



Wills Eye Hospital at ARVO 2023 Annual Meeting

A total of **28** papers and posters with Wills Eye Attendings/Faculty and Trainees (*Fellows, Residents, Medical students, and interns*) as primary presenters were accepted for ARVO Annual Meeting 2023.

Sunday, April 23rd	
PAPERS	
4:45 – 5:00 PM Central (6:45 – 7:00 PM ET)	
Paper Session: Retinal Potpourri [<i>Retina</i>]	
Location 353-355 Session #62	Assessment of geographic atrophy (GA) lesion progression in the phase 3 OAKS and DERBY trials <i>Allen Chiang, Caleb Bliss, Ramiro Ribeiro</i>
POSTERS	
8:00 – 9:45 AM Central (10:00 – 11:45 AM ET)	
Poster Session: Glaucoma Epidemiology [<i>Clinical/Epidemiological Research</i>]	
Poster Number: B0148	Race and Age-based Prevalence Patterns of Glaucoma in the IRIS[®] Registry (Intelligent Research in Sight) <i>Natasha Kolomeyer, Maurizio Tomaiuolo, Louis Pasquale, Young Sheng, Leslie Hyman</i>
12:00 – 1:45 PM Central (2:00 – 3:45 PM ET)	
Poster Session: Melanoma [<i>Anatomy and Pathology/Oncology</i>]	
Poster Number: C0645	The Cancer Genome Atlas cytogenetic analysis of choroidal nevus with transformation to melanoma <i>Kevin Card, Alexandra Zaloga, Eleni Konstantinou, Carol Shields</i>
3:45 – 5:30 PM Central (5:45 – 7:30 PM ET)	
Poster Session: Anterior Segment and Trauma Epidemiology [<i>Clinical/Epidemiological Research</i>]	
Poster Number: C0446	Sociodemographic Patterns in Keratoconus Treatment (2015-2020): IRIS[®] Registry (Intelligent Research in Sight) Analysis <i>Leslie Hyman, Zeba Syed, Maurizio Tomaiuolo, Qiang Zhang, Venkatesh Prajna, Christopher Rapuano</i>

Monday, April 24th	
POSTERS	
11:30 AM – 1:30 PM Central (1:30 – 3:30 PM ET)	
Poster Session: Retinal Vascular Diseases [Retina]	
Poster Number: C0246	Patterns of Diagnostic Imaging for Stroke after Retinal Artery Occlusion <i>Bryce Hwang, Brian Cheng, Loh-Shan Leung</i>
3:15 – 5:00 PM Central (5:15 – 7:00 PM ET)	
Poster Session: AMD AntiVEGF [Retina]	
Poster Number: C0188	Effects of Intravitreal Faricimab 6.0 mg Injection on Functional and Anatomic Outcomes in Patients with Neovascular Age-related Macular Degeneration <i>Saagar Pandit, Taku Wakabayashi, Hana Mansour, Bahram Pashae, Allen Chiang, Jason Hsu</i>
Poster Session: Diabetic Retinopathy [Retina]	
Poster Number: C0272	Christiana Care Health System (CCHS) Diabetic Retinopathy Screening: An Evaluation of an Ongoing Project <i>Robert Abishek, Paula Ko, Tomilade Adepoju, Jeffrey Henderer</i>

Tuesday, April 25th	
PAPER	
12:15 - 12:30 PM Central (2:15 – 2:30 PM ET)	
Paper Session: Vitreoretinal Surgery [Retina]	
Location - 353-355	Natural History of Lamellar Macular Holes: Quantitative Analysis and Surgical Implications <i>Asad Durrani, Rohan Jalalizadeh, Robert Hyde, Merina Thomas, Sean Higgins, Guan Xu, Mark Johnson</i>

Wednesday, April 26th	
PAPERS	
2:15 – 2:30 PM Central (4:15 – 4:30 PM ET)	
Paper Session: Endophthalmitis Clinical [Retina]	
Location - 353-355	Outcomes of Post-Cataract Surgery Endophthalmitis Treated Without Microbial Cultures <i>Annika Samuelson, Samir Patel, Kapila Kommareddy, Eugene Yu-Chuan Kang, Jason Hsu, James Dunn, James Vander, Sunir Garg</i>
POSTERS	
10:30 - 12:15 PM Central (12:30 – 2:15 PM ET)	
Poster Session: Endophthalmitis Clinical & Intravitreal/periocular local therapies (excluding anti VEGF) [Retina]	
Poster Number: B0243	Practice Patterns in the Management of Post-Injection Endophthalmitis in the United States <i>Anand Gopal, Rebecca Soares, Nitika Aggarwal, Nick Boucher, Yoshihiro Yonekawa</i>
Poster Number: B0253	Topical bromfenac 0.09% solution reduces pain following intravitreal vascular endothelial growth factor injections (IVI) <i>Kathryn Achuck, Rebecca Soares, Sunir Garg</i>
Poster Session: Glaucoma Surgery and Wound Healing [Glaucoma]	
Poster Number: C0304	Comparing Outcomes of Kahook Dual Blade with Bent Needle Goniotomy: A NonInferiority Retrospective Study <i>Julienne Jeong, Sagar Shah, Shahin Hallaj, Nicholas O'Connor, Wesam Shalaby, Dilru Amarasekera, Aakriti Shukla, Daniel Lee</i>
Poster Number: C0311	Trabeculectomy versus Tube Shunt efficacy and safety in patients with Pre-operative Intraocular Pressure of More than 40 mmHg: A Retrospective Study <i>Nicholas O'Connor, Sagar Shah, Shahin Hallaj, Christian Nieves, Lauren Hock, Natasha Kolomeyer, Daniel Lee, Marlene Moster, Michael Pro, Elizabeth Dale, Jonathan Myers, Reza Razeghinejad</i>

2:15 – 4:00 PM Central (4:15 – 6:00 PM ET)

Poster Session: Retinal detachment, proliferative vitreoretinopathy and trauma [Retina]

Poster Number: B0206	Incidence and Complications of Silicone Oil Emulsification After Vitrectomy for Complex Retina Diseases: Comparison of 1000- versus 5000-centistoke Silicone Oil Joseph DeSimone, John Williamson III, Raziye Mahmoudzadeh, Taku Wakabayashi, Hannah Anderson, Charles DeYoung, Ajay Makkena, Mirataollah Salabati, Rebecca Soares, Jason Hsu, Sonia Mehta
Poster Number: B0207	Incidence and associations of retinal detachment after Yttrium Aluminum Garnet (YAG) capsulotomy Brian Cheng, Bryce Hwang, Loh-Shan Leung
Poster Number: B0208	Rate and severity of epiretinal membrane formation after scleral buckle for rhegmatogenous retinal detachment Kristine Wang, Hana Mansour, Julia Yu, Adina Kazan, Taku Wakabayashi, Robert Abishek, Meera Sivalingam, Raziye Mahmoudzadeh, Jason Hsu
Poster Number: B0219	Surgical Outcomes of Primary Noncomplex Rhegmatogenous Retinal Detachment in Young Adults Jessica Lee, Michael Ammar, Louis Cai, Anthony Obeid, Omesh Gupta, Jason Hsu, Matthew Starr, Luv Patel, Taku Wakabayashi, Antonio Capone, Geoffrey Emerson, Dean Elliott, Daniel Joseph, Carl Regillo, Edwin Ryan, Yoshiro Yonekawa
Poster Number: B0226	Prevalence, Characteristics, and Outcomes of Retinal Detachment Associated with Toxoplasmosis Retinochoroiditis Holden Caplan, Taku Wakabayashi, Michael Klufas, Sonia Mehta, Jordan Deaner, James Dunn, Yoshihiro Yonekawa
Poster Number: B0235	Rate and Severity of Epiretinal Membrane Formation after Pneumatic Retinopexy for Rhegmatogenous Retinal Detachment Hana Mansour, Kristine Wang, Michael Nguyen, Robert Abishek, Taku Wakabayashi, Meera Sivalingam, Raziye Mahmoudzadeh, Jason Hsu
Poster Number: B0239	Post-operative Retinal Detachment Rates in Patients Who Underwent Macular Surgery Charles DeYoung, Hana Mansour, Taku Wakabayashi, Shreya Swaminathan, Raziye Mahmoudzadeh, Michael Cohen

Thursday, April 27th	
8:00 – 9:45 AM Central (10:00 – 11:45 AM ET)	
Poster Session: Glaucoma Lasers [Glaucoma]	
Poster Number: C0008	Selective Laser Trabeculoplasty (SLT) After Trabecular Meshwork Bypass Microstent Implantation Versus Standalone SLT Outcomes: A Retrospective Cohort Comparison Sagar Shah, Shahin Hallaj, Nicholas O'Connor, Michael Izzo, Jonathan Myers, Daniel Lee
Poster Number: C0015	Surgical efficacy of continuous wave and Micropulse cyclophotocoagulation in primary open-angle glaucoma: a retrospective study Bahram Pashae, Shahin Hallaj, Christian Nieves, Natasha Kolomeyer, Tina Xia, Jonathan Myers, Daniel Lee, Reza Razeghinejad
10:30 – 12:15 PM Central (12:30 -2:15 PM ET)	
Poster Session: Vitreoretinal surgery [Retina]	
Poster Number: C0031	Clinical Features and Factors Associated with Visual Outcomes in Patients with Suprachoroidal Hemorrhage Matthew Griffin, Meera Sivalingam, Taku Wakabayashi, Michael Cohen
Poster Number: C0038	Impact of intraoperative Indocyanine green use on subsequent proliferative vitreoretinopathy development Linnet Rodriguez, Michael Nguyen, Julia Yu, Hana Mansour, Jason Hsu
Poster Session: Teaching, Research Publication [Clinical/Epidemiological Research]	
Poster Number: C0326	Characteristics of Predatory Publishing Solicitation in Ophthalmology Michael Nguyen, Charles Huang, Jessica Lee, Ian Seddon, Sophie Bakri, Zeba Syed, Fasika Woreta, Aakriti Garg Shukla, Kara Cavuoto, M.D., Megan Collins, Basil Williams, Andrea Kossler, J. Peter Campbell, Samir Patel, Grant Justin, Yoshiro Yonekawa
Poster Number: C0334	Improving Emergency Medicine Slit Lamp Use and Confidence Through Longitudinal Training Curriculum - a preliminary report on physician skill and confidence acquisition Samara Hamou, Shayan Ghiaee, Xiao Chi Zhang, Maureen Lloyd, Christine Chung

On Demand Posters

Abstract Number: OD73

[Outcomes of Treat-and-Extend versus Pro Re Nata Anti-VEGF Injections for Myopic Macular Neovascularization in Patients in the United States](#)
Shreya Swaminathan, Raziye Mahmoudzadeh, Taku Wakabayashi, Mallory Elva Bowers, Robert Abishek, Mirataollah Salabati, Jason Hsu, James P. Dunn

Abstract Number: OD83

[Visual Outcomes and Incidence of Complications after Vitrectomy for Vitreous Hemorrhage Associated with Retinal Vein Occlusion](#)
Ankur Nahar, Taku Wakabayashi, Neil Patel, Matthew Bough, Young Sheng, Mirataollah Salabati, Raziye Mahmoudzadeh, Ajay E. Kuriyan, Arunan Sivalingam, Yoshihiro Yonekawa

ABSTRACTS

Assessment of geographic atrophy (GA) lesion progression in the phase 3 OAKS and DERBY trials

Author Block: Allen Chiang¹, Caleb Bliss², Ramiro Ribeiro²

¹Wills Eye Hospital Retina Service, Philadelphia, Pennsylvania, United States; ²Apellis Pharmaceuticals Inc, Waltham, Massachusetts, United States;

Purpose: To assess the efficacy of pegcetacoplan in patient subgroups based on baseline lesion characteristics and to characterize overall trial results based on treatment response quartiles.

Methods: OAKS (n=637) and DERBY (n=621) are Phase 3, randomized, double-masked, sham-controlled trials. Enrolled patients had BCVA \geq 24 letters and GA area of 2.5-17.5 mm². Patients with nonsubfoveal and subfoveal lesions were included. The primary endpoint was change in total area of GA lesions as measured by fundus autofluorescence. Efficacy of pegcetacoplan at 24 months was assessed in patient subgroups based on baseline demographics and GA lesion characteristics. Patients were pooled across trials for this analysis. Subgroups based on age, sex, GA lesion location, focality and laterality, and BCVA were analyzed. Additionally, a quartile analysis based on GA lesion growth (mm²) over 24 months was assessed to further characterize the efficacy of pegcetacoplan. Patients were pooled across trials and trial arms, with Quartile 1 representing slow progressors and Quartile 4, fast progressors. Only patients with Month 24 growth measurements were included.

Results: At Month 24, GA lesion growth across subgroups in the sham arms was in line with natural history studies. Change from baseline in GA lesion growth at Month 24 consistently favored pegcetacoplan vs sham across subgroups including those with nonsubfoveal and subfoveal lesions [(PM=26%, p<0.0001; PEOM=22%, p<0.0001); (PM=19%, p<0.0001; PEOM=16%, p=0.0003), respectively] and those with unifocal and multifocal lesions [(PM=26%, p<0.0001; PEOM=21%, p<0.0007); (PM=20%, p<0.0001; PEOM=17%, p<0.0001), respectively] (Figure 1). In the quartile analysis, Quartile 1 (slow progressors) had a higher proportion of patients from PM and PEOM arms vs sham. Conversely, Quartile 4 (fast progressors) had a higher proportion of sham patients than PM or PEOM.

Conclusions: These analyses demonstrate the consistent efficacy of pegcetacoplan across patient subgroups and with both PM and PEOM dosing. Furthermore, the slowest progressing quartile consisted of a higher proportion of patients treated with pegcetacoplan than sham.

Race and Age-based Prevalence Patterns of Glaucoma in the IRIS[®] Registry (Intelligent Research in Sight)

Author Block: Natasha Nayak Kolomeyer^{1,2}, Maurizio Tomaiuolo³, Louis R. Pasquale⁴, Young Sheng², Leslie Hyman³

¹Glaucoma, Wills Eye Hospital, Philadelphia, Pennsylvania, United States; ²Thomas Jefferson University Sidney Kimmel Medical College, Philadelphia, Pennsylvania, United States; ³Vickie and Jack Farber Vision Research Center, Wills Eye Hospital, Philadelphia, Pennsylvania, United States; ⁴Department of Ophthalmology, Icahn School of Medicine at Mount Sinai, New York, New York, United States;

Purpose: To evaluate whether Black race is associated with 1) younger age at primary open-angle glaucoma (POAG) diagnosis, and 2) more severe POAG in a national clinical registry.

Methods: Patients with POAG and severe POAG in the IRIS[®] Registry (Intelligent Research in Sight) between 2015-2020 were identified based on ICD10 codes. Prevalence rates were estimated overall and by age, race, and ethnicity; associated factors were evaluated using multivariable logistic regression with odds ratios (ORs; 95% confidence intervals; CIs) determined.

Results: Of 59,039,221 patients in the IRIS Registry between 2015-2020, 6.2% (n=3,632,085) and 1.3% (n=769,556) were identified with POAG and severe POAG, respectively. For each race category, Blacks had the highest prevalence of POAG and severe POAG for each age group. While the highest POAG and severe POAG prevalence rates among all age-race categories were in Black patients > 60 years (18.71% POAG and 5.82% severe POAG, respectively), the second highest rates were seen in 41-60 year-old Black patients (12.00% POAG and 2.98% severe POAG). In comparison, POAG and severe POAG prevalence rates in White patients > 60 years were 8.26% and 1.67%, respectively. Race-based prevalence rate ratios (Figure 1) revealed that compared to White patients, among the other race groups, Black patients were at higher risk of having POAG and severe POAG across all age groups. This rate ratio was largest in the 21-40 year age group where Black patients were 4.3 and 6.4 times more likely to have POAG and severe POAG, respectively, compared to White patients of those ages. In a multivariable logistic regression model (Table 1), Black race was the factor with the highest odds of having POAG (OR=2.24 (95% CI: 2.24-2.25), and severe POAG (OR=3.62; 3.60-3.65).

Conclusions: The IRIS Registry highlights a significantly greater risk of developing POAG and severe POAG, especially in the 21-40 and 41-60 age groups in Blacks compared to Whites. Analyses of genetic contributions, as well as the effects of “weathering” (health effects of stress/discrimination), may provide further insight. Glaucoma screening and education of persons of Black or African American descent should begin in early adulthood.

Layman Abstract (optional): Glaucoma can cause progressive permanent blindness. A large national clinical registry of over 59 million patients in the United States was analyzed; 6% of patients had primary open-angle glaucoma (POAG) and 1% had severe POAG. Glaucoma prevalence was highest in Blacks compared to other races (Asians, Whites and Other) across all age groups, with highest rates in Black patients who were over 60 years old (19% had POAG and 6% had severe POAG, respectively). Compared to Whites, the largest rate ratio was in Black patients in the 21–40-year-old group; i.e., being Black was associated with a 4.3 and 6.4 times greater likelihood of having glaucoma and severe glaucoma, respectively, compared to White patients of the same age. Further research is needed to understand whether genetics and/or the theory of weathering could explain some of the increased risk of glaucoma and especially severe glaucoma in this younger age group in the Black population. Earlier glaucoma education and screening is warranted in the Black population.

The Cancer Genome Atlas cytogenetic analysis of choroidal nevus with transformation to melanoma

Author Block: Kevin R. Card^{1,2}, Alexandra R. Zaloga¹, Eleni Konstantinou¹, Carol L. Shields¹

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Purpose: Uveal melanoma (UM), the most common primary ocular malignancy in adults, can arise from the malignant transformation of a choroidal nevus. The Cancer Genome Atlas (TCGA), a recently described classification system based on cytogenetic aberrations on chromosomes 3 and 8, provides a reliable prognostication of metastasis and death in UM. We hypothesize that high-grade tumors (TCGA C or D), which portend higher rates of metastasis and death, arise from a nevus with greater rate of growth and faster time to transformation compared to a low-grade tumor (TCGA A or B).

Methods: A retrospective review was conducted for patients diagnosed with choroidal nevus demonstrating transformation into UM. There were 86 patients who underwent fine-needle aspiration and cytogenetic analysis of the tumor. Clinical risk factors for transformation, such as visual symptoms, tumor base size, tumor thickness, echogenicity on ultrasound, and presence of orange pigment or subretinal fluid at date of nevus diagnosis and date of transformation (DOT) to UM were recorded. Student's t-test was used for continuous variables and chi-squared test was used for categorical variables.

Results: Of the 86 patients with transformation of choroidal nevus into melanoma, 66% (57/86) were cytogenetically low-grade and 34% (29/86) were cytogenetically high-grade. Fast transformation of choroidal nevi (≤ 1 year) into UM was seen in 21% (18/86) of patients and slow transformation (> 1 year) was seen in 79% (68/86) of patients. Tumors with fast transformation showed similar rates of low-grade and high-grade cytogenetics (56% vs. 44%, $p=0.64$), however slow transformation tumors showed a greater predilection of low-grade cytogenetics (69% vs. 31%, $p=0.002$). When comparing high-grade tumors to low-grade tumors, the former showed greater rate of base size increase (2.3 vs. 0.7 mm/year, $p=0.03$), greater rate of thickness increase (1.1 vs. 0.5 mm/year, $p=0.04$), and greater presence of clinical risk factors at DOT (5.0 vs. 4.0, $p>0.001$).

Conclusions: Choroidal nevus with documented fast transformation (≤ 1 year) can possess a high or low-grade cytogenetic profile, however a nevus that slowly transforms (> 1 year) will more likely demonstrate low-grade cytogenetics, predictive of lower rates of metastasis and death. Faster rates of increase in base size and thickness predicted high-grade cytogenetics, suggestive of higher rates of metastasis and death.

Layman Abstract (optional): Uveal melanoma (UM) is the most common primary eye cancer that occurs in adults. UM can spread to other parts of the body, so treatment of the tumor and regular visits to monitor for tumor spread are extremely important. These tumors can grow slowly over time, sometimes arising from a benign mole in the back of the eye called choroidal nevus, which are very common. Recent advancements in genetic testing have allowed clinicians to predict a patient's risk for metastasis and death from UM based on chromosomal mutations, a classification system called The Cancer Genome Atlas (TCGA). Our study analyzed 86 patients who were originally diagnosed with choroidal nevus with eventual transformation into melanoma. We found that a fast-transforming moles (≤ 1 year) can have high-grade (higher risk for metastasis/death) or low grade (lower risk for metastasis/death) genetics at similar rates but slow-transforming tumors (> 1 year) are significantly more likely to be genetically low-grade. We also found that faster rates of increase in size and thickness of the moles is suggestive of higher grade genetics. This is very important clinical information for doctors who are monitoring patients with choroidal nevus to consider.

Sociodemographic Patterns in Keratoconus Treatment (2015-2020): IRIS® Registry (Intelligent Research in Sight) Analysis

Author Block: Leslie Hyman^{1,4}, Zeba Syed^{2,4}, Maurizio Tomaiuolo¹, Qiang Zhang^{1,4}, Venkatesh Prajna³, Christopher Rapuano^{2,4}

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Purpose: To describe sociodemographic patterns for corneal collagen crosslinking (CXL) and keratoplasty (KER) following diagnosis of keratoconus (KCN) in the IRIS® Registry (Intelligent Research in Sight) in light of FDA approval of CXL in 2016.

Methods: Using the American Academy of Ophthalmology IRIS® Registry, patients with a diagnosis of KCN on ≥ 2 consecutive visits between 01/01/2015 and 12/31/2020 were identified by ICD-10 codes. Patients without topography or pachymetry (CPT code) performed within 30 days after KCN diagnosis were excluded to focus on newly diagnosed KCN. Patients with CXL and KER procedures (CPT codes) following KCN diagnosis were then identified. Sociodemographic factors, e.g. age, sex, race, insurance status, were characterized and compared between KCN patients with and without CXL and KER.

Results: Of the 78,976 patients who met the inclusion criteria for newly diagnosed KCN, 11% (8,854) underwent CXL, 5% (3,859) had KER and 84% (66,460) had neither procedure (NP). CXL patients tended to be younger than patients with KER or NP [mean age (SD): CXL: 29.8(11.0) yrs. vs KER: 41.1(14.9) yrs. vs NP: 43.6(17.5) yrs] ($p < 0.0001$). CXL patients had a higher proportion of males (69%) vs KER patients (60%) and NP patients (56%), a higher proportion of Whites (51%) vs 45% (KER) and 51% (NP), and lower percentage of Blacks [11% (CXL) vs 29% (KER) and 15% (NP)] (all p values < 0.001). CXL, KER and NP frequencies varied by geographic region, the highest frequency was in the South and lowest in the Northeast for the three groups. Insurance status varied across the three groups ($P < 0.0001$). KER patients, vs. those with CXL and NP, had a lower frequency of private insurance (83% vs 91% and 89%, respectively) and higher frequency of Medicaid or no insurance (17% vs 11% and 10%). Time between initial KCN diagnosis and procedure was shorter for CXL vs KER [mean (SD) 261 (325) days vs 339 (395) days] overall and for each age category ($p < 0.0001$). The number of CXL cases more than doubled between 2016 and 2019 from 1097 to 2259 while KER cases decreased by more than half from 1109 to 471 cases during that same period.

Conclusions: Although CXL has revolutionized the treatment approach for KCN, there may be sociodemographic differences in access and/or utilization. Further studies are needed to identify the reasons for these differences to optimize access for all patients.

Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.

FDA approval of corneal collagen crosslinking (CXL) in 2016 has transformed the treatment approach to keratoconus (KCN). This project aimed to describe the sociodemographic patterns for CXL and keratoplasty (KER) following diagnosis of keratoconus in the IRIS® Registry (Intelligent Research in Sight) in light of the FDA approval of CXL. In the IRIS® Registry between 2015 -2020, KCN patients who underwent CXL tended to be younger than patients with KER or those with neither procedure (NP). CXL patients had a higher proportion of males (69%) vs KER patients (60%) and NP patients (56%), a higher proportion of Whites (51%) vs 45% (KER) and 51% (NP), and lower percentage of Blacks [11% (CXL) vs 29% (KER) and 15% (NP)] (all p values < 0.001). The distribution of insurance status also varied across the three groups ($P < 0.0001$). Time between initial KCN diagnosis and procedure was shorter for CXL vs KER [mean (SD) 261 (325) days vs 339 (395) days] overall and for each age

category ($p < 0.0001$). The number of CXL cases more than doubled between 2016 and 2019 from 1097 to 2259 while KER cases decreased by more than half from 1109 to 471 cases during that same period. Although CXL has revolutionized the treatment approach for KCN, there may be sociodemographic differences in access and/or utilization. Further studies are needed to identify the reasons for these differences to optimize access for all patients.

Patterns of Diagnostic Imaging for Stroke after Retinal Artery Occlusion

Author Block: Bryce Hwang^{1,2}, Brian T. Cheng¹, Loh-Shan Bryan Leung²

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Purpose: The American Academy of Ophthalmology Preferred Practice Patterns guidelines recommend immediate referral for stroke workup, including diagnostic imaging, after RAO. Previous case series and studies from emergency department data suggest many patients do not receive appropriate diagnostic imaging. This study aims to characterize the frequency and patterns of stroke workup after RAO.

Methods: Retrospective claims-based analysis of adults ≥ 18 years of age in IBM[®] MarketScan[®], a nationally representative sample of commercial insurance beneficiaries with central or branch retinal artery occlusion (CRAO/BRAO) from 2007-2016. We excluded patients with a prior stroke diagnosis, retinal vein occlusion diagnosis within one month of index CRAO or BRAO diagnosis, and prior giant cell arteritis or polyarteritis nodosa diagnosis. The primary study outcome was any stroke imaging, including head imaging, carotid imaging, and echocardiography identified by International Classification of Disease, Ninth and Tenth Revision (ICD-9/ICD-10) codes.

Results: Between 2007 to 2016, 47253 patients were diagnosed with CRAO (15859, 33.5%) or BRAO (31394, 66.5%). Mean age was 66.9 ± 14.1 years, 24682 (52.2%) were male, and mean enrollment length was 4.8 ± 2.5 years. Of patients with RAO, 24197 (50.9%) received any imaging for workup of ischemic stroke, of which 8011 (16.6%) underwent head imaging, 19041 (40.0%) underwent carotid imaging, 12855 (27.1%) underwent echocardiography. Adults < 50 years had lower rates of any imaging (40.1% vs. 52.2% $p < 0.001$), echocardiography (22.2% vs. 27.6% $p < 0.001$), and carotid imaging (21.8% vs. 41.4% $p < 0.001$), compared to adults ≥ 50 years. Age was not associated with a difference in the rate of head imaging (16.8% vs. 16.9%, $p = 0.89$). Patients with a CRAO were more likely to undergo any imaging (53.6% vs 49.5%, $p < 0.001$). Multiple logistic regression indicated that older age (OR 1.01 95% CI, [1.01-1.02], $p < 0.001$), male sex (OR 1.21, 95% CI [1.16-1.25], $p < 0.001$), and CRAO diagnosis (OR 1.15, 95% CI [1.11-1.20], $p < 0.001$) were independent predictors for undergoing any imaging. The frequency of stroke workup increased over the study period ($r^2 = 0.77$, $p = 0.0003$, Figure 1).

Conclusions: Approximately 1 in 2 patients received diagnostic imaging for stroke workup after RAO. Male sex, older age, and CRAO diagnosis were associated with an increased frequency of stroke workup.

Effects of Intravitreal Faricimab 6.0 mg Injection on Functional and Anatomic Outcomes in Patients with Neovascular Age-related Macular Degeneration

Author Block: Saagar Pandit¹, Taku Wakabayashi¹, Hana Mansour¹, Bahram Pashae², Allen Chiang¹, Jason Hsu¹

¹Retina, Wills Eye Hospital, Philadelphia, Pennsylvania, United States; ²Population Health, Thomas Jefferson University, Philadelphia, Pennsylvania, United States;

Purpose: To elucidate the effects of intravitreal faricimab 6.0 mg on functional and anatomic outcomes in previously treated patients with neovascular age-related macular degeneration (nAMD).

Methods: Retrospective chart review was performed on nAMD patients previously treated with intravitreal bevacizumab, ranibizumab, and/or aflibercept who received ≥ 1 injection of intravitreal faricimab 6.0 mg. Exclusion criteria included patients with secondary causes of choroidal neovascularization such as myopic degeneration, polypoidal choroid vasculopathy, trauma, and idiopathic. Fibrovascular pigment epithelial detachment (fvPED) height was measured by two independent graders using the foveal horizontal raster on OCT capturing the maximum height of the fvPED from Bruch's membrane to the outer margin of the hyperreflective RPE layer. Central foveal thickness (CFT) was measured from the internal limiting membrane (ILM) to Bruch's membrane. Image J software was used to analyze OCT images. Paired t-tests were used to compare the mean logarithm of minimum angle of resolution visual acuity (logMAR VA), fvPED height (μ) and CFT (μ) at the baseline visit at which the first faricimab injection was given and at the final visit after receiving the last faricimab intravitreal injection(s).

Results: 240 patients met inclusion criteria. Preliminary analyses of 32 eyes of 31 patients were performed. Median age was 83.5 years, 58% (18/31) were female, and 90% (28/31) were pseudophakic. The median number of intravitreal injections received prior to the first faricimab 6.0 mg injection was 48.5 (mean 53 ± 34). The median number of faricimab 6.0 mg injections received was 3 (mean 3.2 ± 1.4). Mean logMAR VA at baseline was 0.74 ± 0.67 ($\sim 20/110$), and final mean logMAR VA was 0.70 ± 0.68 ($\sim 20/100$) [$p = 0.53$]. Mean fvPED height was 181μ at baseline which decreased to 162μ at the final visit ($p=0.002$). Mean CFT was 379μ at baseline and 357μ at the final visit ($p=0.20$).

Conclusions: A statistically significant decrease in fvPED height was found after at least one intravitreal faricimab 6.0 mg injection in patients with previously treated nAMD. Further data analysis is required to verify these results.

Christiana Care Health System (CCHS) Diabetic Retinopathy Screening: An Evaluation of an Ongoing Project

Author Block: Robert Mathew Abishek^{2,3}, Paula Ko³, Tomilade Adepoju³, Jeffrey D. Henderer^{1,3}

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Purpose: Non-mydriatic digital retinal imaging can improve patient access to diabetic retinal screening. Our previous work revealed 67% of screening images were interpretable and 13% of patients had diabetic retinopathy. The purpose of this study is to report our screening findings following three key changes: we provided additional photographer training, changed the interpreting physicians, and moved some of the cameras to different primary care offices. Outcomes of interest included time to interpretation, number of interpretable images, and the pathology identified.

Methods: Diabetic patients ≥ 18 years who participated in the Intelligent Retinal Imaging System (IRIS, Pensacola, FL) retinal screening initiative at a total of seven CCHS clinics (Wilmington, DE) from December 1, 2020, to June 30, 2022, were included. Photos were taken by clinic staff using the CenterVue DRS (Hill-Rom Holdings Inc., Chicago, IL) or Pictor Plus Fundus camera (Volk, Mentor, OH). Retinal images were primarily interpreted by a CCHS-affiliated retina specialist using the International Classification of Diabetic Retinopathy. IRIS data was used to evaluate the screening results.

Results: 762 patients (1,524 eyes) underwent the screening exam. The retina specialist interpreted 601 (79%) of the screening exams. Exams were interpreted an average of 15.1 ± 45.4 hours after photos were taken. Of the 578 patients (76%) who had bilateral interpretable images, 413 (71%) of patients had no pathology in either eye. 165 patients (29%) had a referable diagnosis which included 78 (13%) with diabetic retinopathy (35 mild, 31 moderate, 6 severe, 6 proliferative), and a mixture of other suspected diseases such as glaucoma/glaucoma suspect (51), macular edema (29), dry AMD (21), hypertensive retinopathy (11), epiretinal membrane (3), unspecified vein occlusion (2), cataract (1), and other diseases (119).

Conclusions: Utilizing the IRIS protocol, the majority of patients were able to complete a diabetic screening. Providing additional photographer training appears to have increased the number of interpretable photographs. However, taking quality photographs remains a limitation. The fact that a retina specialist provided the majority of interpretations did not appear to change the rate of retinopathy diagnosis. A substantial number of other eye diseases were also identified. Our next steps include addressing referral and follow-up rates.

Natural History of Lamellar Macular Holes: Quantitative Analysis and Surgical Implications

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Purpose: Historically, lamellar macular holes (LMH) have been thought to remain stable over time. However, spectral domain OCT (SD-OCT) imaging has suggested that the natural history of LMHs can include progression, stability, and even regression. The purpose of this study was to determine the incidence of LMH progression and regression and to identify features that correlate with progression and regression.

Methods: Retrospective cohort study of patients diagnosed with LMH over a 5-year period. Using a novel algorithm and MATLAB (MathWorks, Natick, MA), serial SD-OCT images were analyzed to determine the change in cross-sectional area of the LMH over time. Progression and regression were defined as $\geq 5\%$ increase or decrease in area per year, respectively. The presence of epiretinal membrane (ERM), lamellar hole-associated epiretinal proliferation (LHEP), vitreomacular traction (VMT), and photoreceptor layer signal disruption were noted.

Results: 373 patients were diagnosed with LMH during the study period and 69 eyes of 69 patients were included in the analysis. The LMH progressed in 32 (46.4%) eyes, remained stable in 22 (31.9%) eyes, and regressed in 15 (21.7%) eyes. LHEP was seen in 17 (53.1%) eyes with LMH progression, 10 (45.5%) eyes with stability, and 1 (6.7%) eye with regression (Chi-Square 9.46, $p = 0.009$). ERM was found in 19 (59.4%) eyes with LMH progression, 17 (77.3%) eyes with stability, and 14 (93.3%) eyes with regression (Chi-Square 6.28, $p = 0.043$). Photoreceptor involvement was seen in 12 (37.5%) eyes with LMH progression, 5 (22.7%) eyes with stability, and 3 (20.0%) eyes with regression (Chi-Square 2.13, $p = 0.344$).

Conclusions: Our study suggests that at least 50% of LMHs progress, while a smaller proportion regress. LHEP is associated with LMH progression, while ERM is associated with regression. We propose that LMH may represent a traumatic Muller gliopathy caused by vitreofoveal traction. Surgical implications of these findings include greater use of fovea-sparing ILM peeling and use of LHEP, when present, to reconstruct the fovea in eyes with full-thickness macular holes and surgical LMHs.

Outcomes of Post-Cataract Surgery Endophthalmitis Treated Without Microbial Cultures

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Purpose: To evaluate outcomes of eyes with post-cataract surgery endophthalmitis that were managed without microbial cultures.

Methods: This retrospective, single-center comparative study identified all cases of endophthalmitis after cataract surgery presenting between February 1, 2014 to May 1, 2020 using billing records. All eyes were treated with intravitreal antibiotics and a vitreous or aqueous tap or vitrectomy. Endophthalmitis cases were divided into the “culture group” if specimens were sent for microbiologic sampling or into the “no culture group” if intraocular specimens were not sent for microbiologic sampling. Each case was reviewed to determine visual acuity outcomes, secondary complications, and need for other procedures. Data was analyzed using IBM SPSS 25 Statistics, Armonk, NY, USA.

Results: Of the 173 endophthalmitis cases identified, 148 (86%) were in the “culture group” and 25 (14%) were in the “no culture group” (Table 1). At endophthalmitis presentation, eyes in the “culture group” had mean logMAR VA of 2.22 [\sim 20/3319] compared to 1.86 [\sim 20/1449] for eyes in the “no culture group” ($p=0.061$). At final follow up, mean logMAR visual acuity was 1.07 [approximately 20/235] for eyes in the “culture group” compared to 0.51 [\sim 20/65] for the “no culture group” (adjusted difference 0.56; 95% confidence interval = 0.05 – 1.06, $p=0.032$) (Table 2). Eyes in the “culture group” required a subsequent pars plana vitrectomy in 42/148 (28%) cases compared to 5/25 (20%) cases in the “no culture group” ($p=0.38$). Fifteen of 148 (10%) eyes in the “culture group” developed secondary retinal detachments compared to 0 in the “no culture group” ($p=0.132$).

Conclusions: Intravitreal antibiotics without microbiologic cultures may be an acceptable treatment strategy to manage endophthalmitis after cataract surgery when immediate access to a microbiologic facility is not available.

Layman Abstract (optional): The risk of developing an infection after cataract surgery is low. However, because cataract surgery is the most common eye surgery performed worldwide, reducing the incidence of endophthalmitis and resulting vision loss has been an area of research and clinical importance. In this study, we examined the role of microbial cultures in the outcomes of these eyes. In some situations, patients have been transferred to tertiary care centers if the treating physician does not have access to microbiology facilities. This can delay treatment with antibiotic injections into the eye. Specifically, we compared the outcomes of eyes with endophthalmitis following cataract surgery who underwent treatment with antibiotics versus those who had microbial cultures immediately before antibiotic treatment. This information will be helpful for patients and providers to make informed decisions when choosing among treatment strategies in the management of endophthalmitis after cataract surgery especially when immediate access to microbiology facilities is not available.

Practice Patterns in the Management of Post-Injection Endophthalmitis in the United States

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Purpose: Endophthalmitis is a rare vision-threatening complication of intravitreal (IVI) injection. IVI antibiotics are considered first-line management, yet there is lack of consensus regarding number and timing of repeat antibiotic injections as well as timing of pars plana vitrectomy (PPV) in eyes ultimately requiring surgery. We conducted a retrospective aggregated health records analysis to characterize practice patterns in management of post-IVI injection endophthalmitis in the United States (US). We sought to further delineate differences by region.

Methods: We performed an analysis of eyes receiving IVI of anti-vascular endothelial growth factor (anti-VEGF) who subsequently developed endophthalmitis within 2 weeks of injection between January 1, 2014 and November 30, 2022. Data were obtained using the Vestrum Health Retina Database, which represents a geographically diverse sample of US retina specialists. We excluded eyes who underwent PPV with concurrent diagnosis of retinal detachment. Descriptive statistics were used to characterize endophthalmitis cases as well as frequency of antibiotic injections and timing of PPV.

Results: Among 706,849 eyes receiving IVI anti-VEGF injections between 2014 and 2022, 2213 (0.31%) were diagnosed with endophthalmitis within 2 weeks of injection. Of these 2213 eyes, 762 (34%) were treated with bevacizumab, 964 (44%) with aflibercept, and 464 (21%) with ranibizumab. Most common indication for anti-VEGF therapy was neovascular age-related macular degeneration (n=1278; 58%). Average number of days between caustic injection and endophthalmitis diagnosis was 4.8 (standard deviation [SD] 2.9). Most cases (n=1432; 65%) were managed with intravitreal antibiotics alone. Among 222 (10%) eyes undergoing PPV, average time to PPV was 7.5 (SD 6) days; 83 (4%) underwent PPV without in-office IVI antibiotic. PPV rates were highest in the Southwest (17%) and lowest in the Southeast (6%) (p<0.001). Few eyes (n=91; 4%) received a second antibiotic injection. Average interval between initial and second IVI antibiotic was 4.1 (SD 3.6) days. Repeat antibiotic injection rates were lowest in the Northeast (1.5%) and highest in the Midwest (5.8%) (p=0.001).

Conclusions: In the US, most eyes with post-injection endophthalmitis were managed with IVI antibiotics alone. Repeat antibiotic injections were uncommon. Regional differences exist in rates of PPV and repeat antibiotic injection.

Topical bromfenac 0.09% solution reduces pain following intravitreal vascular endothelial growth factor injections (IVI)

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Purpose: Ophthalmic nonsteroidal anti-inflammatory drugs (NSAIDs) have decreased pain and inflammation following ophthalmic procedures, including cataract and refractive surgery. Bromfenac has demonstrated particularly good ocular tissue penetration, augmenting its effect in treating pain and inflammation of more invasive ocular procedures. We performed a randomized, double-masked, single-center study of adults receiving bilateral intravitreal vascular endothelial growth factor injections (IVI) to compare the use of pre-injection bromfenac 0.09% ophthalmic solution in pain reduction over time.

Methods: Patients receiving bilateral IVI at Wills Eye Hospital from March 2021 to June 2022 were randomized to receive bromfenac 0.09% solution in one eye and artificial tears in their fellow eye. As part of the standard IVI procedure, both eyes were prepared with proparacaine drops. Before injection, all patients quantified their typical IVI pain using the Wong-Baker FACES and the short-form McGill Pain Questionnaire. Following IVI, patient pain in each eye was assessed via the same questionnaire at three time points: five minutes, six hours, and one day after injection.

Results: 81 patients (162 eyes) were enrolled in the study. A paired T-test was performed on all patients with a typical IVI pain score of >0 ($n=56/81$ subjects) to compare the reduction of pain between the study (bromfenac) and the control eye. Five-minute post-IVI, patients reported a -0.564 point pain reduction using the Wong-Baker FACES scale in the eye that received bromfenac 0.09% ($p=0.041$). However, there was no significant difference in pain reduction at six hours or one day post-IVI, nor was there significant pain reduction between the two groups at any time point when utilizing the short-form McGill Pain Questionnaire.

Conclusions: Compared to the placebo, bromfenac 0.09% solution administered before IVI improved pain control five minutes after injection when quantified by the Wong-Baker FACES scale. However, while there was a trend in the reduction of pain in eyes receiving bromfenac as compared to the control, the difference was not clinically or statistically significant six hours and one day post-IVI.

Layman Abstract (optional): Some patients require injections into their eyes for many reasons, with many experiencing significant discomfort in the 24 hours following treatment. We hypothesized that applying a medication that decreases pain and inflammation (think of ibuprofen in an eye drop form) would decrease the pain that patients experience following their procedure.

Our work demonstrates that there are ways to further improve patient comfort during such an invasive procedure; however, more work is required to help patients reduce the pain that can occur up to one day after their injection. While we studied patients in a retina practice who received vision-preserving injections that stabilize weak blood vessels, making injections more comfortable would apply to other injectable medications as well, including steroids. The start of this work opens up opportunities to decrease pain following injections for all patients.

Comparing Outcomes of Kahook Dual Blade with Bent Needle Goniotomy: A Noninferiority

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Purpose: Minimally invasive glaucoma surgery is a mainstay of glaucoma management. Kahook Dual Blade (KDB) is a goniotomy device that has shown significant, lasting IOP reduction. Alternatively, a bent 27-gauge needle can be used to perform a goniotomy with a similar technique, but has a significantly lower incurred healthcare cost compared to KDB. This study aims to elucidate the relative success rates of both tools and determine whether the bent needle goniotomy is noninferior to KDB.

Methods: A retrospective chart review of 72 eyes who received either KDB or bent needle goniotomy was performed. Demographic data, type and severity of glaucoma, visual acuity, IOP, number of medications (NOM), and post-operative complications were recorded. Failure was defined as an IOP reduction of <20% or IOP > 21mmHg for two consecutive appointments after 3 months, IOP < 5mmHg for two consecutive appointments after 3 months, post-operative NOM > pre-operative NOM after 3 months, further glaucoma surgery, or progression to no light perception at any time during follow-up. Eyes meeting failure criteria were censored and excluded from further analysis. Cox regression was used to assess differences in time until failure between both surgical tools, with the noninferiority margin for the hazard ratio (HR) set at 1.15. Kaplan-Meier (Km) survival analysis was implemented for graphical comparison of relative success between both groups.

Results: KDB and bent needle goniotomy was performed in 72 eyes, with 36 eyes in each group. Baseline characteristics between both groups were similar including age ($p=0.228$), race ($p=0.219$), pre-op IOP ($p=0.618$), NOM ($p=0.056$), and glaucoma type ($p=0.478$). Glaucoma severity, however, was statistically greater in the KDB group ($p=0.16$). There were no statistically significant differences in postoperative IOP reduction, NOM, or complications. However, Cox regression analysis estimated the postoperative 1-year HR at 1.504 (95% confidence interval [CI], 0.780-2.897) and 5-year HR at 1.582 (95% confidence interval [CI], 0.909-2.753). Overall, KDB had a significantly higher success rate at 5 years ($p=0.042$).

Conclusions: Preliminary data show that bent needle goniotomy has a significantly higher rate of failure compared to KDB and cannot be considered noninferior. These differences in outcomes should be considered when choosing an instrument to perform a goniotomy. Data collection is ongoing.

Trabeculectomy versus Tube Shunt efficacy and safety in patients with Pre-operative Intraocular Pressure of More than 40 mmHg: A Retrospective Study

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Purpose: To compare the clinical outcomes between trabeculectomy (trab) and tube shunt (tube) in eyes with a pre-operative (pre-op) IOP > 40 mmHg.

Methods: 70 eyes with a pre-op IOP of > 40 mmHg who underwent either a trab or tube were enrolled in this study. Demographic data, glaucoma type, glaucoma severity, visual acuity, IOP, number of medications (NOM), and post-operative (post-op) complications were gathered. Neovascular and secondary glaucoma eyes were excluded. Failure was defined as an IOP reduction of < 20%, IOP less than or equal to 5 mmHg or > 21 mmHg on two consecutive appointments after 3 months, post-op greater than or equal to pre-op NOM after 3 months, further glaucoma surgery, or vision change to no light perception. Eyes that met the failure criteria were censored and excluded from further analysis.

Results: Tubes and trabs were performed in 34 and 36 eyes, respectively. Baseline characteristics were similar including age ($p=.05$), race ($p=0.19$), pre-op IOP ($p=.06$), NOM ($p=.24$), glaucoma type ($p=0.10$), and glaucoma severity ($p=0.18$). The IOP change was greater in the trab group at all follow-up visits, with the difference significant at 1 month post-op ($p<0.001$). The trab group required fewer glaucoma medications at 1, 3, and 6-month follow-up appointments ($p<0.001$). One-year success rate was higher in the trabs compared to the tubes (82% vs 68.3%; $p=0.20$). Complications including choroidal effusion or hemorrhage, and endophthalmitis occurred in < 3% of trabs and 13.9% of tubes ($p=0.02$)

Conclusions: Trabs required less post-op glaucoma medications and had less sight-threatening complications. Though trabs had higher 1-year success rate, it was not statistically significant which may be related to limited sample size.

Incidence and Complications of Silicone Oil Emulsification After Vitrectomy for Complex Retina Diseases: Comparison of 1000- versus 5000-centistoke Silicone Oil

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Purpose: To compare incidence and complications of silicone oil (SO) emulsification after vitrectomy with 1000- or 5000-centistoke SO tamponade for complex retinal diseases.

Methods: We retrospectively reviewed the medical records of consecutive series of patients who underwent vitrectomy using 1000-centistoke (SO1000) or 5000-centistoke silicone oil (SO5000) at Wills Eye Hospital between January 2012 and January 2021. Baseline characteristics, including demographic information, underlying pathologies, vitreous hemorrhage, and the extent of proliferative vitreoretinopathy (PVR) were collected. The primary outcome was the incidence of SO emulsification after SO1000 vs. SO5000. Secondary outcomes included the time to SO emulsification and complications such as ocular hypertension and re-operation.

Results: A total of 2812 eyes (2724 patients) received SO tamponade; 2619 eyes were treated with SO1000 and 184 eyes with SO5000. Rates of vitreous hemorrhage at baseline were similar between groups ($P=.95$). Indications for SO tamponade were as follows: recurrent rhegmatogenous retinal detachment (RRD) with PVR (37%), primary RRD with PVR (20%), diabetic tractional retinal detachment (18%), primary RRD without PVR (12%), recurrent RRD without PVR (8%), trauma (3%) and other (2%). The overall incidence of SO emulsification was 7.25% per eye (204/2812 eyes) and 5.40% per injection (204/3759 injections). Based on the SO type, the incidence of emulsification per injection was 5.47% (185/3379) in the SO1000 group, and 4.99% (18/361) in the SO5000 group ($P=.79$). The mean time (\pm SD) to emulsification was 481 ± 472 days in the SO1000 group and 788 ± 592 days in the SO5000 group ($P=.046$). In eyes with SO emulsification, 31% had ocular hypertension and 41% required topical medications to manage intraocular pressure. In 45% of eyes with SO emulsification, there were emulsified oil droplets in the anterior chamber. There were no differences in complication rates between SO1000 and SO5000 (all $P>.05$).

Conclusions: This analysis is the largest study to examine the incidence and complications of SO emulsification after SO1000 and SO5000. The incidence of emulsification and complications did not differ significantly between SO1000 and SO5000. SO emulsification was not associated with the number of SO injections nor the presence of vitreous hemorrhage prior to surgery.

Incidence and associations of retinal detachment after Yttrium Aluminum Garnet (YAG) capsulotomy

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Purpose: Yttrium Aluminum Garnet (YAG) laser capsulotomy is the standard of care for the treatment of post-capsular opacification after cataract surgery. Previous studies suggest the incidence of retinal detachment (RD) after YAG capsulotomy ranges between 0.5-1.5%. This study aimed to determine the cumulative incidence of RD after YAG capsulotomy and identify associated risk factors.

Methods: Data were analyzed from adults ≥ 18 years enrolled in IBM[®] MarketScan[®], a representative sample of US commercial insurance beneficiaries who underwent YAG capsulotomy between 2007-2016. Patients with previous RD were excluded. The primary study outcome was time to first RD after YAG capsulotomy, which was identified by CPT and ICD-9/ICD-10 codes. Multivariable Cox regression models were constructed to examine the association with socio-demographic characteristics, clinical comorbidities, and time from cataract surgery to YAG capsulotomy.

Results: Between 2007-2016, 414,174 adults underwent YAG capsulotomy in our cohort. RD was diagnosed in 718 (0.2%) patients within 3 months, 1221 (0.3%) within 6 months, and 1978 (0.5%) within one year after YAG capsulotomy (Figure 1). Patients with RD were more likely to be younger (62.2 vs 71.5 years), male (61.5% vs 38.1%), have diabetic retinopathy (13.2% vs 7.9%), lattice degeneration (3.6% vs 0.8%), posterior vitreous detachment (PVD) (16.7% vs 12.4%), and cataract surgery within 3 months of YAG capsulotomy (7.9% vs 4.0%) ($P < .0001$ for all).

In multivariable Cox regression models, time to RD was associated with male gender (adjusted hazard ratio [95% CI]: 2.50 [2.27-2.70]), lattice degeneration (2.68 [2.11-3.41]), diabetic retinopathy (1.44 [1.26-1.64]), PVD (1.53 [1.36-1.73]), and shorter interval between cataract surgery and YAG capsulotomy (≤ 3 months: 1.61 [1.36-1.93]), 3-12 months: 1.26 [1.13-1.41]), and inversely associated with age (≥ 65 years: 0.95 [0.94-0.95]) and comorbid diabetes (0.75 [0.66-0.85]) ($P < .0001$ for all).

Conclusions: One in 200 patients had RD within one year after YAG capsulotomy. Younger, male patients with a history of lattice degeneration, diabetic retinopathy, PVD, and recent cataract surgery had higher risk of RD. These findings may be used to guide informed consent discussions and identify patients at higher risk of RD who may benefit from close follow-up and monitoring.

Rate and severity of epiretinal membrane formation after scleral buckle for rhegmatogenous retinal detachment

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Purpose: To report the rate and severity of epiretinal membrane (ERM) formation after scleral buckle (SB) for rhegmatogenous retinal detachment (RRD).

Methods: A single-center, retrospective chart review of all patients who underwent SB for RRD repair between January 2015 and June 2022 and developed subsequent ERM was performed. Those who had prior ERM were excluded. Optical coherence tomography (OCT) structural analysis and ERM grading were based on a previously reported scale.

Results: 171 of 1088 eyes (15.7%) of 1088 patients who underwent SB developed subsequent ERM. 147 eyes of 147 patients were included after excluding those with prior surgery for RD. 86 (58.5%) patients were male, and 61 (41.5%) were female. The mean (SD) age was 52.9 (14.3) years. 74 (50.3%) eyes had macula-off RRD, and 73 (49.7%) had macula-on RRD. The mean (SD) logMAR visual acuity (VA) [Snellen] before SB was 0.58 (0.23) [20/76]. The mean (SD) duration between SB and ERM diagnosis was 392.2 (464.4) days. The mean (SD) logMAR VA [Snellen] at ERM diagnosis was 0.584 (0.59) [20/77]. At diagnosis, 108 (77.1%) eyes were graded as stage 1, 13 (9.3%) as stage 2, 16 (11.4%) as stage 3, and 3 (2.1%) as stage 4; 7 eyes were ungradable due to missing or poor-quality OCT images. 125 eyes (85.0%) were observed, while 22 (15.0%) underwent ERM peeling. Ten of the 22 (45.5%) eyes that had ERM peeling had ERM recurrence after peeling. The mean (SD) logMAR VA [Snellen] significantly improved from 1.21 (0.632) [20/324] before peeling to 0.671 (0.162) [20/94] at final follow-up after peeling ($p=0.002$). 12 (8.2%) eyes had no ERM at final visit, while 135 (91.8%) eyes had ERM. At final follow-up, 109 (83.8%) eyes were graded as stage 1, 8 (6.2%) as stage 2, 10 (7.7%) as stage 3, and 3 (2.3%) as stage 4; 5 eyes were ungradable due to missing or poor-quality OCT images. The mean (SD) logMAR VA [Snellen] at final visit was 0.458 (0.54) [20/57], which was significantly improved from VA at ERM diagnosis ($p=0.002$) but did not significantly differ from VA before SB ($p=0.098$).

Conclusions: ERM is a common complication that can develop after SB for the repair of RRD with the majority remaining fairly mild (stage 1) and managed by observation.

Surgical Outcomes of Primary Noncomplex Rhegmatogenous Retinal Detachment in Young Adults

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Purpose: Outcomes of rhegmatogenous retinal detachment (RRD) have been well studied in adult and pediatric populations, but less is known about outcomes in young adults. This study aims to describe anatomic and visual outcomes of young adults with uncomplicated primary RRD treated with scleral buckle (SB), pars plana vitrectomy (PPV), or both PPV/SB.

Methods: This is a multicenter, interventional cohort study. Patients aged 20-45 in the Primary Retinal Detachment Outcomes study were included, with a minimum requirement of 6 months follow-up. Patients with complex RRDs were excluded from this study. Primary outcomes were single surgery anatomic success (SSAS) and final visual acuity (VA). Multivariable cox proportional hazard models and multivariable logistic regression analysis were conducted for the two outcomes, redetachment rates and best available VA, which were assessed from 6 months to 2 years after surgery.

Results: One hundred sixty-five eyes met inclusion criteria. Median age was 37 years, and median follow-up was 364 days. SB was performed in 91 eyes (55%), PPV in 32 (19%), and PPV/SB in 42 (25%). Eyes that underwent SB were younger than eyes that underwent PPV or PPV/SB ($p < 0.0001$), were 100% phakic ($p < 0.0001$), had better initial VA ($p = 0.02$), and had a higher frequency of lattice degeneration ($p = 0.003$). SSAS rates were 79.3% for PPV alone, 83.7% for primary SB, and 92.7% for PPV/SB (ANOVA $p = 0.25$). When potential risk factors were adjusted for with a multivariable Cox proportional hazard regression model, eyes that underwent PPV were found to be more likely to result in redetachment compared to those who underwent PPV/SB (HR: 7.24, 95% CI: 1.25 – 42.1, $p = 0.03$), and eyes that underwent SB alone were not more likely to redetach than those that underwent PPV/SB (HR: 3.24, 95% CI: 0.63– 16.63, $p = 0.16$). When examining good vision (20/40), eyes that underwent PPV/SB were less likely to result with good vision compared to eyes that underwent SB alone (OR: 0.26, 95% CI: 0.07 – 0.94, $p = 0.04$). Similarly, eyes that underwent PPV alone were less likely to obtain good vision compared to eyes that underwent SB alone (OR: 0.20, 95% CI: 0.05 – 0.81, $p = 0.02$).

Conclusions: For young adults in this study, primary SB had the best visual outcomes, and eyes that underwent PPV/SB were less likely to redetach compared to PPV alone.

Prevalence, Characteristics, and Outcomes of Retinal Detachment Associated with Toxoplasmosis Retinochoroiditis

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Purpose: To investigate the incidence, characteristics, and outcomes of retinal detachment (RD) associated with ocular toxoplasmosis (OT).

Methods: This was a retrospective, single-center, consecutive case series of patients who were diagnosed with OT and subsequently developed RD between January 2014 and October 2022. We included patients who were followed for at least three months. We analyzed the location of the retinochoroidal scar, characteristics of the RD, surgical techniques, and anatomic and visual outcomes.

Results: Of 422 patients diagnosed with OT, RD developed in 27 (6.4%) patients. Sixteen eyes (16 patients) met the criteria for inclusion. The mean age was 40.9 ± 22.4 years (range, 10-68). The mean follow-up length was 31.0 ± 28.6 months. Of 16 eyes with RD, 13 (81%) eyes had rhegmatogenous RD (RRD) and 3 (19%) eyes had traction RD (TRD). Eleven (69%) eyes were being treated for active retinitis at the time of RD diagnosis. In 13 eyes with RRD, the mean number of retinal breaks was 1.5 ± 1.1 . Retinal breaks were adjacent to the retinochoroidal scar in 3 (23%) eyes, and peripheral in the rest. Four (31%) eyes had proliferative vitreoretinopathy (PVR) at the time of RRD diagnosis. The RRDs were treated by scleral buckle in 2 (15%) eyes, pars plana vitrectomy (PPV) in 4 (31%) eyes, combined PPV/SB in 5 (38%) eyes, and observed without surgery in 2 (15%) eyes due to advanced pathology at time of diagnosis. The TRDs were treated by pars plana vitrectomy (PPV) in all 3 (100%) eyes. Seven (54%) eyes underwent silicone oil tamponade. The overall single surgery anatomic success at 3 months was 93% (13/14 eyes) (including silicone oil tamponade), and reattachment was achieved in 100% without silicone oil tamponade at the final visit. The mean logarithm of the minimal angle of resolution (logMAR) visual acuity improved from 1.42 ± 0.94 before surgery to 1.35 ± 0.86 at 3 months and 1.20 ± 0.91 at the final follow-up, but these improvements were not statistically significant ($P=0.30$ and $P=0.45$, respectively). Macular scars were associated with poor final visual outcomes ($P=0.04$, linear regression analysis).

Conclusions: Rhegmatogenous or tractional retinal detachment occurred in 6.4% of patients with toxoplasmosis retinochoroiditis. Surgery results in favorable anatomic outcomes, but visual outcomes can be guarded, especially in eyes with macular scars.

Rate and Severity of Epiretinal Membrane Formation after Pneumatic Retinopexy for Rhegmatogenous Retinal Detachment

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Purpose: To report the rate and severity of epiretinal membrane (ERM) formation after pneumatic retinopexy (PR) for rhegmatogenous retinal detachment (RRD).

Methods: A single center, retrospective chart review of all patients who underwent PR for RRD between January 2015, and June 2022, and developed subsequent ERM was done. Those who had prior ERM were excluded. Optical coherence tomography (OCT) structural analysis and ERM grading were based on a previously reported scale.

Results: 161 of 728 eyes (22.12%) of 728 patients who underwent PR developed subsequent ERM. 119 eyes of 119 patients were included in this study after excluding those with prior surgery for RRD or retinal tears. 72 (60.50%) were males and 47 (39.50%) were females; mean (SD) age was 65.73 (9.83) years. 68 (57.14%) had macula-involving RRD while 51 (42.86%) had macula-sparing RRD. Mean (SD) follow up from the date of PR was 1133.44 (739.97) days.

Mean (SD) log MAR visual acuity (VA) [Snellen] at the time of the PR was 2.21 (7.95) [20/3244]. Mean (SD) time until ERM diagnosis after PR was 371.47 (464.49) days. At ERM diagnosis, patients had an improved mean (SD) log MAR VA [Snellen] 0.536 (0.56) [20/77] compared to before PR ($p= 0.034$). The severity of ERM at the time of initial diagnosis was grade 1 in 79 (70.54%) eyes, grade 2 in 15 (13.39%), grade 3 in 11 (9.82%) and grade 4 in 7 (6.25%). Note that 5 eyes were ungradable due to missing or poor-quality OCT images.

101 eyes (84.87%) were observed while 18 (15.13%) underwent membrane peels. Of the eyes that had membrane peels, only 2 (11.11%) had recurrence of ERM afterwards. Final mean (SD) log MAR VA [Snellen] after membrane peel was 0.865 (0.75) [20/147] compared to 1.23 (0.74) [20/340] before ($p= 0.061$).

12 (10.08%) eyes had no ERM at final visit while the remaining 107 (89.02%) had ERM. Final ERM grades were distributed as follows: 77 (64.71%) grade 1, 12 (10.08%) eyes grade 2, 12 (10.08%) eyes grade 3 and 3 (2.52%) eyes had grade 4; (three patients were lost to follow up and were not graded). Mean (SD) log MAR visual acuity [Snellen] at final visit was 0.395 (0.49) [20/50], which improved compared to VA at the time of the PR ($p= 0.018$) and compared to VA at ERM diagnosis ($p < 0.001$).

Conclusions: ERM is a common complication that develops around 1 year post PR for RRD with the vast majority remaining fairly mild (grade 1 or 2).

Post-operative Retinal Detachment Rates in Patients Who Underwent Macular Surgery

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Purpose: To compare the rate of post-operative retinal detachment (RD) in patients who underwent macular surgery for epiretinal membrane (ERM), full thickness macular hole (FTMH), or vitreomacular traction (VMT).

Methods: A single-center, retrospective chart review of all patients who underwent macular surgery for ERM, FTMH, or VMT between 1/1/2015 and 6/1/2022. Patients who developed subsequent RD were included in the analysis. Those with a history of RD before macular surgery were excluded.

Results: The overall rate of RD after macular surgery was 1.13% (127/11256) in 127 eyes of 127 patients. The rates of post-operative RD were 1.87% (7/374) for VMT, 1.15% (54/4680) for FTMH, and 1.06% (66/6202) for ERM ($p=0.348$).

Pre-macular surgery, mean (SD) log MAR [Snellen] visual acuity (VA) was 0.827 (0.598) [20/134]. VA was similar between the three groups ($p=0.555$). RD developed 228.72 ± 407.22 days (range: 2 to 1912 days) after macular surgery. Pre-RD surgery mean (SD) log MAR VA 1.288 (0.886) [20/388] was also similar between the three groups ($p=0.496$). Mean follow-up duration was 1239 ± 851 days.

Single surgery anatomic success (SSAS) rate at 3-months was 87.4% (111/127): 87.0% (47/54), 90.9% (60/66), and 57.14% (4/7) for MH, ERM, and VMT respectively ($p=0.038$). SSAS rate at final follow-up visit was 75.6% (96/127): 77.8% (42/54), 75.8% (50/66), and 57.1% (4/7) for MH, ERM, and VMT, respectively ($p=0.489$). SSAS with pars plana vitrectomy (PPV) was 70.0% (70/100), while with PPV/scleral buckle (SB), it was 100% (18/18), 66.67% (2/3) with pneumatic retinopexy, and 100% (6/6) with laser ($p=0.023$). Re-detachment occurred 126.6 ± 149.5 days (range: 9 to 654 days) after primary RD repair. Final reattachment rate was 98.4% (125/127).

Conclusions: Currently, there is no significant difference in the rate of postoperative RD between PPV for ERM, VMT, and FTMH.

Selective Laser Trabeculoplasty (SLT) After Trabecular Meshwork Bypass Microstent Implantation Versus Standalone SLT Outcomes: A Retrospective Cohort Comparison

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Purpose: Selective laser trabeculoplasty (SLT) and minimally invasive glaucoma surgery (MIGS) have come to the forefront of treatment paradigms for open-angle glaucoma (OAG). Studies have shown mixed results in augmenting intraocular (IOP) reduction after MIGS with SLT. The purpose of this study is to examine the safety and efficacy of SLT after implantation of a trabecular meshwork bypass microstent (iStent, Glaukos Corporation, "TMMS") combined with phacoemulsification.

Methods: A retrospective analysis of all eyes that underwent SLT following TMMS with phacoemulsification surgery compared to a matched cohort of pseudophakic eyes that had SLT without prior glaucoma procedures was performed. Patients were matched by age, gender, race, glaucoma type and severity, preoperative IOP within 2mmHg, and NOM within 1 NOM. Data was collected at intervals up to one year after the procedure. Failure criteria included <20% IOP reduction, the same or more number of glaucoma medications (NOM), and further glaucoma surgery. Kaplan-Meier (Km) survival analysis was implemented for a graphical comparison of relative success between both groups.

Results: A total of 36 eyes were studied. Baseline characteristics between the study group and matched cohort were similar. Both groups received similar power SLT treatment ($p=0.207$). 18 eyes had SLT following TMMS and phacoemulsification with a baseline mean IOP of 17.1 ± 4.7 mm Hg on 2.2 ± 0.9 NOM. This is compared to 18 eyes in the control group with a baseline mean IOP of 18.8 ± 4.1 mm Hg on 2.1 ± 0.9 NOM. At one year, the study group had a mean IOP decrease of $10.71\% \pm 17.11\%$ on 1.7 ± 1 NOM, compared to an $18.62\% \pm 14.37\%$ decrease on 2.2 ± 1.3 NOM in the control group ($p=.095$). Fewer eyes met success criteria in the case versus the matched control group at 1 year post-SLT (45% vs. 78%, $p=0.025$). 2 eyes (11%) had complications (1 prolonged inflammation and 1 hyphema) that resolved medically in the case group; no controls experienced complications.

Conclusions: SLT may be less effective at reducing IOP in eyes that have already had phacoemulsification plus TMMS. However, it may still be beneficial in reducing NOM, consistent with previous literature. Most patients met failure criteria due to the strict requirement of >20% IOP reduction in both groups, which may have been difficult to attain due to low baseline IOP.

Surgical efficacy of continuous wave and Micropulse cyclophotocoagulation in primary open-angle glaucoma: a retrospective study

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Purpose: Micropulse (MP3) and continuous wave (G-Probe) are two delivery methods of cyclophotocoagulation (CPC) in glaucoma. We present a retrospective study with post-operative outcomes of MP3 and G-Probe CPC up to 3 years.

Methods: A retrospective, real-world study of CPC surgical outcomes in a group of 46 primary open angle glaucoma (POAG) eyes that underwent G-Probe matched with 45 MP3 CPC. Both groups were matched for age, sex, race, glaucoma severity, baseline intraocular pressure (IOP), and number of medications (NOM). Post-operative IOP, NOM, visual acuity (VA), and complication rates were compared. Surgical failure was defined as IOP reduction of <20% after the 3 month follow up on the same or greater NOM, secondary surgery, and progression to no light perception. Eyes were censored from further data collection and analysis if they failed.

Results: Baseline characteristics of age, sex, race, pre-op IOP, NOM, and disease severity were similar between both groups. The mean total energy of G-Probe was lower than MP3 (74.3±28.8mJ vs. 115.6±52.9mJ, p<0.001). At 1 year, mean IOP was 13.4±6.8mmHg (42.0% reduction) in G-Probe group (n=15) and 14.5±5.2mmHg (37.5% reduction) in MP3 group (n=11). At 3 years, mean IOP was 10.3±6.4mmHg (66.5% reduction) and 16.0±3.5mmHg (35.7% reduction), respectively. Pre-operative NOM was similar between G-Probe and MP3 (4.0±1.3 and 3.6±1.5, p=0.2) but decreased in number during the 18month follow-up for G-probe and MP3 (2.6±1.7 and 2.7±1.6, p=0.370). At 1 year, failure rate in G-probe group was 47.8% and 53.3% in MP3 group.

Conclusions: One year success rate was similar between both G-probe and MP3 though the total energy was higher in MP3 group. Both G-Probe and MP3 CPC were effective in lowering IOP and NOM, but the failure rate raised over time in both groups.

Clinical Features and Factors Associated with Visual Outcomes in Patients with Suprachoroidal Hemorrhage

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Purpose: To describe and analyze the clinical features and management of suprachoroidal hemorrhage (SCH) in different settings and identify any prognostic factors associated with visual outcomes.

Methods: This was a single-center retrospective case series of consecutive eyes with SCH that were treated between March 2014 and December 2022 at the Wills Eye Hospital and the offices of Mid Atlantic Retina. The main outcome measures included final visual outcomes and factors associated with visual outcomes.

Results: Forty-two eyes of 40 patients with SCH were evaluated. The mean age was 70.0 years. The median follow-up length was 595 days. The inciting events of SCH included ocular surgeries in 55% (23/42 eyes) (13 pars plana vitrectomy [PPV], 4 tube shunts, 3 cataract surgeries, 1 trabeculectomy, 1 scleral buckle, and 1 penetrating keratoplasty), trauma in 31% (13/42) (11 penetrating and 2 blunt), and spontaneous occurrence in 14% (6/42). The SCHs were appositional in 6 eyes and concurrent retinal detachments were observed in 10 eyes. Overall, 57% (24/42) were managed surgically (17 PPV and external drainage, 7 external drainage alone) and 43% (18/42) were observed. In 24 eyes that were treated surgically, 17% (4/24) were drained within 3 days of presentation, 46% (11/24) were drained 4-14 days after presentation, and 38% (9/24) were drained >14 days. 50% (2/4) of SCH drained within 3 days required a follow-up surgery compared with 18% (2/11) of SCH drained within 4 -14 days and 22% (2/9) of SCH drained after 14 days. The logarithm of the minimum angle of resolution (logMAR) visual acuity significantly improved from 2.28 ± 0.63 (Snellen equivalent, 20/3811) at baseline to 1.94 ± 0.92 (20/1742) at the final visit ($P=0.007$). However, ten eyes were non-light perception and one eye resulted in phthisis bulbi at the final follow-up. Multivariable regression analysis revealed that worse baseline visual acuity and traumatic SCH were significantly associated with worse final visual outcomes ($P<0.001$ and $P=0.006$, respectively). The surgical techniques for drainage and time to drainage were not associated with visual outcomes.

Conclusions: In SCH, especially those associated with trauma, it remains challenging to maintain vision, regardless of the surgical techniques and timing of surgery.

Impact of intraoperative Indocyanine green use on subsequent proliferative vitreoretinopathy development

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Purpose: Dispersion and epithelial-mesenchymal transition of retinal pigmented epithelial (RPE) cells in rhegmatogenous retinal detachments (RRD) may lead to the development of proliferative vitreoretinopathy (PVR). Currently, there are no proven preventative pharmacologic therapies. Indocyanine green (ICG) has been reported to be toxic to RPE cells but its use in prevention of PVR has not been studied. We performed a retrospective matched case-control study to evaluate whether the use of ICG during primary RRD repair may lower the risk of PVR development.

Methods: A retrospective matched case-control series was performed identifying patients who underwent pars plana vitrectomy (PPV) with or without scleral buckling (SB) for primary RRD repair with and without the use of 0.25% ICG. No membrane peeling was performed in either group. Both groups were matched according to age, gender, visual acuity (VA) before surgery, lens and macula status, type of surgical procedure, gauge, laser to breaks, and tamponade (Table 1). Exclusion criteria consisted of patients with previous posterior segment surgeries, history of proliferative diabetic retinopathy, and/or presence of PVR. Both groups were followed for 12 months. The primary outcome measure was development of grade C or worse PVR re-detachment. Secondary measures included change in VA and development of epiretinal membrane (ERM). For statistical analysis, the chi square, independent t-test, and paired t-test were used.

Results: A total of 104 patients were included, 52 in the ICG group and 52 in the matched control group. Post-operative PVR re-detachments had occurred in 3/38 ICG patients and 1/45 controls by month 12 ($p=0.26$) and 4/52 ICG patients and 3/51 controls by the final visit ($p=0.72$). ERM was present in 12/41 ICG patients and 22/45 controls at month 12 ($p=0.063$) and 22/52 ICG patients and 30/52 controls at final visit ($p=0.07$). The mean (SD) LogMAR [Snellen] VA was 0.54 (0.57) [20/69] in the ICG group and 0.38 (0.56) [20/48] in the control group at 12 months ($p=0.16$). At the final visit, the mean (SD) logMAR [Snellen] VA was 0.45 (0.59) [20/56] in the ICG group and 0.34 (0.51) [20/44] ($p=0.11$).

Conclusions: ICG did not appear to prevent PVR or ERM formation after prophylactic use during primary PPV for RRD.

Characteristics of Predatory Publishing Solicitation in Ophthalmology

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Purpose: To evaluate email communication from predatory publishers to ophthalmology faculty across subspecialties.

Methods: Emails received by participating United States ophthalmologists from unsolicited publishing sources during May 2021 were collected. Email contents were analyzed for characteristics including spelling, grammar, and soliciting strategies.

Results: Fourteen ophthalmologists received 1,813 emails, of which 522 (28.8%) were related to ophthalmology. Most emails solicited article submissions to open-access journals (79.5%), of which 953 (66.2%) were from publishers identified on Beall's List. Publishing characteristics included rapid publication (18.1%) and discounted submission fees (9.9%). Most emails referenced previous publications by the recipient (14.3%), and contained errors related to spelling and grammar (48.6%) and the recipient's name (20.0%).

Conclusions: Article solicitation by predatory publishers resulted in a large volume of emails, of which only one-quarter were pertinent to the specialty. Red flags for unsolicited communication included errors in spelling, grammar, and the recipient's name.

Improving Emergency Medicine Slit Lamp Use and Confidence Through Longitudinal Training Curriculum - a preliminary report on physician skill and confidence acquisition

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Purpose: Ocular emergencies account for up to 3% of Emergency Department (ED) visits in the US, requiring emergency physicians (EPs) to have the skills and confidence to identify and manage ocular pathology. However, EPs report limited confidence in performing a comprehensive slit lamp exam, one of the fundamental skill sets for an EP, due to insufficient ophthalmic training during residency. Our objective was to design an evidenced-based, simulation-based mastery learning (SBML) curriculum to empower EPs to perform a structured slit lamp exam.

Methods: EPs at a tertiary academic institution were enrolled in an SBML curriculum and evaluated using pre- and post-test assessment, and follow-up skill utilization. Ophthalmology and ED faculty created the curriculum and a 20-item checklist based on targeted needs assessment. Participants first completed an in-person baseline slit lamp exam at Wills Eye Hospital (WEH), then received a learning packet, instructional video, and an independent readiness assessment (IRAT). Passing the IRAT (>90%) permits the EP to schedule the in-person SBML deliberate practice and the final exam at WEH. Participants must score above 90% on the final checklist and complete a 2-month follow-up survey on provider confidence and knowledge dissemination to graduate.

Results: 17 EPs enrolled, and all EPs successfully completed the final exam in one attempt. There was a significant increase between pre-curriculum (11.0, 2.78) and post-curriculum (19.22, 0.78) scores, with an average increase of 8.22, $p < 0.001$. EPs struggled most with anterior chamber evaluation and cell and flare identification, improving from 21% and 7.1% completion pre-training to 100% and 81.8%, respectively, upon curriculum completion.

Conclusions: This is the first interdisciplinary SBML pilot curriculum between the Department of Ophthalmology and EM that demonstrated a significant improvement in clinician skillset. It is imperative for EPs to master the skill of identifying cells and flare, as uveitis is commonly undiagnosed or misdiagnosed for similar-appearing pathology such as conjunctivitis. Further analysis will evaluate knowledge dissemination and physician attitude regarding the slit lamp curriculum with goals of dissemination and replication by other EM programs.

Outcomes of Treat-and-Extend versus Pro Re Nata Anti-VEGF Injections for Myopic Macular Neovascularization in Patients in the United States

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Purpose: The pro re nata (PRN) regimen of anti-vascular endothelial growth factor (VEGF) injection has been widely performed for myopic macular neovascularization (MNV) based on the results of clinical trials. The recurrences of MNV are relatively common in the long term; thus, some physicians employ a treat-and-extend (TE) regimen. However, the optimal regimen is still uncertain. We compared outcomes between PRN and TE regimens in patients with myopic MNV.

Methods: This study included patients aged ≥ 18 years with myopic MNV who had received anti-VEGF injections (either bevacizumab or ranibizumab) and were followed up for at least 12 months. The patients received one to four monthly injections to achieve dry macula, followed by the PRN or TE regimen. The main outcome measures were visual acuity and visual changes at 12 months.

Results: This study included a total of 125 eyes of 125 patients (79 females and 46 males). Forty-four eyes (35%) treated with PRN were compared with 81 eyes (65%) treated with TE. The follow-up duration was 38.0 ± 17.5 months, with no significant differences between the groups ($P = 0.679$). Baseline characteristics, including race/ethnicity, visual acuity, central foveal thickness, and initial anti-VEGF type, did not differ significantly between the groups, except for significantly older age in the TE group. Both PRN and TE groups had significant visual improvement at 12 months ($P = 0.006$ and $P < 0.001$, respectively) and at the final follow-up ($P = 0.036$ and $P < 0.001$, respectively). The visual acuity and visual changes after treatment did not differ significantly between the groups. The PRN group had a significantly higher recurrence rate (36% vs. 19%, $P = 0.032$), while the TE group received more injections during follow-up (4.8 vs. 13.8 injections, $P < 0.001$). In a multivariable regression analysis, better final visual acuity was significantly associated with younger age ($P = 0.010$) and better baseline visual acuity ($P < 0.001$) but not with treatment regimen or initial anti-VEGF type

Conclusions: Anti-VEGF injections with PRN and TE regimens are both effective for myopic MNV with comparable visual outcomes. The TE regimen resulted in less recurrence but with more injections. Further research is needed to investigate the long-term outcomes of each regimen.

Visual Outcomes and Incidence of Complications after Vitrectomy for Vitreous Hemorrhage Associated with Retinal Vein Occlusion

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Purpose: To report the outcomes and incidence of postoperative complications of pars plana vitrectomy (PPV) for vitreous hemorrhage (VH) associated with retinal vein occlusion.

Methods: This retrospective, single-center, consecutive case series examined patients who underwent PPV for VH associated with branch retinal vein occlusion (BRVO) and central retinal vein occlusion (CRVO) between January 2015 and January 2021.

Results: The study included 138 eyes of 138 patients. Overall, 81 (59%) patients had BRVO and 57 (41%) had CRVO. The mean duration between the diagnosis of vitreous hemorrhage and surgery was 79.6 ± 115.3 days. Visual acuity significantly improved from 20/1782 to 20/195 at 6 months and to 20/230 at the final visit (both $P < 0.001$, compared with baseline). The visual acuity at 6 months improved by 3 or more lines in 103 (75%) eyes. Postoperative complications during follow-up included recurrence of VH in 16 (12%) eyes, RRD in 6 (4%) eyes, epiretinal membrane in 34 (25%) eyes, new neovascular glaucoma in 3 eyes (2%), ocular hypertension in 45 (33%) eyes, and macular edema requiring anti-vascular endothelial growth factor (VEGF) injections in 40 (29%) eyes. Worse final visual acuity was significantly associated with older age ($P = 0.007$), concurrent neovascular glaucoma ($P < 0.001$), CRVO ($P < 0.001$), worse preoperative visual acuity ($P < 0.001$), postoperative new neovascular glaucoma ($P = 0.021$), and postoperative retinal detachment ($P < 0.001$).

Conclusions: PPV is effective for the treatment of vitreous hemorrhage associated with RVO, regardless of the duration of hemorrhage. However, pre-existing and postoperative complications may limit visual recovery.