Abstract: Our purpose is to document the first case of unilateral mild corneal ectasia developed in an apparently nonpredisposed cornea after topical latanoprost treatment, and its regression after treatment withdrawal. We describe a 44-year-old man with visual impairment in his left eye (OS) and a past medical history of myopic refraction and ocular hypertension with latanoprost treatment, the rest of ocular examination was normal. A decrease in visual acuity was observed with a refractive change. Corneal tomography showed features of mild corneal ectasia in his OS. Topical prostaglandin analogue therapy was removed and replaced by other antiglaucoma topical treatment. Corneal tomography returned to normal, an improvement in the quality of vision was observed and refractive astigmatism recovered to baseline values. This case illustrates that topical latanoprost does affect the matrix metalloproteinases balance in corneal extracellular matrix, and subsequently may produce a corneal weakening. Corneal biomechanical features and corneal stiffness do probably recover after topical prostaglandin analogues withdrawal.

Key Words: corneal ectasia, corneal biomechanics, latanoprost, topical prostaglandin (PG) analogue, matrix metalloproteases

The ectatic diseases of the cornea are noninflammatory conditions in which the corneal curvature becomes progressively steeper. The corneal thinning is a hallmark of these conditions and a distortion of the anterior corneal curvature occurs, being keratoconus the most common primary ectasia (but postrefractive surgery ectasia and pellucid degeneration share similarities with keratoconus and some suggest they may in fact be different phenotypes of the same disease).1 Although corneal ectasia is one of the most common corneal degenerations,

FIGURE 1. Left eye Pentacam tomography, showing features suggestive of corneal ectasia.
its pathogenesis is not yet fully understood. It is probably a multifactorial disease with both environmental and genetic risk factors. In the last years a growing body of evidence has accumulated suggesting a link between matrix metalloproteinases (MMPs) activity and keratoconus development. There is anecdotal evidence that treatment with topical prostaglandin (PG) analogues may be associated with the progression of a preexisting keratoconus, but in the best of our knowledge no case of a primary corneal ectasia induced by topical PG analogue therapy has been reported.

**CASE REPORT**

We present the case of a 44-year-old man who presented in our clinic with visual complaints. The patient had been evaluated elsewhere for refractive surgery 8 years before we first saw him. The patient rejected surgery, and his ocular examination was reported to be normal, including corneal topography.

Two years later the patient was found to have ocular hypertension and started on bilateral topical latanoprost treatment.

On presentation at our clinic, the patient was on latanoprost treatment in both eyes, his logMAR best-corrected distance visual acuity was −0.1 for both eyes (sphere −6.0 D for both eyes).

**FIGURE 2.** Left eye Pentacam tomographies obtained at 3 (A) and 9 months (B) after latanoprost was interrupted. Both corneal tomographies returned to normal parameters.
Later on, he suffered a progressive glaucomatous visual field defect and required a deep sclerectomy glaucoma filtering surgery on his right eye (OD), with a good control of glaucoma afterwards. The left eye (OS) was found to be well controlled on latanoprost once daily.

One year later the patient referred visual complaints in OS. The logMAR best-corrected distance visual acuity was 0.2 for OD (−6.75 D sphere) and 0.0 for OS (−6.0 D sphere, −1.75 D cylinder). Anterior segment examination was normal, and the intraocular pressure (IOP) was 18 mm Hg in both eyes under latanoprost treatment in his OS only. His corneal tomography showed features suggestive of mild corneal ectasia in his OS (inferior steepening with a normal corneal thickness and maximum keratometry values; Fig. 1). The tomography of OD was normal. For that reason, latanoprost was withdrawn and replaced by Simbrizna bid (Alcon Laboratories Inc., Fort Worth, TX). After that, corneal tomography of his OS returned to normality (Fig. 2) and an improvement in the quality of vision and refraction was observed (0.2 for OD with sphere −6.75 D and 0.0 for OS with −6 D sphere). Thus, the left corneal ectasia was found to regress after cessation of the prostaglandin analogue therapy. The patient was not a contact lens wearer and had no systemic diseases.

**DISCUSSION**

In this case, a unilateral mild corneal ectasia was observed after years of unilateral hypotensive treatment with a PG analogue (latanoprost) for glaucoma and regressed after its withdrawal.

As far as corneal collagen turnover is concerned, it seems necessary a metalloproteinases-driven extracellular matrix remodeling. A fine balance in the expression of MMP is necessary in order to maintain the transparency and the corneal biomechanical behavior, so an imbalance in this regulation could result in the progressive weakening of the cornea. In fact, it has been shown that in keratoconus there is an over-expression of MMP in both the corneal tissue and the tears (particularly MMP-1 and MMP-9).2

On the other hand, topical treatment with PG analogues seem to induce extracellular matrix remodeling due to the PG F-receptor mediated increased synthesis of some MMPs.4,5 In fact, an increased activity of some MMPs, such as MMP-1 and MMP-9, has been observed in latanoprost treated patients.5 There is some evidence suggesting that this increase of the MMPs activity could be related to the PG analogue-induced change in the corneal strain response to acute increases in IOP.6 In addition, these drugs could also induce an increase in the corneal hysteresis, independently of the induced decrease of the IOP, measured by application tonometry.6 Furthermore, it has been reported that changes in some biomechanical parameters, measured by Corvis ST, can be seen in eyes treated with PG analogues. Interestingly, these kind of changes have been also seen in keratoconic eyes7 and also in topographically normal fellow eyes of unilateral keratoconus.8 In addition, some changes in the corneal optical densitometry have been reported after topical PG treatment.9

There is a case report in the literature showing the progression of a previously stable keratoconus after the patient started with latanoprost topical treatment,5 but, to the best of our knowledge, this is the first case of a normal cornea which developed an ectasia after the onset of a treatment with a PG analogue.

In our case, the corneal ectasia regressed after withdrawal of the PG analogue therapy (Fig. 2) An improvement in the quality of vision due to the disappearance of the refractive astigmatism was also observed. This finding suggests that the changes in the corneal biomechanics are reversible. Furthermore, there is evidence in the literature suggesting that some increase of the corneal hysteresis and the corneal resistance factor occur after PG treatment withdrawal.10 But, to the best of our knowledge, there is no data about the possible changes in the parameters obtained with the Corvis ST after PG treatment withdrawal.

In conclusion, it seems that topical PG therapy may induce some kind of biomechanical corneal changes that may make the cornea weaker. The case we report shows that this drug-induced corneal weakening may, leads to a clinically relevant corneal ectasia, even in an eye with normal corneal tomography.

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