Retina Roundup
July 2019

Refractive Outcomes after Pars Plana Vitrectomy and Scleral Fixated Intraocular Lens with Gore-Tex Suture.

Su D, Stephens JD, Obeid A, Borkar D, Storey PP, Khan MA, Hsu J, Garg SJ, Gupta O.

Ophthalmol Retina. 2019 Jul;3(7):548-552. doi: 10.1016/j.oret.2019.02.012. PMID: 31277795

ABSTRACT

PURPOSE:

To evaluate refractive outcomes after combined pars plana vitrectomy (PPV) and scleral fixation of an intraocular lens (IOL) using Gore-Tex suture.

DESIGN:

Retrospective cohort study.

PARTICIPANTS:

Fifty-five eyes from 53 patients who underwent PPV with a Gore-Tex sutured IOL from June 2013 through December 2017.

METHODS:

Patients who underwent combined PPV and scleral fixation of an IOL with Gore-Tex suture were identified. All eyes underwent scleral fixation of either an Akreos A060 or enVista MX60 IOL and were fixated either 2 mm or 3 mm posterior to the limbus. Postoperative manifest refractions were performed at least 3 months after surgery and were compared with preoperative predicted target refraction based on in-the-bag IOL calculations. Subgroup analyses based on sclerotomy placement and IOL models were performed.

MAIN OUTCOME MEASURES:

Postoperative manifest refraction and difference with sclerotomy placement and IOL model.

RESULTS:

The mean postoperative spherical equivalent (SEQ) was -0.99±1.00 diopters (D). The mean difference in SEQ (ΔSEQ) from preoperative predicted target was -0.64±1.00 D. The IOL was fixated 2 mm posterior to the limbus in 14 eyes and 3 mm in 41 eyes. Within these 2

subgroups, the mean postoperative SEQ was -1.53±1.35 D for fixation 2 mm posterior to the limbus and -0.82±0.83 D for fixation 3 mm posterior to the limbus (P = 0.09). The mean ΔSEQ was -0.43±0.71 D for fixation 3 mm posterior to the limbus and -1.35±1.32 D for fixation 2 mm posterior to the limbus (P = 0.03). The mean amount of surgically induced astigmatism in the overall cohort was 0.77±0.65 D. The mean ΔSEQ and induced astigmatism were similar between IOL models.

CONCLUSIONS:

After combined PPV and Gore-Tex-sutured IOL implantation, mean postoperative refractive outcomes were more myopic when the IOL was fixated 2 mm from the limbus compared with 3 mm from the limbus. No significant difference was found between IOL models. Based on these results, future implant power calculations may be adjusted to approximate preoperative target refraction more accurately.

Vision-Related Quality of Life in Patients with Diabetic Macular Edema Treated with Intravitreal Aflibercept: The AQUA Study.

Garweg JG, Stefanickova J, Hoyng C, Schmelter T, Niesen T, Sowade O, Sivaprasad S; AQUA Investigators.

Ophthalmol Retina. 2019 Jul;3(7):567-575. doi: 10.1016/j.oret.2019.03.012. PMID:31080168

ABSTRACT

PURPOSE:

To examine vision-related quality of life in patients with diabetic macular edema (DME) treated with intravitreal aflibercept (EYLEA, Regeneron Pharmaceuticals, Inc, Tarrytown, NY).

DESIGN:

AQUA was a multicenter, open-label, single-arm, phase 4 study.

PARTICIPANTS:

Adults 18 years of age or older with type 1 or 2 diabetes mellitus and DME.

METHODS:

Patients received intravitreal aflibercept 2 mg every 8 weeks for 52 weeks, after 5 initial doses every 4 weeks.

MAIN OUTCOME MEASURES:

The primary outcome was the change in 25-item National Eye Institute Visual Function Questionnaire (NEI VFQ-25) total score from baseline to week 52. Secondary outcomes included the change in NEI VFQ-25 near and distant activities subscale scores, best-corrected visual acuity (BCVA; Early Treatment Diabetic Retinopathy Study [ETDRS] letters), and central retinal thickness (CRT) from baseline to week 52. Change in NEI VFQ-25 score at week 52 for better-seeing eyes (BSEs) and worse-seeing eyes (WSEs) also was evaluated.

RESULTS:

A total of 553 patients comprised the full analysis set, and 560 patients comprised the safety analysis set. At baseline, the mean NEI VFQ-25 total score was 70.12, mean BCVA was 61.5 ETDRS letters, and mean CRT was 464.81 µm. A mean of 8.8 injections were administered over 52 weeks. At week 52, the mean improvement from baseline in the NEI VFQ-25 total score was +6.11 (standard deviation [SD], 11.46); the corresponding improvements in near

and distant activities were +11.37 (SD, 18.01) and +7.33 (SD, 17.32), respectively. Similarly, improvements in patients whose BSE and WSE were treated were 7.74 (SD, 13.59) and 5.48 (SD, 9.70), respectively. At week 52, mean change in BCVA was +10.0 ETDRS letters (SD, 8.0 ETDRS letters), and mean change in CRT was -175.38 µm (SD, 132.62 µm). Overall, 53.6% of patients reported treatment-emergent adverse events (TEAEs), of whom 26.8% experienced an ocular TEAE in the study eye. The most common serious ocular TEAE was endophthalmitis (0.5% [n = 3]). Five deaths (0.9%) were reported, but were not considered treatment related.

CONCLUSIONS:

Intravitreal aflibercept was associated with clinically meaningful improvements in NEI VFQ-25 total score over 52 weeks in patients with DME; these were even more pronounced for near than for distant activities. Adverse events were consistent with the known safety profile of intravitreal aflibercept.

Combined Multimodal Analysis of Peripheral Retinal and Macular Circulation in Diabetic Retinopathy (COPRA Study).

Or C, Das R, Despotovic I, Alibhai AY, Moult E, Waheed NK, Chakravarthy U.

Ophthalmol Retina. 2019 Jul;3(7):580-588. doi: 10.1016/j.oret.2019.03.001. PMID:31078525

ABSTRACT

PURPOSE:

To systematically examine the relationships between the microvascular indices that are measured on OCT angiography (OCTA) and the presence and extent of peripheral nonperfusion in persons with diabetic retinopathy.

DESIGN:

A retrospective cross-sectional study of patients who had varying degrees of diabetic retinopathy. The study sample was recruited from 2 large tertiary referral retina clinics.

PARTICIPANTS:

In total, 82 eyes of 45 patients with varying degrees of diabetic retinopathy were enrolled and analyzed.

MAIN OUTCOME MEASURES:

Relationships between peripheral ischemia measured on fluorescein angiography (FA) and OCTA metrics, including foveal avascular zone (FAZ) and vessel density measurements.

RESULTS:

A significant decrease in mean signal index in both the superficial and deep plexus and binarized flow index in the superficial plexus were found with increasing duration of diabetes mellitus. OCT and OCTA grading showed increasing central macular thickness and prevalence of microvascular abnormalities in the superficial and deep capillary bed with worse retinopathy as measured on the Diabetic Retinopathy Severity Scale. FAZ area and major axis and minor axis length were strongly associated with diabetic retinopathy severity. On classifying eyes into tertiles of peripheral ischemia measured on FA, significant increases in various FAZ metrics, including FAZ area and minor axis length, were noted. Statistically worsening of FAZ OCTA metrics was only seen between tertiles 2 and 3, indicating a non-linear relationship. The presence of neovascularization of the disc, neovascularization elsewhere, or intraretinal microvascular abnormality was associated with a significant increase in FAZ major axis length in the superficial plexus and a significant decrease in binarized flow index in the deep plexus.

CONCLUSIONS:

OCTA metrics are indicators of the severity of peripheral retinal nonperfusion. However, the central ischemic index did not exhibit a linear relationship with peripheral capillary nonperfusion. Our findings suggest that a rise in intraocular vascular endothelial growth factor as a consequence of mild peripheral capillary nonperfusion may play a compensatory role in maintaining the central macular microcirculation. Further investigations with studies employing longitudinal design will improve our understanding of the relationship between macular microcirculation and peripheral ischemia.

ASSESSMENT OF CENTRAL SEROUS CHORIORETINOPATHY DEPICTED ON COLOR FUNDUS PHOTOGRAPHS USING DEEP LEARNING.

Zhen Y, Chen H, Zhang X, Meng X, Zhang J, Pu J. Retina. 2019 Jul 3. doi: 10.1097/IAE.0000000000002621. PMID:31283737

ABSTRACT

PURPOSE:

To investigate whether and to what extent central serous chorioretinopathy (CSC) depicted on color fundus photographs can be assessed using deep learning technology.

METHODS:

We collected a total of 2,504 fundus images acquired on different subjects. We verified the CSC status of these images using their corresponding optical coherence tomography images. A total of 1,329 images depicted CSC. These images were preprocessed and normalized. This resulting data set was randomly split into three parts in the ratio of 8:1:1, respectively, for training, validation, and testing purposes. We used the deep learning architecture termed Inception-V3 to train the classifier. We performed nonparametric receiver operating characteristic analyses to assess the capability of the developed algorithm to identify CSC. To study the inter-reader variability and compare the performance of the computerized scheme and human experts, we asked two ophthalmologists (i.e., Rater #1 and #2) to independently review the same testing data set in a blind manner. We assessed the performance difference between the computer algorithms and the two experts using the receiver operating characteristic curves and computed their pair-wise agreements using Cohen's Kappa coefficients.

RESULTS:

The areas under the receiver operating characteristic curve for the computer, Rater #1, and Rater #2 were 0.934 (95% confidence interval = 0.905-0.963), 0.859 (95% confidence interval = 0.809-0.908), and 0.725 (95% confidence interval = 0.662-0.788). The Kappa coefficient between the two raters was 0.48 ($P < 0.001$), while the Kappa coefficients between the computer and the two raters were 0.59 ($P < 0.001$) and 0.33 ($P < 0.05$).

CONCLUSION:

Our experiments showed that the computer algorithm based on deep learning can assess CSC depicted on color fundus photographs in a relatively reliable and consistent way.

IDENTIFICATION AND CLASSIFICATION OF MACULAR MORPHOLOGIC BIOMARKERS RELATED TO VISUAL ACUITY IN RADIATION MACULOPATHY: A Multimodal Imaging Study.

Parrozzani R, Midena E, Trainiti S, Londei D, Miglionico G, Annunziata T, Frisina R, Pilotto E, Frizziero L.

Retina. 2019 Jul 3. doi: 10.1097/IAE.0000000000002615. PMID:31283736

ABSTRACT

PURPOSE:

To identify and classify, by a multimodal imaging approach, the most relevant macular morphologic biomarkers related to visual acuity in patients affected by radiation maculopathy secondary to brachytherapy.

METHODS:

Fifty-one consecutive patients previously treated with Iodine-125 brachytherapy because of uveal melanoma were enrolled. Each patient underwent full ophthalmologic examination including best-corrected visual acuity and multimodal macular imaging analysis. Macular morphological parameters were processed by a stepwise selection analysis.

RESULTS:

Three macular parameters were identified as the most relevant macular morphologic biomarkers of poor visual acuity: the vertical thickness of the thickest macular cyst (P = 0.0001), the presence of foveal inner segment/outer segment (IS/OS) layer disruption (P = 0.0054), and the presence of foveal **retinal** pigment epithelium atrophy (0.0884). The intergrader agreement for these morphologic biomarkers was 0.98, 0.92, and 0.92, respectively (interclass correlation coefficient).

CONCLUSION:

The vertical thickness of the thickest macular cyst, the presence of foveal **retinal** pigment epithelium atrophy, and IS/OS layer disruption can be used to clinically characterize radiation maculopathy. These parameters allow for separation of the edematous component of radiation maculopathy, which is potentially treatable in early disease stages, from late onset atrophic components, which are theoretically irreversible.

FOVEA-SPARING VERSUS COMPLETE INTERNAL LIMITING MEMBRANE PEELING IN VITRECTOMY FOR THE TREATMENT OF MACULAR HOLES.

Morescalchi F, Russo A, Bahja H, Gambicorti E, Cancarini A, Costagliola C, Semeraro F.

Retina. 2019 Jul 1. doi: 10.1097/IAE.0000000000002612. PMID:31274710

ABSTRACT

PURPOSE:

To compare the anatomical and functional outcomes of vitrectomy involving complete internal limiting membrane peeling (CP) with those of vitrectomy involving fovea-sparing internal limiting membrane peeling (FSP) for the treatment of macular holes measuring >250 µm.

METHODS:

This prospective, randomized, comparative study included 46 eyes with a medium or large macular hole that was randomized to undergo complete (CP group) or fovea-sparing (FSP group) internal limiting membrane peeling during vitrectomy. The main outcome measures included the foveal **retinal** sensitivity, visual acuity, and central **retinal** thickness.

RESULTS:

Both groups showed significantly improved foveal **retinal** sensitivity after surgery; the mean foveal **retinal** sensitivity change at 12 months after surgery was +2.8 ± 2.1 dB in the CP group and +7.2 ± 2.3 dB in the FSP group. The visual acuity also showed a significant improvement in both groups, with no significant differences in values at any time point. Regarding central **retinal** thickness, there was a significant decrease in the CP group and no change in the FSP group. Nicks or dimples in the inner **retinal** layers were visible in the fovea and perifovea of nine eyes in the CP group.

CONCLUSION:

Our findings suggest that both CP and FSP are safe and effective treatments leading to functional and anatomical improvements in patients with all size macular holes. However, the fovea-sparing technique may provide better functional outcomes because of a greater improvement in foveal **retinal** sensitivity.

Factors associated with extended remission in neovascular age-related macular degeneration on pro re nata treatment protocol.

Lin T, Dans KC, Muftuoglu IK, Meshi A, Amador-Patarroyo MJ, Cheng L, Freeman WR.

Br J Ophthalmol. 2019 Jul 13. pii: bjophthalmol-2018-313447. doi: 10.1136/bjophthalmol-2018-313447. PMID:31302628

ABSTRACT

AIM:

To show the characteristics and outcomes of patients with neovascular age-related macular degeneration (nAMD) who had extended remission (ER) while on a pro re nata (PRN) treatment protocol.

METHODS:

This was a retrospective case-control study of a consecutive series of patients with nAMD treated with a PRN antivascular endothelial growth factor (anti-VEGF) drug regimen. ER was defined as the absence of haemorrhage, intraretinal/subretinal fluid on optical coherence tomography and leakage on fluorescein angiography for 52 weeks after cessation of anti-VEGF therapy. Matching patients with nAMD who did not achieve ER were included as control group. Cox regression analysis was fitted to identify predictors of time to achieve ER and time to recurrence. A logistic regression analysis of baseline characteristics was used to identify predictors of achieving ER.

RESULTS:

Of 830 eyes treated with anti-VEGF monotherapy, 77 (9.2%) eyes achieved ER during a median follow-up of 236 weeks (range 70-525 weeks). Cox regression analysis showed that ER was achieved earlier in eyes with isolated intraretinal fluid (HR, 2.05; 95% CI 1.929 to 4.520; p=0.045) at presentation. Logistic regression analysis showed that type 3 choroidal neovascularisation (OR, 0.090; 95% CI 0.021 to 0.382; p=0.001), thinner choroid (OR, 0.993; 95% CI 0.988 to 0.998; p=0.004) and absence of macular atrophy (OR, 0.233; 95% CI 0.065 to 0.839; p=0.026) at baseline increased the likelihood of achieving ER.

CONCLUSION:

ER is achievable in 9.2% of patients under PRN therapy for nAMD. At presentation with nAMD, anatomical features on **retinal** imaging may predict the likelihood of achieving ER and a shorter time to achieve ER.

KEYWORDS: imaging; macula; neovascularisation; **retina**; treatment medical

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