

Pars Plana Vitrectomy versus Scleral Buckle: A Comprehensive Meta-Analysis of 15,947 Eyes

Arjan S. Dhoot¹, Marko M. Popovic², Prem A. Nichani², Arshia Eshtiaghi¹, Andrew Mihalache³, Aman P. Sayal¹, Hannah Yu⁴, Charles C. Wykoff⁴, Peter J. Kertes^{2,5}, Rajeev H. Muni^{2,6}

¹ Faculty of Medicine, University of Toronto, Toronto, ON, Canada ² Department of Ophthalmology & Vision Sciences, University of Toronto, Toronto, ON, Canada ³ Faculty of Science, Western University, London, Ontario, Canada ⁴ Retina Consultants of Texas Research Centers, Houston Methodist Hospital, Houston, Texas, United States of America; ⁵ John and Liz Tory Eye Centre, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada ⁶ Department of Ophthalmology, St. Michael's Hospital/Unity Health Toronto, Toronto, Ontario, Canada

Introduction

- Pars plana vitrectomy (PPV) and scleral buckling (SB) are two of the most common treatments for rhegmatogenous retinal detachment (RRD).
- The comparative efficacy of PPV and SB has been often studied in the literature, however, there are discrepancies between various studies.
- The purpose of this meta-analysis is to compare the efficacy and safety of PPV and SB in RRD.
- To date, no meta-analysis has accrued evidence from all randomized controlled trials (RCTs) and observational studies to investigate the association between various factors and the comparative efficacy and safety of these procedures.

Methods

- A systematic literature search was performed on Ovid MEDLINE, EMBASE and the Cochrane CENTRAL from January 2000 to June 2021.
- Comparative studies reporting on the efficacy and/or safety of PPV and SB for the primary surgical management of RRD were included.
- The primary endpoint was final best corrected visual acuity (BCVA). Secondary endpoints were reattachment rates and adverse event rates.

Results

- 41 studies (8 RCTs, 33 observational studies) reporting on 5,401 SB and 10,546 PPV eyes were included. Median final follow-up was 6 months.
- Overall, SB was associated with a significantly better final BCVA than PPV (weighted mean difference [WMD]: 0.07; 95%CI: [0.02-0.11]; P=0.005). (Figure 1)
- SB was associated with a lower incidence of post-operative cataract formation (P<0.00001) and iatrogenic breaks (P<0.00001).

Results (continued)

- PPV had a lower incidence of choroidal hemorrhage (P=0.007), choroidal detachment (P=0.004), and residual subretinal fluid (RSRF) (P<0.00001).
- There were no significant differences between the two groups for other adverse outcomes, including strabismus, corneal defects, AC cells/flare, endophthalmitis, PVR development, ERM, macular hole, and macular edema.
- SB was no longer associated with a significantly better BCVA in subgroups of phakic (P=0.53) and pseudophakic/aphakic (P=0.24) eyes.
- In studies published after 2010, SB was no longer associated with a significantly higher incidence of subretinal hemorrhage (P=0.12) and choroidal detachment (P=0.20).
- Rates of primary reattachment (P=0.12) and final reattachment (P=0.12) were similar across the two procedures. However, in studies without significant PVR at baseline, primary reattachment rate was significantly better following PPV (P=0.05).

Discussion

- SB was found to have a significantly greater final BCVA in comparison to PPV, however, this result was likely partially driven by observational studies and in phakic eyes developing cataracts.
- PPV was associated with a higher incidence of cataract development. SB should be considered in younger patients where preventing cataract development and the resulting loss of accommodation is a major concern.
- In newer studies, SB was no longer associated with a higher incidence of choroidal detachment and choroidal hemorrhage, emphasizing the improved safety profile of modern-day SB.

Conclusions

- For RRD, SB was associated with a better final BCVA compared to PPV. This result was primarily driven by observational studies and phakic eyes developing cataracts after PPV.
- PPV was significantly more likely to cause iatrogenic breaks and cataract formation than SB. SB was significantly more likely to be associated with subretinal hemorrhage, choroidal detachment, and residual subretinal fluid.

Disclosures

MMP: Financial support (to institution) – PSI Foundation. PJK: Advisory board – Novartis, Alcon, Bayer, Roche, Novartis Nobility; Financial support (to institution) – Bayer, Roche, Novartis; Financial support – Novartis, Bayer; Equity owner – ArcticDx. RHM: Advisory board- Bayer, Novartis, Allergan, Roche; Financial Support (to institution)- Bayer, Novartis. CCW: Grant Support: Neurotech, Ophthea, Samsung. Consultant/Advisor: Alimera Sciences, Allegro, Allergan, Bayer, DORC, Eyepoint, ONL Therapeutics, Polyphotonix. Consultant/Advisor, Grant Support: Adverum, Apellis Pharmaceutical, Clearside Biomedical, Genentech, Kodiak, Novartis, RecensMedical, Regenxbio, Roche. Consultant/Advisor, Grant Support, Lecture Fees: Regeneron Pharmaceuticals.

Full-length Manuscript Published in Survey of Ophthalmology:
[https://www.surveyophthalmol.com/article/S0039-6257\(21\)00221-6/fulltext](https://www.surveyophthalmol.com/article/S0039-6257(21)00221-6/fulltext)

Figure 1 – Best Corrected Visual Acuity at Final Follow-up for Pars Plana Vitrectomy Versus Scleral Buckling

