Patients at risk for epithelial abrasions during LASIK

Sean Henahan in Barcelona

OLDER patients should be advised about the increased risk they face of epithelial abrasion should they undergo LASIK, Mark Wevill MD told a session of the 8th ESCRS Winter Refractive Surgery Meeting.

Dr Wevill assessed the risk factors for epithelial abrasion in a study of 572 consecutive patients (1090 eyes) that underwent LASIK over a 12-month period at the Boots Laser Eye Clinic in Birmingham, UK. He used the LADARVision® 4000 (Alcon Laboratories) excimer laser system and the Hansatome® (Bausch & Lomb) in all cases. A little more than 10% of the patients (6.5% of all eyes) developed epithelial abrasions following refractive surgery. Patients with fair skin had two-and-a-half increased risk of this complication than those patients with normal skin.

Dr Wevill reported that age was also a significant risk factor: The risk of developing epithelial abrasions was more than three times greater for patients over the age of 40 years compared with younger patients. This increased risk was progressive, affecting nearly 20% of those over the age of 50 years. Patients with fair skin and advanced age had the highest risk.

He noted that most of the abrasions, 77.6%, occurred superiorly near the hinge of the flap. The average abrasion size was 4.0 mm². Patients who developed epithelial abrasions in one eye were at increased risk of developing the problem in the other eye.

The surgeon used a 160 micron footplate in half of the cases and a 180 micron footplate in the other half. Patients in whom the 180 micron footplate was used had a higher risk of developing epithelial abrasions, he noted.

"Fair skinned patients over the age of 40 should be warned they are at significant risk of developing corneal abrasions, and that this risk increases with age. Steps should be taken to minimise the risk of abrasion, such as using a 160 micron footplate when possible,” Dr Wevill advised.

He explained that histological evidence of age-related changes in the epithelial adhesion complex has been reported in the literature. This study indicates that these degenerative changes are associated with increased epithelial fragility and are progressive with increasing age.

The problem can be traced to the nature of the microkeratome itself: Maximal friction and shearing forces occur with thicker flaps, particularly when the microkeratome stops abruptly, causing shearing forces on the epithelium, and then accelerates on the reverse pass, further traumatizing the epithelium and possibly exacerbating the abrasion. Smaller epithelial defects are associated with symptoms such as watery eyes, discomfort, foreign body sensation and sensitivity to light. Larger microkeratome-associated epithelial defects are associated with more serious problems including epithelial ingrowth, striae, diffuse lamellar keratitis, along with haze and negative effects on stromal healing. This can have a significant effect on post-operative best-corrected visual acuity.

Fewer problems with newer keratomes

Dr Wevill's findings are in line with those previously reported for the standard Hansatome microkeratome. Approximately 60% of the procedures in his study were done using zero compression heads, but this data was not analysed in the study. Researchers have recently reported significantly lower levels of epithelial problems when using the newer zero-compression head Hansatome. In fact, after a zero compression Hansatome head and use them as often as possible now, I prefer the superior hinge produced by the Hansatome. Of the nasal hinge microkeratomes, I prefer the Nidek MK2000,” he told EuroTimes.

Thomas Kohnen MD and colleagues compared the incidence of epithelial abrasions and related problems in a study in which patients were treated with the standard Hansatome in one eye and the zero-compression head Hansatome in the fellow eye. Some 22.6% of eyes treated with the standard microkeratome developed epithelial defects compared with only 2.1% of eyes treated with the zero-compression head version. The difference was considered statistically significant. That study also found a difference in the size of the epithelial defects, depending on which microkeratome was used. All defects seen in eyes treated with the newer microkeratomes were smaller than 1.5 mm² in contrast, 16% of defects seen in eyes treated with the standard microkeratome were 1.5 mm² or larger in size.

In another comparison study, Nada S Jabbur MD and colleagues at Johns Hopkins evaluated the incidence of intraoperative corneal abrasions when using either the Hansatome and or Amadeus™ (AMO) microkeratomes during LASIK. The retrospective analysis showed that the incidence of epithelial abrasions was statistically significantly higher with the Hansatome instrument. The researchers also noted that increasing age was a risk factor.

Topical precautions

Other surgeons have reported that changes in overall procedures can reduce the incidence of epithelial problems. For example, two clinical trials have shown that modified eyegood regime can reduce the incidence of epithelial defects significantly even when a standard microkeratome head is employed. Other suggested modifications include different doses of local anaesthetic agents and increased application of lubricants.

Dr Wevill explained that he takes several steps to minimise the amount of tangential, shearing force that is applied to the cornea before and after application of the microkeratome. This includes the application of marking to the cornea, wiping the cornea with microsponges and being careful to avoid accidental injuries such as bumping the epithelium with the microkeratome ring prior to application of the ring.

He said that, with the ring applied, he wets the field well with a lubricant, and then dries away the excess lubricant on the ring. He does not dry away any of the lubricant that is on the epithelium. He also uses the 160 micron footplates.

"One study has shown a reduced incidence of abrasions if no reverse pass with the microkeratome is done, i.e. the suction is released and the microkeratome is removed without using a motorised reverse pass. I use this technique in high-risk patients,” he explained.

Terrence P O'Brien, MD, Director, Refractive Eye Surgery at the Wilmer Eye Institute told EuroTimes that newer designs and modifications of older microkeratomes have significantly reduced the likelihood of occurrence of an intraoperative epithelial injury/laceration.

Nonetheless, he said that refractive surgeons still need to be diligent in carefully screening for evidence of epithelial basement membrane and other superficial corneal dystrophies as well as keratoconjugnetics sicca or ocular surface diseases.

"The occurrence of an intraoperative epithelial defect completely changes the experience for the LASIK patient and for the refractive surgeon, is the equivalent of an intraoperative dissection of the posterior capsule. The outcome can still be quite good, yet the early advantages of LASIK are lost and the recovery course is more like surface treatment with variable pain, photophobia and a slower return of vision,” he noted.

Dr O'Brien recommended a ‘less is more’ approach to the use of eyedrops. He advised applying ‘just in time’ anaesthesia, meaning placing a single drop of topical anaesthet 0.5% just after the patient is seated in the eximer laser chair and ready to begin creation of the flap.

"Avoid placing anaesthetic drops too early outside of the room or if there is a delay in obtaining the wavefront analysis or program ming the laser prior to the surgery. As a general rule, try to avoid excessive administration of preservative-containing eyedrops before and after LASIK,” he suggested.

Laser microkeratome

It may be possible to transcend the problem of microkeratome-related problems entirely by switching to the Intralase femtosecond laser, according to Perry Binder MD, co-director of the Gordon/Binder Vision Institute in La Jolla, California. Dr Binder has had considerable experience with most of the microkeratome on the market, but now performs all procedures using the Intralase system. He has seen no cases of epithelial defects in the last 1200 procedures he has performed with the Intralase, he told EuroTimes.

"It is really remarkable. We feel we have turned the corner on this problem. Moreover, we also are not seeing most of the other problems that we used to see when using standard microkeratomes,” noted Dr Binder, who is also the medical director of Intralase.

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