Retina Roundup

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360-DEGREE LASER RETINOPEXY IN PRIMARY VITRECTOMY FOR RHEGMATOGENOUS RETINAL DETACHMENT: FACTORS ASSOCIATED WITH ITS USE AND IMPACT ON SURGICAL OUTCOMES

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Background: To determine patient and surgical factors associated with the use of 360-degree laser retinopexy during primary pars plana vitrectomy (PPV)±scleral buckle (SB) for rhegmatogenous retinal detachment (RRD) and its impact on surgical outcomes.

Methods: Patients who underwent PPV ± SB for repair of non-complex RRD at a single centre were included in this retrospective study. The primary outcome was single surgery anatomical success (SSAS). Secondary outcomes included visual acuity, epiretinal membrane formation, the presence of cystoid macular oedema, tonic pupil and corneal epithelial defects. Multiple logistic regression and multivariate regression was used.

Results: The study included 192 cases, of which 130 received 360-degree laser. Worse preoperative logMAR visual acuity ($P = 0.009$), male sex ($P = 0.060$), higher PVR grades, supplemental SB ($P = 0.0468$) and silicone oil/C_3F_8 tamponade ($P < 0.0001$) were associated with 360-degree laser use. No significant associations between 360-degree laser and SSAS ($P = 0.079$), nal logMAR visual acuity ($P = 0.0623$), ERM development ($P = 0.8208$), postoperative CMO ($P = 0.5946$), tonic pupil ($P > 0.9999$) or corneal epithelial defects ($P = N/A$) were found.

Conclusions: 360-degree laser retinopexy during primary PPV ± SB for RRD was associated with more complex cases and more extensive operations. Even when accounting for this, there was no difference in surgical outcomes or complication rates.

FOVEAL MORPHOLOGY OF NORMAL FELLOW EYES OF PATIENTS WITH UNILATERAL MACULAR HOLE

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Purpose: To determine the morphology of the fovea in the ophthalmoscopically and tomographically normal fellow eyes of patients with a unilateral idiopathic macular hole (MH) and determine the association between foveal morphological parameters and foveal outer nuclear layer (ONL) thickness. Retrospective observational study.

Participants: Two hundred three normal fellow eyes of patients with a unilateral MH and 216 normal eyes of 216 healthy subjects.

Methods: All the eyes were examined using swept-source OCT. A built-in software was used to measure the average retinal and choroidal thickness in the center and in the inner 4 subfields defined in ETDRS. The total retinal thickness, thickness of 3 retinal layers at the fovea and parafovea (0.25 and 0.5 mm nasal and temporal from the fovea), and foveal floor width (FFW) were measured on a scan image of a horizontal line passing through the center of the fovea. We defined the thickness between the internal limiting membrane and outer plexiform layer as inner retinal thickness and the thickness between the external limiting membrane and retinal pigment epithelium as outer retinal thickness. Multiple regression analyses were performed with age, sex, axial length, and the presence of a posterior vitreous detachment as the dependent variables.

Results: The fellow eyes had a thinner central retinal subfield, thinner fovea, thinner ONL at all points except at 0.5 mm nasal, significantly thicker outer retina at all points, and a wider FFW (P 1⁄4 0.040 to P < 0.0001). The foveal ONL thickness was significantly and positively correlated with the central subfield retinal thickness and foveal thickness and negatively correlated with the FFW (all P < 0.0001).

Conclusions: The thinner and deeper fovea and the thinner ONL of the fellow eyes of patients with a unilateral MH make these eyes more susceptible to the formation of an MH.

THE EFFECT OF PEGCETACOPLAN TREATMENT ON PHOTORECEPTOR MAINTENANCE IN GEOGRAPHIC ATROPHY MONITORED BY AI-BASED OCT ANALYSIS

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Purpose: To investigate the therapeutic effect of intravitreal pegcetacoplan on the inhibition of photoreceptor (PR) loss and thinning in geographic atrophy (GA) on conventional spectral domain-optical coherence tomography (SD-OCT) imaging by deep learning-based automated PR quantification.

Design: Post-hoc analysis of a prospective, multicenter, randomized, sham-controlled, masked phase II trial investigating the safety and efficacy of pegcetacoplan for the treatment of GA due to age-related macular degeneration.

Participants: Study eyes of 246 patients, randomized 1:1:1 to monthly (AM), bimonthly (AEOM) and sham (SM) treatment.

Methods: We performed fully automated, deep learning-based segmentation of retinal pigment epithelium (RPE) loss and PR thickness on SD-OCT volumes acquired at baseline, month 2, 6 and 12. The difference in the change of PR loss area was compared between treatment arms. Change in PR thickness adjacent to the GA borders and in the whole 20 degrees scanning area was compared between treatment arms.

Results: A total of 31,556 B-Scans of 644 SD-OCT volumes of 161 study eyes (AM: 52, AEOM: 54, SM: 56) were evaluated from baseline to month 12. Comparison of mean change in PR loss area revealed statistically significantly less growth in the AM group at month 2, 6 and 12 compared to SM.PR thinning was significantly reduced under monthly treatment compared to sham within the GA junctional zone as well as throughout the 20 degrees area. A trend towards greater inhibition of PR loss compared to RPE loss was observed under therapy.

Conclusions: Distinct and reliable quantification of PR loss using deep learning-based algorithms offers an essential tool to evaluate therapeutic efficacy in slowing disease progression. PR loss and thinning are reduced by intravitreal complement C3 inhibition. Automated quantification of PR loss/maintenance based on OCT images is an ideal approach to reliably monitor disease activity and therapeutic efficacy in GA management in clinical routine and regulatory trials.

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NOVEL INSIGHTS INTO THE PATHOPHYSIOLOGY OF PROLIFERATIVE VITREORETINOPATHY: THE ROLE OF VITREOSCHISIS-INDUCED VITREOUS CORTEX REMNANTS

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Purpose: We previously hypothesized a causal relationship between vitreoschisis-induced vitreous cortex remnants (VCR) and the development of proliferative vitreoretinopathy (PVR). This study aims to substantiate this association through histopathological analysis of surgical specimens in support of strategies to improve therapeutic outcomes.

Methods: A descriptive, prospective, non-consecutive case series. Histopathological and immunohistochemical analyses were performed on membranes removed from the peripheral retinal surface during initial vitrectomy for primary rhegmatogenous retinal detachment (RRD) (n = 11) or recurrent retinal detachment (n = 12). The clinical aspect of the membranes ranged from loose-meshed membranes visualized with triamcinolone to more fibrotic membranes stained with trypan blue.

Results: Consistent with the clinical presentation, histopathological analysis revealed membranes with different area characteristics. Paucicellular lamellar collagen-rich areas, suggestive of VCR, appeared to transition to areas of increased cellularity and eventually more fibrotic areas of low cellularity. Five different area characteristics could be identified that seemed to correspond to five histopathological stages in PVR formation, with lamellar VCR collagen acting as an essential precondition: 1. Lamellar collagen, low cellularity (hyalocytes). 2. Lamellar collagen, increased cellularity (hyalocytes, glial cells). 3. Lamellar collagen, high cellularity (macrophages, glial cells, RPE-cells). 4. Early fibrosis, decreased cellularity (myofibroblasts). 5. Fibrosis, low cellularity (myofibroblasts).

Conclusion: These findings confirm the role of VCR in preretinal PVR formation posterior to the vitreous base. We propose that the presence of VCR over the retinal surface should be qualified as a risk factor for PVR formation. Detection and adequate removal of VCR may improve the success rate of vitreoretinal surgeries.

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OCT BIOMARKERS RELATED TO SUBTHRESHOLD MICROPULSE LASER TREATMENT EFFECT IN CENTRAL SEROUS CHORIORETINOPATHY

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Background: To identify the OCT biomarkers related to the anatomical outcomes in eyes with central serous chorioretinopathy (CSCR) after subthreshold micropulse laser (SML) treatment.

Methods: Patients with CSCR underwent SML were enrolled in this retrospective study. Only patients who under- went enhanced depth imaging optical coherence tomography (EDI-OCT) examination before and after SML were selected. Patients were divided into two groups based on whether subretinal uid (SRF) absorbed or not after SML. Group 1 was the SRF resolved group, and Group 2 was the SRF non-resolved group. Factors including age and gender, duration of symptoms, CSCR history, the height of SRF at baseline, retinal pigment epithelium (RPE) /inner choroid alterations, as well as subfoveal choroidal thickness (SFCT) of the affected eye and the fellow eye before and after SML were recorded and compared between two groups. Longitudinal change of SFCT of a subgroup of patients were analyzed.

Results: A total of 58 eyes of 58 patients were involved in this study. SRF of 31 eyes got completely absorbed, and SRF of 27 eyes was retained after SML. Logistic regression analysis revealed baseline SFCT of the affected eye (OR = 1.007, 95% CI: 1.001–1.012, P = 0.019) and RPE/inner choroid alterations (OR = 25.229, 95% CI: 2.890–220.281, P = 0.004) were correlated with SML efficacy. Thirty-three eyes of 33 patients were enrolled in the subgroup analysis. A significant difference of SFCT changes between two groups were demonstrated (P = 0.001). The difference of SFCT between baseline and three months after SML was also related to SRF resolution (OR = 0.952, 95% CI: 0.915–0.990, P = 0.014).

Conclusion: Baseline SFCT, change of SFCT at 3-month after treatment, and RPE/inner choroid alterations were the OCT biomarkers related to SRF resolution after SML treatment.