Is There a Link Between LASIK and Vitreoretinal Pathology?

A retina specialist gives his perspective on the safety of refractive surgery.

BY J. FERNANDO AREVALO, MD, FACS

The ophthalmic community widely accepts refractive surgery for correcting ametropias; however, surgical refractive correction can lead to retinal complications including retinal detachment after radial keratotomy,1-3 asymptomatic or symptomatic retinal breaks, subclinical and clinical rhegmatogenous retinal detachments (RRD), or both after automated lamellar keratoplasty and radial keratotomy,4 and RDs after refractive lens exchange for myopia correction.5-7 Additionally, implantation of a phakic anterior chamber IOL for the correction of severe myopia was followed by a 4.8% incidence of RD.8

LASIK has become one of the most popular options for correcting low to moderate myopia worldwide.9-10 However, complications including under- and overcorrections, flap displacement, epithelial ingrowth, flap melting, keratitis, retinal tears, RD, corneoscleral perforations, retinal hemorrhages, macular holes, choroidal neovascular membranes, and irregular astigmatism have been reported.11-16 Bilateral RD associated with giant retinal tear after LASIK;11 the occurrence of RD in 0.22% to 0.25% of eyes after myopic LASIK;12,13 and early RRD within 3 months after LASIK for high myopia14 have been reported. Although these researchers did not determine a cause-and-effect relationship between LASIK and RD, these data suggest that LASIK may be associated with RD, particularly in highly myopic eyes. In this article, I discuss my viewpoint as a retina specialist on retinal complications and LASIK in myopic eyes.

FOLLOW-UP DATA

In 2000, I reported that at 2 years postoperative, the incidence of vitreoretinal pathology in 29,916 eyes after LASIK for correction of myopia or hyperopia was 0.06%, including 14 RRDs.15 The incidence of RRD after LASIK in our earlier studies was between 0.04% and 0.05%.15-16 In a recent analysis,17 my colleagues and I reviewed medical records and obtained follow-up data for 83,938 eyes treated with LASIK from March 1996 to March 2004 by five experienced refractive surgeons at five institutions. Patients (mean age, 36 years; range, 16 to 60 years) underwent surgical correction for myopia (mean, -6.19 D; range, -0.75 to -29.00 D). Patient follow-up occurred on postoperative day 1 and at 3 months, 12 months, and yearly thereafter (mean follow-up, 65 months; range, 6 to 84 months).

Forty eyes of 34 patients (0.04%) developed RRD after LASIK. On average, these patients were 38 years of age; more than half were male, and RRD occurred in eyes with -1.50 to -16.00 D of preoperative myopia. Additionally, 9% of eyes that developed RRD needed an enhancement after LASIK, and none of the patients underwent other ocular surgery during follow-up. RRDs developed as early as 12 days and as late as 60 months postoperative.

Vitreoretinal surgery was performed for RRD repair at a mean of 56 days (range, 1 day to 18 months) after the onset of visual symptoms. The mean follow-up after retinal surgery was 26 months (range, 3 to 46 months), and 38.7% of 38 eyes (two patients refused surgery) had a final BCVA of 20/40 or better. Final BCVA was better than 20/200 in 77.4% of eyes. Poor BCVA (20/200 or worse) was obtained in 22.6% of eyes. Reasons for poor visual acuity included the development of proliferative vitreoretinopathy (PVR), epiretinal membrane, chronicity of RRD, new breaks, displaced corneal flap, or cataract.

Fundus drawings of the 40 eyes were evaluated (Figure 1). The mean number of retinal breaks per RRD was 4.3 (range,
0 to 40), including 98 holes, 41 horseshoe tears, two retinal dialyses, and one giant retinal tear. In 71.1% of cases, retinal breaks were located temporally. Vitreous status was available for 33 patients; 62.9% of these patients had posterior vitreous detachment (PVD; Figure 2), and 22.5% had a retinal break associated with lattice degeneration. RRD was associated with PVR grade C in 19.3% of cases (Figure 3).

A long interval between the onset of symptoms and RRD surgery may be responsible for some of these factors, including the PVR that contributed to poor final visual acuity in more than 20% of our patients. In some cases, there was delay in the patient’s referral to the vitreoretinal specialist because it was thought that the visual symptoms were related to a refractive or corneal problem after LASIK. Additionally, other factors related to high myopia, including myopic degeneration and amblyopia, may have influenced the final functional results regardless of our high anatomic success rate.

CAUSAL RELATIONSHIP?

How do we account for the development of vitreoretinal disease after LASIK? There is little data to determine if there is a causative relationship between LASIK and vitreoretinal disease. Myopes undergo LASIK in increasing numbers, and these patients are predisposed to RD as well as macular pathologies including macular hemorrhage. It is possible that these abnormalities—or an exacerbation of these conditions—are associated with the LASIK procedure itself. However, the pathologies may have occurred anyway, with refractive surgery. Unfortunately, it is difficult to perform a controlled study.

For patients who have undergone previous refractive surgery, I perform cryopexy, argon laser retinopexy, pneumatic retinopexy, or small-gauge (25- or 23-gauge) vitrectomy without a scleral buckle when appropriate because these techniques do not tend to change the shape or length of the eye. In patients with no previous refractive surgery, I consider combined scleral buckling plus vitrectomy. In the case of scleral buckling, one option is to remove the exoplants early, as suggested by Rodriguez and Camacho, once you are sure that all breaks have sealed and that RD is not present.

The displacement of a corneal cap or flap during vitrectomy may occur in patients with previous LASIK, and preventive measures should be taken. In one of our cases, a dislocated corneal flap occurred due to corneal epithelial debridement during vitreous surgery 69 months after LASIK (Figure 4). A similar case occurred during vitreous surgery only 4 months after LASIK. Displacement of a corneal flap is a serious complication. Possible sequelae include loss of the cap, epithelial ingrowth, interface particles, and striae in the flap.

When treating post-LASIK eyes, vitreoretinal surgeons should avoid debridement of the corneal epithelium to avoid flap displacement. However, when necessary, corneal debridement should begin nasally and advance temporally, as most flap hinges are nasal. A preventive measure to preserve the corneal epithelium during vitrectomy is the use of noncontact wide-angle lenses.

CONSIDERATIONS

I believe it is important to inform patients of the potential retinal complications associated with LASIK in myopic eyes. The incidence of vitreoretinal pathology after LASIK in our studies was 0.06% (annual incidence, 0.02%). This number is much lower than the incidence of RRD in
myopes in general.19 This finding may be explained by the fact that refractive surgery patients undergo preoperative examinations that include thorough dilated indirect funduscopy with scleral depression and treatment of any peripheral retinal lesion predisposing for the development of a RRD before LASIK. In our study, extensive lattice degeneration, flap tears, atrophic holes, and retinal tufts were prophylactically treated regardless of symptoms. Such treatment is justified because vitreoretinal surgery after refractive surgery causes changes in corneal shape, thus damaging the refractive surgeon’s results.20

Currently, it is impossible to scientifically determine whether peripheral retinal lesions should be treated differently from standard practice just because a patient is to undergo LASIK. Most practitioners suggest that patients scheduled for LASIK be carefully examined with indirect ophthalmoscopy and scleral depression under pupillary dilatation to detect any myopic peripheral lesion that requires preoperative treatment. One could argue that this is prudent in myopes whether or not they undergo LASIK. Given the potential of the procedure to exacerbate preexisting pathology, it might be wise to treat such pathology more aggressively in patients before LASIK.

Another important factor to take into consideration is duration of follow-up. It is reasonable to expect that the incidence of RRD in an initial cohort of LASIK patients will increase with time. LASIK-induced trauma may accelerate vitreous liquefaction, and over the years, these patients may have a higher incidence of RD and other vitreoretinal problems. It is equally likely that an ophthalmologist would be unaware of this, considering current practice patterns.

It is important to inform patients that refractive surgery corrects only the refractive aspect of myopia and that myopic eyes have the potential for serious complications. A dilated fundus examination is even more important in post-LASIK patients whose visual acuity is not as good as expected to avoid delay in referral to the vitreoretinal specialist.

J. Fernando Arevalo, MD, FACS, is a Professor of Ophthalmology at University of Los Andes, Merida, Venezuela, and practices in the Retina and Vitreous Service, Clínica Oftalmológica Centro Caracas, and the Arevalo-Coutinho Foundation for Research in Ophthalmology, Caracas, Venezuela. Dr. Arevalo states that he has no financial or proprietary interest in the products or techniques mentioned. He may be reached at tel: +1 58 212 576 8687; fax: +1 58 212 576 8815; e-mail: arevalojf2020@gmail.com.