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Limited Vitrectomy in Patients With Idiopathic Epiretinal Membrane

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ABSTRACT

Purpose: To evaluate the safety and effectivity of limited vitrectomy in patients with epiretinal membrane.

Methods: We included 58 consecutive patients who underwent epiretinal membrane surgery without performing a complete peripheral vitreous removal. The improvement in visual acuity, the incidence of retinal breaks and detachment; anatomical results and intraoperative and postoperative complications of this technique were evaluated.

Results: The median visual acuity was 0.4(0.3-0.5) before the surgery, and it was 0.6 (0.3-0.8) after the surgery (p=0.016). Prophylactic laser photocoagulation was performed in 14(24,13%) patients during surgery. Retinal breaks and detachments did not occur in any of our patients. We did not observe proliferative vitreoretinopathy or surgery- related major complications in any patient.

Conclusion: Limited vitrectomy without removing peripheral vitreous is safe and effective in idiopathic epiretinal membrane surgery. It reduces the risk of peripheral retinal breaks and retinal detachment.

Keywords: Limited vitrectomy; epiretinal membrane surgery; pars plana vitrectomy; retinal breaks; retinal detachment

İDYOPATİK EPİRETİNAL MEMBRANLI HASTALARDA SINIRLI VİTREKTOMİ

ÖZET

Amaç: Epiretinal membran nedeni ile vitreoretinal cerrahi uygulanan hastalarda sınırlı vitrektomi uygulamasının güvenliğinin ve etkinliğinin değerlendirilmesi

Hastalar ve Yöntem: Sınırlı vitrektomi uygulanan epiretinal membranlı 58 hastanın bulguları değerlendirildi. Görme keskinliğindeki artış, operasyon sırasında oluşan periferik yırtıklar ve retina dekolmanı gelişimi sıklığı, anatomik sonuçlar, intraoperatif ve postoperatif komplikasyonlar değerlendirildi.

Bulgular: Median görme keskinliği ameliyat öncesi 0.4(0.3-0.5), ameliyat sonrası 0.6 (0.3-0.8) olarak bulundu (p=0.016). Ondört hastaya (24,13%) operasyon sırasında profilaktik laser fotokoagulasyon yapıldı. Hiç bir hastada operasyon sırasında retina yırtığı ve retina dekolmanı gelişmedi. Hiç bir hastada sınırlı vitrektomiye bağlı proliferatif vitreoretinopati ve komplikasyon oluşmadı.

Sonuç: Periferik vitreusu temizlemden yapılan sınırlı vitrektomi, epiretinal membranı olan hastaların tedavisinde etkili ve güvenli bir yöntemdi. Bu yöntem hastalarda periferik retina yırtıkları ve retina dekolmanı riskini azaltmaktadır.

Anahtar sözcükler: Sınırlı vitrektomi, epiretinal membran cerrahisi, pars plana vitrektomi, retina yırtıkları, retina dekolmanı

Epiretinal membranes are the proliferative fibrous membranes that appear on the internal limiting membrane (ILM) in the macular region. The most common type is the idiopathic epiretinal membrane, it can also occur after trauma, intraocular inflammation, retinal vascular disease, or retinal surgery (1). ERM may be removed by performing pars plana vitrectomy and epiretinal membrane peeling ([2]). Additional ILM peeling may reduce the rate of ERM recurrence since ILM serves as a scaffold for ERM proliferation.

Iatrogenic retinal break is an important complication of vitrectomy. It may lead to retinal detachment and additional surgeries. Retinal break risk may increase if we apply strong traction to the peripheral retina while separating the vitreous. Peripheral retinal degenerations and focal vitreoretinal adhesions will also result in an additional risk. In order to minimize this complication, prophylactic measures have been proposed. The well-known precautions are using small gauge trocars systems, avoiding strong traction to the peripheral retina while separating the vitreous and setting a lower aspiration flow. These precautions may reduce the peripheral retinal traction; however, they do not eliminate all the risks. We believe that peripheral vitreous removal in classic pars plana vitrectomy is another factor that may cause peripheral retinal tears, and leaving the peripheral vitreous may be safer.

In macular surgeries such as macular hole and epiretinal membrane, we routinely do not perform a complete vitrectomy. After removing the posterior hyaloid, we perform a limited vitrectomy. Then we proceed to the surgical maneuvers that are required in the macular region such as ILM or ERM peeling. Finally, we finish the surgery by injecting the tamponade of choice and removing the trocars. We believe that most of the surgeons are following the same way. The aim of our study is to evaluate the safety of this technique in patients with macular hole.

Materıals and methods

Records of the patients who underwent vitrectomy for idiopathic epiretinal membrane were reviewed retrospectively. The follow-up visits were at 1st day, 1st week, 1st month, 3rd month, 6th month and 12th month. The 12th month examination results were evaluated in the study.

Surgical technique

Vitrectomy was performed with standard 23 gauge instruments (OS4, Oertli Instrumente AG, Berneck, Switzerland), and a non-contact viewing system Oculus BIOM (Oculus Surgical, Port St. Lucie, FL, USA) in all patients. After the core vitrectomy, a posterior vitreous detachment (PVD) was performed and the posterior hyaloid was removed. The PVD was advanced until the equator, but not farther. The vitreous in front of the equator was trimmed; however, it was not removed totally. Then ERM was stained with combination of 0.15% Tryphan blue, 0.025%, brilliant blue and 4% PEG (membrane blue dual, DORC) over the macular region. After waiting for 20 seconds exposure time, the dye was aspirated with a back-flush needle. The ERM was peeled around the macular hole across the macula for the whole area within the arcade using an end-gripping ILM forceps. Then the macular region was stained with the same dye again in order to visualize the ILM, and ILM was also peeled. When we observed a peripheral retinal degeneration during the surgery, we applied a prophylactic laser photocoagulation around the degeneration. However, we did not perform a prophylactic peripheral 360 degree laser photocoagulation. All eyes were left with BSS, and trocars were removed.

If cataract was observed in the preoperative evaluation, a combined phacoemulsification and intraocular lens (IOL) implantation would be also planned. A combined cataract surgery was performed with the phacoemulsification before vitrectomy procedure. After inserting the anterior chamber maintainer, a side-port was created from 10 o'clock for the right eye and 2 o'clock for the left eye. The continuous curvilinear capsulorrhexis was created with a cystotome. Then a 2.5 mm limbal corneal tunnel was created from the steep region of the cornea keratometric measurement of the patient. Phacoemulsification (EasyPhaco, OS4, Oertli Instrumente AG, Berneck, Switzerland) was followed by aspiration of cortical remnants. The intraocular lens used in all eyes was a 3-piece hydrophobic acrylic IOL (Sensar, Acrylic IOL AR40e; Abbott Medical Optics, Inc. Santa Ana, CA, USA). At the end of the cataract surgery, the anterior chamber was left with viscoelastic solution. Then we proceeded to pars plana vitrectomy in order to keep the anterior chamber stabilized during the surgery. The viscoelastic solution was removed at the end of vitrectomy.

The follow up visits were scheduled as 1st day, 1st week, 1st month, 3rd month, 6th month and 1st year.

Follow-up examinations

In the pre-operative examination and post-operative follow-up examinations best corrected visual acuity, intraocular pressure, biomicroscopy and fundus of the patients were evaluated. Additionally, optical coherence tomography (OCT, Heidelberg Engineering GmbH, Heidelberg, Germany) was also performed in all visits.

Statistical analysis

All statistical analyses were performed using IBM SPSS for Windows version 20.0 (SPSS, Chicago, IL, USA). Kolmogorov-Smirnov test was used to assess the assumption of normality. Normally distributed continuous variables were expressed as mean ± standard deviation while the continuous variables that did not have normal distributions were expressed as median (25.percentile-75. percentile). Comparisons of normally distributed continuous variables between groups were performed using Student's t-test. For non-normally distributed continuous variables, differences between groups were tested using Wilcoxon Signed Ranked Test. A two-sided p-value<0.05 was considered as statistically significant.

Results

Fifty-eight patients with epiretinal membrane were evaluated. Thirty-four (55,8%) of the patients were male, and 24 (41,3%) of them were female. The mean age of the patients was 62.02±12,05. (Table 1)

Table1. Clinical and surgical characteristics of the patients. There was statistically significant difference in visual acuity between pre-op examination and post-op examinations. There was no difference between pre-op and post-op intraocular pressure. There was no difference in final visual acuity between the patients with combined cataract surgery and the ones without. (*p=0.016, ** p=0,055 *** p=0,750)

	Results
Mean Age±SD	62.02±12,05
Gender	
Male	27(51,91%)
Female	25(48,07%)
Median visual acuity (25.percentile-75.percentile)*	
Pre-op	0.4(0.3-0.5)
Post-op (12 months)	0.6 (0.3-0.8)
Mean IOP±SD**	
Pre-op	15mmHg (14-16 mmHg)
Post-op (12 months)	14mmHg (12-15 mmHg)
Combined cataract surgery***	39(67,2%)

The median visual acuity was 0.4(0.3-0.5) before surgery, and it was 0.6 (0.3-0.8) 12 months after surgery. Postoperative visual acuity was significantly higher than the pre-operative visual acuity (p=0.016). The mean intraocular pressure was 15mmHg (14-16 mmHg) before surgery and it was 14mmHg (12-15 mmHg) months after surgery. There was no difference between preoperative intraocular pressure and postoperative intraocular pressure (p=0,055).

Thirty-nine (67,2%) patients had combined phacoemulsification and IOL implantation. There was no difference in final visual acuity between the patients who had only vitrectomy, and the ones who had combined procedure (p=0,750). We did not observe any major complication related to the additional operation. We performed prophylactic laser photocoagulation to previous peripheral retinal degenerations in 14 patients (24,13%) during surgery.

None of the patients had a retinal break during the surgery. We did not observe retinal tear, retinal detachment or proliferative vitreoretinopathy (PVR)in any patients during follow-up. None of the patients needed revision surgery.

Discussion

Iatrogenic retinal break is one of the most serious complications in epiretinal membrane surgery. Retinal breaks may occur because of the existing peripheral retinal degenerations or because of the vitreous traction on the retina during surgery. This traction may be created by vitreous incarceration into the sclerotomy site or inadvertent vitreous traction during instrument insertion and withdrawal. Incidence of post-vitrectomy retinal detachment was reported to be similar in small gauge vitrectomy compared with 20-gauge surgery (3). On the other hand, some studies reported that the incidence of retinal breaks was higher with the 20 gauge vitrectomy, compared to 23-gauge vitrectomy (4,5). These studies suggest that the incidence of these two traction reasons may be reduced by the 23-gauge or 25-gauge trocar systems use (6). Today, most of the surgeons are using trocar systems in macula surgeries. In a recent study, the occurrence rate of retinal detachment after small gauge vitrectomy for idiopathic epiretinal membrane was found to be less than 1%. Only 2 eyes of 212 eyes had postoperative retinal detachment. The authors concluded that small gauge sutureless vitrectomy improved the safety of ERM surgery (7).

Another reason for vitreous traction during surgery is caused by the separation of the vitreous from the retina and advancing it up to the vitreous base. If there is a focal area of vitreoretinal adhesion, applying stress to this adhesion may increase the risk(for the formation of retinal breaks). Rahman et al. reported that the incidence of iatrogenic retinal breaks associated with posterior hyaloid face separation during 23-gauge PPV was 18.2%. They concluded that the mechanical detachment of the posterior hyaloid is an important risk factor for the formation of retinal breaks, which significantly increases the risk of rhegmatogenous retinal detachment (8).

We believe that limited vitrectomy may address both of these causes of peripheral retinal breaks, and result in a better outcome in surgery. None of our patients had a peripheral retinal tear or retinal detachment in our study. Limited vitrectomy reduces the duration of the surgery, and it avoids(prevents) any complication that may occur while removing the peripheral vitreous.

It has been suggested that the presence of PVD may decrease the incidence of peripheral retinal tears in idiopathic epiretinal membrane and macular hole surgery (9-11). Guillaubay et al reported that the incidence of postoperative retinal breaks was significanly higher in macular hole patients compared to ERM patients (12). Chung suggested that this difference might be related to the presence of PVD in these patients. They investigated the correlation between the incidence of vitrectomy related retinal breaks and PVD. They reported that induction of PVD during vitrectomy results in a significantly higher incidence of preoperative and postoperative retinal breaks, and PVD was higher in epiretinal membrane patients (9). The authors suggested that surgeons must be cautious because of the accompanying retinal breaks that occur with PVD induction. In another study, it has been reported that retinal breaks were found more often in eyes, which PVD was induced during surgery (20.8%), compared with the incidence in eyes in which PVD was present already at the start of the surgery (10.0%) (11). It hypothesized that the attached posterior vitreous might be continuous with the attached peripheral vitreous, and trying to advance the detachment might cause an unnecessary traction to the peripheral retina. This might lead to an additional risk of retinal breaks. In our study, we did not perform a complete removal of the peripheral vitreous, and none of our patients had retinal breaks during surgery or retinal detachment during follow up.

One might think that residual vitreous might induce contraction and cause postoperative retinal breaks or retinal detachment. However, we did not observe these complications as we mentioned before. Grosso et al reported that they performed a core vitrectomy in idiopathic epiretinal membranes. They also did not observe any peripheral retinal traction caused by the residual vitreous. They added that duty cycle is extremely important because it may determine possible vitreous traction and consequent retinal tears (13).

In conclusion, limited vitrectomy without removing peripheral vitreous is safe and effective in macular hole surgery. It reduces the risk of peripheral retinal breaks and retinal detachment.

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