Retina Roundup March 2024

1) *Retina* 44(1):p 10-19, January 2024.

Pigment epithelial detachment thickness and variability affects visual outcomes in patients with neovascular age-related macular degeneration

Purpose:
To evaluate the impact of pigment epithelial detachment (PED) thickness (i.e., height) and thickness variability on best-corrected visual acuity outcomes in patients with neovascular age-related macular degeneration in the Phase 3 HAWK and HARRIER trials.

Methods:
Optical coherence tomography images from the pooled brolucizumab 6 mg and aflibercept 2 mg arms were analyzed for the maximum PED thickness across the macula at baseline through to week 96. Best-corrected visual acuity outcomes were compared in patients with different PED thickness and variability cut-off thresholds.

Results:
Greater PED thickness at baseline or at week 12 was associated with lower mean best-corrected visual acuity gain from baseline to week 96 (baseline PED ≥200 μm: +4.6 letters; <200 μm: +7.0 letters; week 12 PED ≥100 μm: +5.6 letters; <100 μm: +6.6 letters). Eyes with the largest PED thickness variability from week 12 through week 96 gained fewer letters from baseline at week 96 (≥33 μm: +3.3 letters; <9 μm: +6.2 letters). Furthermore, increased PED thickness at week 48 was associated with higher prevalence of intraretinal and subretinal fluid.

Conclusion:
In this treatment-agnostic analysis, greater PED thickness and PED thickness variability were associated with poorer visual outcomes in patients with neovascular age-related macular degeneration and greater neovascular activity.

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2) International Journal of Retina and Vitreous volume 10, Article number: 12 (2024)

Retinal capillary perfusion heterogeneity in diabetic retinopathy detected by optical coherence tomography angiography

Background

Diabetic retinopathy (DR) is a leading cause of blindness and involves retinal capillary damage, microaneurysms, and altered blood flow regulation. Optical coherence tomography angiography (OCTA) is a non-invasive way of visualizing retinal vasculature but has not been used extensively to study blood flow heterogeneity. The purpose of this study is to detect and quantify blood flow heterogeneity utilizing en-face swept source OCTA in patients with DR.

Methods

This is a prospective clinical study which examined patients with either type 1 or 2 diabetes mellitus. Each included eye was graded clinically as no DR, mild DR, or moderate-severe DR. Ten consecutive *en face* 6×6 mm foveal SS-OCTA images were obtained from each eye using a PLEX Elite 9000 (Zeiss Meditec, Dublin, CA). Built-in fixation-tracking, follow-up functions were utilized to reduce motion artifacts and ensure same location imaging in sequential frames. Images of the superficial and deep vascular complexes (SVC and DVC) were arranged in temporal stacks of 10 and registered to a reference frame for segmentation using a deep neural network. The vessel segmentation was then masked onto each stack to calculate the pixel intensity coefficient of variance (PICoV) and map the spatiotemporal perfusion heterogeneity of each stack.

Results

Twenty-nine eyes were included: 7 controls, 7 diabetics with no DR, 8 mild DR, and 7 moderate-severe DR. The PICoV correlated significantly and positively with DR severity. In patients with DR, the perfusion heterogeneity was higher in the temporal half of the macula, particularly in areas of capillary dropout. PICoV also correlates as expected with the established OCTA metrics of perfusion density and vessel density.

Conclusion

PICoV is a novel way to analyze OCTA imaging and quantify perfusion heterogeneity. Retinal capillary perfusion heterogeneity in both the SVC and DVC increased with DR severity. This may be related to the loss of retinal capillary perfusion autoregulation in diabetic retinopathy.

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3) *Retina* 44(1):p 95-101, january 2024.

Vertical and horizontal metamorphopsia one year after surgery for macular holes ≤ 500 μm with and without inverted internal limiting membrane flap

Purpose:
To investigate the effect of an inverted internal limiting membrane flap (IF) and other factors on metamorphopsia after macular hole surgery.

Methods:
Prospective case series of patients undergoing pars plana vitrectomy with gas tamponade, with either conventional internal limiting membrane peeling (CP) or an IF, for primary idiopathic macular holes ≤ 500 μm. Vertical and horizontal metamorphopsia were measured as M-scores (degrees) using M-charts preoperatively and at 2, 6, and 12 months postoperatively.

Results:
Fifty-three eyes of 53 patients were included of whom 27 underwent CP and 26 were treated with an IF. After macular hole surgery, all patients were pseudophakic. Vertical and horizontal metamorphopsia improved from 1.08 (±0.51) and 0.98 (±0.70) preoperatively to 0.58 (±0.37) and 0.45 (±0.36) at 2 months ($P < 0.01$), with no further significant improvement at 6 months (0.39 [±0.31], $P = 0.07$ and 0.31 [±0.28], $P = 0.18$) or at 12 months (0.37 [±0.30], $P = 0.72$ and 0.28 [±0.28], $P = 0.99$). There was no significant difference in the mean vertical and horizontal metamorphopsia between patients with CP and with an IF at 2 months ($P = 0.063$, $P = 0.10$), 6 months ($P = 0.25$, $P = 0.16$), or 12 months ($P = 0.62$, $P = 0.22$). Preoperative vertical M-score improved at 12 months after macular hole surgery by 61% and 64% in the CP and IF groups, respectively ($P = 0.84$), and the horizontal M-score by 65% and 71%, respectively ($P = 0.98$).

Conclusion:
The use of an IF has no evident bearing on the degree of postoperative metamorphopsia 12 months after surgical repair of macular holes ≤ 500 μm.

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4) *Retina* ():10.1097/IAE.0000000000004055, January 23, 2024

Additional Pneumatic Retinopexy in Patients with Persistent Retinal Detachment After Scleral Buckling

Purpose:
To investigate the efficacy, safety, and indications for additional pneumatic retinopexy (PR) in patients with persistent retinal detachment (RD) after scleral buckling (SB).

Methods:
This retrospective study included patients who underwent additional PR after SB for primary rhegmatogenous RD (n = 78). We defined "inadequate buckle" as RD persistence due to low buckle height despite accurate buckle placement and "buckle misplacement" as an uncovered tear because of incorrect buckle placement.

Results:
The anatomical success rate after additional PR was 52.6%. Development of proliferative vitreoretinopathy (PVR) grade B (hazard ratio [HR], 5.73; *P* <0.001) and inferior retinal tears (HR, 2.12; *P* = 0.040) were significant risk factors for anatomical failure. The most common cause of anatomical failure was PVR (19/37; 51.4%), and epiretinal membrane formation was a common complication after additional PR (22/78; 28.2%). The anatomical success rate with additional PR was significantly higher in the inadequate buckle group than in the misplacement group (8/9 [88.9%] vs. 12/28 [42.9%]; *P* = 0.023)

Conclusion:
Development of PVR grade B and inferior retinal tears were significantly associated with anatomical failure after additional PR. Additional PR may benefit patients with superior retinal tears or low buckle height and those without PVR

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5) *International Journal of Retina and Vitreous* **volume 10**, Article number: 1 (2024)

Evaluation of retinal structural and functional changes after silicone oil removal in patients with rhegmatogenous retinal detachment: a retrospective study

Background

To evaluate retinal structural and functional changes after silicone oil (SO) removal in eyes with macula-off rhegmatogenous retinal detachment (RRD).

Methods

Best-corrected visual acuity (BCVA) testing, microperimetry, and optical coherence tomography angiography were performed in 48 eyes with macula-off RRD before and 3 months after SO removal. The values of healthy contralateral eyes were used as control data. Correlations between retinal vessel density (VD), retinal nerve fiber layer thickness (RNFLT), the interval between retinal detachment and surgery, the duration of SO tamponade, the follow-up time after SO removal, and visual function were analyzed.

Results

Significant increases in 2° fixation rate (FR), 4° FR, 2° mean retinal sensitivity (MRS), 6° MRS, parafoveal superficial capillary plexus VD and RNFLT were observed after SO removal (all $P < 0.05$). The increase of 2° MRS and 6° MRS were correlated with the duration of SO tamponade and the follow-up time after SO removal respectively (all $P < 0.05$). The last 2° MRS and 6° MRS were correlated with the duration of SO tamponade, the interval between retinal detachment and surgery, and the follow-up time after SO removal (all $P < 0.01$). The last FR in RRD eyes was close to that of contralateral eyes ($P > 0.05$).

Conclusion

Retinal structure and function improved to different degrees after SO removal. Fixation stability and retinal sensitivity increased more than BCVA postoperatively. Retinal sensitivity, which was affected by the interval between retinal detachment and surgery and the duration of SO tamponade, gradually recovered after SO removal