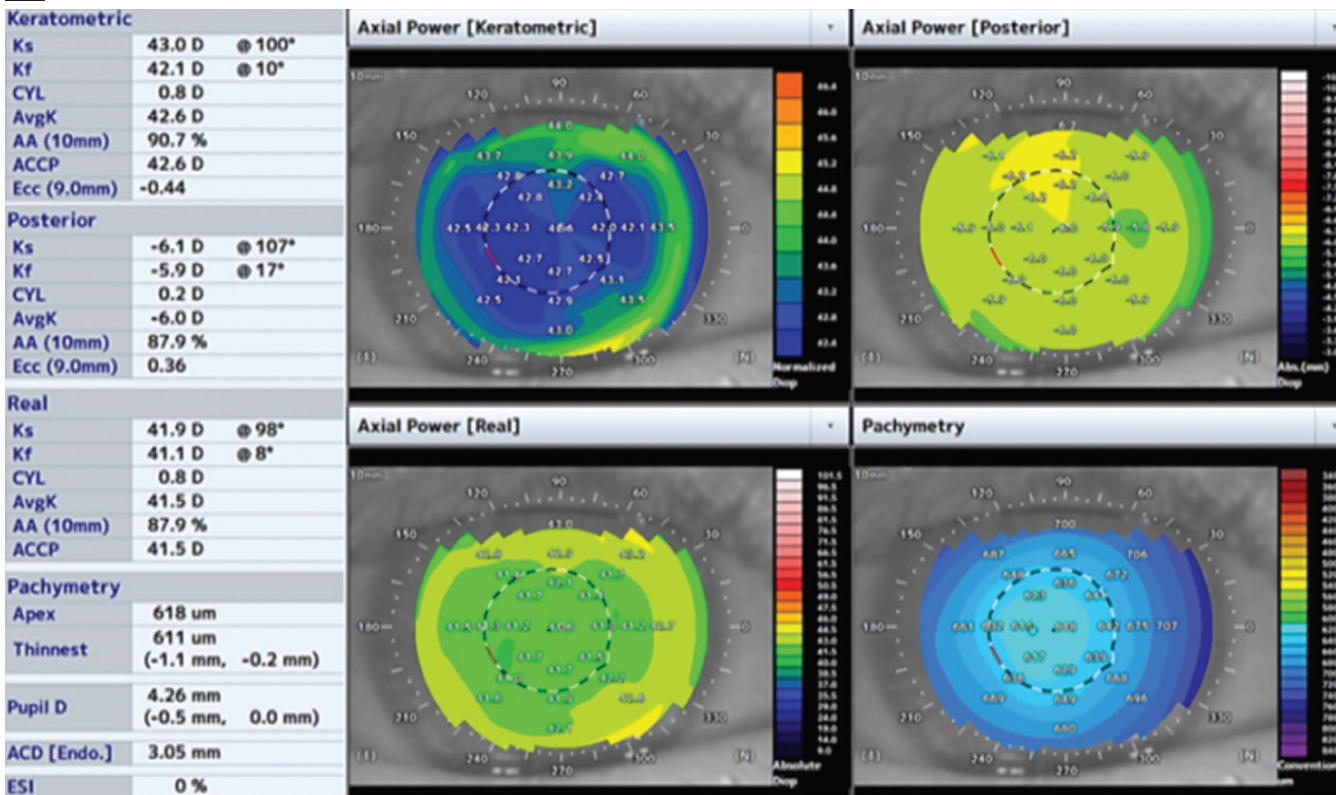
Post-lasik ectasia is under reported. Articles that report on score for the development of post-lasik ectasia are not long enough to elicit long-term onset. Our group published an article on a case series in which ectasia was diagnosed in 3 eyes 6 years post-lasik (2 eyes of the same patient),



Figs 6A and B

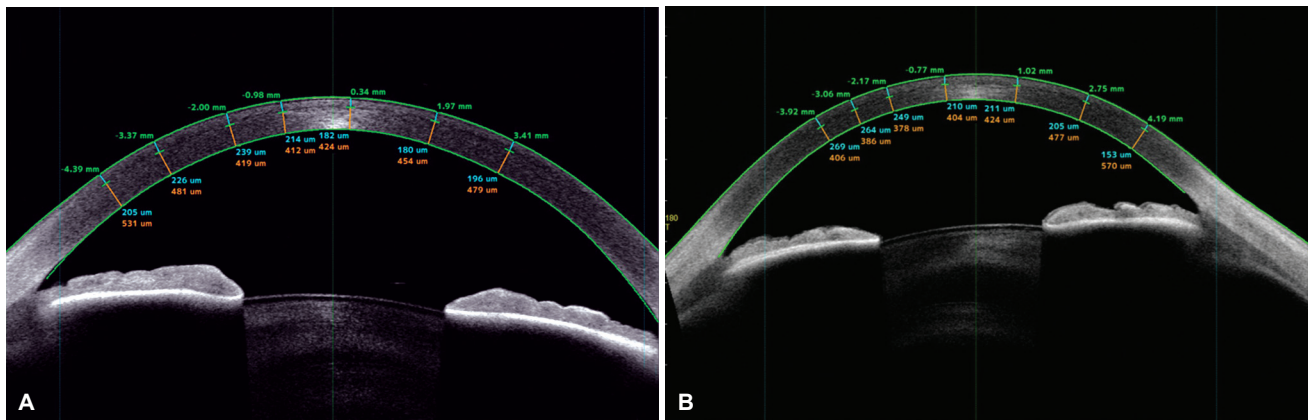


A



B

Figs 7A and B



Figs 8A and B

4 eyes 8 years postsurgery, 2 eyes 9 years postsurgery, and 2 eyes 11 years after lasik in the same patient.¹³ The onset of ectasia may be delayed years postoperatively.

Eye Rubbing and Ectasia

Eye rubbing may be the reason of keratoconus development and progression.^{14,15} Avni-Zauberman and Rootman¹⁶ reported on a case of post-lasik ectasia associated with sleep apnea and floppy eye lid syndrome without any risk factor and also in this case mechanical trauma was suggested as one of the mechanisms that caused the ectasia.

Comaish et al reported in an analysis on the mechanisms of post-lasik ectasia on a case of post-lasik ectasia, which developed because of eye rubbing without any other risk factor.¹⁷

While patients suffering from keratoconus may use contact lenses to improve their best-corrected visual acuity (BCVA), post-lasik ectasia patients find it more difficult to use contact lenses; ectasia patients underwent lasik surgery to “free” them from spectacles and contact lenses. Prior to surgery they could see with glasses, but once ectasia develops their VA improves with glasses only partially. Ectasia patients are more demanding than patients suffering from keratoconus.

Intrastromal corneal rings improve UCVA and BSCVA in keratoconus and post-lasik ectasia patients.¹⁸⁻²¹ Intrastromal corneal rings reduce astigmatism and keratometry readings and stabilize the cornea.

The introduction of collagen CXL by the Dresden Group²² opened new frontiers for arresting keratoconus progression. The treatment flattens the cornea, reduces astigmatism and in two-thirds of patients improves the UCVA and BSCVA. Collagen cross-linking is effective in arresting the progression of post-lasik ectasia,^{2,23,24} therefore, it is crucial to recognize post-lasik ectasia early in the course to arrest progression.

Photorefractive keratectomy with CXL performed sequentially on the same day²⁵ was reported as effective

in stabilizing the cornea of patients suffering from post-lasik ectasia and improved their VA.

This is why ISCR, CXL, and PRK were given to this patient as optional treatments.

What is Particular about this Case?

- No one of the risk factors above mentioned existed in this case. The patient age at the time of operation was 44 years, he had low myopia, thick cornea, and normal corneal topography.
- The flap thickness and the residual bed could be measured in this case by optical coherence tomography with the CASIA II and by this an unexpected thick flap or deep laser ablations could be excluded.
- Intensive eye rubbing reported by the patient is a possible cause of the ectasia.

This case as our above-mentioned case series poses some important questions with regard to lasik patients’ follow-up: Is yearly examination recommended up to 10-year duration? Do we have to warn our already operated persons about the possibility of developing ectasia many years postsurgery, bearing in mind the low percentage of patients who develop ectasia, which might create unnecessary fear and inconvenience to patients and ophthalmologists? Do we have to warn and stress to all post-lasik persons that eye rubbing is absolutely forbidden? These questions are yet to be answered.

CONCLUSION

Post-lasik ectasia is a known complication of refractive surgery, even many years later. Late onset, although rare, should be kept in mind. Early diagnosis is crucial for management and arresting its progression.

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