

## Research Article

# Comparison the Results of Pars Plana Vitrectomy (PPV) With and Without an Encircling Scleral Band (SB) for the Repair of Primary Rhegmatogenous Retinal Detachment

Mehmet Demir\*<sup>1,2</sup> Dilek Guven,<sup>1</sup> Ali Atakhan Yıldız,<sup>1</sup> Orhan Kara<sup>1</sup>

<sup>1</sup> Sisli Etfal Training and Research Hospital, Department of Ophthalmology

<sup>2</sup> Halsakargazi caddesi Etfal sokak. Etfal Hastanesi. Sisli, Istanbul, Turkey

### Corresponding author

Mehmet Demir

E-mail: [dmehmetf@hotmail.com](mailto:dmehmetf@hotmail.com)

**Abstract: Purpose:** To compare the results of pars plana vitrectomy (PPV) with and without an encircling scleral band (SB) for the repair of primary rhegmatogenous retinal detachment (RRD). **Methods:** We reviewed the records of 49 patients who underwent PPV and combined vitrectomy plus SB for primary RRD. The minimum follow-up time was 6 months. There were 25 eyes in the PPV group and 24 eyes in the PPV plus SB group. Anatomic success, baseline and final best-corrected visual acuity (BCVA), and complications were evaluated. **Results:** Mean follow-up was 15.2±8.1 months and 15.5±9.4 months in the PPV group and PPV plus SB group, respectively. The anatomical success rate after a single operation was 96.0% in the PPV group and 95.8% in the PPV plus SB groups (P=0.33). Final BCVA was 0.90±0.72 logMAR in the PPV group and 0.80±0.74 logMAR in the PPV plus SB group (P=0.38). The visual gain was similar in both groups (P=0.76). Glaucoma was recorded in both cases in each group. Endophthalmitis was not recorded in any group. **Conclusion:** The final BCVA, rate of anatomic success and complications were similar in the PPV and PPV plus SB groups. Addition of SB to perform a 23-gauge PPV had no significant effect on the outcomes of RRD.

**Keywords:** pars plana vitrectomy, scleral band, anatomic success, functional success

## INTRODUCTION

Retinal detachment can be defined as the separation of the neurosensory retina from the underlying retinal pigment epithelium (RPE). Direct apposition of the retina to the RPE is essential for normal retinal function, and retinal detachment involving the foveal center leads to a profound loss of vision in the affected eye [1,2]. Rhegmatogenous retinal detachment (RRD) is the most common form of retinal detachment, where a retinal “break” allows for the ingress of fluid from the vitreous cavity to the subretinal space, resulting in retinal separation. The term “retinal break” refers to a full-thickness defect in the neurosensory retina.

## METHODS

The charts of 49 patients who underwent pars plana vitrectomy (PPV) and PPV plus encircling scleral band (SB) for RRD from January 2008 to September 2012 were reviewed. The patients were divided into 2 groups. The PPV group (Group 1) included 25 (51%) patients, and the PPV plus SB group (Group 2) included 24 (49%) patients. Standard three-port PPV (23 gauge) was performed using the Accurus vitrectomy systems (Alcon, Accurus 800 cs, Fort Worth, Texas, USA), with the sclerotomies placed 3.5 mm posterior to the limbus. A silicone scleral band-240 was used to encircle the sclera (5.0 non-absorbable sutures were used), 13–15 mm from the limbus. Silicone oil 1000 centistokes was used in all patients as a retinal tamponade. Retinal

nerve fiber layer (RNFL) thickness was measured in patients with intraocular pressure (IOP) >21 mmHg using optical coherence tomography (RTVue-100; Optovue, Fremont, CA). Baseline and final BCVA, the localization of the tear or detachment, as well as the rates of anatomic success and complications were compared between groups.

The following patients were excluded: those who were under 18 years of age, those with proliferative vitreoretinopathy (PVR) of grade C or worse, those with diabetes mellitus, those with detachment secondary to trauma and exhibiting signs of retinal dialysis.

All procedures were performed in accordance with the declaration of Helsinki. The Ethics Committee approved the study. Number Cruncher Statistical System (NCSS, 2007) software was used to evaluate the results of the study. Descriptive statistical methods (mean, standard deviation, median, interquartile range) and the independent t-test were used together to compare the data from both groups and the parameters that exhibited anormal distribution. The Wilcoxon (z) test was used to compare preoperative to postoperative data. The Mann–Whitney U test was used to compare the parameters when both subgroups did not exhibit a normal distribution. Chi-square and Fisher exact tests were used to compare the qualitative data. A value of P<0.05 was considered significant.

**RESULTS**

Mean age and gender are summarized in Table 1. BCVA increased in the PPV and PPV plus SB groups (P=0.008, P=0.023, respectively). Preoperative BCVA, presence of a lens (phakic, pseudophakic, aphakic), tear status, and localization of the detachment (inferior, superior and unseen tears) were similar in both groups. The operations were performed by 3 surgeons who have been performing vitrectomies for 5–8 years.

**Table 1: Demographic characteristics of patients for baseline and the end of follow up time.**

Parameters	Group 1 (PPV); n=25	Group2(PPV+SB); n=24	P*
Age (mean±SD)	58.88±14.51	54.21±15.16	NS
Gender (female/male)	10/15	8/16	NS

PPV: pars plana vitrectomy, \* Independent t test, SD: standard deviation, SB: scleral encircling band, NS: nonsignificant.

Mean BCVA improved from a preoperative mean of 1.40±1.05logMAR to 0.9±0.72logMAR postoperatively (P=0.008) in PPV group. Mean BCVA improved from a preoperative mean of 1.30±0.95 to 0.80±0.74 logMAR,(P=0.023) in the PPV plus SB group.

Final BCVA was similar in both groups (P=0.38). Upon completion of the follow-up period, the rates of anatomical success and postoperative complications were similar in both groups. Retinal reattachment was ultimately achieved in 24 of 25 eyes (96.0 %) in group 1 and in 23 of 24 eyes (95.8 %) in group 2 (P=0.54). Lens surgery was performed owing to the presence of cataract or to facilitate the surgeon’s visualization during surgery in 90.1% of the patients in group 1 and 100% in group 2. Glaucoma (IOP>21 mmHg in association with RNFL detected by OCT) was recorded in 2 (8.0%) cases in group 1 and in 2 (8.3%) cases in group 2 (P=0.85). One case of keratopathy was recorded in each group. No instance of endophthalmitis was recorded in either group (Table 2).

**Table 2: Surgical data of patients for preoperative and postoperative.**

Parameters	Group 1(PPV); n=25	Group2(PPV+SB);n=24	P*
Mean follow-up (months)	15.2±8.1	15.5±9.4	NS
Preoperative VA(logMAR)	1.40±1.05	1.30±0.95	NS
Postoperative VA (logMAR)	0.90±0.72	0.80±0.74	NS
<b>Complications</b>			
Glaucoma	2	2	NS
Keratopathy	1	1	NS
Endophthalmitis	0	0	NS

\* Independent t test ; PPV: pars plana vitrectomy; SD: standard deviation; NS: non significant, BCVA: best corrected visual acuity; logMAR: logarithm of the minimum angle resolution; SB: scleral band encircling; RRD: rhegmatogenous retinal detachment.

**DISCUSSION**

A variety of options are available for retinal detachment repair, including pneumatic retinopexy, scleral buckling, and vitrectomy alone or in combination with a scleral buckle. The use of a scleral buckle in combination with episcleral elements has been described previously [3,4,5]. Machemer introduced pars plana vitrectomy (PPV) by Machemer [6] for the repair of retinal detachments.

The use of PPV for the primary repair of RRD has gained increasing acceptance [7,8,9]. PPV was initially reserved for patients in whom scleral buckling was thought to be difficult, e.g., in patients with media opacities, posterior breaks, or multiple tears [10]. Over time, more indications have been added and it is now the treatment of choice in many cases. While scleral

buckle surgery is the most common approach to the repair of retinal detachments [11] the potential advantages of vitrectomy without scleral buckling include minimal trauma to the eye, reduced pain and postoperative swelling, minimal postoperative changes in refractive error; reductions in the number and frequency of floaters; and a clearer view of breaks and reattachment during the surgery. A prospective study showed that mean operating time was significantly lower in the PPV group than in the PPV plus SB group [12]. Mean operating time could not be examined here because the information had not been recorded in the charts. In comparison to the conventional PPV, the PPV plus SB approach involves more pain for the patient and more discomfort for the surgeon. The latter therefore requires the use of general anesthesia.

Various authors have shown that vitrectomy with vitreous shaving and without scleral buckling can achieve approximately the same rate of anatomic success as vitrectomy with SB in eyes with PVR; moreover, an encircling SB is not needed for the reattachment of a retina with PVR, as long as all of the peripheral vitreous is removed and all retinal breaks are repaired [13]. Another study reported that the difference in the rate of secondary surgical procedures was similar in PPV and PPV plus SB groups [14].

A retrospective comparative case series found that the final anatomic success was 98.9% in patients treated with vitrectomy alone and 98.8% in patients in whom vitrectomy was combined with an encircling SB [15]. Similar results were reported in a study of 2 groups that underwent either vitrectomy or vitrectomy plus SB for the treatment of retinal detachments with inferior breaks [16]. In this study, we observed that the final visual acuity and the rate of anatomical success were similar in both groups. At the end of the follow-up period, the rate of retinal reattachment was 96.0% in group 1 (PPV) and 95.8% in group 2 (PPV plus SB) ( $P=0.332$ ). The rates of anatomical and functional success in our study were similar to those of some previously published studies; however, the mean follow-up duration of our study was longer than that of the previous studies [15,17]. Current surgical techniques can obtain high rates of anatomical and visual success in patients with retinal detachment [18]. In this study, as in others, postoperative complications were similar in the PPV and PPV plus SB groups [19]. Glaucoma was noted in 8.3% of the patients in group 1, and 8.0% of the patients in group 2 ( $P=0.94$ ). The gain in BCVA was similar in both groups ( $P>0.05$ ). These results showed that the addition of SB to PPV provides no advantage in the context of RRD surgery.

There are a number of limitations to this study. It was a retrospective study; the sample size was small; silicone oil was used for retinal tamponade in all patients; and the mean time required for surgery was not recorded.

## CONCLUSION

In conclusion, PPV with and without an encircling SB achieves similar functional and anatomic outcomes in the majority of patients who treated for rhegmatogenous retinal detachment. Pars plana vitrectomy appears superior to PPV plus scleral buckling in the treatment of patients with RRD with PVR < grade C.

## Conflict of interests:

Authors have no conflict of interest.

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