Retina Roundup

INTERNATIONAL CLASSIFICATION OF RETINOPATHY OF PREMATURITY, THIRD EDITION

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ABSTRACT

Purpose: The International Classification of Retinopathy of Prematurity is a consensus statement that creates a standard nomenclature for classification of retinopathy of prematurity (ROP). It was initially published in 1984, expanded in 1987, and revisited in 2005. This article presents a third revision, the International Classification of Retinopathy of Prematurity, Third Edition (ICROP3), which is now required because of challenges such as: (1) concerns about subjectivity in critical elements of disease classification; (2) innovations in ophthalmic imaging; (3) novel pharmacologic therapies (e.g., anti-vascular endothelial growth factor agents) with unique regression and reactivation features after treatment compared with ablative therapies; and (4) recognition that patterns of ROP in some regions of the world do not fit neatly into the current classification system.

Design: Review of evidence-based literature, along with expert consensus opinion.

Participants: International ROP expert committee assembled in March 2019 representing 17 countries and comprising 14 pediatric ophthalmologists and 20 retinal specialists, as well as 12 women and 22 men.

Methods: The committee was initially divided into 3 subcommittees-acute phase, regression or reactivation, and imaging-each of which used iterative videoconferences and an online message board to identify key challenges and approaches. Subsequently, the entire committee used iterative videoconferences, 2 in-person multiday meetings, and an online message board to develop consensus on classification.

Main outcome measures: Consensus statement.

Results: The ICROP3 retains current definitions such as zone (location of disease), stage (appearance of disease at the avascular-vascular junction), and circumferential extent of disease. Major updates in the ICROP3 include refined classification metrics (e.g., posterior zone II, notch, subcategorization of stage 5, and recognition that a continuous spectrum of vascular abnormality exists from normal to plus disease). Updates also include the definition of aggressive ROP to replace aggressive-posterior ROP because of increasing recognition that aggressive disease may occur in larger preterm infants and beyond the posterior retina, particularly in regions of the world with limited resources. ROP regression and reactivation are described in detail, with additional description of long-term sequelae.

Conclusions: These principles may improve the quality and standardization of ROP care worldwide and may provide a foundation to improve research and clinical care.

EFFECT OF SUBTHRESHOLD NANOSECOND LASER ON RETINAL STRUCTURE AND FUNCTION IN INTERMEDIATE AGE-RELATED MACULAR DEGENERATION

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ABSTRACT

Background: Subthreshold nanosecond laser (SNL) treatment has been studied as a potential intervention in intermediate age-related macular degeneration (iAMD). This study investigated the effect of 100 SNL treatment spots on retinal structure and function.

Methods: A single-arm interventional pilot study. SNL treatment was delivered as 100 spots around the retinal vascular arcades of the study eye (worst visual acuity) in a single session in subjects with iAMD. Multimodal retinal imaging and dark-adapted chromatic perimetry were performed at baseline and at 0.5, 3, 6 and 12 months post treatment. Post treatment changes in best corrected visual acuity (BCVA), retinal thickness, relative ellipsoid zone reflectivity (rEZR), rod-mediated functional parameters were compared to baseline.

Results: Twenty-one subjects with iAMD were recruited. SNL treatment was associated with an increase in retinal thickness ($p = 0.008$) and decrease in rEZR ($p < 0.001$) at 2 weeks post laser. Recovery of retinal thickness and rEZR was observed at the 3-month post laser visit. A gradual improvement in BCVA was observed after laser treatment. The mean change in BCVA between baseline and 12-month visit was +1.9 ± 3.3 letters for the SNL treated eyes, compared to -0.4 ± 3.0 letters for the fellow eyes ($p = 0.027$). Rod-mediated function improved at 3 months post laser ($p < 0.001$) and returned to the baseline levels at 12 months post treatment.

Conclusions: A single treatment with 100 SNL spots causes a short-term change in retinal structure and improvement in retinal function that are apparent at 3 months post treatment.

X-LINKED RETINOSCHISIS: NOVEL CLINICAL OBSERVATIONS AND GENETIC SPECTRUM IN 340 PATIENTS

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ABSTRACT

Purpose: To describe the natural course, phenotype and genotype of patients with X-linked retinoschisis (XLRS).

Design: Retrospective cohort study.

Participants: Three hundred forty patients with XLRS from 178 presumably unrelated families.

Methods: This multicenter, retrospective cohort study reviewed medical records of XLRS patients for medical history, symptoms, visual acuity (VA), ophthalmoscopy, full-field electroretinography and retinal imaging (fundus photography, spectral-domain optical coherence tomography (SD-OCT), fundus autofluorescence).

Main outcome measures: Age at onset, age of diagnosis, severity of visual impairment, annual visual decline, electroretinogram and imaging findings.

Results: In total, 340 patients were included with a mean follow-up time of 13.2 years (range, 0-50.1 years). The median age to reach mild visual impairment and low vision was 12 and 25 years, respectively. Severe visual impairment and blindness were predominantly observed in patients above 40 years old, with a predicted prevalence of 35% and 25% at the age of 60, respectively. The VA increased slightly in the first two decades of life, and subsequently transitioned in to an average annual decline of 0.44% ($P < 0.001$). There was no significant difference in decline of VA between variants that were predicted to be severe and mild ($P = 0.239$). The integrity of the ellipsoid zone (EZ) as well as the photoreceptor outer segment (PROS) length in the fovea on SD-OCT significantly correlated with visual acuity (Spearman's $\rho = -0.604$, $P < 0.001$ and Spearman's $\rho = -0.759$, $P < 0.001$; respectively). Fifty-three different RS1 variants were found. The most common variants were the founder variant c.214G>A (p.(Glu72Lys) (101 subjects, 29.7%) and a deletion of exon 3 (38 subjects, 11.2%).

Conclusion: A large variability in phenotype and natural course of XLRS was seen in this study. In most patients, XLRS showed a slow deterioration starting in the second decade of life, suggesting an optimal window of opportunity for treatment within the first three decades of life. The integrity of EZ as well as the PROS length on SD-OCT may be important in choosing optimal candidates for treatment, and as potential structural endpoints in future therapeutic studies. No clear genotype-phenotype correlation was found.

VITRECTOMY VS. COMBINED VITRECTOMY AND SCLERAL BUCKLE FOR REPAIR OF PRIMARY RHEGMATOGENOUS RETINAL DETACHMENT WITH VITREOUS HEMORRHAGE

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ABSTRACT

Objective: To compare pars plana vitrectomy (PPV) to PPV with scleral buckle (PPV/SB) for repair of primary rhegmatogenous retinal detachment (RRD) with associated vitreous hemorrhage (VH).

Design: Retrospective, observational study.

Subjects: Patients with RRD and associated VH who underwent PPV or PPV/SB from January 1, 2010 through August 31, 2020 were analyzed.

Methods, intervention, or testing: We performed a single-institution, retrospective, observational study of 224 eyes with RRD and VH at the time of detachment. We excluded eyes with less than 6 months of follow up, prior history of retinal detachment repair with vitrectomy or scleral buckle, VH that resolved before surgical intervention, tractional or combined tractional and rhegmatogenous detachment.

Main outcome measures: Single surgery anatomic success (SSAS) at 6 months, defined as no recurrent retinal detachment requiring surgical intervention.

Results: PPV and PPV/SB were performed on 138 eyes (62%) and 85 eyes (38%), respectively. The mean age was 61.9 years in PPV patients and 60.2 years in PPV/SB patients. Single-surgery anatomic success was achieved in 107 of 138 (77.5%) eyes that underwent PPV and in 78 of 85 (91.7%) eyes that underwent PPV/SB. The difference in SSAS between types of treatment was significant ($p = 0.006$). Mean visual acuity improvement in the PPV/SB group was 0.54 logMAR units greater than the PPV group ($p = 0.126$). The incidence of postoperative PVR in the PPV/SB group (11.7%) was lower than in the PPV group (19.5%) ($p = 0.128$). The rate of repeat PPV for non-RD reasons was similar for both groups ($p = 0.437$). Final reattachment status was achieved in 137 of 138 and 84 of 85 eyes in the PPV and PPV/SB groups, respectively. Final visual acuity improvement was significantly better in eyes with PPV/SB compared to PPV alone (logMAR 2.12 vs 1.26; $p=0.011$).

Conclusions: In RRD with VH patients, SSAS was superior in patients treated with PPV/SB compared with PPV alone. Although not significantly different, the PPV/SB group had better visual outcomes and a lower postoperative PVR rate.

NON-ICGA TREATMENT CRITERIA FOR SUBOPTIMAL ANTI-VEGF RESPONSE FOR POLYPOIDAL CHOROIDAL VASCULOPATHY: APOIS PCV WORKGROUP REPORT 2

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ABSTRACT

Purpose: To develop and validate OCT and color fundus photography (CFP) criteria in differentiating polypoidal choroidal vasculopathy (PCV) from typical neovascular age-related macular degeneration (nAMD) in eyes with suboptimal response to anti-vascular endothelial growth factor (VEGF) monotherapy and to determine whether OCT alone can be used to guide photodynamic therapy (PDT) treatment.

Design: Clinical study evaluating diagnostic accuracy.

Participants: Patients with nAMD who received 3-month anti-VEGF monotherapy but had persistent activity defined as subretinal fluid or intraretinal fluid at month 3 assessments.

Methods: In phase 1, international retina experts evaluated OCT and CFP of eyes with nAMD to identify the presence or absence of features due to PCV. The performance of individual and combinations of these features were compared with ICGA. In phase 2, these criteria were applied to an independent image set to assess generalizability. In a separate exercise, retinal experts drew proposed PDT treatment spots using only OCT and near-infrared (NIR) images in eyes with PCV and persistent activity. The location and size of proposed spot were compared with ICGA to determine the extent of coverage of polypoidal lesions (PLs) and branching neovascular network (BNN).

Main outcome measures: Sensitivity and specificity of CFP and OCT criteria to differentiate PCV from nAMD and accuracy of coverage of OCT-guided PDT compared with ICGA.

Results: In eyes with persistent activity, the combination of 3 non-ICGA-based criteria (sharp-peaked pigment epithelial detachment [PED], subretinal pigment epithelium [RPE] ring-like lesion, and orange nodule) to detect PCV showed good agreement compared with ICGA, with an area under the receiver operating characteristic curve of 0.85. Validation using both an independent image set and assessors achieved an accuracy of 0.77. Compared with ICGA, the OCT-guided PDT treatment spot covered 100% of PL and 90% of the BNN.

Conclusions: In nAMD eyes with persistent activity, OCT and CFP can differentiate PCV from typical nAMD, which may allow the option of adjunct PDT treatment. Furthermore, OCT alone can be used to plan adjunct PDT treatment without the need for ICGA, with consistent and complete coverage of PL.

ASSOCIATIONS AND OUTCOMES OF PATIENTS WITH SUBMACULAR HAEMORRHAGE SECONDARY TO AGE-RELATED MACULAR DEGENERATION IN THE IVAN TRIAL

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ABSTRACT

Purpose: To compare demographics, visual acuity (VA) and retinal morphology between those with and without baseline submacular haemorrhage (SMH) for patients enrolled in the Inhibit VEGF in Age-related Choroidal Neovascularisation trial (IVAN).

Design: Secondary analyses of RCT image and clinical data.

Methods: Setting: Clinical trial data collected in 23 UK hospitals.

Study population: IVAN study eyes (with untreated neovascular age-related macular degeneration (nAMD) at randomisation) with at least 12 months' follow-up and adequate imaging.

Intervention: Study eyes randomly assigned between monthly ranibizumab, as-needed ranibizumab, monthly bevacizumab or as-needed bevacizumab. Imaging at baseline graded independently for presence, type, position and extent of SMH.

Main outcome measures: Visual acuity (primary outcome), subretinal fibrosis, atrophic scarring and retinal thickness outcomes at 12 and 24 months RESULTS: : 535 of 605 IVAN trial participants were included. Patients with SMH at baseline (286, 53%) were older (p=0.010), and affected eyes were more likely to have intraretinal fluid present (p=0.038). VA was significantly worse in those with baseline SMH at month 0 (p<0.001; estimate of difference 6 letters with 95% confidence intervals of 4 to 8 letters) but the difference decreased and was not significant at month 12 or 24. No significant association was found between baseline SMH and subretinal fibrosis, atrophic scarring or central retinal thickness.

Conclusion: Presence of SMH at baseline was associated with age, intraretinal fluid and reduced baseline VA. By month 12, VA was no longer significantly different in those who presented with SMH at baseline.

FRACTAL ANALYSIS OF POLYPOIDAL CHOROIDAL NEOVASCULARISATION IN AGE-RELATED MACULAR DEGENERATION

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ABSTRACT

Aim: To describe optical coherence tomography angiography (OCTA) features of polypoidal choroidal neovascularisation (PCNV) secondary to age-related macular degeneration.

Methods: A retrospective consecutive series of 51 patients with a diagnosis of PCNV, based on clinical and multimodal imaging, was analysed. All patients with PCNV underwent a comprehensive ophthalmological examination, including fluorescein and indocyanine green angiography, structural optical coherence tomography (OCT) and OCTA. Two blinded retinal specialists carefully reviewed OCTA slabs in order to assess the morphological patterns of PCNV lesions. Furthermore, fractal analysis of PCNV en face images on OCTA, including vascular perfusion density (VPD), fractal dimension (FD) and lacunarity (LAC), was performed.

Results: Fifty-one PCNV eyes were included in the study. In all, the branching vascular network appeared hyper-reflective. Polyps showed two different patterns: in 34/51 (67%) eyes, they corresponded to hypo-reflective structures, whereas in the remaining 17 (33%) eyes, they appeared as hyper-reflective lesions. In all PCNV eyes, mean VPD, FD and LAC were 0.76±0.17%, 1.46±0.12 and 2.4±0.87, respectively. No significant difference was found between PCNVs showing a different OCTA pattern, in terms of quantitative OCTA parameters.

Conclusion: Fractal analysis provides quantitative parameters demonstrating that PCNVs with different OCTA patterns share the same neovascular architecture and branching complexity. These new findings improve our ability to interpret OCTA slabs, opening new areas of discussion about this type of neovascular lesion.

Compiled by Dr.Aditya Maitray, AEH Chennai