

## 39-Photorefractive keratectomy for the correction of hyperopia using the excimer laser VisX STAR

Emil W. Chynn, MD

W. Bruce Jackson, MD, FRCSC

Over the past few years, most ophthalmologists, even those initially hesitant, have become increasingly comfortable with treating myopia with Photorefractive keratectomy (PRK). These days, the new question being asked is how broadly can the indications for PRK be expanded.

Can PRK safely and effectively treat hyperopia, as well as myopia? This is the question addressed by W. Bruce Jackson, MD, FRCSC, of Ottawa, ON, Canada in his presentation at the AAO meeting in San Francisco.

Co-authors in this study were George Mintsioulis, MD, Peter J. Agapitos, MD, and Evanne J. Casson, Ph.D., also of Ottawa. Dr. Jackson is a paid consultant for both Inova Medical Consultants, Inc., and VISX, Inc.

The laser used was the VisX STAR excimer laser operating at 6 Hz, using a rotating scanning slit. Seventy consecutive eyes with a spherical equivalent of +1.00 to +4.00D were treated using a 5.0 mm optical zone and a 9 mm total ablation. All patients had 1D or less of astigmatic cylinder. Self-fixation was used for each procedure. Follow-up time ranged from between 6 and 18 months. The authors also wished to compare two different techniques of epithelial removal used in the procedure. The first 11 eyes had epithelial removal using the Peyton spatula; thereafter, the Amoyils rotary brush was used.

Post-operatively, patients either were patched and given Tobradex ointment, or received a bandage contact lens (BCL) with Acular and Occuflox for 24 hours, and FML. After one week of FML, patients received either artificial tears or steroids QID, tapering to off over 4 months.

The epithelium healed in a mean of 4 days, and those patients that were patched healed an average of 1 day earlier than those who had received a BCL.

At one month, there was a mean overcorrection of .75D, with mean regression to near-plano by 6 months. There was a slight but statistically insignificant further regression between 12 and 18 months.

By 12 months, there was only one patient who was undercorrected by more than 1D. At 12 months, 80% of patients were within +/- 0.5D of intended spherical equivalent, and 98% were within +/- 1.0D of intended correction.

By one month, only 28% of patients were 20/20 or better, but 86% were at least 20/40 or better. These figures improved consistently with time, so that by 12 months, 52% were 20/20 or better, and 96% were 20/40 or better.

Haze was minimal, with only 1 patient exhibiting as much as 1+ haze in the mid-periphery by 12 months, with similar haze in the second eye of this same patient at 18 months.

Using vector analysis, there was no change in mean cylinder, at either 6 or 12 months.

The most worrisome finding in this study was that 27% of patients lost two or more lines of best spectacle corrected visual acuity (BSCVA) at one month. However, by six months, only one eye had lost two lines of BSCVA (20/30, from

20/20). By 12 months, there were 11 eyes which had lost one line of BSCVA. By 18 months, these figures had improved, so “as many eyes lost as gained one line of BSCVA,” according to Dr. Jackson.

At 12 months, the patients who had their epithelium removed with the brush had better predictability, better uncorrected visual acuity (UCVA), and less loss of low-contrast visual acuity than the patients who had their epithelium scraped with the spatula.

Patients who had been patched, although they healed slightly faster than those who had received a BCL, also had slightly more haze. No potential mechanism was given for this finding.

Compared to those patients who had received only artificial tears, patients who had received steroids were more over-corrected by 1 month, and had less haze by 6 months. However, by 12 and 18 months, the BSCVA was the same between these two groups.

In terms of surgical complications, two patients developed a peripheral marginal infiltrate, which healed without sequelae.

There were transient visual symptoms of shadow, halo, double vision, presumably due to epithelial irregularities during the first month after treatment. These symptoms resolved with time in all cases.

There were no significant decentering complications. Overall, there was minimal haze, no induced astigmatism, and good stability with hyperopic PRK using the VisX STAR system.

The brush removal of epithelium was felt to provide superior results compared to scraping. Dr. Jackson offered several possible explanations for this result, due to better hydration and a smoother initial surface for ablation.

Dr. Jackson concluded that hyperopic PRK is safe and effective for hyperopia ranging from +1.00 - +4.00D, with good predictability and safety (as indicated by no patient losing more than 1 line of BSCVA by 12 months). "All patients were pleased with their results," according to Dr. Jackson.

Discussion of this paper was by Dr. Marguerite B. McDonald, of New Orleans, LA. She noted that hyperopic PRK (H-PRK) is technologically challenging, as it is significantly harder for an excimer laser to sculpt a hyperopic correction onto the corneal surface than a myopic one. To date, according to Dr. McDonald, there are only 6 currently published clinical trials on H-PRK, and only one had a sample size larger than the current study.

Dr. McDonald then proceeded to point out several flaws in the current study. While the study was prospective, it was not randomized. Therefore, although overall conclusions about the safety and efficacy of H-PRK in this group of patients are "rock solid," the conclusions regarding varying treatment parameters are less so.

For example, there while there were 54 "brush" patients, there were only 11 in the "scraped" subgroup. Additionally, there was no randomization between the brush and scrape patients, raising questions about the validity of these results. H-PRK stabilizes more slowly, possibly due to the larger total ablation area and the older age of typical patients compared to PRK. Because the current study included at most 18 months follow-up, and because there was almost 0.3D of regression between 12 and 18 months, more follow-up is obviously essential. Moreover, cycloplegic refractions were not included in this paper, and is a

serious shortcoming in any study of this kind which includes pre-presbyopic patients, who can still accommodate.

Despite these limitations, Dr. McDonald concludes that Dr. Jackson's study of H-PRK is one of the largest, and one of the best papers on the subject. While congratulating the researchers on a very good overall job, she also encouraged them to include more follow-up, and to employ randomization techniques in their future reports.