Refractive Surgical Problem

Edited by José L. Güell, MD

A 26-year-old contact-lens-intolerant man came for consultation because of progressive visual loss during the past few months. During this period, he had been studying intensively using the computer.

Examination of the right eye showed an uncorrected distance visual acuity (UDVA) of 20/30 and a corrected distance visual acuity (CDVA; with spectacles) of 20/20$^-$ with -0.25 -1.50×85. In the left eye, the UDVA was 20/20$^-$ and the CDVA was 20/20$^-$ with $+0.25$ -0.50×100. Figure 1 shows the topography. The rest of the ophthalmologic examination was normal.

Spectacles were prescribed for 4 months, and the patient was asked to return for a reevaluation. Four months later, the UDVA was 20/40$^+$ and 20/20$^-$ in the left eye and the CDVA was 20/25 with $+0.50$ -1.75×105 and 20/20$^-$ with $+0.25$ -0.50×100, respectively. Again, the rest of the ophthalmologic examination was normal. Figure 2 shows the topography 4 months after the initial consultation. Figure 3 shows optical coherence tomography (OCT) images, and Figure 4 the corneal topography difference maps.

Taking into account the available data, would you ask for other tests? Would you ask the patient to return after a certain period? Would you propose surgery and if so, what would be your approach?

■ This patient has early signs of progressing corneal ectasia and raises the dilemma of early versus delayed intervention. The ophthalmologic examination is normal in both eyes, with corneal imaging showing

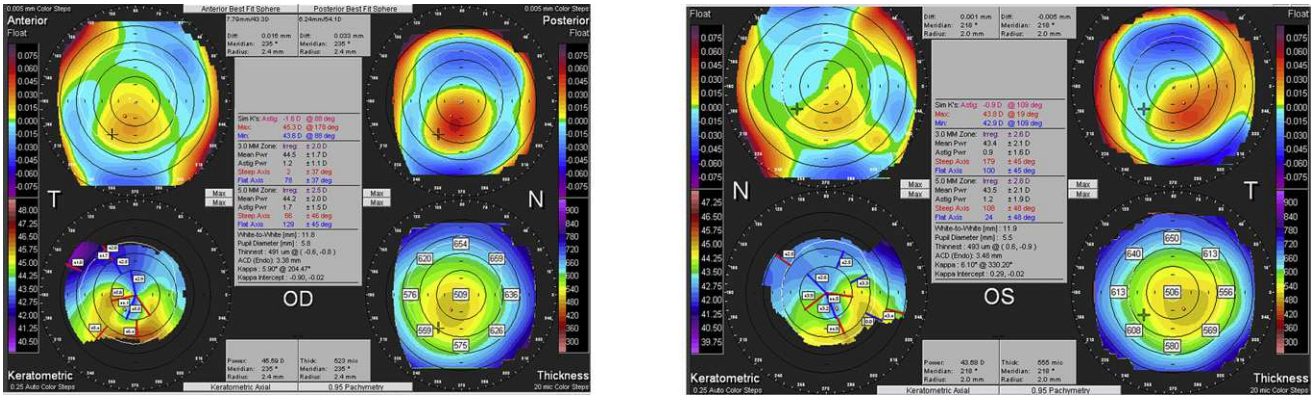

Figure 1. Corneal topography maps taken at the first consultation. *Left*: Right eye. *Right*: Left eye.

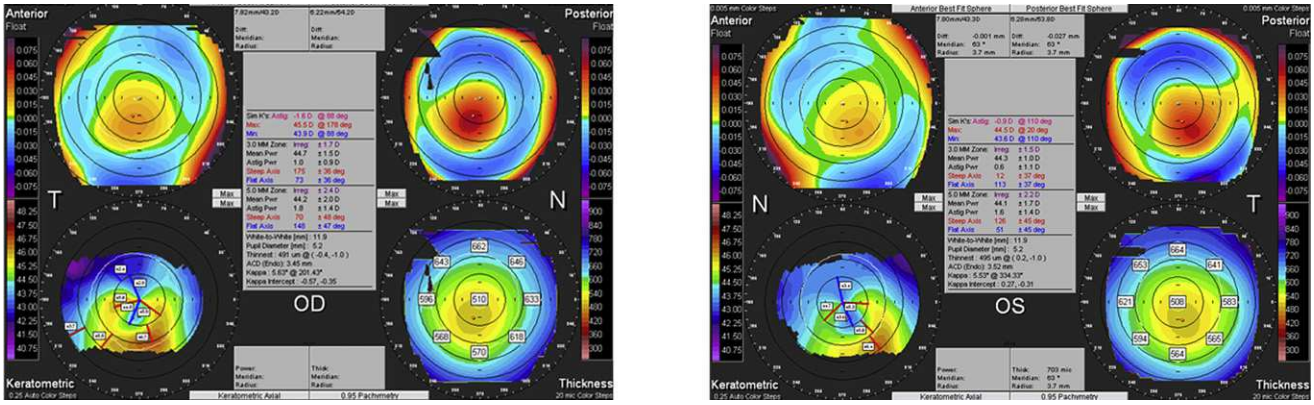

Figure 2. Corneal topography maps 4 months later. *Left*: Right eye. *Right*: Left eye.

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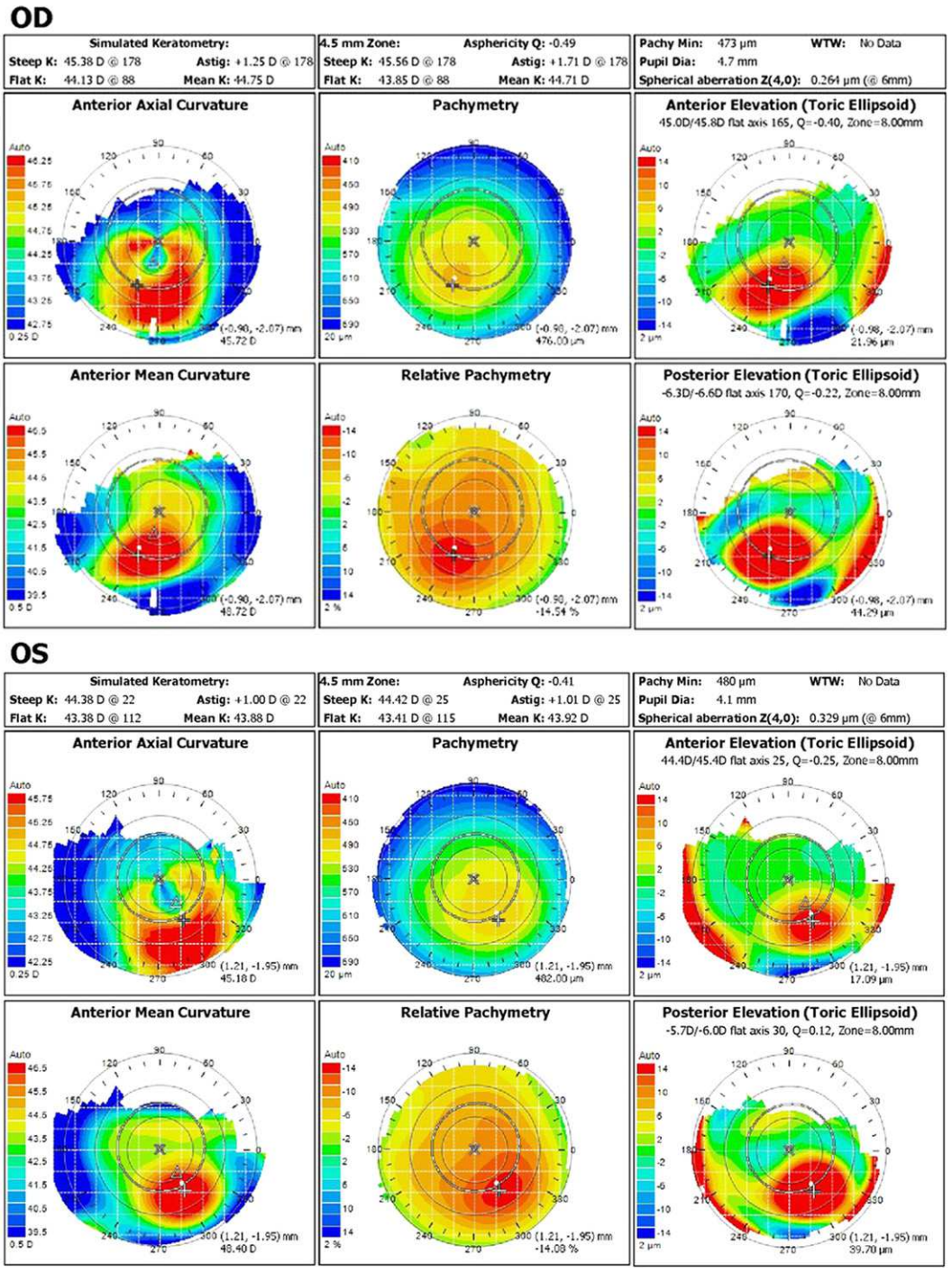

Figure 3. Optical coherence tomography. *Top*: Right eye. *Bottom*: Left eye.

bilateral findings (inferior steepening, paracentral island of positive elevation and thinning) typical of inferior subclinical keratoconus.[1]

Four months after the patient presented, there is vision loss in the right eye and topographic evidence of ectasia progression, in the left eye more than in the right eye. Despite early signs of ectasia progression, the CDVA remains very good, which raises the question of whether surgical intervention would be justified.

I would strongly advise the patient against eye rubbing and would treat any underlying atopy or allergy.[2] That said, this young patient is contact lens intolerant; therefore, should the irregular astigmatism increase, contact lens use would not be an alternative.

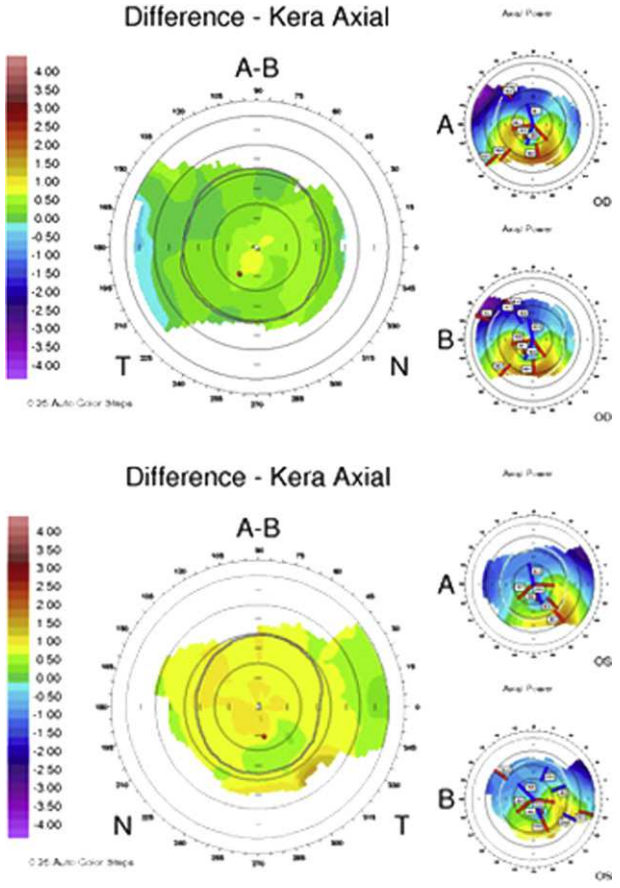

Figure 4. Difference maps. *Top*: Right eye. *Bottom*: Left eye.

Should the patient's medical history be significant for intense eye rubbing, eye atopy, and related symptoms, I would counsel him regarding the possibility that simply stopping the eye rubbing might halt progression.[3] I would then have him return 2 months after he begins topical treatment for atopy.

Collagen crosslinking (CXL) would be my first-line intervention in the absence of a history of significant eye rubbing. Whether to recommend unilateral or bilateral CXL is a tough call in this case. I would start CXL the right eye and watch closely for further change in visual acuity or topography in the left eye. Should that happen, immediate CXL in the left eye is warranted. At present, the long-term effects of CXL for keratoconus are unknown; the ultraviolet-A (UVA) light might damage the corneal endothelial cells, lens, or retina, even though there is no evidence of this in published clinical studies. In addition, although rare, complications of the CXL procedure have been reported. These include corneal haze, corneal burns,[4] bacterial and herpetic keratitis, and corneal melting.[5]

The patient's UDVA in the left eye is 20/20^{-}. Thus, I would recommend follow-up visits every 2 months initially and treatment only in the case of a change in visual acuity or more pronounced topographic progression.

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■ Corneal topography and scanning-slit elevation maps at baseline and 4 months later show little, if any, changes. Keratometry at 3.0 mm is 44.7 D in the right eye and 43.3 D in the left eye. The central corneal thickness (CCT) is 491 µm and 495 µm, respectively. The difference maps also appear stable with respect to axial power. Optical coherence topography confirms the presence of anterior and posterior elevation and inferotemporal thinning bilaterally. Axial curvature maps show a typical crab-claw pattern consistent with pellucid marginal degeneration (PMD). An additional test could be keratoscopy or the use of a simple handheld keratoscope, from which a pattern of "flat-flat-steep-steep-steep" ring mires can be observed progressively from the center to the inferior periphery.

The progressive decline in vision could be due to an increase in accommodative demand from the intensive examinations. Nevertheless, the pattern of PMD is a concern. Despite the apparent stability of the objective tests, it is known that PMD presents in the 20- to 40-year age group and tends to progress over time. Furthermore, when inferior thinning occurs, optical and surgical options become limited.

The following aspects are encouraging for surgical intervention in this case: keratometry readings less than 55.0 D, CCT greater than 400 µm, and good UDVA and CDVA. Because there is more cylinder in the right eye and the CDVA has begun to decline