

LASIK complications – best treatments and preventive methods available

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in Nürnberg

SOPHISTICATED diagnostics and pre-treatment methods directed against LASIK complications may help protect pre-LASIK eyes with identified risk factors.

“Dry-eye syndrome in LASIK patients is associated with specific patient and surgical risk factors. Knowing these, the surgeon can avoid, pre-treat, and reduce the symptoms of dry eye,” said Walter Sekundo MD of the Mainz University Eye Clinic, Mainz, Germany during a discussion of LASIK complications held at the Congress of the DOC (German Ophthalmic Surgeons).

Dr Sekundo pre-treats patients with high risk factors with lubricants, punctum plugs, or autologous serum.

According to the outcome of studies at the Mainz University Eye Clinic, soft bandage contact lenses worn after surgery do not help prevent dry eye from occurring, he said.

Risks factors include preoperative dry eye syndrome, deeper ablations, Asian race, female gender and thicker flap, according to recent investigations. Enhancements and hinge position, with the nasal position presumably creating less dry eye, are controversially discussed in the literature.

Autologous serum drops have the highest efficacy in relieving symptoms in extreme cases. Other treatments include preservative-free lubricants and Cyclosporine A 0.05 per cent drops, which although very popular in the US, may be of limited value to relieve post-LASIK dry eye since its origin is entirely different from the classical “dry-eye syndrome”, he notes. Also, punctum plugs and gas-permeable scleral contact lenses or goggles, can be used as a last resort for extreme cases.

Thin flap LASIK (~100 µm) techniques might lower the incidence of dry eye problems, which will hopefully be verified by femtosecond laser studies, he noted.

Dry-eye syndrome after LASIK with transient poor visual acuity, burning and stinging, a subjective feeling of dryness, and significantly increased rate of regression, is due to a neurotrophic epitheliopathy that includes increased tear film osmolarity, decreased goblet cell density, decreased corneal glycogen, and a decreased tear film lipid layer. While the majority of cases improved over time, 20 per cent of cases with dry eye persist for longer than six months after surgery.

Recent evidence suggests that the tear meniscus is not decreased in dry eye patients. Corneal sensation, however, is dramatically decreased for up to six to 12 months postoperatively, he said.

According to the literature, the average incidence of dry eye is up to 52 per cent one week after surgery and between 12 to 35 per cent at six months. While the majority of cases

improved over time, up to 20 per cent of cases with dry eye persist for longer than six months, Dr Sekundo cited.

Ectasia risk factors identified

The incidence of keratectasia, by contrast, follows a different pattern and is associated with a different set of risk factors, according to Theo Seiler MD, IROC, Zurich, Switzerland. Studies showed keratectasia to be associated with a forme fruste of keratoconus in 88 per cent of cases. Other risk factors include eyes with high myopia, thin residual stroma, young patients, female gender (8x higher than males), and pregnancy.

A keratectasia review from 2006 showed that half the cases developing iatrogenic keratectasia became manifest 12 months following surgery, with the remainder of cases becoming apparent between 12 to 48 months after surgery.

Analysis of the posterior corneal surface allows the surgeon to detect early keratectasia. Dr Seiler used the Pentacam for corneal diagnostics, although in his estimation topography was not enough and ray tracing, which reconstructs the posterior surface, would be an excellent tool.

The Pentacam offers a toric/ellipsoid fit option that the surgeon should use instead of the spherical fit for the corneal posterior surface, since the posterior surface is aspheric and the Q value is very significant, according to Jack Holladay MD, who attended Dr Seiler’s presentation.

“Fitting the toric/ellipsoid fit onto the posterior surface is much more sensitive than looking for the best sphere fit. A little bulge on the surface may turn out to have an actual elevation of around 5-12 µm,” he noted.

“Instead of looking at a pachymetry map, the Pentacam has a relative-pachymetry map that shows the percentage thin or thickness as you move peripherally, relative to what it should be at the peripheral point, rather than looking at the elevation above (as with pachymetry). It is always five to 10 per cent thinner at that point which you can not see on a regular pachymetry map,” he said.

Dr Seiler performs collagen cross-linking to inhibit further progression of keratectasia. Out of 10 cases in which he performed cross-linking, seven were associated with undiagnosed keratoconus, two with undiagnosed PMD, and one was of unclear aetiology at one year follow-up.

Keratectasia began a mean 8.5 months after LASIK (range two to 18 months) in these eyes. He noted a stop of progression in 10/10, reduction of maximum K of greater than 2 D in 9/10, BCVA improvement of more than lines in 6/10, BCVA deterioration of greater than two lines in 0/10, and UCVA improvement of more than lines in 3/10.

Michael Knorz MD who moderated the DOC session observed that cross-linking the flap did not get at the real problem of ectasia lying within the stroma.

“Corneal cross-linking works in the anterior 200µm of the cornea. My problem with this technique has always been that you basically cross-link the flap, but that is not really what is causing the ectasia, it is the stroma underlying the flap. I fully understand and see an indication for cross-linking in keratoconus, but I have problems with keratectasia,” he said.

Dr Seiler elucidated that confocal microscopy studies revealed the cross-linking depth to be 250-300 µm, clearly beyond the flap and into the stroma. The treatment was efficient and safe, and a viable option to stop progression, he said.

Other treatments for ectasia include rigid contact lenses, used if vision drops. This option is not popular with patients who chose LASIK to get away from contacts. Deep lamellar keratoplasty can be used to save the epithelium, but this keeps the patient in bilateral treatment for at least one year.

In terms of retinal complications of LASIK and refractive surgery overall, Klaus Lucke MD, Augenlinik Universitaetsallee, Bremen, Germany, indicated that the incidence of retinal detachment, macular haemorrhage or macular hole in refractive patients was unrelated to refractive surgery.

If LASIK damaged the posterior segment of the eye at all, it was a result of removing the suction ring. Suction ring application first elongates the eye, and then releasing it causes the eye to suddenly widen in the equatorial plane which may be responsible for some cases of vitreous traction and detachment. Avoiding sudden decompression by releasing the suction ring slowly is therefore much less likely to cause damage, Dr Lucke said.

A retrospective investigation by Arevalo et al. that covered 38,823 LASIK operations, revealed 33 cases of retinal detachment. Increased risk through LASIK was therefore not likely, he concluded.

The same was essentially true for refractive lens exchange, with a low likelihood that this surgery presented any additional risk factor over and above those known for cataract surgery in causing vitreoretinal disease, he reported.

Dr Lucke noted that preserving the capsular diaphragm was a good way to maintain a normal balance in the eye, which can be disturbed by capsular rupture or YAG laser treatments. He urged that refractive surgeons performing refractive lens exchanges to make rhexis smaller than the IOL to preserve the protective effect of the diaphragm.

In 2005, a study by Uhlmann proposed refractive lens exchanges together with vitrectomy, which eliminates vitreous traction, the major cause of retinal detachment. In 14 eyes of eight patients with a 30-month follow-up, he found no retinal detachment, CME or loss of BCVA. This is an interesting alternative worthy of further attention, according to Dr Lucke.

Dr Lucke stressed that refractive surgeons not

block visibility to the posterior segment, as this might engender additional problems for future vitreoretinal patients.

"We need to distinguish between true complications of a refractive procedure and the effect a refractive surgery can have on the therapy of a vitreoretinal condition. The point is that we need good fundus visualisation to enable good diagnostics and therapy. So anything created in the anterior segment that reduces the ability to see into and treat the posterior segment, is highly undesirable," he observed.

For instance, anterior capsule fibrosis was a huge problem for vitreoretinal surgeons, he said. Silicone oil was incompatible with silicone lenses, many lenses condensate within seconds of gas infusion, and plate haptics blocked visualisation to the retinal periphery, he noted.

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