Retina Roundup
November 2020

Axial length as a basic anatomical predictor for morphological and clinical characteristics in acute central serous chorioretinopathy

Maltsev DS, Kulikov AN, Burnasheva MA, Arsenov NV, Chhablani J

Eye (Lond). 2020 Nov;34(11):2063-2067. doi: 10.1038/s41433-020-0774-7
PMID: 31969681

ABSTRACT

Objectives: To study the association between axial length (AL) and morphological and clinical characteristics in acute central serous chorioretinopathy.

Methods: All patients received optical coherence tomography, fluorescein angiography (FA), optical biometry, and retro-mode scanning laser ophthalmoscopy. The distance between the leakage point and the centre of the fovea were defined using FA images, and its correlation with AL, subfoveal choroidal thickness (SCT), central retinal thickness (CRT), and neurosensory detachment (NSD) area was calculated. The number of leaks, rate of bilateral involvement, and recurrence rate was evaluated.

Results: Forty-seven patients (47 eyes) were included in this study (38 males, 9 females, mean age 43.5 ± 10.8 years). The distance between the leakage point and the centre of the fovea had a correlation with AL ($r = -0.38$, $p = 0.008$), SCT ($r = 0.51$, $p = 0.0004$), and the area of NSD ($r = 0.5$, $p = 0.0006$) but not with CRT ($r = -0.11$, $p = 0.45$). A statistically significant difference in the distance between the leakage point and the centre of the fovea was found between eyes with short (<23.0 mm), medium (23.0-24.0 mm), and long (>24.0 mm) AL ($p = 0.014$). Number of leaks, rate of bilateral involvement, and recurrence rate had a negative linear association with AL ($p < 0.05$).

Conclusions: AL appears to be the basic anatomical predictor, which associated with morphological and clinical characteristics in acute central serous chorioretinopathy.

Comparison of various surgical techniques for optic disc pit maculopathy: vitrectomy with internal limiting membrane (ILM) peeling alone versus inverted ILM flap 'plug' versus autologous scleral 'plug'

Babu N, Kohli P, Ramasamy K

Br J Ophthalmol. 2020 Nov;104(11):1567-1573. doi: 10.1136/bjophthalmol-2019-315075.
PMID: 32029434

ABSTRACT

Aim: To compare the anatomical and visual outcomes of vitrectomy with internal limiting membrane (ILM) peeling alone versus inverted ILM flap to plug the pit versus autologous scleral plug for the treatment of optic disc pit maculopathy (ODP-M).

Methods: This retrospective study included 23 patients (23 eyes) who underwent 25G pars plana vitrectomy, ILM peeling and gas tamponade. While the pit was not plugged in group 1 (n=8), inverted ILM flap and autologous scleral flap were used to plug the pit in group 2 (n=7) and group 3 (n=8), respectively. Complete anatomical success was defined as total resolution of subretinal fluid (SRF) and macular schisis on optical coherence tomography while visual success was defined as a gain of at least 2 Snellen lines 1 year after surgery.

Results: Baseline characteristics were similar in all three groups. Mean central foveal thickness and SRF decreased in all three groups ($p<0.05$). Complete anatomical success was achieved in 25.0%, 85.7% and 87.5% eyes while visual success was achieved in 12.5%, 28.6% and 12.5% eyes in groups 1, 2 and 3, respectively. One eye (4.3%) in group 2 developed full-thickness macular hole at 1 month post-surgery. After complete resolution, there was no recurrence of fluid.

Conclusion: OPD-M has a better surgical outcome if the pit is plugged. Both inverted ILM flap and autologous scleral plug are equally efficacious adjuncts to plug the pit.

Comparison of OCT angiography in children with a history of intravitreal injection of ranibizumab versus laser photocoagulation for retinopathy of prematurity

Zhao J, Wu Z, Lam W, Yang M, Lu Chen 1 , Zheng L

Br J Ophthalmol. 2020 Nov;104(11):1556-1560. doi: 10.1136/bjophthalmol-2019-315520.
PMID: 32051137

ABSTRACT

Purpose: To compare the foveal microvascular structure characteristics in children with a history of intravitreal injection of ranibizumab (IVR) versus laser photocoagulation (LP) for retinopathy of prematurity by optical coherence tomography angiography (OCTA).

Methods: In this cross-sectional study, a total of 17 children (28 eyes) underwent IVR and 20 children (37 eyes) underwent LP were recruited. The age of doing OCTA examination of the two groups are 5.4±1.1 years and 6.3±1.8 years, respectively (p=0.07). Spectral-domain OCTA was performed for all the eyes with a scan size of 3×3 mm. The data of the superficial retinal layer were analysed. The foveal avascular zone (FAZ) and vessel density (including vessel length density (VLD) and perfusion density (PD)) were measured using the software of OCTA (Cirrus AngioPlex 5000, Carl Zeiss, Meditec, Dubin, California, USA). The central foveal thicknesses (CFT) were measured by cross-sectional OCT.

Results: In the central fovea, the retinal VLD and PD of patients with IVR were 13.82±2.99 mm/mm2 and 0.25±0.05 mm2/mm2, respectively, which were significantly lower than those of the LP group (15.64±2.71 mm/mm2 and 0.28±0.05 mm2/mm2, p=0.01 and p=0.006). The FAZ area of patients with IVR and LP were 0.13±0.09 mm2 and 0.09±0.07 mm2, respectively (p=0.048). The CFT of patients with IVR and LP were 200.7±16.7 µm and 220.9±22.7 µm, respectively (p<0.01). The logarithm of the minimal angle of resolution best-

corrected visual acuity of patients with IVR and LP were 0.2±0.1 and 0.1±0.1, respectively (p=0.01). There was no significant difference in the parafoveal and foveal VLD and PD, FAZ morphological index and spherical equivalent refraction (SER) between the two groups.

Conclusion: The IVR might contribute to microvascular changes in the macular zone, such as reducing the central foveal VLD and PD, while the LP might contribute to microstructural changes, such as smaller FAZ and thicker CFT.

Agreement of Spectral-Domain OCT with Fluorescein Leakage in Neovascular Age-Related Macular Degeneration: Post Hoc Analysis of the HARBOR Study

Khurana RN, Hill L, Ghanekar A, Gune S

Ophthalmol Retina . 2020 Nov;4(11):1054-1058. doi: 10.1016/j.oret.2020.04.016.

PMID: 32353536

ABSTRACT

Purpose: To evaluate the agreement between detection of activity of choroidal neovascularization (CNV) in neovascular age-related macular degeneration (AMD) by fundus fluorescein angiography (FFA) and spectral-domain (SD) OCT in the HARBOR study. Most retina specialists rely on OCT to guide treatment decisions in neovascular AMD. However, OCT may not always detect exudative activity. Traditionally, FFA was frequently performed in clinical practice, but its use has diminished due to reliance on OCT.

Design: Retrospective post hoc analysis of prospective clinical trial (HARBOR; ClinicalTrials.gov identifier, NCT00891735).

Participants: Patients with neovascular AMD in the HARBOR Trial.

Methods: Baseline to month 24 data from all randomized study eyes in HARBOR with both FFA and SD OCT data were analyzed for (1) evidence of CNV activity on SD OCT (presence of subretinal fluid, intraretinal fluid, and/or cystoid spaces); (2) evidence of CNV activity on FFA identified by the presence of leakage, and (3) cross-tabulation of CNV activity identified by FFA and SD OCT by office visit.

Main outcome measures: The percent agreement between FFA and SD OCT in detecting CNV activity and sensitivity and specificity of SD OCT to detect fluorescein leakage in neovascular AMD using FFA as the reference standard.

Results: At baseline, 1094 patients (99.9%) had agreement between SD OCT and FFA in detecting CNV activity. By month 24, of the 779 total active cases, the agreement was only 36% (277 cases). By month 24, most cases (n = 452 [58%]) had evidence of CNV activity on SD OCT only, whereas 6% of cases (n = 50) had CNV activity identified by FFA only. At screening and months 3, 6, 12, and 24, 92% to 100% of cases identified by FFA only were occult CNV lesions. Using FFA as the reference standard, the sensitivity and specificity of SD OCT in detecting CNV activity was 91% (95% confidence interval [CI], 84%-99%) and 13% (95% CI, 4%-22%).

Conclusions: Spectral-domain OCT alone can be relied upon for detecting CNV activity while monitoring eyes with neovascular AMD. However, FFA may still be of value in those with occult lesions that appear quiescent on SD OCT, as this type of lesion may show leakage on FFA.

Long-term (20-year) real-world outcomes of intravenous chemotherapy (chemoreduction) for retinoblastoma in 964 eyes of 554 patients at a single centre

Shields CL, Bas Z, Tadepalli S, Dalvin LA, Rao R, Schwendeman R

Br J Ophthalmol. 2020 Nov;104(11):1548-1555.doi: 10.1136/bjophthalmol-2019-315572.
PMID: 32051141

ABSTRACT

Background: Intravenous chemotherapy (IVC) remains an important globe salvage therapy for retinoblastoma.

Methods: Evaluation of long-term globe salvage at 5, 10, 15 and 20 years following frontline IVC for retinoblastoma.

Results: Of 994 eyes, comparison by International Classification of Retinoblastoma group (A vs B vs C vs D vs E) revealed more advanced group with older mean age at presentation (8 vs 7 vs 10 vs 11 vs 15 months, p<0.001). By clinical features, more advanced group demonstrated greater mean tumour diameter (3.2 vs 6.8 vs 9.4 vs 14.3 vs 16.4, p<0.001) and thickness (2.0 vs 3.7 vs 4.4 vs 7.3 vs 9.3, p<0.001), and greater frequency of vitreous seeds ≥1 quadrant (0% vs 0% vs 44% vs 42% vs 57%, p<0.001) and subretinal seeds (0% vs 0% vs 22% vs 65% vs 54%, p<0.001). By outcomes, less advanced group demonstrated greater tumour control (without need for enucleation or external beam radiotherapy (EBRT)) by year 2 (96% vs 91% vs 91% vs 71% vs 32%, p<0.001), and with minimal change up to 20 years. In order to achieve globe salvage, additional intra-arterial chemotherapy (IAC) or plaque radiotherapy was employed by year 2 (5% vs 26% vs 28% vs 27% vs 19%, p<0.001), with little further need up to 20 years. Pinealoblastoma (2%), metastasis (2%) and death (1%) were infrequent.

Conclusion: Frontline IVC (plus additional IAC and/or plaque radiotherapy) for retinoblastoma provided complete tumour control for groups A (96%), B (91%), C (91%), D (71%) and E (32%), avoiding enucleation or EBRT and was lasting for up to 20 years.

Optimizing the Repeatability of Choriocapillaris Flow Deficit Measurement From Optical Coherence Tomography Angiography

Byon I, Alagorie AR, Ji Y, Su L, Sadda SR

Am J Ophthalmol. 2020 Nov;219:21-32.doi: 10.1016/j.ajo.2020.05.027.
PMID: 32454035

ABSTRACT

Purpose: To evaluate the impact of processing technique and slab selection on the repeatability of choriocapillaris (CC) flow deficit (FD) measurements as assessed using optical coherence tomography angiography (OCTA) DESIGN: Prospective, cross-sectional study.

Methods: Healthy subjects were imaged with 4 consecutive 3 × 3-mm OCTA using a swept-source OCT (PLEX elite 9000; Carl Zeiss Meditec). OCTA images were generated using the Max projection, and three 10-µm-thick slabs starting 11, 21, and 31 µm posterior to the automatically segmented retinal pigment epithelial band. The resultant images were binarized using the Phansalkar method with a 43.94-µm radius and then the CCFD% was computed. The intraclass correlation coefficient (ICC) and coefficient of variation (CV) were computed for the 4 acquisitions to assess the repeatability of the CCFD%. This entire analysis was repeated after separately modulating several parameters: (1) Sum instead of the Max projection, (2) retinal pigment epithelial fit instead of the retinal pigment epithelial band as the offset reference, (3) 14.65 and 87.88 µm radius values instead of 43.94 µm.

Results: Twenty-four healthy eyes (mean age; 36.4 years) were enrolled. The CCFD% in the 11-21-, 21-31-, and 31-41-µm slabs generated by the Max algorithm and the retinal pigment epithelial band showed high repeatability values (ICCs = 0.963, 0.975, and 911; CVs = 0.05, 0.05, and 0.05, respectively). As most of the cases were confounded with the hypointense region when the 11-21-µm slab was used, however, this slab could not be included in the

subsequent analyses. Those values in the 21-31- and 31-41-µm slabs were higher than those of the corresponding slabs by the Sum algorithm (ICC = 0.916 and 0.776; CV = 0.15 and 0.19, respectively) or by the retinal pigment epithelial fit (ICC = 0.907 and 0.802; CV = 0.06 and 0.06, respectively). The Phansalkar radius of 43.94 µm had the highest ICC numerically, but this was not statistically significantly greater than for a radius of 14.65 µm (ICC = 0.960 and 0.911, respectively) or a radius of 87.88 µm (ICC = 0.958 and 0.897, respectively). Regardless of which parameter was modulated, the 21-31-µm slab was the most repeatable.

Conclusions: In normal eyes, en face CC OCTA images generated using the Max projection and a 10-µm-thick slab offset of 21 µm below the instrument-generated retinal pigment epithelial band yielded the most repeatable CCFD%. These findings have implications for the design of standardized processing algorithms for quantitative CC assessment.

Macular and Peripapillary Optical Coherence Tomography Angiography Metrics Predict Progression in Diabetic Retinopathy: A Sub-analysis of TIME-2b Study Data

Custo Greig E, Brigell M, Cao F, Levine ES, Peters K, Moult EM

Am J Ophthalmol. 2020 Nov;219:66-76 .doi: 10.1016/j.ajo.2020.06.009.
PMID: 32574773

ABSTRACT

Purpose: To identify optical coherence tomography angiography (OCTA)-derived vessel metrics of the macula and optic nerve head (ONH) that predict diabetic retinopathy (DR) disease progression.

Design: Secondary analysis of clinical trial data.

Methods: This was a sub-analysis of prospectively collected data from 73 subjects that participated in the TIME-2b study (Aerpio Pharmaceuticals), a multicenter clinical trial for patients with moderate-to-severe DR treated with AKB-9778 and followed over a 12-month period. Eligible subjects were tested every 3 months with color fundus photography, spectral-domain OCT, and slit-lamp biomicroscopy. OCTA of the macula and ONH was obtained for a subset of patients enrolled at participating sites. En face, full-depth retinal projections centered at the macula were analyzed for multiple metrics including foveal avascular zone (FAZ) area and perimeter, nonperfusion area, vessel density (VD), and presence of intraretinal microvascular abnormalities (IRMA). VD of the radial peripapillary capillaries was evaluated in 4 quadrants surrounding the optic disc for ONH images. Progression was defined as a ≥2-step increase in DR severity scale score or development of diabetic macular edema.

Results: Over a follow-up period of 12 months, 15 of 73 (20.5%) subjects progressed. At pretreatment baseline, larger FAZ area, presence of IRMA, and reduced peripapillary VD in the superior temporal and inferior temporal regions were significantly associated with increased odds of progression.

Conclusions: FAZ area and temporal peripapillary VD are predictors of DR progression. OCTA metrics may improve progression risk assessment in DR when compared to established risk factors alone.

Compiled by: Dr. Ritesh Chainani, Aravind Eye Hospital, Chennai