Wavefront-guided PRK safe and effective treatment for low myopes

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in Paris

Wavefront-guided PRK appears to be safe and effective for the treatment of low to moderate myopia and myopic astigmatism and induces less higher-order aberrations than standard PRK treatments, according to a number of researchers.

Steven C. Schallhorn MD and Bernard Mathys MD told delegates here at the XXII Congress of the ESCRS that combining wavefront sensing with PRK gives patients an excellent quality of vision while avoiding the potential flap and hinge related complications of LASIK procedures.

“The early results thus far have been very encouraging. With wavefront-guided PRK, the clinical outcomes are excellent and there does not appear to be safety concerns. Also the healing response is not like conventional PRK and is more in line with wavefront-guided LASIK as far as the nomogram is concerned,” said Dr Schallhorn, director of cornea and refractive surgery at the Naval Medical Center in San Diego, United States.

Dr Mathys, in private practice in Brussels, Belgium, agreed with Dr Schallhorn’s assessment.

“Wavefront-and topography-guided PRK seems a valuable tool to correct myopia and compound myopic astigmatism. It could be an alternative to LASIK, especially when dealing with thin corneas and it avoids the risk of flap-induced aberrations,” he said.

New technology reviving PRK

Dr Schallhorn noted the renewed interest of refractive surgeons in surface ablations using techniques such as wavefront scanning and corneal cooling to yield better results than were possible with conventional PRK.

“I think that there are several clear advantages of surface ablation: there is no concern about flap striae or displacement, no risk of microkeratome-related complications and there is the potential for improved quality of vision with such procedures,” he said.

He also noted that current regulations governing refractive surgery in the US military gives PRK a definite edge over LASIK for existing as well as aspiring aviators.

“The United States Air Force has recently changed its policy to allow LASIK in certain types of aviators, but there are tight controls on that: they can only fly certain types of aircraft, for instance, not tactical aircraft or fighter jets, and it was also specified that it had to be a wavefront-guided rather than a conventional procedure. As far as the navy is concerned, LASIK is still disqualifying for all aviation duty but PRK is now waivable for students entering flight training,” he said.

Dr Schallhorn’s study looked at 50 eyes of 25 patients who were treated with the VISX CustomVue platform in an IRB approved and FDA authorized protocol. The average age of the patients was 32 years, and mean spherical equivalent was –3.0 D. Patients received wavefront-guided treatments in one eye and standard PRK in the other eye.

The surgical technique involved removing the epithelium with an Amoill’s brush, using a 6.0 mm optical zone, a 9.0 mm transition zone and then applying a bandage contact lens after the ablation.

Overcorrection followed by regression towards emmetropia

Dr Schallhorn said that the team noticed early on in the study a tendency to under-correct for the wavefront-guided PRK group, with 66% of patients achieving 20/20 uncorrected visual acuity after one month compared to 92% for conventional treatment. However, as time went by there was regression of the myopia in the wavefront-guided group with over 90% of these patients achieving 20/20 at the three and six month follow-up mark.

“This reversal of myopia is unusual and something we have not seen with conventional PRK, indicating a different kind of healing response,” he said.

Dr Schallhorn said that the results for the wavefront-guided PRK patients showed improved best corrected visual acuity and improved contrast sensitivity under both photopic and mesopic conditions, but said that the procedure still induces higher order aberrations.

The next step, he concluded, is to evaluate the latest version of the VISX software which incorporates a 4.5% nomogram boost to compensate for the mild under-correction, and to proceed with a primary cohort comparing 200 patients treated with wavefront-guided PRK compared to a similar amount treated with wavefront-guided LASIK.

In a separate presentation, Dr Mathys presented the results of his observational case study conducted on 40 eyes of 21 patients with myopia and compound myopic astigmatism using the Zyoptix platform (Bausch & Lomb).

“We selected patients with thin corneas or with large pupils or because we wanted to save tissue or because their preoperative RMS was quite high or because they had a deformed point spread function,” he said.

Several studies have shown that refractive photoablations such as PRK and LASIK increase the overall corneal aberrations and that the increase is dependent on pupil size and ablation depth. The aberrations that increase most are spherical aberration and coma. Proponents of PRK and LASEK note that these procedures do not induce the flap-induced aberrations seen with LASIK, he noted.

In terms of refractive stability, 100% of patients achieved 20/20 visual acuity after one year and problems with haze formation were minimal. Induced aberrations were also reduced using custom surface ablation, said Dr Mathys.

He surmised that the superior results of wavefront-guided ablations might be partly due to the lower amount of tissue that has to be removed compared to conventional ablations. By removing less tissue, wavefront-guided ablation induces less of a healing response and fewer biomechanical changes, he explained.