



COURTESY OF PATRICK J. CAROLINE, FAAO

Orthokeratology Lenses Worn Overnight Help Presbyopes

Linda Roach April 11, 2013

Monocular hyperopic orthokeratology produces sufficient refractive change to enable a presbyopic emmetrope to accomplish near visual tasks throughout the day without requiring reading glasses, according to a report [published](#) in the April issue of *Optometry and Vision Science*.

After 7 days of wearing the therapeutic, rigid contact lenses overnight, the 13 middle-aged participants in the study (mean age, 51.5 years; range, 43.2 - 58.7 years) had a mean myopic shift in their treated eyes of -1.11 D (SD, 0.61 D) in the morning, the scientists report. This shift declined only slightly 8 hours later, to -0.91 D (SD, 0.41 D; both $P < .05$).

"In this study, we have shown that optical correction of presbyopia can also be achieved with hyperopic [orthokeratology] lenses, bringing the advantages of waking hour visual correction without the need for glasses or contact lenses to a rapidly growing sector of the optical market," note Paul Gifford, PhD, a lecturer at the Queensland University of Technology, in Brisbane, Australia, and Helen A. Swarbrick, PhD, from the School of Optometry and Vision Science at the University of New South Wales in Sydney, Australia.

In orthokeratology, overnight wear of rigid, reverse-geometry contact lenses changes the corneal topography and refractive power temporarily. The lenses do so by compressing the epithelium, either flattening the central cornea (to reduce myopia) or steepening it (hyperopia).

Easier to Flatten Than Steepen

The cornea is easier to flatten than to steepen, however. Because of this, the potential refractive effect from hyperopic orthokeratology is small (maximum of about 1.5 D) and has limited usefulness in hyperopes, Dr. Gifford told *Medscape Medical News*.

"That's why we began looking at presbyopia, and we found that in this it is actually very useful," he said.

"Eighty percent of the effect happens after the first night. The next day you get regression, and the effect wears off quickly. But by the time you get to 1 week, that effect is much stronger, and it lasts much longer," he explained.

By creating a monovision effect, hyperopic orthokeratology required the participants' visual processing system to adjust to having 1 eye slightly [more] myopic than the other. Binocular uncorrected distance visual acuity (VA) did not change from pre- and posttreatment, the researchers report. There also was no change in this metric between day 1 and day 7, even though the myopic shift in the study eye increased during that time.

Binocular near VA also was improved after 7 nights of sleeping in the orthokeratology lens. The mean near VA was Jaeger 3.2 (SD, 2.3) in the morning and Jaeger 3.9 (SD, 3.0) 8 hours later, the researchers found.

"Jaeger 4 is equivalent to 6.5-[point] text, and with normal newspaper print in the region of 8 [points] (Jaeger 5), this means that [orthokeratology]-induced monovision provides functional near vision correction for most normal reading tasks," the researchers write.

Cary Herzberg, OD, FIAO, president of both the International Academy of Orthokeratology and the Orthokeratology Academy of America, told *Medscape Medical News* that the Australian study confirms what he and other eye care practitioners have concluded based on their clinical experiences. Dr. Herzberg also has a clinical practice in Aurora, Illinois.

"We're doing this all the time. I've done over 100 cases like these," Dr. Herzberg said. "Just doing monovision is easy. We do some very complex prescriptions now."

This study was funded by a public-private Australian Research Council Linkage Project grant, with industry partners Bausch & Lomb Boston, Capricornia Contact Lens Pty Ltd, and BE Enterprises Pty Ltd, which continues to fund Dr. Swarbrick's research. Dr. Gifford is a consultant to Capricornia. Dr. Herzberg has disclosed no relevant financial relationships.