POST-LASIK DRY EYE
Pre- and postoperative examination of ocular surface key to optimum prevention and treatment

by Roibeard O’hEineachain in Istanbul

Refractive surgeons can reduce the incidence of persistent post-LASIK dry eye through careful examination of the ocular surface, and by employing remedial treatments both pre- and postoperatively, said Beatrice Cochener MD, University of Brest, France.

“Preoperative assessment is crucial to minimising the risk of dry eye following refractive surgery. It enables us to identify those with subclinical dry eye who might be at risk for more severe form postoperatively, and can help us decide whether to cancel the procedure or consider a surface ablation,” she told delegates at the 15 ESCRS Winter Meeting.

She noted that the diagnosis and treatment of dry eye has changed over the past 10 years in tandem with the definition of the disease. In the 1990s the standard description of the disease tended to focus on poor tear production, whereas more modern definitions stress the multifactorial nature of the condition, including such factors as changes in tear film quality and inflammation of the ocular surface.

“The underlying mechanism of dry eye is that alterations in one or several components of the ocular surface system result in changes in the tear film and/or corneal epithelial surface composition, which in turn leads to epithelial damage, inflammation and a chronic deregulation of the ocular surface system,” she said.

Dry eye after LASIK

Some dryness of the ocular surface is very common during the first three months following LASIK, with an incidence that can go up to 50 per cent, Prof Cochener said. Although it is generally mild and responsive to lubricants, 10 per cent of LASIK patients report severe discomfort from the condition. Dry eye symptoms include a foreign body sensation, burning, itching, stinging and lid heaviness. Visual symptoms include fluctuating acuity, degradation of vision quality with an increase of HOA, a decrease in BCVA, glare and night vision problems.

The theories as to how LASIK induces this complication tend to centre on the disruption in the feedback loop for tear secretion with the severing of corneal nerves by the microkeratome and the ablation, Prof Cochener noted.

“The severing of a large number of afferent sensory nerve fibres through the lamellar cut impacts the integrated lachrymal gland/ocular surface system and the alteration of the corneal shape leads to a change in the tear film dynamics,” she added.

The reduced sensitivity of the ocular surface reduces the blinking and basal and reflex tear production. Meanwhile, the alteration of corneal shape alters tear film distribution and changes the relationship between the ocular surface and the upper lid, increasing evaporative tear loss.

Moreover, the lachrymal regulation loop has a central role in epithelial wound healing, she said. The lachrymal gland produces cytokines that modulate corneal epithelial proliferation, migration, and differentiation, all of which are normally increased in epithelial wound healing, she pointed out.

In addition, research has shown that the reduced tear function following LASIK can increase the tear film’s osmolarity, which in turn increases the production of pro-inflammatory cytokines by limbal epithelial cells and increases the amount of matrix degrading enzymes in the tear film, she noted. The resulting inflammation can directly damage the ocular surface epithelial cells and thereby prolong injury to corneal nerves.

Furthermore, dry eye can contribute to flap complications, such as persistent corneal defect epithelial cell in-growth, and diffuse lamellar keratitis. It can also contribute refractive regression, and can be a factor in infectious keratitis.

The therapeutic strategy for dry eye depends on the severity of the condition. In milder cases, preservative-free artificial tears are the first line of defence. More severe cases may respond to twice daily administration of 0.05 per cent Cyclosporine A eye drops, which can be combined with anti-inflammatory agents. Bandage contact lenses are very useful when the condition occurs following PRK.

Identifying those at risk

The principal risk factor for post-LASIK dry eye is the presence of preoperative ocular dryness, which is often subclinical, Prof Cochener noted. There are strategies to help identify patients with milder and even asymptomatic amounts of dry eye, which can help designing treatment plans that will reduce postoperative manifestations.

The first step in measuring ocular dryness is to interview the patients regarding their symptoms, and review their clinical history. Afterwards the physician should evaluate the three major components of the tear film, the aqueous layer, by the Schirmer’s test, the mucin layer by the breakup time and lissamine green staining, and the lipid layer by lid examination.

Prof Cochener said that although these tests measure factors that are all involved in the pathophysiology of dry eye, their results actually do not correlate with patients’ symptoms. She noted that a new objective test for tear film osmolarity is showing promise in predicting which patients are more likely to require additional treatment to alleviate their symptoms.

The new device, called Tear Lab (Tear Lab Corp/MedEuronet) provides a fast, non-invasive test for tear osmolarity and requires only 50 nL of tears. In a study involving 18 PRK candidates and 10 control patients with no known dry eye, the Tear Lab testing device detected mild-to-moderate dryness in 44 per cent of patients.

She noted that although preoperatively there was no correlation between hyper-osmolarity and subjective discomfort scores, those with higher preoperative osmolarity scores spontaneously chose to use a greater amount of eye lubrication postoperatively.

“Tear osmolarity can define a preoperative predisposed population deserving a pre- and postoperative treatment of dryness to avoid patient disappointment. This new tool appears to be at that day an interesting instrument to add in clinical trials about ocular surface,” she said.