IS ORTHOKERATOLOGY A DYING ART?

Don't let uncertainty or common myths lead you to overlook this valuable treatment option.

BY KEVIN CHAN, OD, MS, FAAO

Optometrists are no strangers to orthokeratology (ortho-k), yet many tend to prefer to stick with treatment options they're most comfortable with, saving ortho-k for when nothing else works. The problem with this practice is that it overlooks ortho-k's enormous clinical potential and risks it becoming a dying art. Based on a survey spanning 14 years and including practitioners from 45 countries, Morgan et al reported that ortho-k lens fits represented a mere 1.2% of all contact lens fittings worldwide, ranging from no fits in some countries to 6% of fits in the Netherlands.[1]

As a practitioner whose sole focus is on managing myopia, I see ortho-k as a hidden treasure, and I think it would be beneficial to patients if more optometrists saw it that way. Offering more coverage of this vision correction modality and dispelling some of the common myths surrounding its use may help accomplish that goal, and this article aims to do just that.

TRENDS AND OPINIONS ON ORTHO-K

Within the gas permeable (GP) lens family, ortho-k lenses are the only type that patients can wear in a closed eye environment. The premise behind ortho-k goes beyond vision correction: It works as a mold to reshape the cornea. Ortho-k's main benefit is that it provides clear, unaided vision during the day, but studies have shown that ortho-k can also help slow or halt the progression of myopia.[2-4] For this alone, clinicians should embrace ortho-k lens technology and save a spot for it in their specialty GP lens toolboxes.

The prevalence of myopia has soared in the United States and elsewhere in the past 3 decades.[5] In some Asian countries, myopia has affected nearly 90% of the population.[6] In response, the World Council of Optometry has unanimously called for all optometrists to embrace evidence-based approaches for myopia management as a standard of care.[7] A recent global survey among practitioners found that ortho-k had gained tremendous interest and wide acceptance worldwide, particularly in Asia.[8]

One way to increase the visibility and value of ortho-k within the optometric community is to offer more opportunities for optometry students to learn about it. At present, optometry students receive limited clinical instruction in and exposure to ortho-k before they begin their optometric careers. A 2016 survey of academic centers found that most responding optometric institutions designated

Figure courtesy of Patrick Caroline, COT, Pacific University

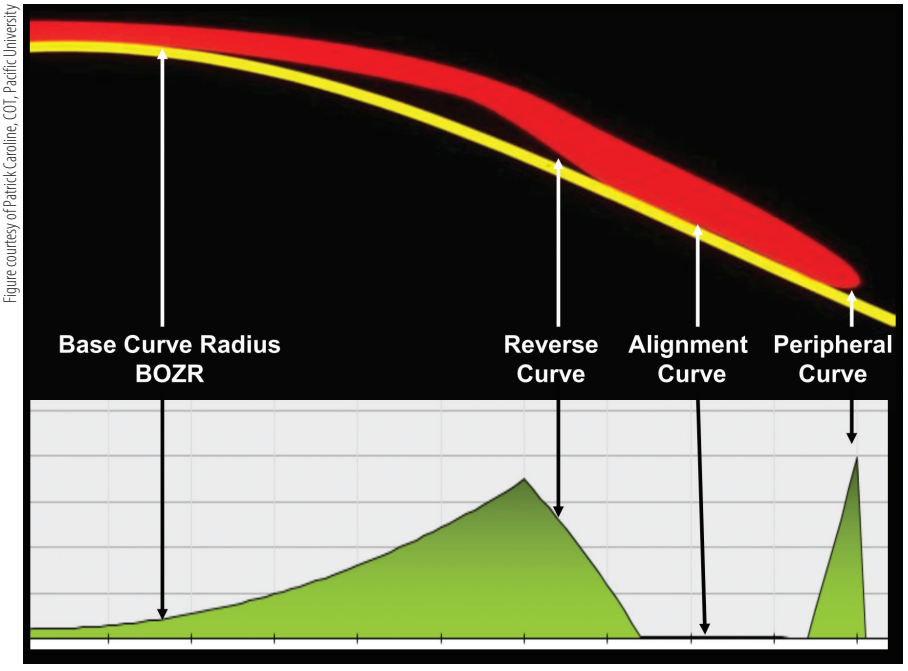

Figure 1. Schematic representation of an ortho-k lens on a cornea (top). Fluorescein distribution pattern corresponds to each curvature of ortho-k lens design (bottom).

only 1.0 to 2.5 hours of didactic or clinical time to ortho-k throughout their entire 4-year OD curriculum.[9]

ORTHO-K MYTHS

Although a positive perception of ortho-k has appeared to have reestablished itself in recent years, practitioners, particularly those in North America, have continued to lag behind in bringing cognitive awareness into action. Wolffsohn et al reported that, despite increased recognition of the importance of myopia control for children, more than 60% of clinicians surveyed said they are still inclined to prescribe single-vision spectacles as the primary mode of correction for myopic children.[8] Why is that? Consider these three common myths that deter practitioners from fully implementing ortho-k in their practices.

Myth No. 1: Ortho-K Doesn't Work Well

Ortho-k is considered the most effective noninvasive method known for mitigating myopia progression.[10-13] Its efficacy is largely thought to stem from the widely accepted theory of hyperopic defocus for the development of myopia, demonstrated in monkey models by Smith et al.[14]

Hyperopic defocus occurs when paraxial light rays enter the eye and are focused posteriorly in the peripheral retina. Studies have found that relative peripheral hyperopia is greater in myopes than in emmetropes or hyperopes, potentially acting as a catalyst for axial elongation.[15-17] The refined design of reverse geometry lenses for ortho-k allows unique corneal reshaping algorithms (4-, 5-, or 6-curve approach) to create an ideal ortho-k fitting relationship (Figure 1).[10,11] In particular, manipulation of optic zone sizes (Figure 2) can serve specific treatment goals. For example, an ortho-k lens with a smaller, 5-mm optic zone size was recently shown to provide greater benefit in the retardation of axial length elongation than a similar lens with a 6-mm optic zone.[18,19] In general, the altered visual feedback generated by ortho-k lenses has achieved significant success in this regard in comparison with single-vision correction.[20-22]

Myth No. 2: Ortho-K Isn't Safe

A meta-analysis of 170 publications by Liu et al[23] found that ortho-k is a safe GP lens modality for overnight wear. Paragon CRT (CooperVision Specialty Eye Care) was the first therapeutic ortho-k lens design approved by the FDA, in 2002.

This year, almost 2 decades later, the

AT A GLANCE

- A survey of optometric academic institutions found that most designated only 1.0 to 2.5 hours of didactic or clinical time to ortho-k throughout their 4-year curricula.
- Despite increased recognition of the importance of myopia control for children, more than 60% of clinicians surveyed said they are still inclined to prescribe single-vision spectacles as the primary mode of correction for myopic children.
- Ortho-k is considered the most effective noninvasive method known for mitigating myopia progression.
- Technological advances in ortho-k include the use of corneal topographical analysis and machine-driven algorithms to predict and optimize first-fit success.

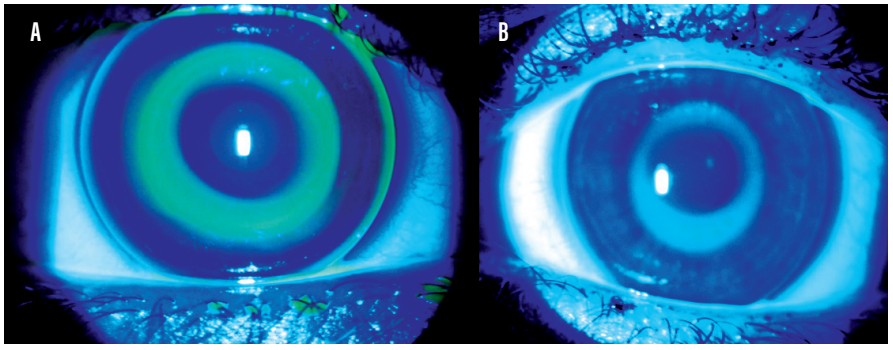

Figure 2. Fluorescein pattern of a well-fit ortho-k lens with a default 6.0-mm optic zone (A). Fluorescein pattern of a well-fit ortho-k lens with a smaller 4.8-mm optic zone (B). The patient's small optic zone design was reported to be associated with retardation of axial length growth and therefore benefitted myopia control.

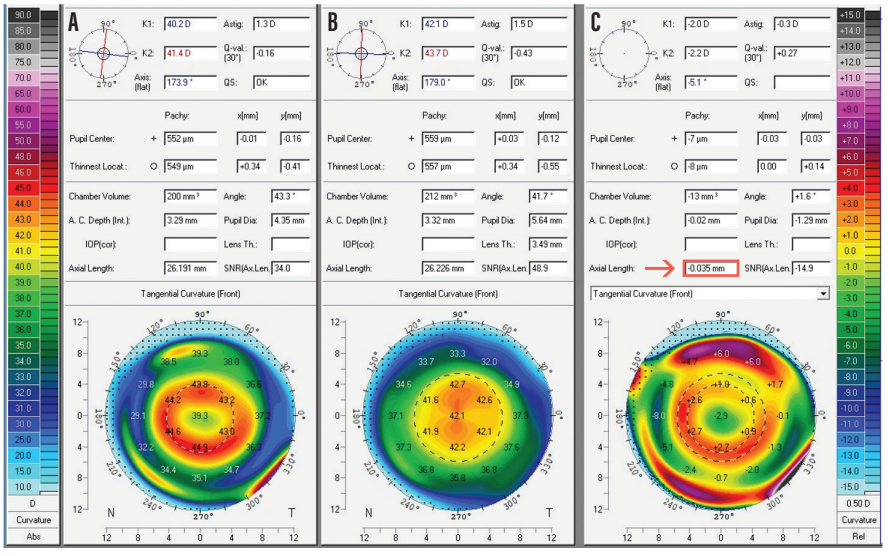

Figure 3. Tangential maps show 1-year post-ortho-k data (A), pretreatment (B), and topographic comparison (C).

FDA approved the private labeling of Menicon Z Night lenses (Menicon) to Acuvue Abiliti Overnight Therapeutic Lenses (Johnson & Johnson Vision). This gives the myopia management market another ortho-k lens approved for the temporary reduction of myopia and overnight wear.

Although ortho-k–related microbial keratitis (MK) cases have been reported,[24] infections were generally rare and largely related to improper use of tap water in the cleaning regimen rather than to habitual overnight wear. Bullimore et al reported the incidence of MK in children wearing ortho-k lenses in the United States to be 13.9 per 10,000 patient-years,[25] and lower rates have been reported in Russia.[26] Both studies showed the risks with ortho-k to be comparable to those of wearing soft daily or other contact lens modalities overnight.[25,26]

It is essential that practitioners provide thorough patient education and regular follow-up care, especially for patients with years of continuous ortho-k wear, to ensure that patients adhere to proper hygiene and compliance.

Myth No. 3: Fitting Ortho-K is Difficult and Time-Consuming

Although successfully prescribing ortho-k for children takes clinical knowledge and proficiency, the learning experience for both patients and practitioners has improved considerably in recent years. Traditional methods of ortho-k lens fitting relied solely on keratometric and refractive parameters, largely overlooking corneal topographic data. Thus, the fitting process and clinical success were noticeably varied and unreliable.

Recent technological advances in the industry have driven a wide array of ortho-k developments, using corneal topographic analysis and machine-driven algorithms to predict and optimize first-fit success (Figure 3).[27] Corneal topography is an indispensable tool to help practitioners analyze pre-fitting corneal curvature, determine patient candidacy, strategize lens design, and predict the prognosis of ortho-k treatment. Corneal topography also significantly reduces unpredictable clinical outcomes, streamlines chair time, and ultimately enhances the experience of both the practitioner and the patient using ortho-k lenses.

TAKEAWAYS

Ortho-k has experienced a renaissance in the GP lens industry and the optometric profession. Mastering this modality takes more than simply following a fitting guide; it truly embodies the art and science of optometry to deliver meaningful results to our patients.

I encourage students and practitioners to broaden their knowledge of this exciting, yet underused, GP lens tool for vision correction and myopia management modality. Bring it to the forefront in your specialty GP lens toolbox. Abundant educational resources are available from the GP Lens Institute (gpli.info) and the American Academy of Orthokeratology and Myopia Control (aaomc.site-ym.com). Success with ortho-k not only changes lives, but can also be a huge practice-builder that can help set your practice apart from others in your community. ■

> **ALTHOUGH A POSITIVE PERCEPTION OF ORTHO-K HAS APPEARED TO HAVE REESTABLISHED ITSELF IN RECENT YEARS, PRACTITIONERS, PARTICULARLY THOSE IN NORTH AMERICA, HAVE CONTINUED TO LAG BEHIND IN BRINGING COGNITIVE AWARENESS INTO ACTION.**

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KEVIN CHAN, OD, MS, FAAO

- Senior Clinical Director, Treehouse Eyes, Washington, DC
- kevin.chan@treehouseeyes.com
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