Comparison of anatomical and functional outcomes of pars plana vitrectomy for rhegmatogenous retinal detachment with phaco-vitrectomy

Abdulbaki Tanriverdi[1], Omer Ozer[2], Pinar Eroz[3], Erdem Dinc[4], Ozer Dursun[4], Ufuk Adiguzel[5]

ABSTRACT

Purpose: The aim of the present study was to compare the anatomical and functional outcomes in patients who underwent pars plana vitrectomy (PPV) for rhegmatogenous retinal detachment (RD) with those who underwent cataract surgery combined with PPV.

Materials and Methods: A total of 159 eyes of 159 patients who presented to our outpatient clinic with the complaint of vision loss and underwent surgery with the diagnosis of rhegmatogenous RD were included in this study. Patients who underwent 23 gauge PPV combined with standard cataract surgery were included in group 1 (n=62) and patients who underwent 23 gauge PPV alone were included in group 2 (n=97). Demographic data, preoperative and postoperative best corrected visual acuity (BCVA), anatomical success rates, optical coherence tomography findings and complications were recorded.

Results: The median BCVA value before surgery was 0.003 in group 1 and 0.016 in group 2 and the difference was not significant (p=0.69). After surgery, the median visual acuity value in both groups was 0.3 and the increase was significant in both groups (p<0.001 for both groups). Similarly, the postoperative manifest spherical equivalents were similar between the two groups and there was no statistically significant difference (p=0.92). Reoperation was required in 4 patients (6.5%) in group 1 and 15 patients (15.5%) in group 2 due to recurrent detachment and there was no significant difference between the two groups in terms of reoperation rates (p=0.087).

Conclusion: Combined surgery in the treatment of rhegmatogenous RD can be safely performed without serious complications.

Keywords: Cataract, pars plana, rhegmatogenous retinal detachment, surgery, vitrectomy.

INTRODUCTION

Retinal detachment (RD) is defined as the separation of the neurosensory retina from the retinal pigment epithelium (RPE).[1] RD is one of the eye emergencies and delays in diagnosis and treatment can lead to permanent visual loss. RD is clinically classified into three groups as rhegmatogenous, tractional and exudative, with the rhegmatogenous form being the most common.[2] Different methods such as cryopexy, scleral buckling, pneumatic retinopexy and pars plana vitrectomy (PPV) can be applied alone or in combination in the treatment of rhegmatogenous RD.[3] The aim of the treatment is to bring the detached neurosensory retinal tissue back into contact with the RPE. In recent years, PPV has been accepted as the standard method for the treatment of rhegmatogenous RD.[4,5] The main reason for this is the technological advances in vitrectomy devices and surgical equipment. With these advances, success rates have increased significantly and complications have been significantly reduced. In addition to all these factors, it is important to keep in mind that classical detachment surgeries have a long learning curve and require considerable experience. Despite the advantages of PPV, cataract development after vitrectomy, especially in phakic patients, is still an important problem. It has been reported that approximately 80% of patients develop cataract within the first year following vitrectomy,

1- MD, Ophthalmology Clinic, Gölbaşı State Hospital, Adıyaman, Türkiye
2- Assis. Prof., MD, Department of Ophthalmology, Niğde Ömer Halisdemir University, Niğde, Türkiye
3- MD, Ophthalmology Clinic, Tarsus State Hospital, Mersin, Türkiye
4- Assoc. Prof., MD, Department of Ophthalmology, Mersin University, Mersin, Türkiye
5- Prof. MD, Department of Ophthalmology, Mersin University, Mersin, Türkiye

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Correspondence author:
Omer Ozer
Email: omerozer92@gmail.com

which significantly decreases visual acuity.[6,7] This is due to impaired lens nutrition and the effect of the tamponade used. In recent years, combined surgery has become common in phakic patients, thus eliminating the need for a second surgery.[8] However, some vitreoretinal surgeons avoid combined surgery due to possible complications. The aim of the present study was to compare the anatomical and functional outcomes in patients who underwent PPV for rhegmatogenous RD with patients who underwent PPV combined with cataract surgery.

MATERIALS AND METHODS

Prior to this study, the necessary ethical permissions were obtained from Mersin University Clinical Research Ethics Committee (November 03, 2021/23-682). Informed consent was obtained from all patients included in this study and this study was conducted in accordance with the Declaration of Helsinki. Between January 2016 and March 2021, 159 eyes of 159 patients who applied to the outpatient clinic of Mersin University Faculty of Medicine, Department of Ophthalmology with the complaint of visual loss and underwent surgery with the diagnosis of rhegmatogenous RD were included in this study. Patients aged 18-90 years, without previous retinal surgery, newly diagnosed patients with stage 0, A-B PVR, with a minimum follow-up period of six months and regular follow-up visits were included. Patients under the age of 18 years, with previous retinal surgery, with stage C PVR and without regular follow-up visits were excluded from this study. The Lens Opacities Classification System III (LOCS III) was used for lens evaluation in the patients. According to this classification system, patients with NC2 and above, C2 and above or P1 and above underwent cataract surgery. Patients with stages below these levels in the preoperative evaluation were excluded from this study. Patients who underwent standard phacoemulsification surgery combined with standard 23 gauge PPV were included in group-1 (n=62) and patients who underwent only 23 gauge PPV were included in group-2 (n=97). Demographic data, preoperative and postoperative best corrected visual acuity (BCVA), anatomical success rates, optical coherence tomography (OCT) findings and complications were recorded.

All surgeries were performed by a single surgeon under general anesthesia. In cases with combined surgery, a one-piece, monofocal acrylic hydrophobic intraocular lens was implanted into "the bag" and 10/0 nylon suture was placed at the main incision area. Perfluoropropane (C3F8) or silicone oil was used as a tampon at the end of surgery in both groups. All patients were prescribed topical antibiotic-steroid postoperatively. The suture at the main incision area was removed in the postoperative second week, whereas silicone oil was removed after the postoperative third month.

Statistical analysis of this study data was performed with SPSS 24.0 package program. Categorical variables were shown as number and percentage. Continuous variables that conformed to normal distribution were summarized with mean ± standard deviation, while continuous variables that did not conform to normal distribution were summarized with median. Normal distribution of continuous variables was checked by Kolmogorov-Smirnov test. Student's t test was used for the comparison of variables conforming to normal distribution. Variables that did not conform to normal distribution were compared with Mann Whitney U test. Statistical significance level was taken as $p<0.05$ for all comparisons.

RESULTS

The mean age of the patients in group 1 was 58.7 ± 10.2 years, while the mean age of the patients in group 2 was 61.7 ± 10.4 years and the difference was not statistically significant (p=0.08). Regarding gender distribution, 61.3% of the patients in group 1 were male and 38.7% were female. In group 2, these rates were 77.3% and 22.7%, respectively, and the difference was statistically significant (p=0.029).

In group 1, the median value of BCVA was 0.003 before surgery and 0.3 after surgery and the difference was significant (p<0.001). Similarly, in group 2, the median value of BCVA was 0.016 before surgery and 0.3 after surgery, and the difference was statistically significant (p<0.001). However, there was no significant difference between the visual acuities obtained both preoperatively and postoperatively between the two groups (p=0.69, p=0.48, respectively). Similarly, the postoperative manifest spherical equivalents (Diopters - D) were similar between the two groups with no statistically significant difference (p=0.92). The distribution of "macula on" and "macula off" cases was similar in the two groups. Reoperation was required in 4 patients (6.5%) in group 1 and 15 patients (15.5%) in group 2 due to recurrent detachment and there was no significant difference between the two groups in terms of reoperation rates (p=0.087). In addition, when the distribution of tamponade used in both groups was evaluated, this distribution was similar and there was no significant difference between the two groups (p=0.08).

In the early postoperative period, 30.6% of the patients in group 1 had elevated intraocular pressure (20 mm Hg and above) compared to 54.6% in group 2 and the difference was statistically significant (p=0.003). However, the difference was not significant in long-term follow-up. Epiretinal membrane (ERM) development was observed in 53.2% of patients in group 1, while this rate was 47.4% in group 2 and the difference was not statistically significant (p=0.47). In addition, the rates of macular hole (MH) development, presence of intra and/or subretinal fluid and cystoid changes were similar in both groups and the difference was not statistically significant (p=0.52, p=0.72 and p=0.77, respectively). In the long-term follow-up of the patients, 2 patients (3.2%) in group 1 required ERM surgery, while 5 patients (5.2%) in group 2 required ERM surgery and 1 patient required MH surgery. There was no significant difference between the two groups (p=0.6). (Table 1)

DISCUSSION

Combined cataract-vitrectomy surgery in the treatment of rhegmatogenous RD is viewed with skepticism because of the complications that may occur and the surprising refractive errors that may be observed in the postoperative period. However, the results obtained from many studies in the literature show that the anatomical results are similar in cases with both combined surgery and PPV alone.[9,10] The results obtained in the present study were similar to the studies in the literature and no difference was found between the two groups in terms of anatomical success rates and the need for reoperation. In addition, the anatomical success rates obtained with a single surgery appear to be consistent with the literature.

Although similar anatomical success rates were obtained with both combined surgery and PPV alone, the available data on functional outcomes are controversial. A meta-analysis by Mirshahi et al. reported that postoperative visual acuity was better in patients who underwent PPV alone.[10] However, unlike this meta-analysis, there are studies in the literature suggesting that visual acuity was similar.[11] In the present study, postoperative visual acuity was similar and there was no significant difference between the two groups.

One of the most important problems that can be observed as a result of combined surgeries is unpredictable refractive errors and the main reason for this is the anterior displacement of the retina. As a result, erroneous lens power calculation may be encountered. Studies have reported that myopic shift may occur after combined procedures.[9,11,12] However, it is noteworthy that the amount of this shift is not large enough to require additional surgery. In the present study, there was no significant difference in manifest spherical equivalents between the two groups.

In a meta-analysis evaluating the results of combined phaco-vitrectomy and vitrectomy in the treatment of

Table 1: *Demographic data and surgical outcomes of the patients.*

	Grup 1	Grup 2	p
	n = 62	n = 97	
Age (years)	58.7 ± 10.2	61.7 ± 10.4	0.08
Male (n,%)	38 (61.3)	75 (77.3)	0.029
Female (n,%)	24 (38.7)	22 (22.7)	
Preoperative VA	0.003 (0.001 - 1)	0.016 (0.001 - 1)	0.697
Postoperative VA	0.3 (0.001 - 1)	0.3 (0.001 - 1)	0.484
ERM	33 (%53.2)	46 (%47.4)	0.475
IRF and/or SRF	7 (%11.3)	8 (%8.2)	0.522
Macular Hole	3 (%4.8)	6 (%6.2)	0.72
Cystoid degeneration	10 (%16.1)	14 (%14.4)	0.771
IOP elevation	19 (%30.6)	53 (%54.6)	0.003
Silicone oil	53 (%85.5)	91 (%93.8)	0.08
Perfluoropropane (C3F8)	9 (%14.5)	6 (%6.2)	

VA: Visual acuity, ERM: epiretinal membrane, IRF: intraretinal fluid, SRF: Subretinal fluid, IOP: intraocular pressure

rhegmatogenous RD, the frequency of hyphema and iris trauma was similar between the groups, while fibrin formation and pupillary synechiae were reported to be significantly higher in the combined surgery group.[13] There was also no difference between the two groups in terms of intraocular pressure elevation. In the present study, no serious per-operative complications were encountered in either group; however, it is interesting to note that the number of patients with early intraocular pressure elevation was higher in the PPV-only group. The main reason for this may be that the patients did not pay attention to the lying position and the resulting transient block. Because in the long-term follow-up, the number of patients who experienced elevated intraocular pressure and were started on medication was similar in both groups.

Another controversy over combined surgery is the late postoperative complications, especially vitreomacular surface problems. These complications are associated with more inflammation in combined surgery. A study by Loukovaara et al. showed that postoperative complications were more frequent in patients who underwent combined surgery.[14] Similar results have been obtained in different studies.[10] However, in addition to all these studies, there are studies reporting that the frequency of such complications did not increase.[11] In the present study, there was no finding that late complications were more frequent in the combined surgery group. An important point that should not be forgotten in this discussion is the possible toxic effects of silicone oil used as a tamponade on the retina, especially on the vitreomacular surface.[15] It is very difficult to say whether the vitreomacular surface problems that develop due to these toxic effects are due to combined surgery or silicone oil. When the tamponade used in the present study was analyzed, there was no difference between the two groups.

Another important point to be discussed, especially in western countries, is the economic aspect of the surgeries performed. In an analysis by Seider et al. calculated that combined surgeries resulted in approximately 20% less cost.[16] This may be an advantage of combined surgeries for developing countries like our country with a high patient load. In conclusion, combined surgeries for the treatment of rhegmatogenous RD can be performed safely without causing any serious complications.

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