Incidence and Types of Peripheral Retinal Degenerations in Patients with Myopia Who Underwent SMILE

Miyopi İçin SMILE Uygulanan Hastalarda Periferik Retina Dejenerasyonu Sıklığı ve Tipleri

Ali DEMİRCAN[1], Zeynep ALKİN[2], Zeynep Gizem ERDEM[3], Dilek YASA[1], Gökhan DEMİR[1], Alper AĞCA[2], Ahmet DEMİROK[4]

ABSTRACT

Purpose: The purpose of this study was to determine the incidence and to characterize peripheral retinal degenerations in myopic patients who received small-incision lenticule extraction (SMILE) surgery.

Material and Methods: This study was carried out at Beyoglu Eye Training and Research Hospital. Patients who underwent SMILE for correction of myopia were included. A complete ophthalmologic examination including measurement of best corrected visual acuity, slit-lamp biomicroscopy, intraocular pressure measurement, dilated fundus examination before the surgery. Demographic variables, axial lenght (AL), and spherical equivalant (SE) were recorded.

Results: We rewieved 560 patients who received SMILE. Of the 68 patients (12.1%) had peripheral retinal degeneration. Mean age was 27.3±6.1 years. Mean AL was 25.31±1.42 mm and mean spheric equivalent refractive error was −4.76 ± 3.06 (−3.50 to −15.50) diopters Eighteen eyes (26.4%) had lattice degeneration, 16 eyes (23.5%) retinal holes/tears, 13 eyes (19.1%) microcystoid degeneration, 7 eyes (10.3%) snail track degeneration, 7 eyes (10.3%) white without pressure, 5 eyes (7.3%) zonular traction tuft, and 2 eyes (2.9%) pavingstone degeneration. Prophylactic laser retinopexy was performed in 36 eyes (52.9%). During a mean follow-up period of 11.5±11.7 months, no retinal detachment.occured in study eyes.

Conclusion: Lattice degeneration was found to be the most common retinal peripheral degeneration in study eyes. Retinal detachment was not observed in patients with peripheral retinal degenerations who received SMILE surgery during the period studied.

Key Words: Peripheral retinal degeneration, incidence, myopia, SMILE.

ÖZ

Amaç: Küçük kesiden lentikül ekstraksiyonu (SMILE) yapılan myopik hastalarda periferik retina dejenerasyonu sıklığı ve tiplerini belirlemek.

Gereç ve Yöntem: Bu çalışma Beyoglu Göz Eğitim ve Araştırma Hastanesi'nde gerçekleştirildi. Çalışmaya miyopi düzeltilmesi için SMILE uygulanan hastalar dahil edildi. Cerrahi öncesinde en iyi görme keskinliği ölçümü, yarıklı lamba biyomikroskopisi, göz içi basıncı ölçümü ve dilate fundus değerlendirmesini içeren tam bir göz muayenesi yapıldı. Demografik özellikler, aksiyel uzunluk (AU) ve sferik eşdeğer(SE) kaydedildi.

Bulgular: SMILE yapılan 560 hastanın verileri değerlendirildi. Hastaların 68'inde (%12.1) periferik retina dejenerasyonu saptandı. Ortalama yaş 27.3±6.1 yıl idi. Ortalama AU 25.31±1.42 mm ve ortalama sferik eşdeğer -4.76 ± 3.06 (−3.50 to −15.50) dioptri olarak bulundu. 18 gözde (%26.4) latis dejeneresansı, 16 gözde (%23.5) delik/yırtık, 13 gözde (%19.1) mikrokistoid dejeneresans, 7 gözde (%10.3) salyangoz izi dejeneresansı, 7 gözde (%10.3) bastırmadan beyaz, 5 gözde (%7.3) zonüler çekinti püskülü ve 2 gözde (%2.9) kaldırım taşı dejeneresansı vardı. Profilaktik lazer retinopeksi 36 göze (%52.9) uygulandı. Ortalama 11.5±11.7 aylık takip süresinde hiçbir hastada retina dekolmanı görülmedi.

Sonuç: Çalışmada en sık periferik retina lezyonu latis dejeneresansı olarak bulundu. SMILE cerrahisi yapılan ve periferik retina dejeneresansı bulunan bu hastaların hiçbirinde retina dekolmanı gelişimi gözlenmedi.

Anahtar Sözcükler: Periferik retina dejenerasyonu, sıklık, miyopi, SMILE.

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1- Uz. Dr., Beyoğlu Göz Eğitim ve Araştırma Hastanesi, Retina, İstanbul, Türkiye

2- Doç. Dr., Beyoğlu Göz Eğitim ve Araştırma Hastanesi, Retina, İstanbul, Türkiye

3- Asist. Dr., Beyoğlu Göz Eğitim ve Araştırma Hastanesi, Retina, İstanbul, Türkiye

4- Prof. Dr., Beyoğlu Göz Eğitim ve Araştırma Hastanesi, Retina, İstanbul, Türkiye

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Yazışma Adresi / Correspondence Adress:
Zeynep ALKIN
Beyoğlu Göz Eğitim ve Araştırma Hastanesi, Retina, İstanbul, Türkiye

Phone: +90 212 251 5900
E-mail: zalkin@ttmail.com

INTRODUCTION

Small-incision lenticule extraction (SMILE) surgery is newly introduced technology for treating refractive errors with flapless method.[1] As known, major advantage of SMILE technique along with other benefits is without necessity for suction during procedure which causes increase in intraocular pressure.[2] Few studies reported cases of rhegmatogenous retinal detachment (RRD) associated with retinal tear after Laser in situ keratomileusis (LASIK).[3-6] LASIK is a traditional refractive surgery technique which uses keratome suction ring to create flap. During suction, intraocular pressure exceeds 65 mm Hg.[3] Ozdamar et al reported a case of bilateral RRD associated with giant tear after LASIK.[3] Authors hypothesized that sudden increase and decrease in intraocular pressure during and after suction may cause mechanical stretching of the vitreous base and may play a role in the development of posterior vitreous detachment. We still don't know the exact responsible mechanism of this complication may be related to the risk from myopia or may be induced by LASIK surgery itself. By now, there has been no report presenting RRD after SMILE. The aim of this study was to characterize the types and to determine incidence of peripheral retinal findings in myopic patients who underwent SMILE. Additionally, we aimed to determine presumed risk of RRD during follow-up period in such patients.

MATERIALS AND METHODS

The medical records of patients who received SMILE for the treatment of myopia and myopic astigmatism at Beyoglu Eye Research and Education Hospital between May 2012 and December 2016 were reviewed for this retrospective single-center study. The patients with any peripheral retinal degeneration which was diagnosed by a retina specialist were included in this study. All patients signed an informed consent in accordance with the tenets of the Declaration of Helsinki. Eyes with a history of ocular surgery or ocular pathology other than myopia were excluded from the study. Surgery in both eyes of each patient was performed using the VisuMax femtosecond system (Carl Zeiss Meditec AG, Jena, Germany) following standard procedures. All patients had a complete ophthalmologic examination included a measurement of best corrected visual acuity using Snellen charts, slit-lamp biomicroscopy, intraocular pressure measurement using applanation tonometry before the procedure. Dilated fundus examination was performed with a wide angle contact lens (Volk QuadrAspheric® lens) by a retina specialist preoperatively. A family history of RRD and specific symptoms of floaters, light flashes were recorded. Type, extension and localization of peripheral retinal degeneration(s) were recorded as well to help in deciding whether to treat or to observe. If the peripheral degeneration was to be treated, SMILE would be performed at least 4 weeks later. Prophylactic laser treatment was applied at least 3 near-confluent rows of laser spots to completely surround the retinal degeneration using a duration of 0.1 to 0.2 seconds and spot sizes of 200 to 500 microns with green argon laser system ((Zeiss, Visulas, Argon II). Demographic variables were collected including age and gender. Axial lenght (AL) and spherical equivalant (SE) were also obtained before the procedure.

STATISTICAL ANALYSIS

Data were analyzed using SPSS 20.0 program (SPSS Chicago, IL, USA). Continuous variables are expressed as mean ± standard deviation (SD). Categorical variables are expressed as numbers (n) and percentages (%). Spearman correlation test was used to investigate the relation between SE with degeneration type. The level of statistical significance was $p < 0.05$.

RESULTS

We retrospectively reviewed 560 patients. Of the 560 patients, 68 eyes of 68 patients (12.1%) (34 females and 34 males) with a mean age of 27.3±6.1 years (range, 19-50 years) were referred to retina section for risk of RRD and were included for analysis. The SMILE procedure was performed uneventfully in all patients without any intraoperative complications. Mean AL was 25.31±1.42 mm and mean SE refractive error was −4.76 ± 3.06 (−3.50 to −15.50) diopters. Peripheral retinal abnormalities identified were lattice degeneration in 18 eyes (26.4%), retinal holes/tears in 16 eyes (23.5%), microcystoid degeneration in 13 eyes (19.1%), snail track degeneration in 7 eyes (10.3%), white without pressure in 7 eyes (10.3%), and zonular traction tuft in 5 eyes (7.3%), pavingstone degeneration in 2 eyes (2.9%). Prophylactic laser retinopexy was performed in 36 eyes (52.9%) for 16 eyes with retinal holes/tears with subretinal fluid or vitreous traction around the hole, 14 eyes with lattice degeneration with a positive family history of RRD or floater/flashing light symptoms, 3 eyes with zonular traction tuft with unilateral high myopia, and 3 eyes with white without pressure with vitreo-retinal adhesion and traction. Patients were followed-up for 11.5±11.7 months. RRD did not develop in any of the eyes during the follow-up period.

Spearman analysis showed that there is a significant correlation between SE and degeneration type (r=-0.25, p=0.03). While lattice degeneration is more frequent degeneration type in high myopes, the other peripheral retinal degenerations were similar in distrubution among low and high myopes.

DISCUSSION

In this study, we found that the most common peripheral retinal pathologies were lattice degeneration, retinal holes/tears, and microcystoid degeneration in patients who underwent SMILE surgery. Additionally, lattice degeneration was found more likely to be in high myopes in this study. Similarly, Gozum et al found that lattice degeneration was a frequent finding in high myopes, and tended to increase with AL.[7] Symptomatic or asymptomatic retinal holes/tears are frequently observed peripheral retinal pathologies and may lead to retinal detachment.especially in patients with symptoms of floaters or flashing lights.[8] Lattice degeneration is present in 6% to 8% of the general population and is responsible for approximately 30% of phakic retinal detachments. In patients with lattice degeneration who have a positive family history or history of RRD in the other eye, the incidence of RRD is much higher.[9] Many studies of prophylactic treatment for peripheral retinal degenerations have been done, but there is no consensus on treatment. An evidence-based analysis of prophylactic treatment of retinal holes/tears and lattice degeneration showed that symptomatic flap tears.should promptly be treated.[10] Retinal tears/holes unassociated with acute symptoms and lattice degeneration without risk factors are significantly less likely to be responsible for RRD.[11] Nonetheless, prophylactic treatment is of value in the management of retinal tears/ holes associated with the symptoms of flashing lights and floaters, because such symptomatic retinal tears/holes are associated with a high rate of progression to RRD.[12] But there is no evidence of a benefit of prophylactic therapy for treatment of peripheral retinal lesions without symptoms in refractive surgery candidates. Retinal detachment can rarely caused by the development of retinal breaks in association with the zonular traction tuft. A study by Lewis showed that 6% of retinal tears were due to zonular traction tuft. Because these lesions are mostly clinically insignificant and nonprogressive, prophylactic treatment of these lesions is not indicated.[13] In this study, we only treated zonular traction tufts in patients with high myopia. The phenomenon of white without pressure is an advanced form of white with pressure and retinal breaks have been reported in the areas of these lesions. In view of vitreo-retinal adhesion and traction being present in such lesions, these conditions are potentially dangerous as may predispose to development of RRD.[14] Thus we only treated white without pressure lesions when vitreo-retinal adhesion and/or traction was being present on the lesion.

Several reports in literature releasing RRD cases occured after refractive surgery.[3-6] Ozdamar et al reported a case of bilateral RRD associated with giant tear after LASIK.[3] Farah et al reported four eyes with early RRD within 3 months of LASIK.[4] Arevalo et al reported 13 eyes with RRD after LASIK.[5] Stulting et al reported a case of RRD after LASIK.[6] According to previous reports, LASIK may be associated with sudden pressure changes during suction or release of the keratome suction ring, which might relax or stretch the vitreous base.[3,4] Pressure changes in the eye are not valid for SMILE procedure which uses flapless technology. On the other hand, some authors hypothesized that another risk factor for RRD is shock wave induced by the laser, comparable to the expansive wave associated with ocular injury.[3] However, Krueger et al measured the pressure waves during laser in the anterior vitreous. They demonstrated that stress waves produced by the excimer laser would not create problems for the intermediate and posterior parts of the eye.[15]

Nevertheless, these data in previous reports can not provide sufficient evidence to guide management. Myopia has been described as the most important risk factor for RRD.[16,17] The possible pathogenesis of RRD may be related to the risk from myopia rather than refractive surgery. Güngel et al. performed prophylactic laser retinopexy on lattice degeneration, holes and tears before LASIK in their study. However, since there was no control group in this study, they stated it is not possible to say that these lesions are a risk factor for retinal detachment in cases of LASIK surgery. [18]

This study evaluated a large number of eyes with peripheral retinal degeneration which received SMILE. We only treated eyes with certain retinal degenerations with concomitant characterisitcs which were demonstrated as potential risk factors for RRD earlier. During follow-up period no RRD occured neither in prophylactically treated eyes nor in eyes without treatment. Under the light of these findings, we suggest that there are need for future studies with control series, for better understanding of benefit of treatment or observation in eyes with peripheral retinal degeneration before refractive surgery.

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