

**Stretch-Induced Foveal Ectopia (SIFE/Displacement) Following Retinal Detachment Repair:
A Novel Assessment Using Spectral-Domain Optical Coherence Tomography**

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Introduction: Retinal displacement is a common occurrence following rhegmatogenous retinal detachment (RRD) repair which has been linked to impaired functional outcomes, particularly postoperative aniseikonia. Fundus autofluorescence is commonly used to identify retinal displacement; however, concerns regarding detection accuracy persist. This investigation aims to elicit a novel methodology using spectral-domain optical coherence tomography (SD-OCT) to quantify foveal displacement post-RRD repair.

Methods: This retrospective case series conducted at St. Michael's Hospital in Toronto, Canada included consecutive patients undergoing surgical repair for fovea-involving RRD with SD-OCT (Carl Zeiss Meditec, Jena, Germany) images available before RRD development and 1-2 months post-RRD repair. Fellow eyes without RRD at corresponding time points were included to validate the methodology. Using 6 mm x 6 mm infrared cube scans, two independent graders (A.M., M.B.) computed vertical, horizontal, and overall distances between foveal centers and optic nerve head (ONH) centers on ImageJ. An unpaired t-test was used to compare baseline distances between study and fellow eyes, whereas paired t-tests were used to compare baseline and follow-up distances in each group.

Results: A total of 76 eyes (n=38 RRD eyes and n=38 fellow eyes) from 38 participants undergoing RRD repair were included in our analysis. 24 (63%) patients were male and 14 (37%) as female, for which the mean age was 57 ± 11 years old. The intraclass correlation coefficient for line segment lengths was 0.99, indicating nearly perfect agreement and reliability for measurements of fovea-to-ONH distances across all participants. At the baseline visit, there were no significant differences between RRD and fellow eyes with respect to overall ($p=0.13$), horizontal ($p=0.10$), and vertical ($p=0.20$) fovea-to-ONH distances. Compared to baseline, there was a significantly increased overall ($p=0.02$) and vertical ($p=0.03$) fovea-to-ONH displacement in study eyes at 1-2 months post-RRD repair. However, these findings were not observed in fellow eyes at the same time points ($p=0.06$ and $p=0.19$, respectively). Across 18 patients treated with pars plana vitrectomy, overall ($p=0.01$) and vertical ($p=0.04$) displacement in study eyes was significantly greater at 1-2 months post RRD-repair compared to baseline. These findings did not hold across 17 patients who underwent successful pneumatic retinopexy ($p=0.24$ and $p=0.54$, respectively).

Conclusions: Considerable differences in foveal location were observed when comparing pre-RRD and post-RRD repair SD-OCT scans, which were not observed in fellow eyes without RRD. Furthermore, greater vertical displacements were observed in study eyes, particularly in those undergoing pars plana vitrectomy, complementing previous literature on retinal displacement.