

Hyperopic PRK

Emil William Chynn, MD

With the recent US FDA approval of the VISX excimer laser for the treatment of hyperopia, refractive surgeons in the US are only beginning to treat patients for hyperopia using excimer lasers. However, in other countries, including Canada, surgeons are not similarly restrained by the FDA, and have been treating hyperopia for years. To share this experience, W. Bruce Jackson, MD, spoke on "Hyperopic PRK" at the 1998 AAO annual meeting in New Orleans, LA.

Dr. Jackson began with a historical review of hyperopic PRK, noting that initial results with a 4-mm optical zone were disappointing, proving the need for larger ablation diameters. Similarly, small treatment zones of 7 mm with steep edges resulted in regression, induced astigmatism, de-centered ablations, slow return of BSCVA, and loss of BSCVA (best spectacle corrected visual acuity).

Therefore, present ablation profiles use at least a 5-mm optical zone, and a 9-mm overall diameter. Attempted corrections have ranged between +1.0 and +10.0 in the early studies by the various laser manufacturers. Dr. Jackson reviewed data from over half a dozen manufacturers. Only a brief summary of each will be included in this article.

The Aesculap Meditec MEL 60 is a scanning excimer laser using a 9.0 x 1.0 mm slit profile, at a 20 Hz repetition rate. To treat hyperopia, it uses a mask inserted in a suction ring fixed to the patient's eye. Corrections of up to 1.0 D were attempted. Postoperatively, 6% lost 1 or more line of BSCVA, while 2% lost 2 or more lines. BCVA improved slowly over 3 months, with significant haze in high hyperopes, and regression continuing for as long as 1 year postop.

The Nidek #C-5000 laser uses a treatment zone of 5.5 mm with a transition zone out to 9.0 mm. Regression was noted at all levels of hyperopia, but especially hyperopia over +4.00 D. There was poor predictability for corrections over +3.00 D, and loss of 2 or more lines of BSCVA with high corrections.

The Novatec laser is a solid-state, non-193 nm laser with an active eye tracker. The central optical zone is 6-7 mm, with a total ablation diameter of 9.0 - 9.5 mm. Twenty-four eyes were reported at 6 months, with early refractive stability by 6 months--a promising result.

The Summit Apex Plus laser employs an erodible mask to create a 6.5-mm diameter hyperopic ablation. The Apex Plus uses an Axicon reusable quartz-lens prism to fashion a 1.5-mm blend zone. Using this system, initial over-correction was followed by regression, with refractive stability achieved by 12 - 24 months. It showed safe and effective results up to +4.5 D.

The Chiron-Technolas Keracor 116 uses a 2-mm beam at 10 Hz in a circular ablation pattern around the central cornea. It uses a 5-mm optical zone with an 8.5-mm overall ablation. Astigmatism was corrected by ablating the negative axis. Good predictability was reported for treatments less than +5.0 D, but longer follow-up is needed to confirm refractive stability.

The Autonomous Technologies LADARVision Excimer uses a 6-mm optical zone with a 1.5-mm blend, or transition zone. Very early promising results based on only 24 treated eyes were presented at ASCRS.

Dr. Jackson spent the bulk of his talk covering data from the VISX Star laser, since this is the laser that has been approved by the FDA for the treatment of hyperopia in the US. The VISX Star uses an imaging lens to shift the slit image off-axis and rotate it around the cornea. The central 0.8 mm is spared, and the

maximum ablation diameter is 9.0 mm. The deepest ablation is at 5 mm. 10 Hz is currently used for treatments. Astigmatism is treated by steepening the flatter meridian first. Currently, up to 6D of sphere and 4D of cylinder can be treated. Dr. Jackson presented data from the University of Ottawa Eye Institute Hyperopic Study involving 70 eyes with +1.0 to +4.0 of hyperopia preoperatively. Postoperatively there were no significant complications and no significant haze greater than +1.0. Predictability was better for corrections under +4.0D, and astigmatism tended to be under-corrected.

Dr. Jackson reviewed some of the possible pitfalls of "H-PRK." He warned about the need for a cycloplegic refraction, and also cautioned surgeons to be aware and expect some difficulties treating so far out--epithelium needs to be removed to at least 9.0 mm.

Dr. Jackson concluded with the recommendations, "Expect some regression of effect, and treat only the manifest refraction, and maybe some of the latent hyperopia in a young patient." He considers the ideal patient to be "50 years of age with between +2.50 and +4.00 D of hyperopia, with low cylinder." With realistic expectations, your hyperopic patients will be very satisfied if you stick close to these guidelines.