Foveal crack sign: an optical coherence tomography sign preceding macular hole after vitrectomy for rhegmatogenous retinal detachment.

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ABSTRACT

PURPOSE:

To describe an optical coherence tomography (OCT) sign preceding macular hole (MH) formation after pars plana vitrectomy (PPV) for rhegmatogenous **retinal** detachment (RRD).

DESIGN:

Retrospective observational case series.

METHODS:

Patients who underwent PPV for RRD at Osaka Rosai Hospital between January 2014 and December 2017 were analyzed. First, the medical records of the patients who had secondary MH after RRD repair were examined, and their sequential changes of the OCT images until MH formation were evaluated. Second, the OCT findings and the medical records of all patients who underwent PPV for RRD were evaluated based on the findings of the secondary MH cases.

RESULTS:

Ten eyes of 10 patients that had secondary MH after PPV for RRD were enrolled. Before MH formation, all eyes had parafoveal ERM and a characteristic OCT sign that was termed a foveal crack sign (FCS): a hyperreflective vertical line in the foveola with a deformation of the fovea. FCS was found 255 ± 217 days after PPV for RRD, and MH developed 232 ± 171 days after FCS appearance. Furthermore, among 518 eyes that underwent PPV for RRD, FCS with parafoveal ERM was found in three eyes without succeeding MH after RRD repair. FCS of these three eyes were found 363 ± 4 days after PPV for RRD.

CONCLUSIONS:

In all cases with secondary MH after PPV for RRD, FCS with parafoveal ERM was found before MH formation. This sign may predict secondary MH formation caused by ERM traction.

Primary Retinal Detachment Outcomes Study (PRO Study): Pseudophakic Retinal Detachment Outcomes-PRO Study Report #3.

Joseph DP, Ryan EH, Ryan CM, Forbes NJ[2], Wagley S, Yonekawa Y et al

Ophthalmology. 2020 May 8;S0161-6420(20)30428-0. doi: 10.1016/j.ophtha.2020.05.005.

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ABSTRACT

OBJECTIVE:

This study evaluates outcomes of comparable pseudophakic rhegmatogenous **retinal** detachment (RRD) treated with pars plana vitrectomy (PPV) or PPV with scleral buckle (PPV-SB).

DESIGN:

Multicenter, retrospective, interventional cohort study. Subjects, Participants, and/or Controls: Data were gathered from patients from multiple **retina** practices in the United States with RRD in 2015. Methods, Intervention, or Testing: A large detailed database was generated. Pseudophakic patients with RRD managed with PPV or PPV-SB were analyzed for anatomic and visual outcomes. Eyes with proliferative vitreoretinopathy (PVR), giant **retinal** tears, previous invasive glaucoma surgery, and < 90 days of follow-up were excluded from outcomes analysis. Single surgery anatomic success (SSAS) was defined as **retinal** attachment without ongoing tamponade and with no other RRD surgery within 90 days.

MAIN OUTCOME MEASURES:

SSAS and final Snellen visual acuity (VA).

RESULTS:

1158 out of 2620 eyes (44%) with primary RRD were pseudophakic. A total of 1018 eyes had greater than 90 days of follow-up. Eyes with PVR, previous glaucoma surgery, and giant **retinal** tears were excluded, leaving 893 pseudophakic eyes eligible for outcome analysis. 461 (52%) were right eyes. 606 patients (67%) were male, with a mean age of 65 ±11 years. PPV or PPV-SB as the first procedure were performed on 684 (77%) and 209 (23%) eyes, respectively. The mean follow-up was 388 + 161 days, and overall SSAS was achieved in 770 (86%) eyes. SSAS was 84% (577/684) for PPV, and 92% (193/209) for PPV-SB. The difference in SSAS between types of treatment was significant (p=0.009). In eyes with macula-on RRD, SSAS was 88% in eyes treated with PPV, and 100% in eyes treated with PPV-SB (p=0.0088). In eyes with macula-off RRD, SSAS was 81% in eyes treated with PPV and 89% in eyes treated with PPV-SB (p=0.029). SSAS was greater for PPV-SB than PPV for inferior (96% vs 82%) and superior (92% vs 82%) detachments. Mean final VA was similar for PPV (20/47) and PPV-SB (20/46; p=0.805).

CONCLUSION:

In pseudophakic RRDs, SSAS was better in patients treated with PPV-SB compared to PPV alone while visual outcomes were similar for both groups

Localized versus 360° intraoperative laser retinopexy in cases of rhegmatogenous retinal detachment with mild-to-moderate grade proliferative vitreoretinopathy.

Loiudice P, Montesel A, Sartini F, Morganti R, Posarelli C, Nardi M et al

Eye (Lond). 2020 May 12. doi: 10.1038/s41433-020-0950-9

PMID: 32398848

ABSTRACT

BACKGROUND/OBJECTIVES:

To compare the efficacy of intraoperative localized and 360° laser retinopexy in cases of rhegmatogenous **retinal** detachment (RRD) treated with pars plana vitrectomy and air tamponade.

SUBJECTS/METHODS:

In this interventional, prospective, randomized, comparative study, 93 consecutive cases of RRD were enroled. After randomization 48 eyes received circumferential, while 45 underwent localized intraoperative laser retinopexy. Number and position of the **retinal** breaks, presence of proliferative vitreoretinopathy and/or lattice degeneration were recorded. Anatomical and visual outcome of the two groups were compared at 6 months postoperatively.

RESULTS:

Baseline characteristics did not significantly differ between groups. The single-operation reattachment rate was 86.66% in localized group and 89.58% in 360° group. The difference was not significant. ($P = 0.46$, χ^2 test). At 6 months

postoperatively, visual acuity (logMAR) was 0.06 ± 0.05 in localized group and 0.05 ± 0.03 in 360° group. The difference was not statistically significant (P = 0.673, t-test).

CONCLUSIONS:

Localized laser resulted to be as effective as 360° laser application; this may lead some advantages in term of lower invasiveness, reduction risk of complications and time saving

Retinal Nonperfusion in Proliferative Diabetic Retinopathy Before and After Panretinal Photocoagulation Assessed by Widefield OCT Angiography.

Russell JF, Al-Khersan H, Shi Y, Scott NL, Hinkle JW, Fan KC et al

Am J Ophthalmol. 2020 May;213:177-185. doi: 10.1016/j.ajo.2020.01.024

PMID: 32006481

ABSTRACT

PURPOSE:

Widefield swept source optical coherence tomography angiography (WF SS-OCTA) imaging was compared with ultra-widefield (UWF) fluorescein angiography (FA) imaging to better understand changes in **retinal** nonperfusion before and after panretinal photocoagulation (PRP) in treatment-naïve eyes with proliferative diabetic retinopathy (PDR).

DESIGN:

Prospective, observational, consecutive case series.

METHODS:

Participants with treatment-naïve PDR were imaged using the SS-OCTA 12- × 12-mm scan pattern at baseline and at 1 week, 1 month, and 3 months after PRP. UWF FA was obtained at baseline and 3 months after PRP. Selected eyes were imaged using 5 SS-OCTA 12- × 12-mm scans to create a posterior pole montage, and 5 eyes also underwent SS-OCTA imaging at 6 months and 1 year. Areas of **retinal** nonperfusion (RNP) were drawn independently by 2 masked graders, and

analysis of variance (ANOVA) tests were used to compare areas of RNP over time. Main outcome measurements consisted of areas and boundaries of RNP visualized using WF SS-OCTA and UWF FA.

RESULTS:

From January 2018 through January 2019, WF SS-OCTA was performed on 20 eyes with treatment-naïve PDR from 15 patients. Areas of RNP identified on UWF FA images co-localized with RNP areas visualized on WF SS-OCTA images. There were no statistically significant changes in RNP area on WF SS-OCTA images through 3 months after PRP. Even eyes that were severely ischemic at baseline had no significant changes in RNP area 1 year after PRP.

CONCLUSIONS:

RNP in PDR can be identified at baseline and imaged serially after PRP using WF SS-OCTA. **Retinal** perfusion in PDR does not change significantly after PRP. The ability of WF SS-OCTA to longitudinally evaluate RNP areas provides additional justification for adopting WF SS-OCTA as the sole imaging modality for **clinical** management of PDR.

Morphologic and Functional Assessment of Photoreceptors After Macula-Off Retinal Detachment With Adaptive-Optics OCT and Microperimetry.

Reumueller A, Wassermann L, Salas M, Karantonis MG, Sacu S, Georgopoulos M et al

Am J Ophthalmol. 2020 Jun;214:72-85. doi: 10.1016/j.ajo.2019.12.015.

PMID: 31883465

ABSTRACT

PURPOSE:

Limited information is available on morphologic and functional regeneration of photoreceptors after **retinal** detachment (RD) surgery. This observational **clinical** study compared morphologic and functional changes of cones after vitrectomy for macula-off **retinal** detachment.

DESIGN:

Prospective, fellow-eye comparative case series.

METHODS:

StudyPopulation: Five eyes after vitrectomy with gas for macula-off **retinal** detachment (**retinal** detachment eyes, RDE) and 5 healthy fellow eyes (HFE) of 5 patients (mean age 59.8 years, macula-off duration 0.5 days to 5.5 days). ObservationProcedures: Eyes were examined with adaptive-optics optical coherence tomography (AO-OCT), spectral-domain OCT (SDOCT), and microperimetry (MP) at 6 (baseline, BL) and 56 weeks (follow-up, FUP) after 23

gauge pars plana vitrectomy and SF6 gas tamponade. Eight corresponding regions at foveal eccentricities of 2.5° (ecc 2.5°) and 6.5° (ecc 6.5°) were analyzed in every eye. AO-OCT en face images and SD-OCT B-scans were graded regarding irregularity and loss of photoreceptor signals ranging from none to severe changes. The number of detectable cones at height of the inner-outer segment junction (IS/OS) and cone outer segment tips (COST) was counted manually in AO-OCT images. MP with a custom grid was used to assess **retinal** sensitivity at these locations. MainOutcomeMeasures: Cone density, cone pattern regularity and signal attenuation, **retinal** sensitivity.

RESULTS:

In comparison to HFE, RDE showed highly irregular cone patterns in AO-OCT and irregular outer **retinal** bands in SDOCT. Despite significant improvement of cone pattern regularity compared to BL ($P < .001$), 63% of AO images showed remaining cone pattern irregularity and 45.5% of SDOCT B-scans showed severe signal reduction at FUP. In HFE, mean cone density retrieved from IS/OS and COST remained around 20,000/mm^2 (ecc 2.5°) and 16,000/mm^2 (ecc 6.5°) at BL and FUP. Cone density of RDE was significantly reduced and ranged between 200/mm^2 and 15,600/mm^2 ($P < .001$) at BL. Despite improvement at FUP ($P < .001$), mean cone density at IS/OS and COST was still lower compared to HFE and ranged between 7790 and 9555 cones/mm^2 ($P < .001$). Mean **retinal** sensitivity of all measured locations remained 18 dB in HFE and was significantly lower in RDE, with 14.30 dB at BL and 14.64 dB at FUP. Both SDOCT grading and microperimetry sensitivity showed strong correlation with AO-OCT grading and cone density (rho values > 0.750).

CONCLUSIONS:

The combination of AO-OCT, SDOCT, and microperimetry is a powerful tool to capture cone regeneration after vitreoretinal surgery. Our study shows that cone morphology and function improve within 56 weeks after RD surgery but structural and functional impairment is still present.

Outer retinal hyperreflective deposits (ORYD): a new OCT feature in naïve diabetic macular oedema after PPV with ILM peeling.

Iglicki M, Loewenstein A, Barak A, Schwartz S, Zur D et al

Br J Ophthalmol. 2020 May;104(5):666-671. doi: 10.1136/bjophthalmol-2019-314523.

PMID: 31391181

ABSTRACT

AIMS:

We aimed to investigate a novel optical coherence tomography (OCT) finding of outer **retinal** hyperreflective deposits (ORYDs) in patients with naïve diabetic macular oedema (DMO) seen after small gauge pars plana vitrectomy (PPV) with internal limiting membrane (ILM) peeling. Furthermore, we evaluated the predictive value of ORYD for visual outcome over 24 months follow-up.

METHODS:

Retrospective cohort study including 111 eyes from 111 patients with naïve DMO treated by PPV and ILM peeling with a follow-up of 24 months. OCT scans were analysed for the presence of ORYD 1 week and 1, 6, 12, 18 and 24 months after surgery. Change in baseline best-corrected visual acuity (BCVA) and central subfoveal thickness (CST) after surgery were measured over the follow-up period. Presence of ORYD was correlated with baseline characteristics and BCVA after 24 months.

RESULTS:

Hundred and eleven eyes from 111 patients were included (mean age 67.5±14.8 years). ORYD was identified in the outer plexiform layer as hyperreflective deposits in 92 patients (82.8%) 7 days after surgery but it was not present before surgery. There was a significant reduction in the presence of ORYD. After 24 months ORYD disappeared in all cases ($p<0.001$).

CONCLUSIONS:

We describe a novel OCT feature of ORYD present in the early postoperative phase in the majority of patients after PPV with ILM peeling for naïve DMO, disappearing over the postoperative course. These deposits might be a result of sudden desinflammation and could shed new light on the process of DMO resolution after operative intervention.

Inverted Internal Limiting Membrane Flap versus Internal Limiting Membrane Peeling for Macular Hole Retinal Detachment in High Myopia.

Matsumae H, Morizane Y, Yamane S, Yanagisawa S, Sakurai T, Kobori A et al.

Ophthalmol Retina. 2020 Apr 2. pii: S2468-6530(20)30123-8. doi: 10.1016/j.oret.2020.03.021

PMID: 32448780

ABSTRACT

PURPOSE:

To compare surgical outcomes between the inverted internal limiting membrane (ILM) flap technique and ILM peeling for macular hole retinal detachment (MHRD) in eyes with high myopia.

DESIGN:

Multicenter cohort study.

PARTICIPANTS:

We retrospectively reviewed medical records of consecutive patients treated between June 2008 and September 2018 at 7 hospitals and included 100 eyes with MHRD associated with high myopia in our study. All eyes underwent vitrectomy with the inverted ILM flap technique (57 eyes) or ILM peeling (43 eyes) and were followed up for more than 6 months.

METHODS:

We estimated odds ratios and their 95% confidence intervals (CIs) for macular hole (MH) closure using multivariate logistic regression analysis. We also examined factors associated with the postoperative best-corrected visual acuity (BCVA) at the final visit using multiple linear regression analysis.

MAIN OUTCOME MEASURES:

Macular hole closure and postoperative BCVA at the final visit.

RESULTS:

The MH closure rate was significantly higher in the inverted ILM flap group (80.7%) than in the ILM peeling group (37.2%; $P < 0.001$). Moreover, postoperative BCVA at the final visit was significantly better in the former group (0.88 ± 0.48 vs. 0.99 ± 0.48; $P = 0.03$). The retinal attachment rate (ILM flap, 91.2%; ILM peeling, 79.5%; $P = 0.229$) and recovery rates for the external limiting membrane and ellipsoid zone line (ILM flap, 10.9%; ILM peeling, 0%; $P = 0.12$) showed no significant intergroup differences. After adjustment for age, axis, tamponade substance, and dye for ILM staining, the inverted ILM flap technique was associated strongly and positively with MH closure (odds ratio, 7.14; 95% CI, 2.72-18.7; $P = 0.001$). Moreover, the inverted ILM flap technique and preoperative BCVA were associated significantly and positively with the postoperative BCVA at the final visit.

CONCLUSIONS:

Our findings suggest that the MH closure rate and postoperative visual outcome for eyes with high myopia-associated MHRD are better with the inverted ILM flap technique than with ILM peeling. Thus, vitrectomy with the inverted ILM flap technique should be considered as the initial surgery for MHRD associated with high myopia.

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