
**Retinal Displacement Following Rhegmatogenous Retinal Detachment:
A Systematic Review and Meta-Analysis**

Ryan Mason¹, MD PhD, Samuel Minaker¹, MD MSc FRCSC, Samara Marafon¹, MD MSc,
Roxane Hillier¹, MBChB MSc FRCOPHTH, Rajeev Muni¹, MD MSc FRCSC,

¹Department of Ophthalmology and Vision Science, University of Toronto

Introduction: Rhegmatogenous retinal detachment (RRD) is one of the most common sight-threatening ophthalmic surgical emergencies. Refinements in pars plana vitrectomy (PPV), scleral buckle (SB) and pneumatic retinopexy (PnR) have given excellent anatomic reattachment rates. Nevertheless, many patients report unsatisfactory functional outcomes including metamorphopsia. Suboptimal functional outcomes may be the result of retinal displacement. In this study we assessed quantitatively the proportion of patients who develop retinal displacement following RRD repair.

Methods: Using inclusion criteria of English-language articles investigating retinal displacement following RRD repair with fundus autofluorescence, we identified 21 studies encompassing 1258 eyes. Study and evidence quality was assessed using ROBINS-I, Cochrane risk of bias, and GRADE frameworks. Outcome measures included frequency of retinal displacement, visual acuity, metamorphopsia, and displacement direction. A meta-analysis was performed using a Mantel-Haenszel method to report risk ratios (RR) for categorical variables, and a fixed-effects model was applied. Weighted mean difference (WMD) and 95% confidence interval was computed for continuous variables using the inverse variance method and a random-effects model.

Results: Retinal displacement was found in 35±20% of RRD repairs. SB without tamponade had the lowest rate of retinal displacement (RR=9.60 [2.01-45.95], p=0.005), followed by PnR and finally PPV. Macula-off RRDs were more likely to have retinal displacement (2.66 [1.82-3.90], p<0.001), but there was no clear relationship between the presence of displacement and extent of initial RRD. Silicone oil tamponade may reduce risk of displacement following PPV compared to gas (2.16 [1.22-3.83], p<0.009), as may immediate face-down positioning for 2 hours. Retinal displacement following PPV occurred in the downward direction in 92±14% of cases and with gas tamponade. Interestingly, when silicone oil tamponade is used or when PnR is performed, superior retinal shift is more frequent. Retinal displacement does not appear to significantly impact visual acuity (0.05 [-0.21-0.31, p=0.70]), although it may increase distortion.

Conclusions: Functional outcomes are of paramount importance to patients, and there is increasing evidence that a high-integrity anatomic attachment may lead to superior functional outcomes. SB and PnR are likely associated with less retinal displacement compared to PPV with a full gas fill, and PPV with silicone oil also has a comparatively low rate of retinal displacement. When performing PPV with gas, immediate face-down positioning for at least 2 hours may reduce retinal displacement. Larger prospective studies may provide the conclusive evidence that allows the surgeon to adopt techniques that minimize displacement and provide high-integrity retinal attachment and superior functional outcomes.