

Pars Plana Vitrectomy with and without Supplemental Scleral Buckle for the Repair of Rhegmatogenous **Retinal Detachment: A Meta-Analysis**

Arjan S. Dhoot¹, Arshia Eshtiaghi¹, Andrew Mihalache², Marko M. Popovic³, Prem A.H. Nichani³, Aman Sayal¹, Hannah J. Yu⁴, Charles C. Wykoff⁴, Peter J. Kertes^{3,5}, Rajeev H. Muni^{3,6}

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

Introduction

- Pars plana vitrectomy (PPV) with and without supplemental scleral buckling (PPV+SB) are commonly used to repair rhegmatogenous retinal detachments (RRD).
- It is unclear whether there are differences in the safety and efficacy of PPV vs PPV+SB for the treatment of RRD.
- Previous studies comparing these procedures have found conflicting differences in final visual or anatomic outcomes and a wide variability in the reported rates of postoperative complications.
- The purpose of this meta-analysis is to compare the efficacy and safety of PPV and SB in RRD.

Methods

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

Results

- 38 studies (6 RCTs, 32 observational studies) reporting on 10,397 PPV and 5,264 PPV+SB eyes were included. Median follow-up was 6 months.
- PPV and PPV+SB had a similar final BCVA (P=0.55).
- PPV+SB had a significantly better primary reattachment rate compared to PPV (88.2% vs. 86.3%; risk ratio [RR]:0.97[0.95,1.00], P=0.03; NNT: 50). (Figure 1). There was no significant difference for final reattachment rates.

Results (continued)

- PPV required significantly more operations to achieve final retinal re-attachment compared to PPV+SB (1.3 \pm 0.7 vs. 1.2 ± 0.4 ; weighted mean difference [WMD]:0.13 [0.02,0.24], P=0.02)
- PPV was less likely to be significantly associated with macular edema (6.0% vs. 19.0%; P=0.02; NNH: 20) and epiretinal membrane formation (8.1% vs. 9.5%; *P*=0.02; NNH: 50). These differences were not seen in studies after 2010.
- There were no significant differences between the two groups for other adverse outcomes, including strabismus, corneal defects, AC inflammation, hypotony, iris capture, cataract development, vitreous hemorrhage, endophthalmitis, PVR development, subretinal/choroidal hemorrhage, macular hole formation, or iatrogenic breaks.
- Subgroup analyses of PVR grade C or more, lens status, and macular attachment status did not mediate differences in effect.

Figure 1 – Primary Reattachment Rate for PPV vs DDV+CR

	PPV+2R						
	PPV		PPV+	SB		Risk Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	N
Baba 2020	1595	1738	75	110	2.5%	1.35 [1.18, 1.53]	
Cankurtaran 2016	61	76	16	20	1.0%	1.00 [0.78, 1.28]	
Chanana 2016	14	20	20	20	0.7%	0.71 [0.53, 0.95]	
Demir 2013	24	25	23	24	2.9%	1.00 [0.89, 1.12]	
Dotana 2019	2149	2532	818	957	6.0%	0.99 [0.96, 1.02]	
Echegaray 2020	90	111	345	376	3.5%	0.88 [0.80, 0.97]	
Falkner-Radler 2015	28	30	28	30	2.4%	1.00 [0.87, 1.14]	
Ghoraba 2014	24	26	34	38	2.0%	1.03 [0.88, 1.21]	
Hamdy 2016	47	50	42	44	3.5%	0.98 [0.90, 1.08]	
Haugstad 2017	282	317	20	23	1.9%	1.02 [0.87, 1.20]	
Joseph 2020	577	684	193	209	5.3%	0.91 [0.87, 0.96]	
Kessner 2016	27	32	25	33	1.0%	1.11 [0.87, 1.42]	
Kiew 2020	90	97	9	10	1.2%	1.03 [0.83, 1.28]	
Kinori 2011	78	96	74	85	2.6%	0.93 [0.82, 1.06]	
Lai 2016	21	36	33	41	0.6%	0.72 [0.53, 0.99]	
Lee 2019	163	195	61	66	3.6%	0.90 [0.82, 0.99]	
Lindsell 2017	112	132	39	47	2.1%	1.02 [0.88, 1.19]	
Mehboob 2018	84	100	82	100	2.6%	1.02 [0.90, 1.16]	
Mehta 2011	73	85	128	134	3.6%	0.90 [0.82, 0.99]	
Moinuddin 2021	609	668	43	51	2.7%	1.08 [0.96, 1.22]	
Orlin 2014	43	52	19	22	1.3%	0.96 [0.78, 1.18]	
Pournaras 2003	27	27	22	24	2.3%	1.09 [0.95, 1.26]	
PRO 1 2020	1011	1200	735	815	5.9%	0.93 [0.90, 0.97]	
PRO 2 2020	207	249	271	297	4.6%	0.91 [0.85, 0.97]	
Romano 2011	40	44	35	38	2.5%	0.99 [0.87, 1.13]	
Ross 2008	2	2	18	19	0.2%	0.90 [0.53, 1.52]	
Rush 2014	296	366	70	78	3.7%	0.90 [0.82, 0.99]	
Sanabria 2012	215	251	236	272	4.5%	0.99 [0.92, 1.06]	
Schaal 2011	398	442	297	316	5.6%	0.96 [0.92, 1.00]	
Setlur 2015	58	70	36	43	1.8%	0.99 [0.84, 1.17]	
Siqueira 2007	24	28	20	23	1.2%	0.99 [0.79, 1.23]	
Stangos 2004	44	45	24	26	2.8%	1.06 [0.94, 1.19]	
Storey 2014	14	29	27	36	0.4%	0.64 [0.42, 0.98]	
Walter 2016	122	155	79	100	2.5%	1.00 [0.87, 1.13]	
Weichel 2006	63	68	79	84	3.8%	0.99 [0.90, 1.07]	
Wickham 2004	36	41	33	45	1.3%	1.20 [0.97, 1.48]	
Wong 2014	147	189	484	551	4.0%	0.89 [0.82, 0.96]	
Total (95% CI)		10308		5207	100.0%	0.97 [0.95, 1.00]	
Total events	8895		4593				
Heterogeneity: Tau² = Test for overall effect: .				P < 0.0	0001); I²:	- 58%	0.5 0. Favours







Discussion

- There was no statistically significant difference between PPV and PPV+SB for final BCVA. There was a slight preference for PPV alone, but this was driven by the inclusion of one study in the overall meta-analysis.
- PPV+SB was associated with a greater primary reattachment rate relative to PPV alone, although the magnitude of the effect is number needed to treat (NNT = 50).
- Future studies should be conducted to better understand individual patient and surgeon factors that lead vitreoretinal surgeons to choose PPV alone or PPV with a supplemental SB.

Conclusions

- For eyes with RRD undergoing PPV or PPV+SB, there was no significant difference in final BCVA.
- PPV+SB was associated with a greater primary reattachment rate, although the magnitude of the effect is small with a high number needed to treat.
- PPV required more operations to achieve final reattachment of the retina.
- Final reattachment rate and the rate of most adverse events were similar between procedures.

Disclosures

MMP: Financial support (to institution) - PSI Foundation. PJK: Advisory board -Novartis, Alcon, Bayer, Roche, Novelty 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 Ophthalmology Retina:

https://www.ophthalmologyretina.org/article/S2468-6530(22)00071-9/fulltext