Primary Rhegmatogenous Retinal Detachment: Scleral Buckling and/or Pars Plana Vitrectomy, Properties of Vitreous Base and Retinal Tears

Primer Yırtıklı Retina Dekolmanı: Skleral Çökertme ve/veya Pars Plana Vitrektomi, Vitre Bazı ve Retina Yırtık Özellikleri*

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ABSTRACT

Purpose: To search the additive effect of scleral buckling (SB) to pars plana vitrectomy (PPV) and to compare the properties of vitreous base and retinal tears in primary phakic (PRD) and pseudophakic (PSRD) rhegmatogenous retinal detachment (RRD).

Materials and Methods: This prospective study compares primary anatomical and functional outcomes statistically in the primary RRD consecutive cases (PRD group 44 cases) who (PSRD group 51 cases) underwent PPV with/without SB. Preoperative and intraoperative fundus findings in terms of vitreous base and retinal breaks were compared statistically.

Results: PSRD group had the width of vitreous base more than 2 disc diameters (DD) (47%), irregular posterior edge of vitreous base attached to the breaks in different meridians. PRD group had 2DD width of vitreous base (95.5%), regular posterior edge of vitreous base . The differences were significant statistically. The redetachment rate was 9/26 (34.6%) in PSRD cases with the width of vitreous base wider than 2DD, 2/25 (8%) with the width of vitreous base within 2DD (p=0.038). The differences of primary anatomical and functional results of PPV+SB and PPV were not significant in both groups.

Conclusions: In this study PPV with vitreous base shaving has been found as effective as PPV+SB based on primary anatomical and functional success in both groups. The width of vitreous base more than 2DD effects the redetachment rate significantly in PSRD cases. The properties of vitreous base and the relation with retinal tears in PRD and PSRD groups should be investigated.

Key Words: Pars plana vitrectomy combined with scleral buckling, primary rhegmatogenous retinal detachment, pseudophakic retinal detachment, scleral buckling.

ÖZ

Amaç: Fakik ve psödofakik primer yırtıklı retina dekolmanı olan olgularda, skleral çökertmenin (SÇ) pars plana vitrektomiye (PPV) olan ilave etkisini incelemek ve vitre bazı ile retina yırtıklarının özelliklerini değerlendirmek.

Gereç ve Yöntem: Bu ileriye dönük çalışmada PPV ve/veya SÇ uygulanan primer yırtıklı retina dekolmanı olan ardışık olgular (Fakik 44, Psödofakik 51 olgu) primer anatomik ve fonksiyonel başarı yönünden istatistiksel olarak incelendi. Ameliyat öncesi ve ameliyat sırasındaki göz dibi bulguları vitre bazı ve retina yırtıkları bakımından istatistiksel olarak karşılaştırıldı.

Bulgular: Psödofakik olgularda 2 disk çapından daha geniş vitre bazı (%47) ve farklı meridyenlerde, yırtıklarla bağlantılı düzensiz vitre bazı arka kenarı mevcuttu. Fakik olgularda vitre bazı genişliği 2 disk çapında idi (%95.5) ve düzenli vitre bazı arka kenarı vardı. Aradaki fark istatistiksel olarak anlamlı idi. İki disk çapından daha geniş vitre bazına sahip olan psödofakik olgularda nüks oranı 9/26 (%34.6) iken vitre bazı genişliği 2 disk çapı genişlikte olanlarda 2/25 (%8) idi (p=0.038). PPV+SÇ uygulanan olgular ile sadece PPV uygulanan olguların primer anatomik ve fonksiyonel başarı oranları arasındaki fark her iki grupta da istatistiksel olarak anlamlı değildi.

Sonuç: Bu çalışmada vitre bazı traşlama ile yapılan PPV, primer anatomik ve fonksiyonel başarı açısından her iki grupta da PPV+SÇ kadar etkili bulunmuştur. Psödofakik olgularda iki disk çapından daha fazla vitre bazı genişliği nüks oranını önemli derecede etkilemektedir. Fakik ve psödofakik retina dekolmanlarında vitre bazı özellikleri ve retina yırtıkları ile olan ilişkileri araştırılmalıdır.

Anahtar Kelimeler: Skleral çökertme ile kombine pars plana vitrektomi, primer yırtıklı retina dekolmanı, psödofakik retina dekolmanı, skleral çökertme.

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INTRODUCTION

Vitreoretinal surgeons subsequently have used various surgical techniques such as pneumatic retinopexy, scleral buckling (SB), pars plana vitrectomy (PPV) with or without SB to repair primary phakic (PRD) and pseudophakic (PSRD) rhegmatogenous retinal detachments successfully.[1,2]

In recent years, pars plana vitrectomy with vitreous base shaving is the primary technique of choice in patients with primary rhegmatogenous retinal detachment. The vitreous base is a band of firm attachment between the collagenous vitreous gel and the posterior part of the pars plana and ora serrata. The collagen fibrils in the anterior vitreous merge with fibrils located beneath the inner limiting lamina (ILL) of the postoral retina and occupying clefts or crypts between the Müller cells. The laminae undergo a complex interdigitation with the vitreous collagen fibrils. In literature an alternative explanation of the development of crypts, is its “reparative” response to peripheral retinal degeneration arising from ischemia or from biomechanical insults.[3-5]

Teng and Chi[6] observed a narrow (<1 mm) posterior vitreous base in eyes of older donors, and clarified the reason as long standing posterior vitreous detachment prevents the further posterior migration of the vitreous base. They also revealed a widening of the zone of attachment up to 3.0 mm postorally with increasing age after the age of 30 years in a study of 68 donor eyes with posterior vitreous detachment. Jing Wang et al.,[7] indicated the change in the average width of the posterior vitreous base with age, increasing up to the age of 80 years and then decreasing slightly. In the same study it is said that the increase in average width of the posterior vitreous base with age being larger in the nasal half than temporal up to 1 mm.

In this study we conducted a prospective comparative consecutive case series evaluating PPV+SB versus PPV for the repair of primary PRD and PSRD. This study aimed to compare the properties of vitreous base and retinal tears and to determine the additive effect of SB to PPV in terms of primary anatomical success and visual acuity acquisition in both groups. For this purpose, we evaluated 44 PRD and 51 PSRD cases who underwent surgery and followed up in our clinic.

MATERIAL AND METHOD

This study was performed in 4th Eye Clinic, Istanbul Beyoglu Eye Education and Research Hospital between January 2007 and September 2009. The risks and benefits of the treatment were explained to the patients and informed consent was obtained in accordance with the Helsinki Declaration before the procedures. The Institutional Review Board/Ethics Committee approved the design of the study.

Fourty four patients with PRD and 51 patients with PSRD were included. Exclusion criteria were, pediatric cases, trauma etiology, degenerative myopia and other ocular morbidities (uveitis, glaucoma, etc.), cases with proliferative vitreoretinopathy of grade C2 or worse and follow up time less than six months.

The ocular history, demographic data such as age, sex, eye, symptom duration (the time between onset of retinal detachment-early signs and symptoms including flashes and floaters and application to hospital), preoperative best corrected visual acuity (BCVA), intraocular pressure (IOP) with applanation tonometry, biomicroscopy, contact and noncontact biomicroscopical fundoscopy, A-B scan ultrasonography (if needed) was recorded.

If any retinal tears were not seen preoperatively, then the tears are named as ‘unseen breaks’. Cases with no visible tears and missing number of tears preoperatively were evaluated as ‘cases with unseen breaks’. Width of vitreus base, the regularity of the posterior edge of vitreus base and ‘unseen breaks’ were named as detachment features.

Marking pen was used for the measurement of the width of vitreous base. Ora serrata is located at Tillaux ring, the distance to the limbus varies 5.5 mm-7.7 mm from nasal to temporal. It is known that the width of vitreous base varies between 4 mm-3 mm from nasal to temporal with increasing age.

This distance was expressed as 2DD practically. Vitreus base posterior edge was localized during the indentation with a marker pen from the conjunctiva, measured radially from the limbus.

The distance of marked point from the limbus was measured with strabismus caliper. It was calculated that regular vitreous base posterior edge could be found 9.5 mm-10.7 mm varying distances to the limbus from nasal to temporal. Measured values smaller than or equal to these distances were considered as cases with the width of vitreous base 2DD and larger values called cases with the width of vitreous base wider than 2DD.

Topical antibiotic and anti-inflammatory drops were applied after surgery for approximatively one month. Patients were discharged within 48 hours after the operation with directions for head positioning, depending on the location of the retinal lesions to secure breaksealing.

Postoperative data collection included BCVA, IOP, anterior segment and fundus examination results. Postoperative complications also were recorded.

All patients were followed by at least six months after removal of silicone oil and six months after disappearance of gas tamponade. Primary anatomical success was defined as single PPV with/without SB surgery to reattach the retina anatomically until the end of documented patient follow-up.

In this study visual acuity acquisition and primary anatomical success rate were compared between the patients who underwent primary PPV and PPV with SB in PRD and PSRD group seperately by statistically. Also the comparisons were made between 20 and 23 Gauge (G) vitrectomy in the same subgroups of PRD and PSRD groups.

Surgical Technique: Pars plana vitrectomy combined with phacoemulsification was applied in phakic cases with or without cataract. Phacoemulsification with superonasal or superotemporal clear corneal incision was performed and hydrophilic acrylic intraocular lens was placed in the bag. Without removal of viscoelastic, corneal incision was sutured. If there was a break in inferior quadrants, SB was added to the surgical procedure. Peritomy and SB with 3.5 mm solid silicone band was performed before sclerotomies. All patients in both groups underwent a standard 3-port 20 or 23 G vitrectomy with 360 degree of vitreous base shaving under scleral depression using a noncontact wide-angle viewing system (EIBOS). A posterior vitreous detachment, if not already present, was created using aspiration with the vitrectomy hand piece or an extrusion cannula. All procedures were performed using high-speed vitreous cutting rates (2000-2500 cuts/minute) with low vacuum settings to allow meticulous removal of the vitreous base region without causing iatrogenic retinal tear. Intravitreal triamcinolone acetonide was injected to assist with identification of retained cortical vitreous during vitreous base shaving. Perfluoro-n-octane and/or air were used to drain subretinal fluid through the anterior or posterior retinotomy in peripheral retina. Endolaser photocoagulation was applied around the retinal tears, holes, degenerative areas, drainage retinotomy and inferior peripheral retina using a 20 or 23 G curved illuminated laser probe. Posterior capsulectomies were created using the vitreous cutter to improve visualization when needed. All patients underwent an air-fluid exchange by flushing with 20 ml of a premixed nonexpansile concentration of perfluoropropan exchange (15%) or silicone oil (1000cst) as a tamponade with postoperative positioning.

The remaining retinal tears were located by meticulous examination of the peripheral retina with an internal microsurgical approach, aided with scleral indentation, or through observation of the Schlieren phenomenon. Posterior vitreous status (totally detached or partially detached), the relations between retinal tears and vitreous base, the width of vitreous base, the regularity of posterior edge of vitreous base, number of breaks(one /two or more breaks), unseen breaks were documented at the end of each operation as peroperative findings.

This study's main outcome measures focused on primary anatomical success rate and visual acuity acquisition differences between the patients with/without SB in PRD and PSRD cases. In terms of the properties of the width of vitreous base, the relation between vitreous base posterior edge and retinal breaks, be either single or multiple tears, PSRD and PRD groups were compared statistically. The effect of the width of vitreous base on primary anatomic success were analyzed statistically.

Statistical Methods: SPSS 15.0 for Windows is used to analyze variables. Statistical analysis was performed using two tailed Student's t test or Fisher's exact test. All tests were applied using 95% confidence interval ($p<0.05$).

RESULTS

This study included 38 female and 57 male patients. There were 44 PRD and 51 PSRD cases.The mean age was 61.12±12.65 (41-76 years) years. The patients were followed at least 10 months. There was not any significant difference between PRD and PSRD groups. Scleral buckling was applied in 30/44 cases in PRD group and 25/51 cases in PSRD group ($p>0.05$). The PRD and PSRD cases were similar.

Both PRD and PSRD groups were evaluated based on the mean age, the mean preoperative BCVA, the mean duration of retinal detachment and macula on/off retinal detachment status preoperatively as shown in Table 1.

Table 1: *Preoperative findings of pseudophakic and phakic retinal detachment cases.*

	PSRD (n=51)	PRD (n=44)	p value
Mean time of RD (days)	36.4±39.4 (3-210)	32.27±28.4 (1-150)	0.5
Mean age (years)	61.18±12.50 (25-83)	61±0.70 (39-78)	0.73
Preoperative BCVA (logMAR unit)	2.47±0.89 (3.10-0.00)	2.41±1.0 (3.10-0.25)	0.8
Macula-off cases	44 (86.27%)	37 (84.09%)	0.47

RD; *Retinal Detachment,* ***BCVA;*** *Best corrected visual acuity,* ***n;*** *Number of cases,* ***p value;*** *Statistically significance value, significant p<0.05,* ***PSRD;*** *Pseudophakic Retinal Detachment,* ***PRD;*** *Phakic Retinal Detachment.*

Table 2: *Preoperative and postoperative findings of 23/20 G PPV cases in phakic and pseudophakic groups.*

	PRD		**PSRD**	
	23 G PPV (n=18)	**20 G PPV (n=26)**	**23 G PPV (n=17)**	**20 G PPV (n=34)**
Mean time of RD(day)	24.06±33.25	37.43±31.43	28.06±32.25	32.43±34.43
	(4-150)	(1-90)	(10-210)	(3-120)
Preoperative BCVA	2.34±0.94	2.60±0.98	2.70±0.84	2.35±1.00
(logMARunit)	(3.10-0.25)	(3.10-0.30)	(3.10-0.40)	(3.10-1.80)
Mean age(year)	58.30±11.16	62.86±7.75	59.30±11.21	63.86±6.75
	(39-79)	(46-75)	(49-82)	(41-79)
Visual acuity	-1.27±1.57	-1.33±1.39	-1.86±0.83	-1.37±0.88
acquisition(logMARunit)	(-3.0-0.40)	(-3.10-0.80)	(-2.95-(-)0.25)	(-2.95-(-)1.00)

RD; *Retinal Detachment,* ***BCVA;*** *Best Corrected Visual Acuity,* ***G;*** *Gauge,* ***PPV;*** *Pars Plana Vitrectomy,* ***PRD;*** *Phakic Retinal Detachment,* ***PSRD;*** *Pseudophakic Retinal Detachment.*

Both in PRD and PSRD groups, cases who underwent either 20 G or 23 G PPV, were evaluated based on the mean age, the mean duration of retinal detachment, the mean preoperative BCVA, visual acuity acquisition and primary anatomical success (Table 2). There were no statistical differences between 20 and 23 G subgroups in PRD and PSRD groups. We decided not to divide the groups as 20 and 23 G PPV, both 20 and 23 G subgroups of PRD and PSRD groups were accepted as similar.

Properties of Retinal Breaks: According to the records of detachment features, there were one break in 28/44 (63.6%) of PRD group and 22/51 (43%) of PSRD group, two and more breaks were found in 16/44 (36.3%) in PRD group, and 29/51(65%) in PSRD group (p=0.046). The rate of unseen retinal breaks was 16/44 (36.3%) in PRD group, 38/51(74.5%) in PSRD group. The difference was statistically significant (p=0.00).

Tear Location and Vitreus Base: The posterior vitreous detachment was uncompleted in 9/44(20.5%) eyes in PRD group, in 2/51 (4%) eyes in PSRD group (p=0.012). The posterior edge of the vitreous base was expanded more than 2DD to the posterior retina in 2/44 (4.5%) eyes in PRD group, but this rate was 26/51 (51%) in PSRD group (p=0.000). 42/44 (95.4%) eyes in PRD and 25/51 (49%) eyes in PSRD group had the width of vitreus base within 2DD. In PRD group, the breaks were attached to vitreous base posterior edge or not. If the breaks were posterior to the vitreous base, there was a little vitreous collagen between vitreous base posterior edge and retinal breaks. In PSRD group the width of vitreous base was different in different quadrants, so borderline of posterior edge of vitreous base was irregular. For example, in one quadrant the posterior edge of the vitreous base location was at equator and in other quadrants it continued to anterior of the equator. In PSRD group some of the breaks were attached to the posterior edge of the vitreous base and others were juxtabasal or more posterior tears, the meridional locations of breaks were different in the same eye. The locations of retinal breaks were at the equator in 13/44 (29.5%) eyes and at anterior of equator in 31/44 (70.5%) eyes in PRD group. In PSRD group these rates were 18/51 (35.2%) and 33/51 (64.8%), respectively. The locations of breaks were similar (p=0.66).

Table 3: *Primary anatomical success and redetachment according to the mean duration of retinal detachment.*

	Mean Duration of Retinal Detachment (days)	
	PSRD	**PRD**
Primary Anatomical Success	28.6±37.8 days	44.55±58.54 days
Retinal Redetachment	94.11±120.4 days	23.00±26.3 days
p value	0.02	>0.05

p value; *Statistically significance value, significant p<0.05,* ***PSRD;*** *Pseudophakic Retinal Detachment* ***PRD;*** *Phakic Retinal Detachment.*

Anatomic Success: The redetachment rate was 3/44 (6.8%) in PRD group after silicone oil removal (all three eyes failed due to PVR) and 11/51 (21.5%) in PSRD group, 7 of PSRD cases redetached under silicone oil tamponade, 4 redetached after silicone oil removal (6 failed due to PVR and 5 failed due to PVR and holes). When the relation between the duration of retinal detachment and redetachment rate was compared, it was seen that the mean duration of retinal detachment was 28.6±37.8 days in cases who had primary anatomical success and 94.11±120.4 days who redetached in PSRD cases (p=0.02). In PRD group, the mean duration was 44.55±58.54 days in cases who had primary anatomical success and 23.00±26.31 days in cases who redetached (p>0.05), (Table 3).

The primary anatomical success rates were 29/30 (97%) in PPV+SB and 12/14 (85%) in PPV subgroups of PRD group .The redetachment rate was 1/30 (3%) in PPV+SB and 2/14 (15%) in PPV subgroups of PRD group (p=0.18).

The primary anatomical success rates were 18/23 (78%) in PPV+SB subgroup and 22/28 (78.6%) in PPV subgroup of PSRD group.

The redetachment rate was 5/23 (%21.7) in PPV+SB subgroup and 6/28 (21.4%) in PPV subgroup of PSRD group with an insignificant difference (p=0.97).

The redetachment rate was 9/26 (34.6%) in PSRD cases with the width of vitreous base more than 2DD, 2/25 (8%) with the width of vitreous base within 2DD, the difference was statistically significant (p=0.038). The effect of vitreous base on primary anatomical success rate in PRD cases was not analyzed statistically because of 3/44 redetached cases.

Visual Acuity Results: Preoperative and postoperative visual acuities were 2.41±1.00 logMAR unit and 0.64±0.50 logMAR unit in PRD group, 2.47±0.89 logMAR unit and 0.93±0.55 logMAR unit in PSRD group, respectively. In both groups the difference between preoperative and postoperative visual acuities was highly significant statistically (p=0.000).

Visual acuity acquisition was -1.32±1.39 logMAR and -1.66±1.18 logMAR in PPV and PPV+SB subgroups of PRD group (p>0.05). Visual acuity acquisition was -1.42±1.34 logMAR and -1.48±0.79 logMAR in PPV and PPV+SB subgroups of PSRD group, respectively (p>0.05).

There was no statistically significant differences for preoperative visual acuity between PPV and PPV+SB subgroups of PRD and PSRD cases as shown in Table 4.

The rates of reaching a final vision better than or equal to 0.4 in PPV and PPV+SB subgroups of PSRD and PRD cases were 7/23 (8.6%) and 10/28 (25%) (p=0.31); 10/30 (33.33%) and 11/14 (78.4%), (p=0.49), respectively. The differences were statistically insignificant (p>0.05).

Table 4: *Preoperative visual acuity in PPV and PPV+SB subgroups of PRD and PSRD cases.*

	Preoperative visual acuity	
	PRD	**PSRD**
PPV	2.13±1.09 logMAR	2.35±0.95 logMAR
PPV+SB	2.55±0.90 logMAR	2.67±0.75 logMAR
p value	>0.05	>0.05

PPV; *Pars Plana Vitrectomy,* ***PRD;*** *Phakic Retinal Detachment, Scleral Buckling,* ***PSRD;*** *Pseudophakic Retinal Detachment,* ***p value;*** *Statistically significance value, significant p<0.05.*

DISCUSSION

A variety of options are available for rhegmatogenous retinal detachment repair, including pneumatic retinopexy, SB, PPV alone or in combination with a scleral buckle.[8-10] While SB surgery is the traditional method of retinal detachment repair, the use of vitrectomy surgery is on the rise.

The most important advantage of PPV over SB is better visualization of peripheral retina. In literature the rate of unseen breaks preoperatively is reported as 2-22% and presence of one break is reported as 50%.[11,12] Latikainen has determined the rate of retinal tears more than one as 40.9%.[13]

In this study the rate of unseen retinal breaks was 13/44 (28.6%), one break was 28/44 (63.6%), two and more breaks was 16/44 (36.3%) in PRD group. Detection of pseudophakic retinal breaks is generally difficult due to their anterior location and small size. Pseudophakic breaks are typically tears with small flap or oval holes located just at the posterior border of the vitreous base, tears with large flap are occasionally seen.

In our study, it was determined that a dense and large vitreous base also cause to unseen breaks. In literature the rate of unseen breaks preoperatively in PSRD cases is about 5-29.8%[14-17], it is reported that lower rates of primary anatomical success of SB rather than PPV in PSRD cases is due to unseen breaks in these cases.

In this study unseen breaks rate was 38/51 (74.5%). This rate is higher than the rate given in reviewed literature. The fundus properties that differ PSRD cases from PRD cases were unseen breaks, expanded vitreous base (4.5% in PRD vs 51% in PSRD groups), especially different width of vitreous base at different quadrants, irregular posterior vitreous edge and tears located in different meridians.

We think that the reason of insufficient primary anatomical success with SB alone may due to the tears located more than two disc diameters away from the ora serrata, multiple tears, unseen breaks, irregular posterior edge of vitreous base in PSRD cases.

According to this, we think that it's unlikely to know how many tears or holes can be sealed after SB surgery even though it is successful anatomically. Tears can be seen 94-100% during PPV.[18-20] It's said that this advantage increases primary anatomical success rate.

In this study all tears and holes are seen with PPV. The similar primary anatomical success rates between PPV and PPV combined with SB make us think that the procedure providing primary anatomical success is PPV.

Some authors report similar primary anatomical success rates between PPV with vitreous base shaving and PPV combined with SB in phakic retinal detachment cases with PVR.[21] In a different study authors find higher functional success rates with PPV than PPV combined with SB group and no difference in primary anatomical success rates between two procedures.[22] In a phakic rhegmatogenous retinal detachment study including 61 eyes RajVardhan Azad et al.,[23] reported similar results between PPV group and SB group interms of primary anatomical and functional success.

Investigators recommend SB in phakic cases without media opasification because of cataract complication in PPV with a rate of 17%. Tewari et al.,[24] in a randomized trial of 44 eyes with unseen retinal breaks, reported no statistically significant differences in either reattachment rates or visual outcomes between a 360 degree SB and a combined procedure of SB with PPV, suggesting that SB alone is an effective technique in the primary management of uncomplicated RRD with unseen retinal breaks (if the media is clear).

Similarly, in a retrospective study, Halberstadt et al.,[25] observed that the anatomical and functional outcome of primary retinal reattachment surgery for patients with phakic or pseudophakic eyes was the same for SB alone or PPV combined with SB.

However, a prospective, non-randomized clinical study by Devenyi et al.,[26] concluded that a combined approach of PPV with SB offers significant benefits over SB alone, including improved success rates (primary reattachment of combined surgical approach 100%).

In the mentioned study; however, reattachment rates with a single approach (SB or PPV) were not assessed. Moreover, increased complications associated with the combined surgical approach remains unclear. It is tempting to speculate that the complication rate of combined procedures may approach the summation of that observed for each procedure alone.

In this study all phacic eyes underwent PPV; PPV combined SB applied to 30 eyes and PPV alone 14 eyes. The detachment rates were 1/30 (3%) and 2/14 (15%) in PPV+SB and PPV subgroups of PRD group, respectively, and the difference was statistically insignificant ($p>0.05$). Although SB supports vitreous base completely in PRD group, we have detected that SB did not provide additive effect in preventing redetachment if vitreous base shaving has been performed during PPV. Surgeons prefer PPV with or without SB in PSRD cases. In literature primary anatomical success rate in PSRD cases reported as 63-93%.[18-20,27-31] Final anatomical success rate is 97-100%.

In this study primary anatomical success rate was 22/28 (78.5%) in PSRD cases applied PPV alone. Primary anatomical success rate has been reported as 79% in PSRD cases applied PPV combined with SB.[19] In this study, this rate was 18/23 (%78).

There are not many studies about comparison of PPV and PPV combined SB in PSRD cases in literature. Moreoften it is evaluated primary surgery is PPV or SB. Reported primary anatomical success rate,which is about 57-89%, is lower in PPV group than SB group.[32-34]

In a study it is reported that there is no difference between the primary anatomical success rates of PPV and SB[17] others have reported that primary anatomical success rate is significantly higher in PPV.[27-35] PPV alone has been reported to be successful at least up to SB in PSRD cases.[17,18,31] The studies about PPV and PPV with SB comparison have reported no additional efficacy of SB.[26]

In this study, primary anatomical success rate was 78.4% both in PPV and PPV combined with SB in PSRD cases. SB had no additional efficacy in preventing redetachment. The use of combined surgical approaches has also been an active area of investigation. However, again, results from multiple clinical studies have been conflicting.

In a prospective, randomized study, Stangos et al.,.[36] recently reported that PPV is as effective as PPV with an additional encircling buckle for pseudophakic patients with RRD, and has the benefit of fewer intraoperative and postoperative complications.

Sharma et al.,[37] also reported that successful reattachment of primary RRD with inferior breaks can be achieved with PPV alone, and that supplementary SB is unnecessary.

In this study it has been shown SB has no additional efficacy in achieving primary anatomical success in both PSRD and PRD cases. Michael Kinori et al., also reported that primary anatomical success rate was 92% in the phakic and 77.5% in the pseudophakic patients in PPV group ($p=0.11$), in the PPV plus SB group, it was 87.5% and 86.7% respectively ($p=0.91$).[38] They indicated that the addition of a SB did not improve the primary anatomical success rates and the final visual acuity for noncomplex retinal detachment.

Pournaras and Kapetanios compared PPV and PPV plus SB in pseudophakic retinal detachments and found no statistical difference between the techniques.[39] A study that evaluated PPV and PPV plus SB for the repair of noncomplex pseudophakic retinal detachment showed similiar primary anatomic success rates.[40]

In PSRD cases we think the reason that addition of SB to PPV has no supplementary efficacy is due to the fluid passing from tears or holes which can not be supported by SB because of the varied width of vitreous base, tears located different meridians, many missed tears preoperatively, while one tear is supported by SB another one may remain posterior to SB and lastly tractions secondary to membranes caused by PVR.

Inferior tears have been reported to be a risk factor for retinal detachment. We believe SB can decrease the effect of tangential contractions secondary to PVR because tears are located commonly at the posterior border of the normal width of a vitreous base supported by SB in PRD cases. But it is seen that a complete PPV with vitreous base shaving is effective as much as PPV combined SB. It is shown SB additional to a complete PPV has no supplementary efficacy in achieving primary anatomical success in PRD cases. In this study, insignificant differences have been identified between preoperative, postoperative visual acuity and visual acuity acquisitions of PPV and PPV + SB subgroups of PRD and PSRD groups.

Postoperative functional success is said to be related with macula on/off detachment status.[19,28,41,42] It is also said that how much the visual acuity is bad, the visual acuity gain is better and this is regardless of macula on/off retinal detachment status.[43] In this study, macula off retinal detachment status was 37/44 (84%) in PRD and 44/51(80%) in PSRD group ($p>0.05$). There was no significant difference between PSRD and PRD groups, in terms of preoperative visual acuity and macula on/off retinal detachment status.

Although it is reported that visual acuity is lower in PSRD cases than PRD cases due to preoperative and postoperative cystoid macular edema, postoperatively significant visual acuity acquisition is achieved in both groups. Postoperative the mean visual acuity and visual acuity acquisition are similar between two groups. In our opinion it is not easy to determine macula on/off retinal detachment status preoperatively without optical coherence tomography. It is more likely to misjudge an onset macular detachment as undetached macula during fundoscopy. In literature macula on/off retinal detachment status is determined by fundoscopy. Because of the mentioned reason, we think that these misjudgments cause different results about the efficacy of macula on/off retinal detachment status on visual acuity acquisition.

When the relation between the mean duration and redetachment rate in PSRD cases is evaluated, the mean duration was 28.6±37.8 days and 94.11±120.4 ($p=0.02$) in cases without redetachment and those with redetachment, respectively.

The mean duration detachment was 44.55± 58.54 days and 23.00±26.31 days in PRD cases without redetachment and those with redetachment ($p=0.42$).

In PRD group, the relation between the mean duration of retinal detachment and redetachment rate cannot be compared as the number of redetached cases is only three. Redetachment rate was higher in PSRD cases with the longer mean duration. Mean duration seems as an important factor in PSRD cases.

In this study, vitreous base properties were recorded peroperatively as all cases underwent PPV. Phakic cases had mostly the width of vitreous base within 2DD and regular vitreous base posterior edge. Locations of tears in phakic and pseudophakic cases, to be seen more often at equator and anterior of equator, were similar. But pseudophakic cases had mostly the width of vitreous base more than 2DD and irregular posterior edge of vitreous base and retinal tears attached to the posterior edge of the vitreous base, so the breaks were in different meridians.

The pseudophakic cases with expanded vitreous base more than 2DD away from the ora serrata were 51% and 9 of 11 redetached cases (81%) had the width of vitreous base more than 2DD.

In addition to aging, there may be factors that push the vitreous base back more in PSRD cases, as the recurrence rate is high in this group, this finding suggests that expanded vitreous base more than 2DD is an important status for recurrence in PSRD cases. Metabolic, toxic or inflammatory pathologies that lead to vitreous base expansion in PSRD cases is not clear today.

In our opinion, as a result of cataract surgery, loss of metabolic exchange between peripheral retina and lens material, exposure to different wavelengths of the light, thermal effects may lead to degenerative changes in peripheral retina and ILL. In phakic cases there were the width of vitreous base as 2DD and the posterior edge of vitreous base was regular.

Shaving of peripheral retina with high indentation in PSRD cases may pull the vitreous fibers that invade the defects in ILL and lead to reactionary proliferation of glial cells in exposed defects, we think this situation might appear as PVR.

In the literature SB surgery was presented a highly effective procedure with encouraging outcomes independent of the patients' refractive error and almost equally successful in phakic, aphakic and pseudophakic patients. It could not demonsrate that PPV success rates are higher than SB surgery[44], in this study PPV has been found as effective as PPV combined with SB based on primary anatomical and functional success in PRD and PSRD cases.

Consequently, because of the width of vitreous base wider than 2DD, lack of equal distance posterior edge of vitreous base at each quadrant, tears that is associated with posterior edge of vitreous base settled in different meridians and missing tears preoperatively at psödofakik patients, primary vitrectomy should be preferred.

In phakic cases if the location of the tears allow to be secured with a buckle than a SB chance can be tried, though, the primary vitrectomy offers the desired anatomical and functional success. The width of vitreous base more than 2DD can be a risk factor for PSRD cases. The properties of vitreous base, its relation with retinal tears and the anatomical results should be investigated and discussed in larger primary rhegmatogenous retinal detachment case series.

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