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CASE SERIES

Late Onset Post-Lasik Ectasia

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ABSTRACT

Post-Lasik ectasia is the most feared complication following laser *in situ* keratomileusis (Lasik), occurring in majority of cases within 1 year of surgery. Furthermore, it is reported many years after surgery. In this case series, we report on late onset ectasia in 11 eyes of nine patients occurring at least 6 years after surgery. Causes and management plan are not discussed here. The aim is to emphasis the late occurrence of this complication.

Keywords: Post-Lasik ectasia, Refractive surgery complications, Lasik, Late onset ectasia.

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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[1] 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 cross-linking (CXL) in arresting the progression of the ectasia[2] makes early diagnosis crucial to prevent deterioration of vision.

CASE SERIES

In this case series, we report on 11 eyes of nine patients which developed ectasia more than 6 years post-Lasik surgery. The aim of this study is to emphasize the late onset of ectasia in these patients and not the causative factors or the management plan. In two patients, the ectasia developed in both eyes (Figs 3 to 9); in seven patients, only one eye was involved although Lasik surgery was performed concomitantly (Figs 1 and 2). Data of nine patients are shown in Table 1.

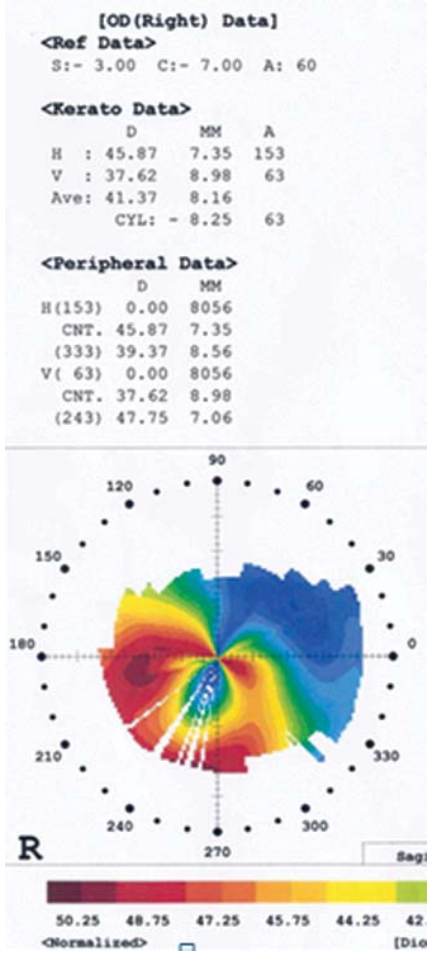

Fig. 1: Case 1: Right eye axial topographic map demonstrating ectasia

Table 1: The nine cases, 11 eyes of late onset ectasia data at time of diagnosis

Case	*Age*	*Lasik*	*Ectasia*	*Years*	*Eye*	*UCVA*	*BSCVA*	*Sph*	*Cyl*	*Axis*	K_{max}	K_{min}	K_{avg}	*CCT*
1	44	2000	2010	9.5	RE	0.05	0.6p	3.00	–11.00	60	45.87	37.62	41.37	454
2	33	2000	2008	8	RE	0.66p	1	1.50	–1.50	135	44.50	40.37	42.37	493
3	27	1999	2007	8	RE	0.15p	0.4p	–2.00	–1.75	80	43.25	39.87	41.50	378
4	25	2003	2012	9	LE	0.1	0.66p	1.00	–6.00	105	43.50	37.87	40.50	335
5	36	2000	2006	6	RE	0.1	0.5P	–0.50	–3.50	70	48.00	44.25	46.12	427
					LE	0.1	0.4P	0.00	–3.50	90	46.37	43.37	44.87	484
6	45	2003	2009	6	RE	0.05	0.4p	–4.50	–6.00	40	50.62	45.62	48.00	420
7	33	2000	2008	8	RE	0.4p	0.6p	–0.25	–2.00	45	41.50	39.12	40.37	448
8	33	2000	2008	8	RE	0.5	0.66P	0.50	–2.00	90	43.37	39.87	41.62	434
9	42	2001	2012	11	RE	0.1	0.6P	2.50	–4.00	90	37.62	33.12	35.25	502
					LE	0.5	0.5P	3.00	–4.50	90	36.62	32.00	34.12	494

Age: Age at time of diagnosis; Lasik: Year of Lasik operation; Ectasia: The year of diagnosis of ectasia; Years: Years from the Lasik to the diagnosis of ectasia; Eye: The eye that developed ectasia; UCVA: Uncorrected visual acuity; BSCVA: Best spectacle corrected visual acuity; Sph: Sphere in Diopters; Cyl: Cylinder in Diopters; Axis: Axis of the cylinder; CCT: Central corneal thickness

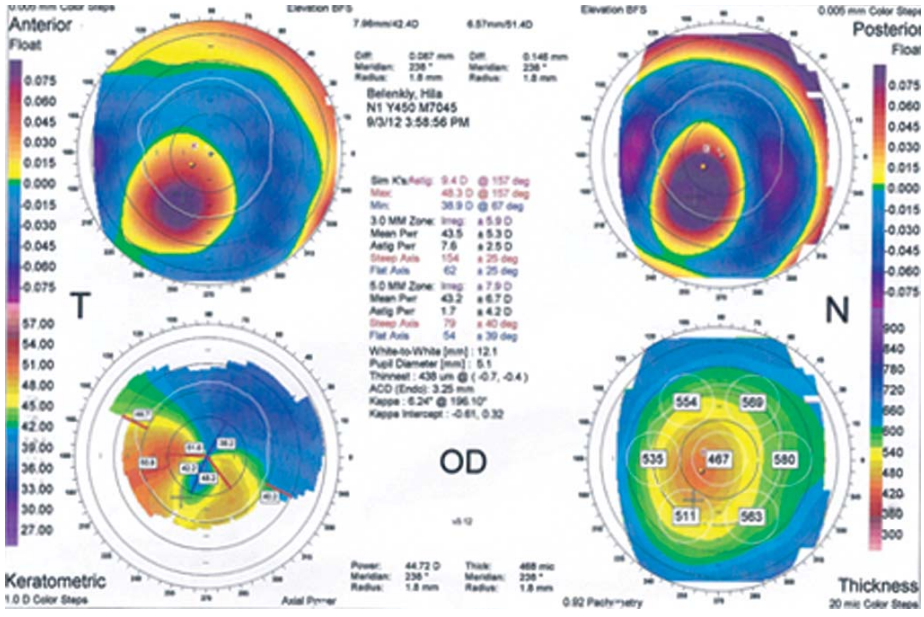

Fig. 2: Case 1: Right eye orbscan demonstrating ectasia

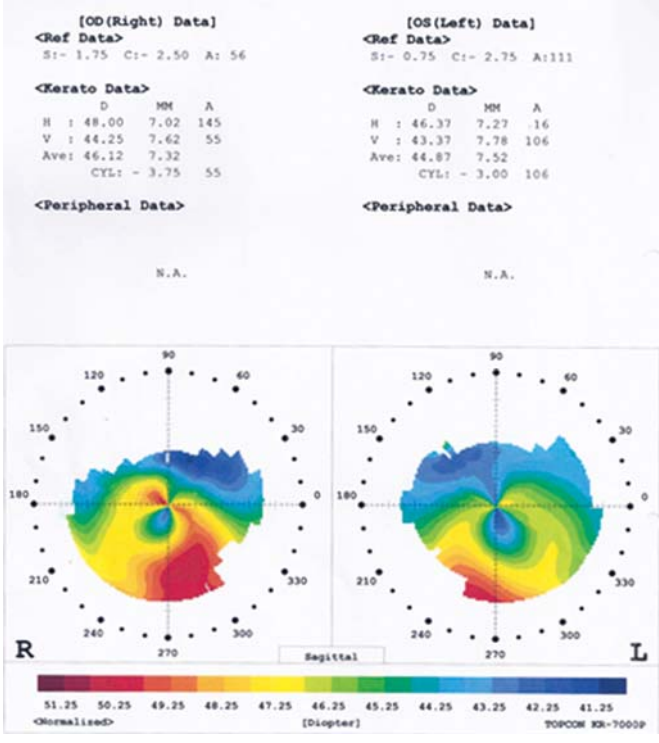

Fig. 3: Case 5: Axial map demonstrating ectasia in both eye

The topographic maps are diagnostic of ectasia in all patients. In case no. 9 the axial map is not typical of ectasia (Figs 6 and 7) and the diagnosis was made by taking into consideration the loss of best spectacle corrected visual acuity (BSCVA), the increased astigmatism, the high anterior and posterior float. Although the posterior float is high in nonecstatic post-Lasik cases but in this case as is shown in the TMS 5 topography (the scheimpflug of Tomey, Japan) there is an increase in the anterior float (Figs 8 and 9).

All patients underwent full ophthalmic examination, which included uncorrected visual acuity (UCVA), BSCVA, corneal transparency, intraocular pressure, and lens and dilated fundus examination. All patients had undergone corneal topographic mapping using Topcon placid topography (Topcon, Japan), Orbscan II (Bausch & Lomb, USA), TMS 4 (Placido topography, Tomey, Japan) and the TMS 5 (the scheimpflug of Tomey, Japan). The thinnest point of corneal thickness (CCT) was recorded.

In three eyes, four eyes and two eyes the ectasia was diagnosed 6, 8 and 9 years postoperatively respectively. Moreover, ectasia was diagnosed in both eyes of one patient of which gradual deterioration of vision started 9 years following surgery but ectasia was not diagnosed till 11 years after surgery (case no. 9; Table 1). The diagnosis was made by coincidence in the two patients with late onset ectasia at 9 years after surgery. The first patient complained of low vision upon closing one eye (case no. 1). The second went for ophthalmic examination due to irritation in his eye (case no. 4).

DISCUSSION

Since, first reported by Seiler[1] many papers reported on post-Lasik ectasia.[3-11] Randelman et al reported in 2003 on 43 eyes with average time of ectasia onset at 16.3 months (range: 1-45 months) after surgery.[3] Randelman 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.[4] A total of 164 post-Lasik ectasia and seven postphotorefractive keratectomy (PRK) ectasia were there. One-third of cases developed ectasia within 6 months, 50%

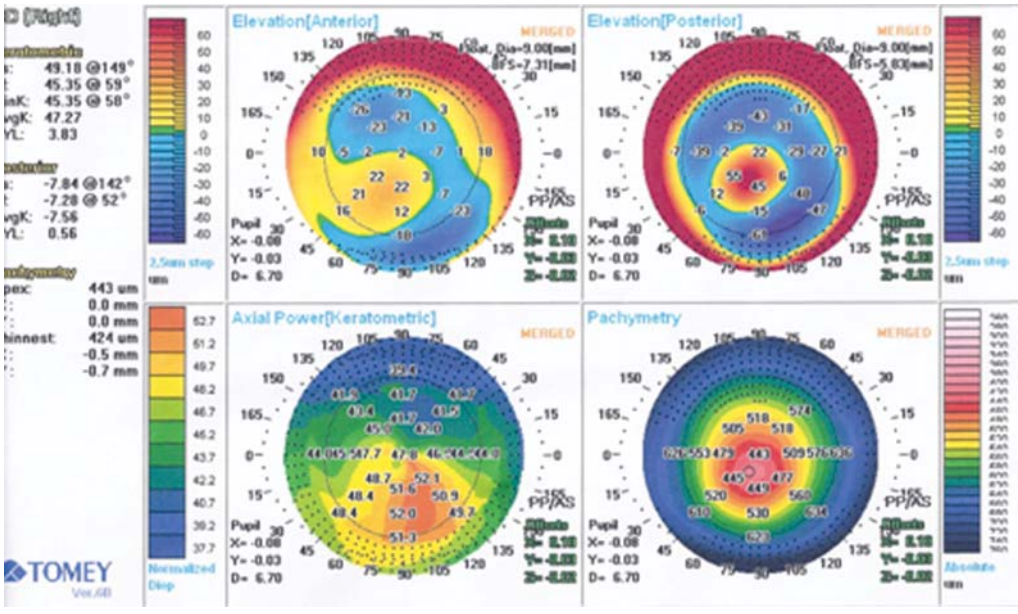

Fig. 4: Case 5: TMS 5 Scheimpflug topography demonstrating ectasia in the right eye

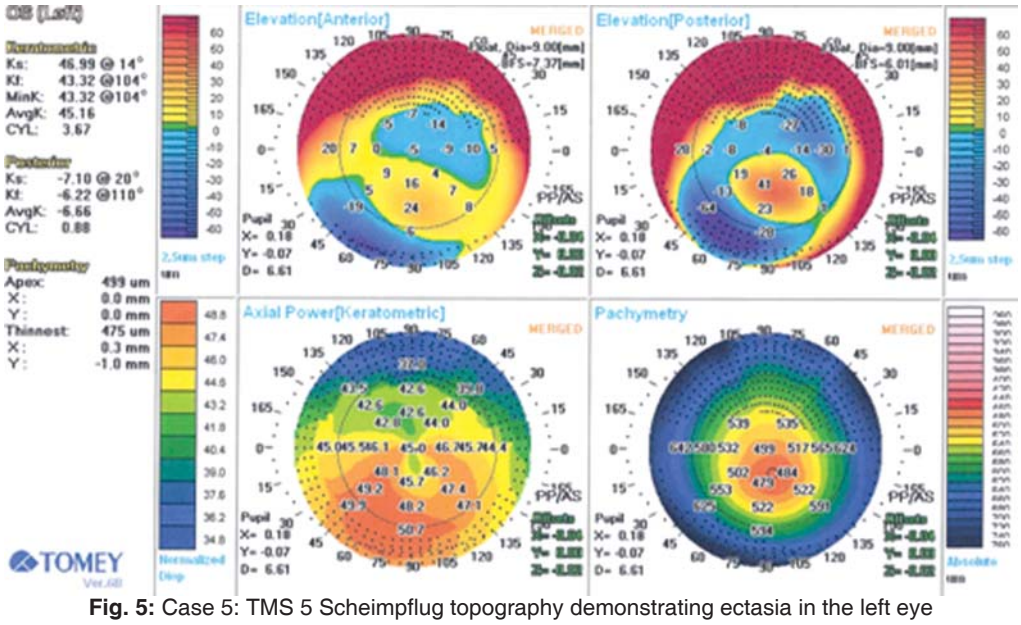

Fig. 5: Case 5: TMS 5 Scheimpflug topography demonstrating ectasia in the left eye

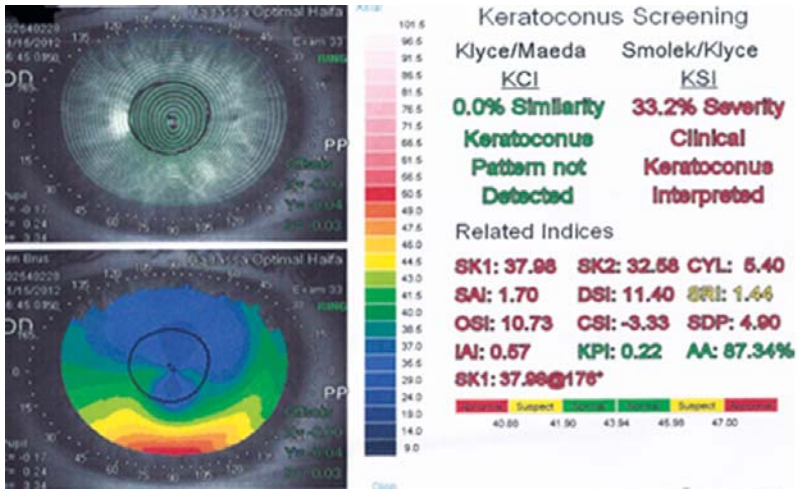

Fig. 6: Case 9: Axial topographic map of the right eye

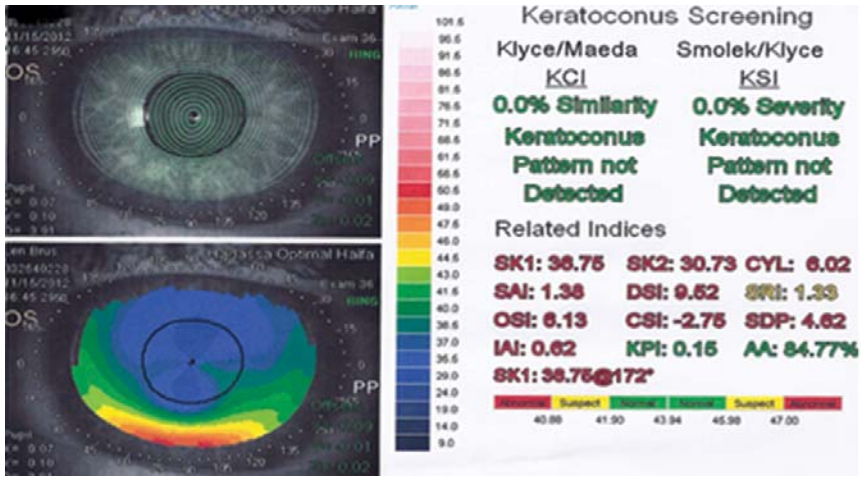

Fig. 7: Case 9: Axial topographic map of the left eye

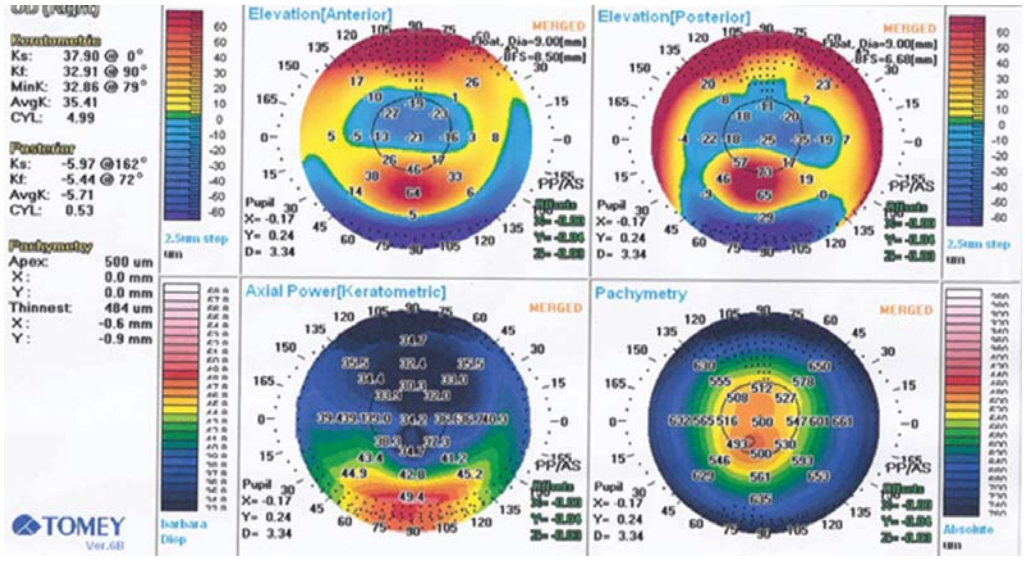

Fig. 8: Case 9: TMS 5 Scheimpflug topography of the right eye. Here, the ectasia is more evident than in the axial map

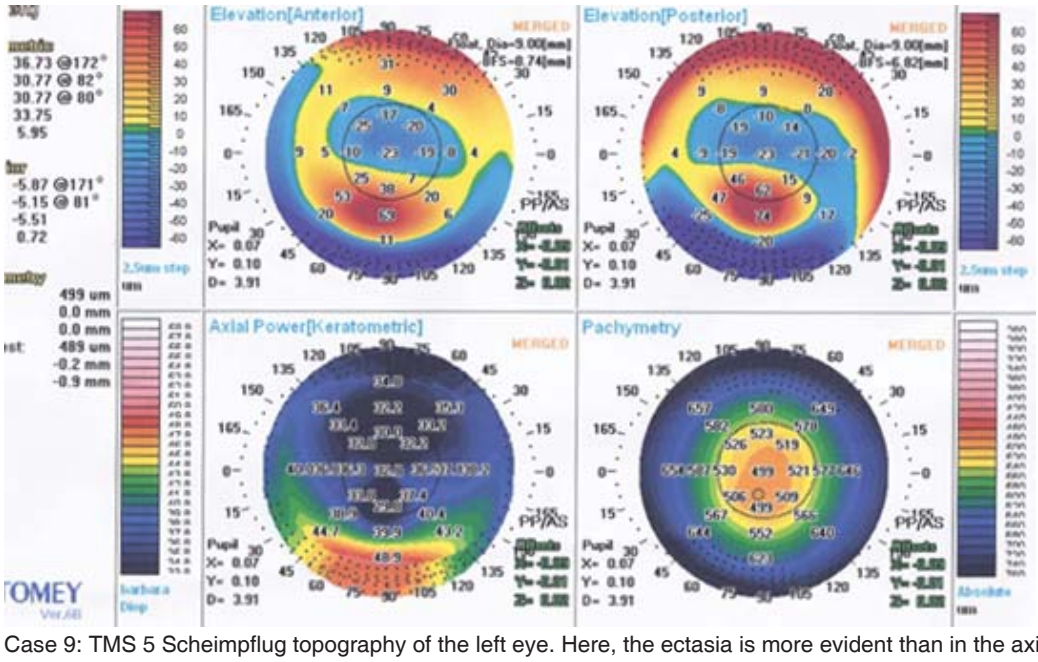

Fig. 9: Case 9: TMS 5 Scheimpflug topography of the left eye. Here, the ectasia is more evident than in the axial map

of cases by 12 months, and 75% by 18 months. Average time to the development of ectasia was 15.3 months.[4] Young age (less than 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 al report on 27 eyes of 25 patients who developed ectasia. Mean time to diagnosis was 14.2 months (range: 3-27 months).[5] Randelman et al reported on 50 eyes that had an onset of ectasia less than 3 years post-Lasik surgery.[6] Brener et al reported on 96 eyes between 1996 to 2010 of which 72 had mean time to diagnosis of 4.79 years.[7] Ashraf et al reported on 29 eyes of 19 patients, with mean time of onset of 57 ± 24 months (range: 24-120 months) post-Lasik surgery.[8] Spadea et al 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 years (range: 1-4) in group 1 and 2.64 ± 1.29 years (range: 0.5-5) in group 2.[9] Pallikaris et al reported on 19 eyes of 14 patients of 2,873 operated eyes (0.66%). The mean follow-up was 16.32 months (range: 6-42 months).[10] Hafezi et al 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 two eyes 4 years after Lasik, one after 5 years, one after 6 years and one after 9 years.[11]

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.[12] In our series, ectasia was diagnosed in three eyes 6 years post-Lasik (two eyes of the same patient), four eyes 8 years postsurgery, two eyes 9 years postsurgery and two eyes 11 years after Lasik in the same patient. The onset of ectasia may be delayed years postoperatively. Even patients who have successful surgery may develop ectasia in the future.

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, once ectasia develops their visual acuity (VA) improves with glasses only partially. Ectasia patients are more demanding than patients suffering from keratoconus. Intrastromal corneal rings (ISCR) improve UCVA and BSCVA in keratoconus and post-Lasik ectasia patients.[13-16] ISCR reduce astigmatism and keratometry readings and stabilize the cornea.

The introduction of CXL by the Dresden group[17] opened new frontiers for arresting keratoconus progression. The treatment flattens the cornea, reduces astigmatism and in two-third of patients improves the UCVA and BSCVA.[17] CXL is effective in arresting the progression of post-Lasik ectasia,[2,18,19] therefore, it is crucial to recognize post-Lasik ectasia early in the course to arrest progression. In post-Lasik ectasia, patients' vision has already deteriorated upon time of diagnosis.

In this case series, we did not evaluate the cause of the ectasia or the treatments offered. The aim is to stress the fact that even after 6 years of Lasik surgery one cannot be certain that the cornea will remain biomechanically stable and free of ectasia. This case series demonstrate the importance of examining post-Lasik patients many years after surgery and especially patients complaining of vision deterioration. Two patients in our series did not notice the gradual deterioration of vision.

This 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 after surgery, bearing in mind the low percentage of patients who develop ectasia, which might create unnecessary fear and inconvenience to patients and ophthalmologists. These questions are yet to be answered.

CONCLUSION

Post-Lasik ectasia is 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, hence, reducing the need for corneal transplantation.

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