

José Domingo Luna
Victor Eduardo Reviglio
Claudio Patricio Juárez

Bilateral macular hemorrhage after laser in situ keratomileusis

Received: 2 June 1998
Revised version received: 16 November 1998
Accepted: 17 November 1998

J.D. Luna (✉) · V.E. Reviglio · C.P. Juárez
Fundacion VER, PO Box 743,
Correo Central, 5000 Córdoba,
Argentina
e-mail funver@powernet.com.ar
Fax +54-51-234848

Abstract ● **Background:** This is the first report of a bilateral submacular hemorrhage after LASIK surgery in an extreme myopic patient. A 31-year-old man underwent bilateral surgery for correction of $-16.75+0.75 \times 70^\circ$ and $-16.50+0.50 \times 55^\circ$. ● **Methods:** Case report. ● **Results:** One day after surgery the patient's uncorrected visual acuity was in the 20/50 range OU and by 17 days after surgery his visual acuity had declined to 20/200

range. Fundus examination showed multifocal subretinal macular and posterior pole hemorrhages. Fluorescein angiography showed some macular lesions compatible with lacquer cracks. ● **Conclusions:** Preoperative and postoperative fundus examination is important to detect this phenomenon. Patients should be informed of this rare complication.

Key words Macula · Macular hemorrhage · LASIK complications

Introduction

Laser in situ keratomileusis (LASIK) is a safe and widely used surgical technique to treat low, moderate, high and extreme myopia [2]. However, serious complications can occur. Many of these are related to the anterior corneal incisions, such as displaced flaps, epithelial ingrowths, corneal infections and perforations [5, 6]. The effects upon the posterior segment of the eye of the sudden increase in intraocular pressure and its subsequent release, when the suction ring is used, have not been carefully investigated.

A presumed ciliary body shutdown, with delayed severe hypotension and the presence of nonrhegmatogenous retinal detachment following a case of keratomileusis was recently described [4]. In the retina, it is still unclear whether the use of the suction ring could bring about a retinal detachment. Some of the most experienced anterior segment surgeons believe that there is no cause-effect relationship. Unilateral retinal vascular occlusion and subretinal hemorrhage following LASIK have also been reported [2]. We present a case of bilateral subretinal hemorrhage 17 days after successful LASIK surgery in an extremely myopic patient.

Case report

A 31-year-old man underwent LASIK surgery to correct extreme myopia in May 1997. His best corrected visual acuity before surgery was 20/40 OU with $-16.50+0.50 \times 55^\circ$ OD and $-16.75+0.75 \times 70^\circ$ OS. Ocular external examination, extrinsic and intrinsic motility, anterior segment biomicroscopy, applanation tonometry, pachymetry, and corneal topography performed preoperatively were within normal limits. Dilated fundus examination of both eyes revealed a typical myopic fundus with attenuation of the retinal pigment epithelium sparing the fovea, tilted discs with temporal crescent, and peripheral thinned retinal areas without gross lattice degeneration or retinal holes. The choroidal vessels were easily visualized and no lacquer cracks or evidence of choroidal subretinal neovascularization (Fuch's spots) and/or staphylomas were noted. During the surgery, done bilaterally under topical anesthesia, a mini-excimer Compak-200 LaserSight was used with a Chiron microkeratome to obtain a "C" corneal flap. The suction ring was applied for a few seconds to obtain the flap and was released during the laser treatment. Postoperatively no eye patch was used and topical diclofenac solution was prescribed q.i.d. At follow-up 24 h and 72 h after surgery both eyes were in the 20/50 range without correction and best corrected with $-1.00+1.00 \times 175^\circ$ OD and $-1.00+0.50 \times 175^\circ$ OS to 20/40 OU. No fundus examination was carried out at these visits.

Seventeen days later, the patient complained of decreased vision in both eyes. Upon examination, visual acuity without correction was 20/200 OU, without visual improvement with pinhole. Fundus

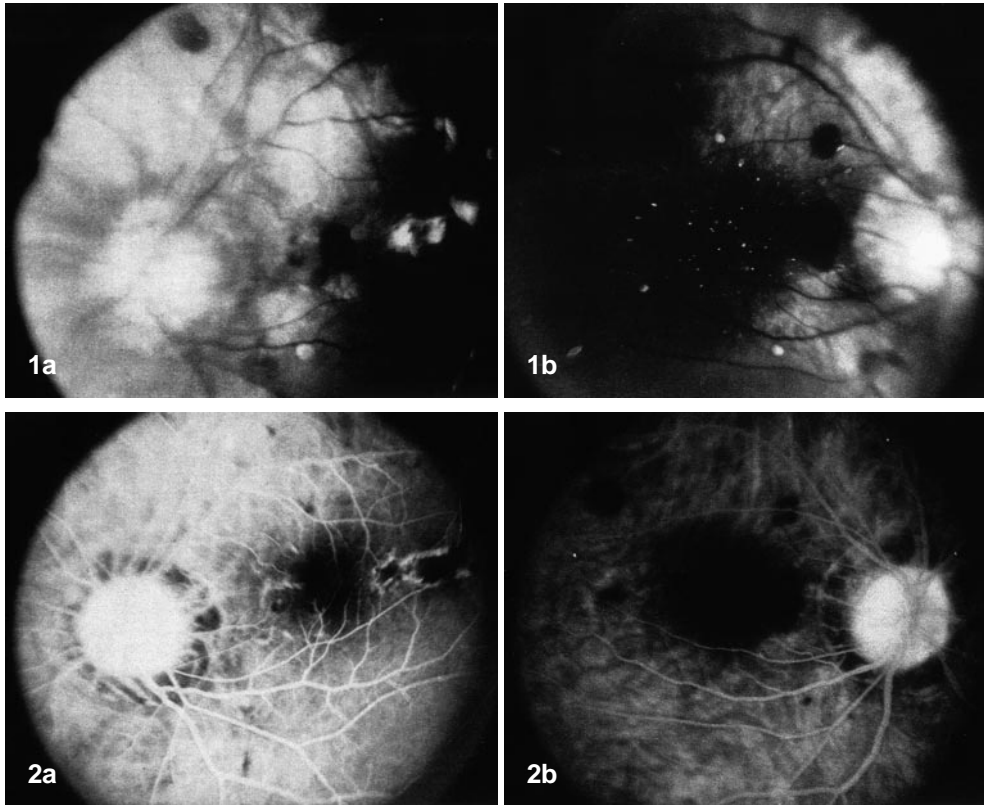


Fig. 1a, b Scattered multiple round focal dense retinal and subretinal hemorrhages and venous congestion present in both eyes. Some retinal hemorrhage observed beyond macular area. Fluorescein angiography showed irregular hyperfluorescent line in early phase. **a** OD; **b** OS

Fig. 2a, b Disappearing venous congestion and macular hemorrhage 6 weeks after surgery. No leakage present in late phase. **a** OD; **b** OS

examination revealed scattered multiple round focal dense retinal and subretinal hemorrhages (Fig. 1) with some venous congestion. Some of the retinal hemorrhages were present beyond the macular area, reaching almost to the equator. Six weeks later the venous congestion was no longer present and the macular hemorrhage had disappeared. Visual acuity had recovered to 20/60 OD and 20/50 OS. Fluorescein angiography at this point revealed an irregular hyperfluorescent line in the early phases of the angiogram. No leakage of dye was present in the late phase (Fig. 2).

Discussion

Degenerative myopia is characterized by increased axial length, with progressive degeneration in the posterior pole. Macular hemorrhages, resulting from breaks of Bruch's membrane (lacquer cracks) or from choroidal neovascularization (CNV), are a typical cause of decreased vision in degenerative myopia. They occur in 5–10% of the myopic population [7]. Two unilateral submacular hemorrhages at 1 and 3 months following LASIK surgery have been described [3]. However, a cause-effect

relationship with the surgical technique in these cases is difficult to explain. Another study reported that three patients suffered from severe unilateral visual loss due to subretinal hemorrhages during the postoperative period, but the authors did not mention how long after the surgery the bleeding occurred. We present a 31-year-old patient with bilateral multifocal posterior pole retinal and subretinal hemorrhages that occurred 17 days after surgery.

Unfortunately, we did not perform a fundus examination shortly after surgery, but the patient's visual acuity 24 h and 72 h after surgery suggests the lesions were not present at that time. One possible explanation for these complications is the sudden change of intraocular pressure while the suction ring and the microkeratome are used during the creation of the corneal flap, particularly in eyes that may be more susceptible to mechanical forces.

Some authors have commented that shock waves produced by the excimer laser might contribute to the development of some alterations in the fragile submacular vessels and/or the retinal pigment epithelium, leading to cystoid macular edema or submacular hemorrhage [1, 6]. Our patient definitely developed lacquer cracks (Bruch's membrane ruptures) as shown by fluorescein angiography. These most probably developed through mechanical forces. On the other hand, the presence of venous congestion and retinal hemorrhage beyond the macular area in the equator suggest the presence of non-ischemic or im-

pending retinal vein occlusion. Either ischemia during surgery or prolonged hypotonia could also explain these findings. To the best of our knowledge, this is the first reported case of postoperative bilateral submacular hemorrhage after LASIK surgery. Inspection of the fundus before and immediately after surgery merits consideration,

particularly with highly myopic patients. The possibility of a subretinal hemorrhage has to be discussed with the patient prior to surgery. This is, however, a very rare complication, occurring only once among more than 1000 consecutive patients operated on by our group.

References

1. Janknecht P, Soriano JM, Hansen LL (1993) Cystoid macular edema after excimer laser photorefractive keratectomy. (letter) *Br J Ophthalmol* 77:681
2. Knorz MC, Lierman A, Seiberth V, Steiner H, Wiesinger B (1996) Laser in situ keratomileusis to correct myopia of -6.00 to -29.00 diopters. *J Refract Surg* 12:575-84
3. Luna JD, Reviglio V, Rodríguez M, Juárez CP (1997) Non-refractive complications after 700 bilateral LASIK surgery for myopia. Paper presentation. The cutting edge. Pre-Academy meeting, San Francisco, October
4. Maldonado Bas AR, Carrizo R (1997) Scientific poster, 98th Annual Meeting of the American Academy of Ophthalmology, October, San Francisco, p 180
5. Mulhern MG, Condon PI, O'Keefe M (1997) Endophthalmitis after astigmatic myopic laser in situ keratomileusis. *J Refract Surg* 23:948-50
6. Pallikaris I, Siganos D (1996) LASIK complication management. In: Talamo JH, Krueger RR (eds) *The excimer manual: a clinician's guide to excimer laser surgery*. Little, Brown, Boston, pp 227-243
7. Soubrane G, Coscas G (1989) Choroidal neovascular membrane in degenerative myopia. In: Ryan SJ (ed) *Retina*, vol 2. Mosby, St Louis, pp 201-215