

You Treated Me. How About My Son?

BY JOHN F. DOANE, MD; MARK KONTOS, MD; AND COLMAN R. KRAFF, MD

CASE PRESENTATION

A 23-year-old man is referred for a LASIK consultation. He has successfully worn soft contact lenses since the age of 16 but is concerned about continuing to use this form of correction due to his chosen profession as a firefighter. The patient has had the same optometrist since high school, and the spherical power of his soft contact lens prescription has not changed in the past 3 years. His mother is a former patient who participated in an FDA study evaluating wavefront technology for myopia, and she remembers that one of the entrance criteria was an age of 18 years. The patient's father, age 54, is in excellent health, has great distance vision, and rarely uses reading glasses despite his job as a contractor.

On examination, the patient's UCVA is 20/400 OU. His visual acuity corrects to 20/15 with a manifest refraction of -4.50 -1.00 x 090 in his right eye and to 20/15 with a manifest refraction of -4.50 -1.00 x 090 in his left eye. The slit-lamp and dilated fundus examinations are completely normal.

An evaluation of both of the patient's eyes with the TMS-4 Keratoconus Screening System (Tomey) is normal (Figure 1). Visx CustomVue scans (Abbott Medical Optics) show a high correlation between the wavefront-derived 4.00 Rx Calculation and the patient's manifest refraction in both eyes (Figure 2). The coma term is 0.33694 μ m OD and 0.31621 μ m OS. The central pachymetry reading with

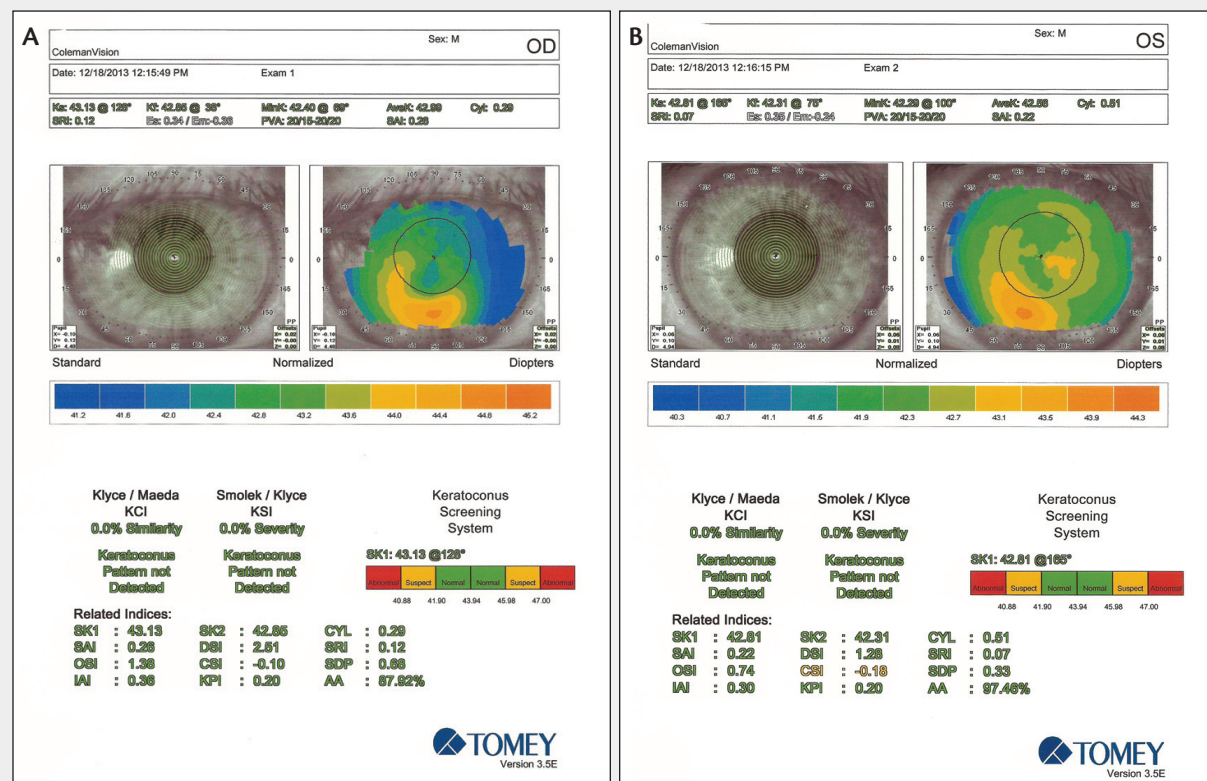


Figure 1. Topography of the patient's right (A) and left (B) eyes using the TMS-4 Keratoconus Screen.

CASE PRESENTATION (CONTINUED)

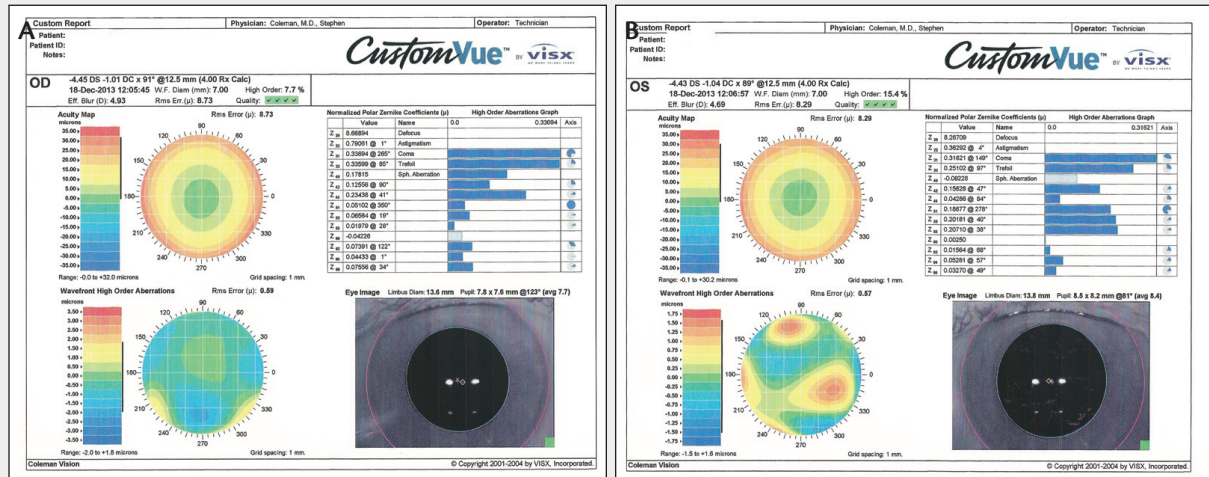


Figure 2. Visx CustomVue scans of the patient's right (A) and left (B) eyes.

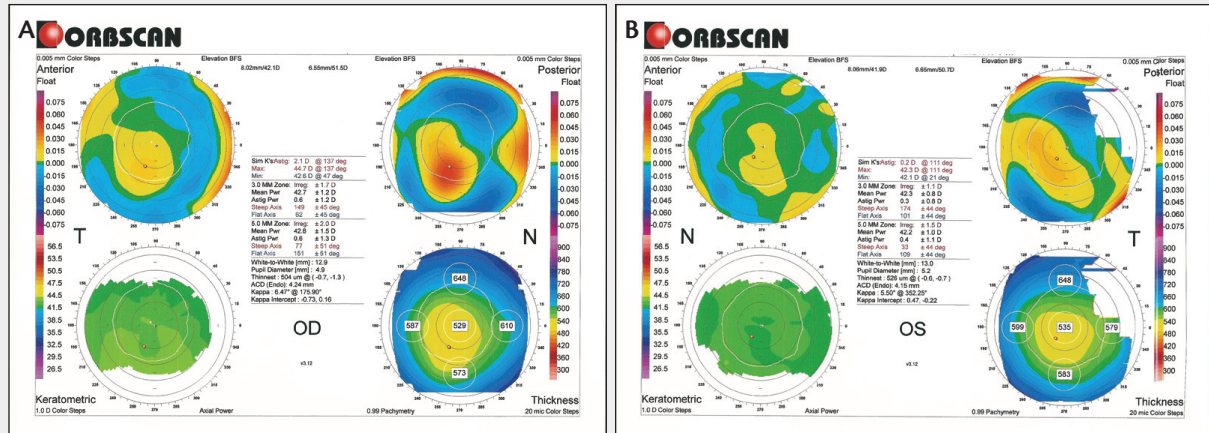


Figure 3. Pachymetry readings taken with the Orbscan of the patient's right (A) and left (B) eyes.

the Orbscan (Bausch + Lomb) for the patient's right eye is 529 μm, with the thinnest pachymetry noted inferotemporal to the apex and measuring 504 μm. His left eye has a central pachymetry reading of 535 μm, with the thinnest area located immediately adjacent and inferonasal to the corneal apex and measuring 525 μm (Figure 3).

The patient has had one prior consultation for laser vision correction, and the recommendation was bilateral

PRK. Having since done some research, his mother's questions for you are

1. Is my son a good candidate for laser vision correction?
2. What is pellucid marginal degeneration (PMD), and is it different from keratoconus?
3. Is PRK a safe alternative to LASIK for my son?
4. If he were your son, what would you do?

—Case prepared by Stephen Coleman, MD.

JOHN F. DOANE, MD

The key issues that have confused this type of case over the years are an against-the-rule pattern of astigmatism and a relatively low mean central corneal power (approximately 43.00 D OD and 42.60 D OS). In my experience, low central corneal power in the presence of against-the-rule astigmatism with "kissing" of the ends of the bowtie at the 270° meridian or a pattern of PMD always tends to

culminate in a negative keratoconus screening or suspect with software provided by screening devices. It should come up negative for keratoconus, but wouldn't it be nice if it came up with a positive score for forme fruste PMD? The save for disqualifying this patient for lamellar refractive surgery is the superior-inferior discrepancy of 2.40 D OD and 2.00 D OS; my personal cutoff for not performing lamellar refractive surgery is 1.40 D.

The color image of the TMS-4 Keratoconus Screening System is a giveaway for both eyes (Figure 1). Refractive surgeons should be able to put this topography up a ¼ mile away and, with field binoculars, see the gestalt image of against-the-rule kissing at the 270° meridian or “crab claw” of PMD. Refractive surgeons should all become accustomed to identifying this topographic pattern at first glance and then looking for the scaling to determine the inferior-superior number.

PMD is a type of ectatic corneal disease. Morphologically and histologically, it is different from keratoconus, but they may be within the same spectrum of disease. Clinically, with respect to corneal laser refractive surgery, PMD and keratoconus must be respected, and in their forme fruste patterns, I believe lamellar refractive surgery is contraindicated. With proper informed consent, I believe PRK is a safe option for this young man, and I would do the same for my son.

MARK KONTOS, MD

I have performed LASIK surgery for nearly 20 years, and patients of mine are starting to bring their children in for surgery, as in this scenario. It is a validation of the surgery and the care they received in the past. Aside from the inquiry about PMD, the questions this mother asks are fairly common. I would try to answer them in the following manner.

First, I would be curious to know why she is asking about keratoconus and PMD. (Is there a family history?) I would tell her these conditions may be related to each other but that PMD is less well understood. I would note that PMD is hard to diagnose early. I would then explain that the condition causes progressive corneal distortion with vision loss and that, in advanced cases, corneal transplant surgery is needed. I would say that both keratoconus and PMD are contraindications to LASIK and PRK.

The other three questions all relate to the best course of action for her son. On evaluation, what concerns me the most are

- the findings in the right eye of a thinner-than-average cornea not matched in the left eye
- significant posterior corneal elevation ($> 40 \mu\text{m}$)
- slight inferior steepening of the anterior surface with drooping horizontal bowtie astigmatism

These findings would make me hesitate to say this young man is an “ideal” candidate (that is really what the mother is asking) or that PRK would be a completely safe procedure in this setting. PRK could be performed but not without some risk of ectasia in the future. With corneal collagen cross-linking in my office (CXL; not available in the United States), I could explore the possibility

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—Colman R. Kraff, MD

of combined therapy, but this is currently a complex issue. I think that the Visian ICL (STAAR Surgical) could be a good alternative. The patient’s astigmatism could be addressed, and the procedure would be reversible if things changed in the future. I would discuss this option in detail with the mother and son and probably make it my primary recommendation.

COLMAN R. KRAFF, MD

I often see patients in their early to mid-20s who present with a similar clinical situation—low myopic astigmatism, normal indices, and abnormal corneal topographic maps. Often, the patient or family members ask the same questions as this patient’s mother does. She raises several unknowns.

As to whether her son is a good candidate for laser vision correction, I would respond (as always) that LASIK is contraindicated in a young adult with this corneal topography, regardless of refractive error and corneal thickness assessment. The corneal topographic maps are the “trump cards” in this situation that contraindicate LASIK. The shape appears as a forme fruste keratoconus and may progress to full PMD as the patient ages.

The mother asks if PRK is safe. I have performed PRK on eyes with similar clinical features under similar circumstances. Special informed consent and clinical stability are essential. Will removing a small amount of corneal stroma increase the patient’s risk of developing corneal ectasia after PRK? I think the answer to that question is unknown.

What would I do if this were my son? I would consider the entire clinical situation—his age, refractive clinical features, family history, and desired occupation. (Being a firefighter may be driving his interest in having a laser vision procedure.) This is where the extra informed consent process is important. I would stress the unknown and emphasize that, although the complication is unlikely, he will probably be at higher

risk of induced ectasia than a patient in a “normal” clinical situation. He and his family need to understand these matters prior to making their decision. Even with the appropriate consent, I would want to see documentation of refractive and topographic stability before performing PRK.

Five to 10 years ago, prior to the development and refinement of CXL, I might have turned away a patient such as this one because of the abnormal corneal shape. CXL research is starting to change the way I think about patients in these clinical circumstances. Is it time for refractive surgeons to start thinking of forme fruste corneal shapes differently? As more and more information and data on CXL results become available, surgeons may find that they should advise patients like this one that PRK is a safe alternative to LASIK. ■

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