Clinical Ophthalmology

Dovepress
Taylor & Francis Group

Open Access Full Text Article

ORIGINAL RESEARCH

# Outcomes in Recurrent Rhegmatogenous Retinal Detachment Repair: Does Scleral Buckling at Primary or Secondary Surgery Impact Results?

Mélanie Hébert, Jérôme Garneau, Sihame Doukkali, Serge Bourgault, Mathieu Caissie, Éric Tourville, Ali Dirani

Department of Ophthalmology, Hôpital du Saint-Sacrement, CHU de Québec – Université Laval, Quebec City, Canada

Correspondence: Ali Dirani, Department of Ophthalmology, Hôpital du Saint-Sacrement, 1050 Ste-Foy Street, Quebec City, QC, G1S 4L8, Canada, Tel +1-418 525-4444, Email drdirani@gmail.com



**Background/Objectives:** To analyze outcomes in recurrent rhegmatogenous retinal detachment (re-RRD) repair using pars plana vitrectomy (PPV) combined with scleral buckle (SB) at the first or second surgery.

**Subjects/Methods:** Patients with primary uncomplicated RRD at initial presentation who were operated for re-RRD between 2014 and 2018 were included in this retrospective cohort study (n = 127). Patients were compared based on first and second surgery sequence: PPV then PPVSB (PPV-PPVSB: n = 51, 40%), or PPVSB then PPV (PPVSB-PPV: n = 76, 60%). Anatomical and functional outcomes were evaluated with second surgery success (2SS) defined as absence of reoperation after the second surgery and final pinhole visual acuity (PHVA) in logarithm of the minimum angle of resolution (logMAR), respectively.

**Results:** Mean age at initial presentation was 65.7 years. There were 78 (61%) men and 56 (44%) pseudophakic patients. Median [Q1, Q3] baseline PHVA in logMAR was 0.70 [0.18, 2.30]. SB at first or second surgery did not significantly alter 2SS (PPV-PPVSB: 38, 75% vs PPVSB-PPV: 57, 75%; p = 1.00) or silicone oil use at second surgery (PPV-PPVSB: 18, 35% vs PPVSB-PPV: 36, 47%; p = 0.40). At final follow-up, PHVA did not significantly differ by sequence (p = 0.16).

**Conclusion:** In re-RRD repair, SB at first or second surgery did not alter 2SS and final PHVA.

**Keywords:** rhegmatogenous retinal detachment, recurrent retinal detachment, pars plana vitrectomy, scleral buckle, anatomic success, visual acuity

## Introduction

The standard of care for rhegmatogenous retinal detachment (RRD) is shifting and varies by institution. Though a growing body of literature suggests that additional scleral buckle (SB) in cases of pars plana vitrectomy (PPV) repair may improve outcomes in uncomplicated RRD,[1,2] the current evidence derived from randomized controlled trials[3–7] suggests this is not the case. This was also corroborated by a large propensity-matched cohort study published recently by our group.[8] According to another study, SB (combined to PPV) may not only have a neutral impact on reattachment rates but also prolong surgical time and increase postoperative pain.[9] Some surgeons still advocate that SB at first surgery may result, if any recurrence happens, in a less advanced RRD and a higher chance to repair. None of previous reports had studied whether the use of scleral buckle (combined to PPV) during the initial surgical repair influences the success rate in cases of recurrent RRD.

Our study therefore aimed to study cases of failed initial repair of primary uncomplicated RRD (re-RRD) and compare outcomes at the second surgery between patients who had scleral buckle at the first surgery (group PPVSB-PPV) and patients who had scleral buckle at the second surgery (group PPV-PPVSB).

Received: 22 November 2024
Accepted: 26 February 2025
Published: 17 March 2025

# Subjects and Methods

## Study Design and Population

This retrospective cohort study adhered to the tenets of the Declaration of Helsinki. The Research Ethics Board of the Centre Hospitalier Universitaire de Québec – Université Laval ruled that approval was not required due to the retrospective nature of the analysis and waived individual patient consent as per the Canadian Tri-Council Policy Statement article 2.5. Institutional approval was then obtained to have access to patient data which was maintained with confidentiality. All consecutive patients operated for re-RRD in a tertiary ophthalmology care center between 2014 and 2018 were included. Exclusion criteria were: proliferative diabetic retinopathy, proliferative vitreoretinopathy (PVR, grade ≥C2) at the initial RD (first presentation), chronic RD with duration of RD >3 months, macular holes, traumatic RD, giant retinal tears, retinal dialysis, foveoschisis, wet age-related macular degeneration, endophthalmitis, acute retinal necrosis, Coats disease, retinopathy of prematurity, retinoschisis, and retinal colobomas. Patients who were treated using silicone oil at first surgery were excluded. Patients who were operated with PPV at both first and second surgery were also excluded given that these patients would represent patients with lower risk disease in which the surgeon did not deem necessary to add an SB.

The data collection was performed on electronic medical records under the supervision of a senior vitreoretinal surgeon (A.D.). Preoperative baseline characteristics were collected prior to initial surgery. These included age at first presentation, sex, symptoms duration, pinhole visual acuity (PHVA), laterality, myopia >4 diopters, lens status (ie, aphakic, phakic, pseudophakic), macula status (ie, on, off, split), and presence of vitreous hemorrhage. PHVA was measured in metric Snellen notation and defined as the best visual acuity possible using the patient's current refraction with or without improvement with pinhole. The number of retinal breaks was assessed intraoperatively under direct visualization at the beginning of the surgery. Appearance of the RD with location including number of quadrants involved and number retinal breaks were noted, specifically presence of inferior retinal breaks located in the RD between 4:00 and 8:00 clock hours. Time to onset of recurrence was reviewed, and causes of RD recurrence (ie, PVR including macular epiretinal membrane (ERM) causing recurrent detachment and/or new or recurrent retinal breaks) were used to categorize patients based on etiology of recurrence. PVR was also categorized based on the 1983 Retina Society Terminology Committee classification system[9] given that this was the most commonly used in patient files to grade PVR severity.

## Intraoperative Management and Postoperative Outcomes

Procedure choice was at the discretion of the treating surgeon. Factors that may influence surgeon decision to add an SB relate to perceived complexity of the RRD, including extent of the RRD, number and inferior location of tears, chronicity, and mild PVR. Practices do not significantly differ between surgeons who regularly operate patients referred among themselves based on each other's preoperative evaluation and surgical recommendation. Patients were categorized based on the sequence of surgeries received: PPV-PPVSB or PPVSB-PPV. Tamponade agents could include sulfur hexasulfate ($SF_6$), perfluoropropane ($C_3F_8$) gas, and silicone oil (at the second surgery). Intraoperative observation of full-thickness retinal breaks was used to assess the number of retinal breaks.

Procedures were performed by one of five vitreoretinal surgeons experienced with both techniques as previously described.[8] Briefly, surgery was performed under local anesthesia with retrobulbar block (ie, 2% lidocaine without epinephrine and 0.5% bupivacaine in a 1:1 ratio). Surgeons used a wide-angle viewing system and the Alcon Constellation system combined with the ULTRAVIT 23-G+ or 25-G+ vitreous cutter (Alcon Laboratories, Inc., Fort Worth, TX).

During the first surgery, pars plana vitrectomy was performed in a standard fashion. Central vitrectomy was done, then retinal breaks were localized and marked with endodiathermy. Perfluorocarbon liquid was used at the discretion of the surgeon to displace subretinal fluid. Vitreous base shaving, air-fluid exchange, and laser photocoagulation around retinal breaks, lattice degeneration, and sclerotomy sites were done in all cases. Use of intraoperative cryotherapy and 360° laser retinopexy was at the discretion of the surgeon. The latter consisted of three to five rows of medium-white burns anterior to the level of the vortex vein, towards and beyond the equator. The use of retinotomies (at the first and second surgery) and retinectomies (at the second surgery to relax a stiff retina secondary to PVR) was at the discretion of the surgeon. During the PPVSB procedure, a 360° peritomy and dissection of 4 quadrants were done, then a 41-circling band with 3082 sleeves (Labtician Ophthalmics, Oakville, ON Canada) were used in all cases and were

fixed to the sclera so as to place the center of the band at approximatively 11.5 mm from the limbus (or 5.5 from the insertion of rectus muscles) using partial thickness scleral tunnel or mattress sutures with 5.0 prolene or nylon performed in four quadrants depending on the surgeon preferences.

All patients had a 3-month postoperative follow-up after the second surgery. Additional follow-ups until September 2021 were reviewed and included in this analysis. The primary anatomical outcome was second surgery success (2SS) following second surgical repair. The second surgery was considered a success if no additional reoperation in the operating room for recurrent RD is necessary until final follow-up. Surgery for silicone oil removal and laser retinopexy for localized recurrences in the ambulatory clinic were not considered surgical failures. Secondary anatomical outcomes included final retina status (ie, attached or detached) and use of silicone oil at second surgery. For patients who received silicone oil at second surgery, recurrence of RD under silicone oil, recurrence of RD after removal of silicone oil, and presence of silicone oil or detached retina at final follow-up were reported as separate outcomes. None of the patients underwent cataract surgery between the two interventions. The primary functional outcome was final PHVA, and the secondary functional outcome was change in visual acuity between initial presentation and final PHVA.

## Statistical Analysis

Continuous variables are presented as mean ± standard deviation when normally distributed and as median [first quartile, third quartile] for non-normally distributed data. Categorical variables are presented as frequencies (percentages). Variables were compared between each surgery sequence group (ie, PPV-PPVSB and PPVSB-PPV) using Student's *t*-test or Mann–Whitney *U*-test for continuous variables as appropriate and chi-square analysis for categorical variables. Kaplan–Meier analysis was performed to compare the time to onset of RD recurrence in both surgery sequence groups using Log rank tests. Vision was converted from metric Snellen notation to logarithm of the minimum angle of resolution (logMAR) as previously done.[8]

To determine the association of different factors and 2SS, a multiple logistic regression model was built for 2SS. All preoperative and intraoperative characteristics of the first surgery were considered for inclusion, namely pseudophakia, number of retinal breaks, number of RD quadrants of the initial RD, initial macula off status, presence of inferior tears in RD, presence of vitreous hemorrhage, PVR severity, 360° laser use, and type of gas tamponade (ie, $SF_6$ or $C_3F_8$). Characteristics of the second surgery considered for inclusion were PVR severity, 360° laser use, and retinectomy. Basic demographic characteristics like age and sex were kept in the final model for adjustment as was surgery sequence. Backward selection was then used to exclude other variables with $p > 0.20$ one at a time until a final model was reached. Odds ratios (OR) with 95% confidence intervals (CI) were produced for each variable included. Visual acuity at initial presentation was not considered for inclusion because of collinearity with the characteristics and extent of the RD, which was more closely associated with 2SS.

To evaluate the association of different factors and final PHVA, a multiple linear regression model was built for final PHVA in logMAR. The same characteristics of the first and second surgery as the logistic regression model were considered for inclusion in addition to total follow-up duration and 2SS. Backward selection was then used to exclude variables with $p > 0.20$ one at a time until a final model was reached. Basic demographic characteristics like age and sex were kept in the final model for adjustment as was surgery sequence.

Statistical analyses were performed using IBM SPSS Statistics for Windows (version 28.0; IBM Corp., Armonk, NY). Statistical significance was set at $\alpha = 0.05$.

# Results

## Initial Baseline Characteristics

During the inclusion period, there were a total of 148 patients (9.8%) operated for re-RRD among 1516 patients operated for initial RRD. Among these, 71 occurred among 816 patients undergoing initial PPV (8.7%) and 77 occurred among 700 patients undergoing initial PPVSB (11%) ($p = 0.13$). Of these, 12 patients (8%) were excluded given lack of SB placement at either first or second surgery, and 9 patients (6%) were excluded due to lack of follow-up data or operative

data for either initial or second surgery. The entire cohort included in this analysis therefore consisted of 127 patients operated for re-RRD.

Mean age at initial presentation was 65.7±10.3 years of age and 78 (61%) were male. There were 56 (44%) pseudophakic patients, 20/103 (19%) myopic patients, and 70 (55%) patients who were initially macula-off. The initial primary uncomplicated RRD had an extent of 2 [2, 3] quadrants and 2 [1, 3] tears with a baseline visual acuity of 0.70 [0.18, 2.30]. Patients presented after 8 [5, 20] days of symptoms. First surgery was performed using $SF_6$ in 93 patients (73%) compared to $C_3F_8$ in 34 (27%). Re-RRD occurred at a median time of 1.4 [0.9, 2.1] months after the first surgery (range: 0.4 months to 36 months) which did not differ by surgery sequence (p = 0.08). The cause of re-RRD was new or recurrent tears in 61 (48%) patients and/or development of PVR in 94 (74%).

Surgery sequence consisted of PPV-PPVSB in 51 (37%) and PPVSB-PPV in 76 (55%) patients. Initial baseline characteristics and characteristics of first surgery by surgery sequence are presented in Table 1. Notably, patients with initial PPV were less likely to have inferior tears in RD than patients initially operated with PPVSB and were also more likely to have an initial macula-on RD with a corresponding better baseline PHVA.

## Second Surgery Postoperative Outcomes

Causes of recurrence and surgical characteristics of the second surgery by surgery sequence are presented in Table 2. Median follow-up duration was 32.8 [17.1, 50.5] months. Overall 2SS was 95 (75%). At second surgery, 21 (17%) patients were given $SF_6$ gas tamponade, 51 (40%) $C_3F_8$ gas tamponade, and 54 (43%) silicone oil.

Among anatomical outcomes, surgery sequence did not significantly alter 2SS (PPV-PPVSB: 38, 75% vs PPVSB-PPV: 57, 75%; p = 0.95). It also did not change the use of silicone oil at second surgery (PPV-PPVSB: 18, 35% vs

**Table 1** Comparison of Preoperative Demographic and Initial Rhegmatogenous Retinal Detachment (RRD) Characteristics in Patients Undergoing Pars Plana Vitrectomy (PPV) Only and/or PPV With Scleral Buckle (PPVSB) for First and second Repair Surgery

| Characteristic | PPV-PPVSB n=51 | PPVSB-PPV n=76 | *p* |
|---|---|---|---|
| Age, years | 65.8±10.0 | 65.7±10.6 | 0.96 |
| Male sex | 32 (63%) | 46 (61%) | 0.80 |
| Baseline PHVA, logMAR | 0.3 [0.1, 1.3] | 1.2 [0.3, 2.3] | **0.006** |
| Snellen equivalent | 20/40 | 20/315 | |
| Laterality, left | 28 (55%) | 42 (55%) | 0.97 |
| Myopia, >4 diopters | 5/38 (13%) | 15/65 (23%) | 0.22 |
| Duration of symptoms, days | 8 [4, 15] | 8 [6, 26] | 0.20 |
| Pseudophakic lens status | 25 (49%) | 31 (41%) | 0.36 |
| Macula status | | | **<0.001** |
| On | 27 (53%) | 18 (24%) | |
| Off | 18 (35%) | 52 (68%) | |
| Split | 6 (12%) | 6 (8%) | |
| Vitreous hemorrhage | 8 (16%) | 15 (20%) | 0.56 |
| Number of quadrants | 2 [2, 2] | 3 [2, 4] | **<0.001** |
| Number of retinal breaks | 2 [1, 3] | 2 [1, 3] | 0.56 |
| Inferior RD breaks | 7 (14%) | 33 (43%) | **<0.001** |
| PVR | 8 (16%) | 17 (22%) | 0.35 |
| Grade A | 1 (2%) | 1 (2%) | |
| Grade B | 7 (14%) | 11 (15%) | |
| Grade C1 | 0 (0%) | 4 (5%) | |
| 360° laser at first surgery | 33 (65%) | 43 (57%) | 0.36 |

**Note**: Values in bold are statistically significant at a threshold of p<0.05.
**Abbreviations**: logMAR, logarithm of the minimum angle of resolution; PHVA, pinhole visual acuity; PVR, proliferative vitreoretinopathy; RD, retinal detachment.

**Table 2** Comparison of Recurrence Cause and Timing, as Well as second Surgery Characteristics in Patients Based on First and second Surgery Repair Sequence

| Characteristic | PPV-PPVSB n=51 | PPVSB-PPV n=76 | *p* |
|---|---|---|---|
| Time to recurrence, months | 1.3 [0.8, 1.8] | 1.6 [1.0, 2.3] | 0.08 |
| Cause of recurrence | | | |
| New or recurrent tears | 29 (57%) | 32 (42%) | 0.10 |
| PVR | 35 (69%) | 59 (78%) | 0.26 |
| Grade A | 0 (0%) | 2 (3%) | |
| Grade B | 9 (18%) | 10 (13%) | |
| Grade C1 | 13 (26%) | 19 (25%) | |
| Grade C2 | 9 (18%) | 18 (24%) | |
| Grade C3 | 1 (2%) | 3 (4%) | |
| Grade D1 | 2 (4%) | 5 (7%) | |
| Grade D2 | 1 (2%) | 3 (4%) | |
| Grade D3 | 0 (0%) | 0 (0%) | |
| Retinectomy | 20 (39%) | 42 (55%) | 0.08 |
| Degrees of retinectomy | 120 [79, 180] | 120 [90, 180] | 0.74 |
| 360° laser at second surgery | 42 (82%) | 55 (72%) | 0.19 |

**Abbreviations**: logMAR, logarithm of the minimum angle of resolution; PHVA, pinhole visual acuity; PPV, pars plana vitrectomy; PPVSB, pars plana vitrectomy with scleral buckle; PVR, proliferative vitreoretinopathy.

PPVSB-PPV: 36, 47%; p = 0.18). Use of retinectomy at second surgery (p = 0.08) and degrees of retinectomy (p = 0.74) were not found to be significantly different by sequence.

Among functional outcomes, at final follow-up, PHVA in the entire cohort was 0.60 [0.18, 1.00]; final PHVA was 0.40 [0.10, 1.00] in the PPV-PPVSB group and 0.88 [0.18, 1.30] in the PPVSB-PPV group. This did not significantly differ by surgery sequence (p = 0.06). PHVA between the final follow-up and initial presentation improved by −0.08 [−1.00, 0.30] (p = 0.02).

## Outcomes with Silicone Oil at Second Surgery

Among the 54 patients who received silicone oil at second surgery, a total of 16 (30%) had a recurrence of RD under silicone oil (PPV-PPVSB: 7, 39% vs PPVSB-PPV: 9, 25%; p = 0.29). During follow-up, a total of 41 patients underwent removal of silicone oil (76%) among whom one patient (2%) in the PPVSB-PPV group developed recurrent RD postoperatively. At final follow-up, the silicone oil had been kept in the eye of 13 patients (24%). This did not vary by surgery sequence (PPV-PPVSB: 3, 17% vs PPVSB-PPV: 10, 28%; p = 0.37). Time between second surgery during which silicone oil was placed and final follow-up among these patients was 24.7 [11.9, 46.3] months. Though silicone oil would typically be removed within six to twelve months, patients in this re-RRD cohort who had more complex presentations requiring silicone oil tamponade at second surgery could remain on silicone oil without necessitating removal for intolerance.

## Multiple Regression Analyses

In multiple logistic regression analysis for 2SS (Table 3), the main factor associated with 2SS was initial macula-off status which decreased it (OR 0.324, p=0.035), while surgery sequence did not alter 2SS (p>0.05). Other initial baseline characteristics were also not associated with 2SS and were excluded from the final model.

In multiple linear regression analysis for final PHVA (Table 4), main associations with final PHVA were, in decreasing order of effect, retinectomy (β 0.390; p < 0.001), 2SS (β −0.242; p = 0.001), RD quadrants at initial surgery (β 0.206; p = 0.009), 360° laser at first surgery (β 0.170; p = 0.028), age (β 0.159; p = 0.033), and 360° laser at second surgery (β 0.152; p = 0.039). Sequence of surgery was not associated with final PHVA (p > 0.05), and other initial baseline characteristics included in the final model did not reach statistical significance.


https://doi.org/10.2147/OPTH.S507985

**Table 3** Multiple Logistic Regression Model for Recurrent Surgery Success Rate (Re-SSR) in Patients Undergoing Recurrent Rhegmatogenous Retinal Detachment Repair

| Characteristic | OR | 95% CI | *p* |
|---|---|---|---|
| Age, years | 0.968 | 0.923, 1.016 | 0.19 |
| Male sex | 0.455 | 0.171, 1.210 | 0.12 |
| Pseudophakia | 2.287 | 0.811, 6.450 | 0.12 |
| Initial macula off status | 0.324 | 0.114, 0.922 | **0.035** |
| Inferior tears in inferior RD | 2.794 | 0.883, 8.837 | 0.080 |
| 360° laser at first surgery | 2.462 | 0.937, 6.471 | 0.068 |
| Retinectomy at second surgery | 0.399 | 0.155, 1.023 | 0.056 |
| Surgery sequence | | | |
| PPV-PPVSB | REF | REF | REF |
| PPVSB-PPV | 1.351 | 0.490, 3.725 | 0.560 |

**Note**: Values in bold are statistically significant at a threshold of p<0.05.
**Abbreviations**: CI, confidence interval; logMAR, logarithm of the minimum angle of resolution; OR, odds ratio; PPV, pars plana vitrectomy only; PPVSB, pars plana vitrectomy with scleral buckle; RD, retinal detachment.

**Table 4** Multiple Linear Regression Model for Final Pinhole Visual Acuity in Patients Undergoing Repair for Recurrent Retinal Detachment

| Characteristic | B | 95% CI | *p* | β |
|---|---|---|---|---|
| Age, years | 0.013 | 0.001, 0.025 | **0.033** | 0.159 |
| Male sex | −0.178 | −0.419, 0.064 | 0.15 | −0.104 |
| RD quadrants | 0.175 | 0.044, 0.306 | **0.009** | 0.206 |
| Initial 360° laser | 0.287 | 0.031, 0.543 | **0.028** | 0.170 |
| Retinectomy at second surgery | 0.648 | 0.399, 0.896 | **<0.001** | 0.390 |
| 360° laser at second surgery | 0.297 | 0.015, 0.579 | **0.039** | 0.152 |
| Surgery sequence | | | | |
| PPV-PPVSB | REF | REF | REF | REF |
| PPVSB-PPV | 0.084 | −0.171, 0.339 | 0.52 | 0.050 |
| Re-SSR | −0.462 | 0.001, 0.188 | **0.001** | −0.242 |

**Note**: Values in bold are statistically significant at a threshold of p<0.05.
**Abbreviations**: B, unstandardized coefficients; β, standardized coefficients; CI, confidence interval; PHVA, pinhole visual acuity; PPV, pars plana vitrectomy only; PPVSB, pars plana vitrectomy with scleral buckle; PVR, proliferative vitreoretinopathy; RD, retinal detachment; re-SSR, recurrent surgery success rate.

## Discussion

This retrospective study analyzed re-RRD repair outcomes of patients undergoing PPV combined with SB at first or second surgery. The primary anatomical outcome (overall 2SS) was achieved in 75% of patients, and neither 2SS nor final PHVA (primary functional outcome) differed between either surgery sequence.

Previous reports addressing the optimal surgical approach for recurrent RRD repair had defined PPV as the cornerstone to manage this condition.[10] The same tendency was seen in pediatrics, where PPVSB provides equivalent anatomical and functional outcomes compared to PPV alone for re-RRD after unsuccessful primary PPV.[11]

Our results suggest that adding an SB at the first or the second surgery in cases of unsuccessful repair of primary uncomplicated RRD does not alter the disease course or the success rate of the second surgical repair. Several studies have shown little to no difference between PPVSB and PPV alone in terms of anatomic success and final visual acuity in initial and second surgery.[6,9,12–18] Popovic et al have produced a meta-analysis including 2751 cases, reporting no significant benefit to combine PPV and SB relative to PPV alone regarding visual outcomes, complications, and reattachment rates for uncomplicated pseudophakic RRD.[9] Similarly, Walter et al also presented no significant risk reduction for any second surgery for recurrent RRD

by adding SB for pseudophakic patients.[6] Moreover, some series report more complications in PPVSB compared to PPV alone.[16,18] Despite the fact that prior studies did not analyze the influence of the timing of SB in the same way as we did, their results align with ours and can be interpreted in a similar fashion. It is, however, possible that some patients with additional SB may have avoided a second surgery from the use of SB in the first surgery and were subsequently not included in this analysis as a result. The debate between PPV and PPVSB, however, remains active in the literature given the absence of a proper multicenter randomized controlled trial addressing the question. Our findings could lead to renewed reflection aiming to reduce surgical burden with both cost-effectiveness and quality-of-care perspectives.

On the other hand, the PRO study demonstrated a better surgical success for PPVSB compared to PPV alone for phakic, moderately complex RRD, which matches a more frequent use of PPVSB with inferior tears RRD in our study.[1] They also advocated the combined technique for pseudophakic RRD for higher single-surgery anatomic success but reported equivalent visual outcomes.[2] Mehta et al also reported a decreased risk of recurrence for phakic RRD with PPVSB, but no significant difference between both procedures for pseudophakics RRD.[19] In a meta-analysis by Totsuka et al, combination management had significantly higher single-surgery anatomic success rate compared to PPV alone, with similarly high final reattachment rates for both methods.[20] However, 9 out of 10 included studies were nonrandomized, putting the results at greater risk of selection bias and confounding by indication.

While the literature seems to disfavor additional SB to address uncomplicated RRD based on the few randomized controlled trials to date, there appears to be greater single-surgery anatomic success with PPVSB in complicated cases like RRD with high risk of PVR[21] and RRD presenting with inferior tears.[22] On the other hand, primary SB still remains a good option in the treatment of young, phakic patients and those with inferior tears given the reduced risk of cataract progression.[17] Other intraoperative factors that could be considered to improve surgical outcomes in lieu or in addition to SB could be intraoperative 360° laser. This is being investigated as a possible method to improve single-surgery anatomic success, though reports differ.[23–25]

## Limitations

This study was performed at a single, large tertiary academic center with five surgeons involved. Therefore, this increases homogeneity of surgical practices though may reduce the possibility of generalizing these results to other practices. A multicenter design could help in increasing the external validity in future studies. A larger sample size may have been necessary to detect a smaller effect difference for 2SS. Vision in this study was also not evaluated using manifest refractions in all patients. Therefore, this limits the reliability of PHVA as an outcome, especially given the presence of SB-induced myopization. Likewise, this study was not randomized. However, given the question at hand, a randomized study design would be difficult to achieve given cost and low incidence of re-RRD.

In conclusion, in re-RRD repair, our results showed that adding SB at the first or second surgery could result in similar anatomical and functional outcomes. Therefore, SB could be considered as a salvage procedure in cases of recurrence that did not receive an SB at first surgery and not necessarily as a primary procedure in eyes with primary uncomplicated RRD.

## Funding

There is no funding to report.

## Disclosure

The authors declare no competing financial interests for this work. Previous versions of this work were presented at the 2022 Canadian Ophthalmological Society Annual Meeting and at the 2022 Association for Research in Vision and Ophthalmology meeting.

## References

1. Ryan EH, Ryan CM, Forbes NJ, et al. Primary retinal detachment outcomes study report number 2. *Ophthalmology*. 2020;127(8):1077–1085. doi:10.1016/j.ophtha.2020.03.007
2. Joseph DP, Ryan EH, Ryan CM, et al. Primary retinal detachment outcomes study: pseudophakic retinal detachment outcomes. *Ophthalmology*. 2020;127(11):1507–1514. doi:10.1016/j.ophtha.2020.05.005

3. Romano MR, Angi M, Valldeperas X, Costagliola C, Vinciguerra P. Twenty-three-gauge pars plana vitrectomy, densiron-68, and 360° endolaser versus combined 20-gauge pars plana vitrectomy, scleral buckle, and SF6 for pseudophakic retinal detachment with inferior retinal breaks. *Retina*. 2011;31(4):686–691. doi:10.1097/IAE.0b013e3181f0d249
4. Falkner-Radler CI, Graf A, Binder S. Vitrectomy combined with endolaser or an encircling scleral buckle in primary retinal detachment surgery: a pilot study. *Acta Ophthalmol*. 2015;93(5):464–469. doi:10.1111/aos.12663
5. Moradian S, Ahmadieh H, Faghihi H, et al. Comparison of four surgical techniques for management of pseudophakic and aphakic retinal detachment: a multicenter clinical trial. *Graefes Arch Clin Exp Ophthalmol*. 2016;254(9):1743–1751. doi:10.1007/s00417-016-3318-x
6. Walter P, Hellmich M, Baumgarten S, et al. Vitrectomy with and without encircling band for pseudophakic retinal detachment: VIPER Study Report No 2—main results. *Br J Ophthalmol*. 2017;101(6):712–718. doi:10.1136/bjophthalmol-2016-309240
7. Mehboob M, Ghani MU, Khan A, Imran M. Scleral buckling and pars plana vitrectomy versus vitrectomy alone for primary repair of rhegmatogenous retinal detachment. *Pak J Med Health Sci*. 2018;12(2):5.
8. Hébert M, You E, Garneau J, et al. Outcomes in primary uncomplicated rhegmatogenous retinal detachment repair using pars plana vitrectomy with or without scleral buckle. *Retina*. 2022;42(6):1161–1169. doi:10.1097/IAE.0000000000003425
9. Popovic MM, Muni RH, Nichani P, Kertes PJ. Pars plana vitrectomy, scleral buckle, and pneumatic retinopexy for the management of rhegmatogenous retinal detachment: a meta-analysis. *Surv Ophthalmol*. 2021. doi:10.1016/j.survophthal.2021.05.008
10. Nagpal M, Chaudhary P, Wachasundar S, Eltayib A, Raihan A. Management of recurrent rhegmatogenous retinal detachment. *Indian J Ophthalmol*. 2018;66(12):1763. doi:10.4103/ijo.IJO_1212_18
11. Al Abdulsalm O, Al Habboubi H, Mura M, Al-Abdullah A. Re-vitrectomy versus combined re-vitrectomy with scleral buckling for pediatric recurrent retinal detachment. *Clin Ophthalmol*. 2022;16:877–884. doi:10.2147/OPTH.S356993
12. Weichel ED, Martidis A, Fineman MS, et al. Pars plana vitrectomy versus combined pars plana vitrectomy–scleral buckle for primary repair of pseudophakic retinal detachment. *Ophthalmology*. 2006;113(11):2033–2040. doi:10.1016/j.ophtha.2006.05.038
13. Stangos AN, Petropoulos IK, Brozou CG, Kapetanios AD, Whatham A, Pournaras CJ. Pars-plana vitrectomy alone vs vitrectomy with scleral buckling for primary rhegmatogenous pseudophakic retinal detachment. *Am J Ophthalmol*. 2004;138(6):952–958. doi:10.1016/j.ajo.2004.06.086
14. Sanhueza A, González R. Pars plana vitrectomy plus scleral buckle versus pars plana vitrectomy in pseudophakic retinal detachment. *Medwave*. 2020;20(6):e7965. doi:10.5867/medwave.2020.06.7964
15. Kinori M, Moisseiev E, Shoshany N, et al. Comparison of pars plana vitrectomy with and without scleral buckle for the repair of primary rhegmatogenous retinal detachment. *Am J Ophthalmol*. 2011;152(2):291–297.e2. doi:10.1016/j.ajo.2011.01.049
16. Al Taisan AA, Alshamrani AA, AlZahrani AT, Al-Abdullah AA. Pars plana vitrectomy vs combined pars plana vitrectomy-scleral buckle for primary repair of pediatrics retinal detachment. *Clin Ophthalmol*. 2021;15:1949–1955. doi:10.2147/OPTH.S305910
17. Znaor L, Medic A, Binder S, Vucinovic A, Marin Lovric J, Puljak L. Pars plana vitrectomy versus scleral buckling for repairing simple rhegmatogenous retinal detachments. *Cochrane Database Syst Rev*. 2019;2019(3). doi:10.1002/14651858.CD009562.pub2
18. Kessner R, Barak A. Pseudophakic rhegmatogenous retinal detachment: combined pars plana vitrectomy and scleral buckle versus pars plana vitrectomy alone. *Graefes Arch Clin Exp Ophthalmol*. 2016;254(11):2183–2189. doi:10.1007/s00417-016-3381-3
19. Mehta S, Blinder KJ, Shah GK, Grand MG. Pars plana vitrectomy versus combined pars plana vitrectomy and scleral buckle for primary repair of rhegmatogenous retinal detachment. *Can J Ophthalmol*. 2011;46(3):237–241. doi:10.1016/j.jcjo.2011.05.003
20. Totsuka K, Inui H, Roggia MF, Hirasawa K, Noda Y, Ueta T. Supplemental scleral buckle in vitrectomy for the repair of rhegmatogenous retinal detachment: a systematic review of literature and meta-analysis. *Retina*. 2015;35(11):2423–2431. doi:10.1097/IAE.0000000000000797
21. Storey P, Alshareef R, Khuthaila M, et al. Pars plana vitrectomy and scleral buckle versus pars plana vitrectomy alone for patients with rhegmatogenous retinal detachment at high risk for proliferative vitreoretinopathy. *Retina*. 2014;34(10):1945–1951. doi:10.1097/IAE.0000000000000216
22. Starr MR, Obeid A, Ryan EH, et al. RETINAL DETACHMENT WITH INFERIOR RETINAL BREAKS: primary vitrectomy versus vitrectomy with scleral buckle (PRO Study Report No. 9). *Retina*. 2021;41(3):525–530. doi:10.1097/IAE.0000000000002917
23. Dirani A, Antaki F, Rhéaume MA, et al. 360-degree intra-operative laser retinopexy for the prevention of retinal re-detachment in patients treated with primary pars plana vitrectomy. *Graefes Arch Clin Exp Ophthalmol*. 2020;258(2):249–256. doi:10.1007/s00417-019-04534-5
24. Loiudice P, Montesel A, Sartini F, et al. Localized versus 360° intraoperative laser retinopexy in cases of rhegmatogenous retinal detachment with mild-to-moderate grade proliferative vitreoretinopathy. *Eye*. 2021;35(3):786–790. doi:10.1038/s41433-020-0950-9
25. Soekamto C, Chu ER, Johnson DA, Sohn JH, Bahadorani S. Protective role of 360° laser retinopexy in patients with rhegmatogenous retinal detachment: a systematic review and meta-analysis. *Korean J Ophthalmol*. 2021;35(3):215–222. doi:10.3341/kjo.2021.0013