THIN CORNEAS
PRK or thin-flap LASIK? Experts find merit in both approaches

by Howard Larkin in Chicago

To reduce the risk of post-procedure ectasia, many refractive surgeons favour surface ablation over LASIK for patients with central corneas less than 500 microns thick. But with the advent of sub-100 micron planar flaps cut by femtosecond lasers, thin-flap LASIK may be just as safe and more comfortable for patients.

PRK pioneer Marguerite McDonald MD, of New York University US, and Jan Venter MD, medical director for Optical Express, London, UK, debated the merits of the two approaches at the International Society of Refractive Surgery of the American Academy of Ophthalmology (ISRS/AAO) 2010 meeting. The topic remains controversial because the true incidence of post-LASIK and post-PRK ectasia is unknown, Dr McDonald noted. Reasons for this include lack of a standard definition of ectasia, lack of mandatory reporting, and lack of long-term follow-up of laser vision correction patients by refractive surgeons.

Detecting post-PRK ectasia is particularly challenging because it typically presents three to five years after surgery, compared with six to 18 months for post-LASIK ectasia. As a result, effects such as increased myopia in post-PRK patients may be misdiagnosed, often as cataractous nuclear sclerotic changes. She recommends looking at topography difference maps to make the diagnosis because the steepening pattern can be hard to detect on straight topography images.

“We do know which procedure poses the greater ectasia risk,” Dr McDonald said, arguing that the bulk of evidence in the medical literature and clinical experience supports PRK as the safer alternative.

According to a 2007 review by J Bradley Randleman MD of Emory University, Atlanta, US, there were 23 times more reports of post-LASIK ectasia in English language journals. Dr Randleman also has reported that 36 times more cases of post-LASIK ectasia have been treated at Emory, a tertiary referral centre, Dr McDonald noted. Even accounting for the relative differences in case volumes (in the US, there is seven times as much LASIK performed as surface ablation), there is still a two times greater chance of being sued in the US after LASIK compared to surface ablation (data from the last 20 years of the Ophthalmic Mutual Insurance Company, a malpractice insurance company associated with the AAO). In addition, the primary cause for a suit after LASIK is ectasia; not so for PRK.

The higher incidence of post-LASIK ectasia is especially remarkable in that most surface procedures are done on thin corneas, Dr McDonald emphasised. Surveys of US refractive surgeons by Market Scope have consistently found that thin corneas are by far the most common reason they recommend surface ablation, which currently holds about a 15 per cent share of the market, over LASIK.

“From this we can infer that there is less risk of ectasia when performing PRK on a thin cornea versus the risk with LASIK. What we should not infer is that it is always safe to do PRK on thin corneas instead of LASIK, and instead of abstaining from surgery,” Dr McDonald said.

She noted that corneal thickness is involved in two of the top four risk factors identified by Dr Randleman and colleagues for both post-PRK and post-LASIK ectasia.

Dr McDonald recommended only operating if corneal topography is normal, and holding thin-cornea ablation to a refraction of 6.0 dioptres or less.

“If you have a thin pre-op central corneal thickness, go back and look at the topography. If you wouldn’t do LASIK on the patient, you shouldn’t do PRK.”

Dr Venter sees the literature differently. He said that several studies have found LASIK to be equal or superior to PRK in efficacy and safety in the short and long term. While studies such as Dr Randleman’s comparing ectatic and non-ectatic post-LASIK eyes have identified thin corneas as a risk factor, several other studies of eyes with corneas thinner than 500 microns have found no increased incidence of ectasia post-LASIK, he added.

Dr Venter’s experience also supports the notion that thin-flap LASIK is safe for thin corneas. Out of 81,715 consecutive LASIK cases performed from April 2008 through March 2009 at Optical Express centres, 2,181 eyes had central corneas less than 500 microns. These thin cornea eyes had normal topography and were treated with flap thickness of 100 microns or less. Among the 79,534 eyes with corneas 500 microns or more, some flaps were cut with femtosecond lasers and others mechanical microkeratomies. Distribution of preoperative sphere and patient demographics were similar between the two groups.

In follow-up ranging from 18 to 30 months, outcomes were also similar. There were no cases of ectasia in the thin cornea group, and two cases in the much larger thick cornea group, an outcome that was not statistically significant. No significant differences were found in best correct vision at three months, or in complication rates for glare, light sensitivity, decentred ablations, dry eye or mild DLEK.

A second study comparing 2,000 eyes with flaps of 90 microns, with 2,000 eyes with flaps of 100 microns or more found no significant differences in visual outcomes or complications, demonstrating the safety of thin flap procedures, Dr Venter said.

Dr Venter believes the thin planar flap made possible by the femtosecond laser may reduce the risk of post-LASIK ectasia in thin corneas. He cites research showing that femtosecond laser flaps are more stable compared with microkeratome flaps, and by John Marshall PhD showing that the structural strength of corneas treated with thin-flap LASIK is equivalent to corneas treated with surface ablation.