Characteristics of Rhegmatogenous Retinal Detachment After Refractive Surgery: Comparison With Myopic Eyes With Retinal Detachment

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• PURPOSE: To evaluate the characteristics of rhegmatogenous retinal detachment (RD) in patients with previous laser in situ keratomileusis (LASIK) and compare them to RD in patients with previous laser assisted subepithelial keratomileusis (LASEK) and myopic patients with no previous refractive surgery.

• DESIGN: Retrospective, comparative case series.

• METHODS: In 106 eyes of 106 patients with RD, patients with previous refractive surgery included 21 eyes after LASIK and 13 eyes after LASEK; 72 myopic patients with refractive errors of −3.0 diopters or less were grouped as the R (−) group. Characteristics of RD included distribution of RD and associated retinal breaks, location and number of retinal breaks, presence of lattice degeneration, and axial lengths.

• RESULTS: The mean interval between refractive surgery and the onset of rhegmatogenous RD was 63.7 ± 43.5 months, occurring across a broad spectrum of time intervals. There were no significant differences among the LASIK group, the LASEK group, and the R (−) group in axial length (26.8 mm vs 26.4 mm vs 26.9 mm, respectively); in mean number of retinal holes/tears, (2.1/1.5, 0.9/1.4, 1.5/1.6, respectively); or in the presence of lattice degeneration (52.4% vs 46.2% vs 43.1%, respectively). Distribution of RD and associated retinal breaks were also not significantly different; retinal holes and tears were more prevalent in the temporal quadrants, and inferotemporal quadrants were the most commonly detached areas in both the LASEK and LASIK groups and in the R (−) group.

• CONCLUSIONS: Myopia is a well-known risk factor for rhegmatogenous RD and may contribute more to the development of RD in myopic patients after refractive surgery, rather than refractive surgery itself. (Am J Ophthalmol 2014;157:666–672. © 2014 by Elsevier Inc. All rights reserved.)

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RHEGMATOGENOUS RETINAL DETACHMENT (RD), the most common type of RD, is caused by liquefied vitreous passing through a retinal break into the subretinal space, separating the neurosensory retina from the retinal pigment epithelium.[1,2] Fundamental mechanisms leading to rhegmatogenous RD are largely unknown. The formation of retinal breaks is often preceded by vitreoretinal degeneration, the cause of which is unclear.

One of the factors strongly associated with rhegmatogenous RD is myopia.[3–5] Low myopes (−0.75 to −2.75 diopters [D]) show an odds ratio of 3.14 for RD, and the odds ratio was shown to rise steeply with increasing myopic refractive errors in the Japanese population.[4] Increased vitreous liquefaction, earlier posterior vitreous detachment, and higher incidence of vitreoretinal degeneration such as lattice degeneration are thought to be attributable to the higher prevalence in rhegmatogenous RD in myopes.[2]

Refractive surgeries, such as laser in situ keratomileusis (LASIK) and laser-assisted subepithelial keratomileusis (LASEK), have been popularized for correction of low to moderate myopia.[6,7] Vision-threatening posterior segment complications can occur after refractive surgeries; they include macular hemorrhages, macular holes, and rhegmatogenous RD.[8–14] The reported incidence of rhegmatogenous RD in those with histories of LASIK is not high, ranging from 0.033% to 0.25%.[11,15–17] However, many have regarded a suction ring application during LASIK to be a potential risk factor for rhegmatogenous RD because this procedure may induce vitreous traction and detachment resulting from sudden decompression of the eye.[18,19] A previous study found that retinal breaks were more commonly located in the inferotemporal quadrant in rhegmatogenous RD after LASIK.[20] Whether this feature is characteristic of rhegmatogenous RD after LASIK is unclear because this finding was not compared to rhegmatogenous RD without prior LASIK.

Herein, we studied the characteristics of rhegmatogenous RD in patients with previous LASIK and compared them to both rhegmatogenous RD in myopic patients with no previous refractive surgeries and to rhegmatogenous RD in patients with previous LASEK, which does not require a suction ring application, unlike LASIK.

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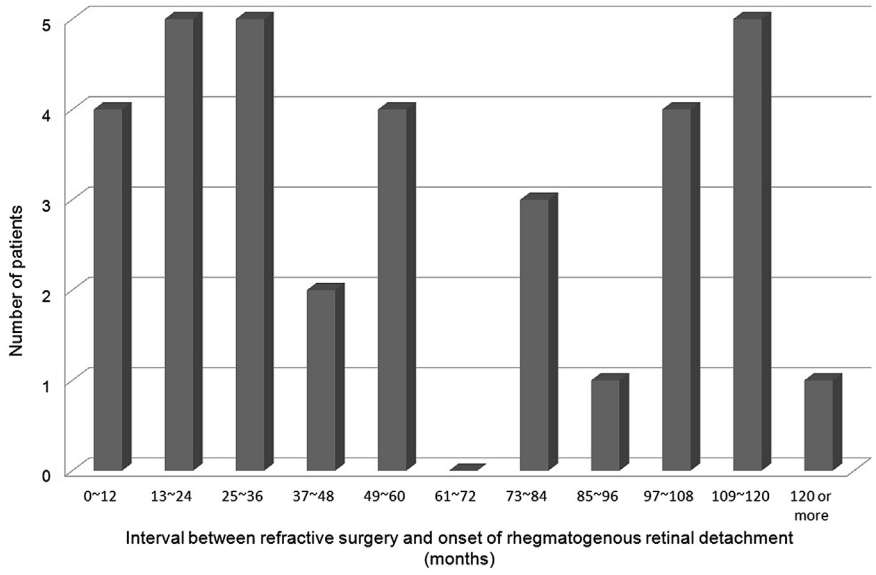

FIGURE 1. Distribution of the intervals between refractive surgery and the onset of rhegmatogenous retinal detachment in patients with prior refractive surgery. Note that the mean interval between refractive surgery and rhegmatogenous RD onset was 63.7 ± 43.5 months.

METHODS

• **ENROLLMENT OF STUDY SUBJECTS:** We retrospectively reviewed 106 eyes of 106 patients who fulfilled the inclusion criteria at the Vitreoretinal Service Clinic of Yonsei University Medical Center between March 2007 and March 2012. This retrospective, comparative case series was performed with the approval of the Institutional Review Board of Yonsei University College of Medicine and conducted in accordance with the tenets of the Declaration of Helsinki. Inclusion criteria were patients with (1) nontraumatic rhegmatogenous RD who underwent surgical repair; (2) no previous surgical history other than corneal laser refractive surgery for the study group; and (3) −3.0 D or lower myopia without previous refractive surgery for the control group. Patients with concomitant ocular diseases, such as diabetic retinopathy, myopic choroidal neovascularization or uveitis at the time of surgery were excluded. The patients included 34 eyes of 34 patients who had histories of refractive surgery before the onset of rhegmatogenous RD (21 eyes after LASIK and 13 eyes after LASEK), and they were grouped as the refractive surgery group (R [+] group). The remaining 72 myopic patients without previous refractive surgery were grouped as the nonrefractive surgery group (R [−] group), or the control group. The control group was selected to include moderately myopic patients who would be typical candidates for LASIK or LASEK. Because of a lack of information about refractive errors before refractive surgery for the R (+) group, the axial lengths of the affected eyes were used to confirm and compare the degrees of myopia between the R (+) and the R (−) groups. No patient in the R (+) group showed myopic posterior staphyloma, so highly myopic patients with posterior staphyloma were excluded in the R (−) group.

• **EXAMINATION:** All patients received complete ocular examinations, including best-corrected visual acuity (BCVA), color fundus photography and ultrasonography. Follow-up visits were arranged in general at 1 week and 1 month after each surgery. Subsequent 3- to 6-month examinations were performed; they included BCVA and dilated fundus examinations with an indirect ophthalmoscope.

• **STATISTICAL ANALYSIS:** Patients' characteristics were retrieved from their medical charts, including age at refractive surgery and development of rhegmatogenous RD, sex, and axial lengths (mm). BCVA by decimal visual acuity charts were converted into logarithm of the minimum angle of resolution (logMAR) values for statistical analysis. We evaluated the characteristics of RD, including numbers and locations of retinal tears and holes and the presence of lattice degeneration. In addition, rhegmatogenous RD extent (involved quadrants), location of the detached retina, and status of the macula (detached labeled as *off* and attached as *on*) were investigated by reviewing the operation notes. The rhegmatogenous RD eyes were also classified as 1 of 3 types: equatorial, oral or macular.[21]

SPSS Statistics 18.0 software for Windows (IBM, Somers, NY, USA) was used for statistical analysis. The Kolmogrov-Smirnov test was used to confirm normal distribution of the study population. For comparison of the eyes with and without prior refractive surgery, the Student *t* test