

AMERICAN JOURNAL OF OPHTHALMOLOGY®

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ORIGINAL ARTICLES

- **1 Postoperative complications in Medicare beneficiaries following endothelial keratoplasty surgery.** Sidra Zafar, Peiqi Wang, Fasika A. Woreta, Kanza Aziz, Martin Makary, Zara Ghous, and Divya Srikumaran

Most published data for postoperative complications following endothelial keratoplasty (EK) procedures are derived from single centers, groups with small sample sizes, or shorter-term follow-up. This cross-sectional population-based study analyzed 94,829 EK procedures by using 100% 2010-2019 Medicare fee-for-service carrier claims. The incidence of major postoperative complications, including endophthalmitis, retinal detachment, and choroidal hemorrhage following EK procedures, was low. A high proportion of eyes undergoing EK eventually require glaucoma surgery and experience graft-related complications.

- **12 Short-term changes in prediction error after cataract surgery in eyes receiving 1 of 3 types of single-piece acrylic intraocular lenses.** Ken Hayashi, Motoaki Yoshida, Shunsuke Hayashi, and Koichi Yoshimura

Three types of single-piece acrylic intraocular lenses resulted in different changes in the refractive prediction error in the early period after cataract surgery, suggesting that postoperative refractive stability differs according to the lens type.

- **21 Optimizing the repeatability of choriocapillaris flow deficit measurement from optical coherence tomography angiography.** Iksoo Byon, Ahmed Roshdy Alagorie, Yongsok Ji, Li Su, and Srinivas R. Sadda

An overall high level of repeatability of flow measurement was observed from en face choriocapillaris optical coherence tomography angiography images. Slab location and

reference offset, projection method, and local thresholding radius could impact the repeatability. A slab positioned 21-31 μm below the retinal pigment epithelial band with the Max projection yielded the most repeatable results.

- **33 Corneal topography raw data classification using a convolutional neural network.** Pierre Zéboulon, Guillaume Debellemannière, Magalie Bouvet, and Damien Gatinel

A deep-learning model was built to classify corneal tomography examinations based on the combined raw numeric data of tomography maps. It is a powerful and promising technique for corneal tomography analysis.

- **40 Ocular manifestations and burden related to Sjögren syndrome: Results of a patient survey.** Ian J. Saldanha, Vatinée Y. Bunya, Sara S. McCoy, Matthew Makara, Alan N. Baer, and Esen K. Akpek

This study is a survey of 2,961 patients with physician-diagnosed Sjögren syndrome ("Sjögren's"). Large proportions of the patients had dry eye, dry mouth, and fatigue. Sjögren's patients with significant dry eye more often agreed that Sjögren's made living every day a challenge and added a significant emotional burden. Sjögren's-related dry eye is more burdensome than systemic manifestations of the disease and has a comparable impact on patient life.

- **49 Effects of induced astigmatism on spectral domain-OCT angiography quantitative metrics.** Jesse J. Jung, Yu Qiang Soh, Patricia Sha, Sophia Yu, Mary K. Durbin, and Quan V. Hoang

With-the-rule astigmatism leads to diffuse lowering of spectral-domain optical coherence tomography angiography (OCTA) quantitative measurements due to defocus in the horizontal meridian. This effect is symmetric in the vertical meridian, but asymmetrically affects the nasal

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more than the temporal quadrants due to the higher prevalence of horizontally-oriented vessels nasally. Caution should be used when evaluating OCTA metrics in highly astigmatic eyes.

• **59 Factors associated with improvement in vision following femtosecond astigmatic keratotomy in post-keratoplasty keratoconus patients.** *Michael Mimouni, Mohammad Kreimeh, Nir Sorkin, Tanya Trinh, Gisella Santaella, Eyal Cohen, Clara C. Chan, and David S. Rootman*
Femtosecond astigmatic keratotomy in patients with keratoconus post-keratoplasty with high astigmatism leads to a 3-line improvement in visual acuity 60.7% of the time. Patients with previous penetrating keratoplasty (PKP) and a greater preoperative astigmatism are more likely to gain 3 lines of vision. Patients following deep anterior lamellar keratectomy experience overcorrection, whereas patients following PKP experience under correction, indicating that separate nomograms for each group may be useful to improve outcomes.

• **66 Macular and peripapillary optical coherence tomography angiography metrics predict progression in diabetic retinopathy: a sub-analysis of TIME-2b study data.** *Eugenia Custo Greig, Mitchell Brigell, Frank Cao, Emily S. Levine, Kevin Peters, Eric M. Moul, James G. Fujimoto, and Nadia K. Waheed*

Optical coherence tomography angiography metrics have shown promise as predictive biomarkers for diabetic retinopathy disease progression. This study assesses the predictive capability of macular and peripapillary vessel metrics in diabetic retinopathy. In this cohort of 73 patients prospectively followed over 12 months, increased foveal avascular zone area, presence of intraretinal microvascular abnormalities, and decreased temporal peripapillary vessel density at baseline were found to predict diabetic retinopathy disease progression at 1 year.

• **77 From conventional angle surgery to 360-degree trabeculotomy in pediatric glaucoma.** *Osvaldo Berger, Jibran Mohamed-Noriega, Sancy Low, Moritz C. Daniel, Sakaorat Petchyim, Maria Papadopoulos, and John Brookes*
The present study compares the outcomes of conventional angle surgery (goniotomy and standard trabeculotomy) with 360-degree trabeculotomy assisted with illuminated microcatheter for the treatment of pediatric glaucoma. The 360-degree trabeculotomy is a superior treatment, with better success and survival rates, and its introduction as a standard treatment can be easily achieved.

• **87 Baseline visual field findings in the RUSH2A study: associated factors and correlation with other measures of disease severity.** *Jacque L. Duncan, Wendi Liang, Maureen G. Maguire, Isabelle Audo, Allison R. Ayala, David G. Birch, Joseph Carroll, Janet K. Cheetham, Simona Degli Esposti, Todd A. Durham, Laura Erker, Sina Farsiu, Frederick L. Ferris III, Elise Heon, Robert B. Hufnagel, Alessandro Iannaccone, Glenn J. Jaffe, Christine N. Kay, Michel Michaelides, Mark E. Pennesi, and José-Alain Sahel, on behalf of the Foundation Fighting Blindness Consortium Investigator Group*
The Rate of Progression in USH2A-related Retinal degeneration (RUSH2A) study is a 4-year international natural history study of 127 participants with variants in the USH2A gene. Eighty with Usher syndrome (retinal disease with congenital hearing loss) have worse visual field loss than 47 with retinal disease alone. Visual field loss may be a useful outcome measure for future treatment studies. The findings should accelerate the development of treatments for USH2A-related retinal degeneration.

• **101 Rethinking the Hydroxychloroquine Dosing and Retinopathy Screening Guidelines.** *David J. Browning, Naoto Yokogawa, Paul B. Greenberg, and Elliot Perlman*
Guidelines for ophthalmic screening of patients taking hydroxychloroquine need to be revised to correct shortcomings in the 2016 version, incorporate new scientific

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information, and include prescribing physicians on the writing committee. The most important points for revision concern the ceiling for safe daily dosing and the response to subclinical abnormalities in ancillary testing.

• **107 Lymphoma of the lacrimal gland — An international multicenter retrospective study.** *Stine Dahl Vest, Lauge Hjorth Mikkelsen, Frederik Holm, Peter Kristian Rasmussen, Tine Gadegaard Hindso, Marina K.H. Knudsen, Sarah E. Coupland, Bitu Esmali, Paul T. Finger, Gerardo F. Graue, Hans E. Grossniklaus, Santosh G. Honavar, Kaustubh Mulay, Lene D. Sjö, Matthew C. Sniegowski, Geeta K. Vemuganti, Bradley A. Thuro, and Steffen Heegaard*
In this multicenter retrospective interventional case series, 260 patients with lacrimal gland lymphoma were analyzed with respect to lymphoma subtype, clinical findings, and survival. The distribution of lymphoma subtypes in the lacrimal gland was found to resemble that of the ocular adnexa, and lymphoma subtype was a significant predictor of disease-specific survival. The prognosis was relatively good, with a 5-year overall survival and disease-specific survival of 73.8% and 87.5%, respectively.

• **121 Three-year outcomes of tri-folded endothelium-in Descemet membrane endothelial keratoplasty with pull-through technique.** *Angeli Christy Yu, James Myerscough, Rossella Spena, Fiorella Fusco, Sergiu Socea, Luca Furioli, Luigi De Rosa, Cristina Bovone, and Massimo Busin*
Tri-folded endothelium-in Descemet membrane endothelium keratoplasty with bimanual pull-through delivery technique facilitates graft unfolding with excellent 3-year outcomes, regardless of preoperative eye status.

• **132 Unplanned return to the operating room after trabeculectomy.** *Nur Cardakli, David S. Friedman, and Michael V. Boland*

This retrospective study examined the rate of unplanned return to the operating room after attending-performed and attending-supervised trabeculectomy surgery. A size-

able portion of patients who underwent trabeculectomy required further surgery, which may be important in setting appropriate patient and provider expectations. Factors most strongly associated with an increased risk of reoperation were postoperative complications that often required surgical intervention.

• **141 A patient-reported outcome measure of functional vision for children and young people aged 8 to 18 years with visual impairment.** *Alexandra O. Robertson, Valerija Tadić, Mario Cortina-Borja, and Jugnoo S. Rahi, on behalf of the Child Vision PROMs group*

We report the development of age-specific extensions of the FVQ_CYP to allow for use with a broader age-range of children and young people with visual impairment. The FVQ_Child and FVQ_Young Person are psychometrically robust, age-appropriate versions of the FVQ_CYP, which can be used cross-sectionally or sequentially/longitudinally across the age-range of 8 up to 18 years in clinical practice and research.

• **154 Repeatability of the Pentacam HR in various grades of keratoconus.** *Elke O. Kreps, Marta Jimenez-Garcia, Ikram Issarti, Ilse Claerhout, Carina Koppen, and Jos J. Rozema*

A reliability analysis was performed to assess the repeatability of relevant indices with Pentacam in normal eyes and keratoconus eyes of varying severity. Repeatability in subclinical disease was similar to normal eyes. Mild and moderate keratoconus showed significant measurement variability compared to normal eyes, to a degree that is clinically relevant. Maximal keratometry and anterior astigmatism were most susceptible to worsening repeatability in more advanced disease.

• **163 Paracentral and cecocentral scotomas after pars plana vitrectomy for rhegmatogenous retinal detachment.** *Rahul N. Khurana and Vivek R. Patel*

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Novel paracentral and cecentral scotomas after uncomplicated pars plana vitrectomy for rhegmatogenous retinal detachment are described in nine patients. The location of the scotomas in the inferior temporal visual field is consistent with ganglion cell loss imaged in the superior nasal macular area. Surgeons should be aware of this complication and take precautions to slowly inject the gas after the air-gas exchange.

- **170 Evaluating Goldmann applanation tonometry intraocular pressure measurement agreement between ophthalmic technicians and physicians.** Aleksandra Mihailovic, Varshini Varadaraj, Pradeep Y. Ramulu, and David S. Friedman

Goldmann applanation intraocular pressure measurement disagreed frequently when comparing measurements by technicians to those by physicians (25% of measurements differed by >2 mm Hg). An educational intervention had little impact on the agreement in intraocular pressure measurement between technicians and physicians. These findings highlight an important limitation of Goldmann applanation tonometry. Treatment decisions, especially those involving substantial risk such as surgery, should not be made based on intraocular pressure alone.

- **177 Effect of prematurity on foveal development in early school-age children.** Semra Tiriyaki Demir, Evrim Kiray Bas, Murat Karapapak, Mehmet Egemen Karatas, Hasan Sinan Uslu, Ali Bulbul, and Dilek Guven

This retrospective cohort study included children 6-8 years of age who were preterm at birth and who had not received retinopathy treatment. As neonates, all participants had been treated in our neonatal intensive care unit. Patients were categorized into 2 groups according to gestational age (GA) (group I: ≤30 weeks GA and group II: 31-34 weeks GA), and their results were compared with those of full-term children (group III: ≥37 weeks GA). Group III consisted of healthy volunteers with a best corrected visual

acuity of 20/20 using the Snellen chart and with no evidence of ocular disease in either eye.

- **186 Comparison of toric implantable collamer lens and toric Artiflex phakic IOLs in terms of visual outcome: a paired contralateral eye study.** Mohammad Ghoreishi, Abolfazl Kashfi, Mohammadreza Peyman, and Mohadeseh Mohammadinia

Phakic intraocular lenses have been widely used in patients with higher degrees of refractive errors. In this paired eye study, both toric implantable collamer lenses and toric Artiflex lenses showed promising results in terms of safety, efficacy, and predictability for correction of myopic astigmatism, and most outcomes were almost identical, and none of these lenses were clinically superior to the other.

- **195 Genotype-Phenotype Correlations in a Spanish Cohort of 506 Families With Biallelic ABCA4 Pathogenic Variants.** Marta Del Pozo-Valero, Rosa Riveiro-Alvarez, Fiona Blanco-Kelly, Jana Aguirre-Lamban, Inmaculada Martin-Merida, Ionut-Florin Iancu, Saoud Swafiri, Isabel Lorda-Sanchez, Elvira Rodriguez-Pinilla, Maria José Trujillo-Tiebas, Belen Jimenez-Rolando, Ester Carreño, Ignacio Mahillo-Fernandez, Carlo Rivolta, Marta Corton, Almudena Avila-Fernandez, Blanca Garcia-Sandoval, and Carmen Ayuso

ABCA4 is the most mutated gene in our cohort of inherited retinal dystrophies, with 506 families with biallelic mutations. Most of the variants are missense, and they are associated with Stargardt disease, except 3 variants associated with cone-rod dystrophy. Truncating ABCA4 variants are associated with a more severe phenotype and earlier age of onset. Prevalent c.3386G>T; p.(Arg1129Leu) Spanish variant is correlated with a milder phenotype, and it is overrepresented in patients presenting with foveal sparing.

- **205 Temporal raphe sign in elderly patients with large optic disc cupping: its evaluation as a predictive factor for**

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glaucoma conversion. Ahnul Ha, Young Kook Kim, Jin-Soo Kim, Jin Wook Jeoung, and Ki Ho Park

In elderly with large cup-to-disc ratio (≥ 0.7), the presence of temporal raphe sign on the macular ganglion cell–inner plexiform layer thickness map was significantly associated with rapid conversion to glaucoma at a rate that might exceed age effects.

• **215 The short-term effect of a single lapse in anti-vascular endothelial growth factor treatment for diabetic macular edema within routine clinical practice.** Siri P. Yalamanchili, Christopher M. Maatouk, Daniel U. Enwere, Thais F. Conti, Grant L. Hom, Isaac N. Briskin, Tyler E. Greenlee, Amy S. Babiuch, and Rishi P. Singh

This retrospective study examined the changes seen in diabetic macular edema patients who experience at least a 3-month unintended lapse in anti-vascular endothelial growth factor (VEGF) treatment, as well as the changes that occur following reinitiation of treatment. Mixed model regression analyses showed that 3- to 24-month treatment lapses result in increased central subfield thickness. The findings indicate that treatment lapses of at least 3 months may result in reversible macular thickening following reinitiation of consistent anti-VEGF therapy for 6 months after lapse.

• **222 Eliminating Visual Acuity and Dilated Fundus Examinations Improves Cost Efficiency of Performing Optical Coherence Tomography–Guided Intravitreal Injections.** Omer Trivizki, Michael R. Karp, Anuj Chawla, Justin Yamanuha, Giovanni Gregori, and Philip J. Rosenfeld

Improvements in clinic efficiency and significant cost savings can be achieved when formal visual acuity assessments and dilated fundus exams are eliminated from clinic visits in the management of established patients with exudative macular diseases undergoing OCT-guided intravitreal injection retreatments.

• **231 Developmental changes in retinal microvasculature in children: a quantitative analysis using optical coherence tomography angiography.** Songshan Li, Xiao Yang, Mengke Li, Limei Sun, Xiujuan Zhao, Qiong Wang, Sijian Huang, Chonglin Chen, Zhirong Wang, Xiaoling Luo, Bilin Yu, and Xiaoyan Ding

This study evaluated retina microvasculature by using optical coherence tomography angiography in normal children 4–16 years old. Data included macular vascular density, perfusion density, fovea avascular zone (FAZ) area, FAZ perimeter, and the acircularity index of FAZ. Results showed an increase in the macular vascular density and perfusion density with age. The proportion of children with nonconsecutive branched vessels or vascular loops in FAZ decreased along with age.

• **240 Effect of 3-Hydroxy-3-Methyl-Glutaryl-Coenzyme A Reductase Inhibitors on the Meibomian Gland Morphology in Patients with Dyslipidemia.** Kuan-I Wu, Chin-Ying Chen, Tzuu-Shuh Jou, Jyh-Ming Jimmy Juang, Jin-Ying Lu, and I-Jong Wang

This article evaluates the longitudinal morphologic changes of meibomian glands among patients with dyslipidemia by noncontact infrared meibography. Patients with or without statin treatment were enrolled to examine the relationship between dyslipidemia, changes in meibomian gland function, and dry eye condition with time.

• **253 The Aravind Pseudoexfoliation Study: 5-Year Postoperative Results. The Effect of Intraocular Lens Choice and Capsular Tension Rings.** Aravind Haripriya, Pradeep Y. Ramulu, Emily M. Schehlein, Madhu Shekhar, Shivkumar Chandrashekhara, Kalpana Narendran, Rengaraj Venkatesh, Mohammed Sithiq, Rengappa Ramakrishnan, Ravilla D. Ravindran, and Alan L. Robin

The results of large, randomized controlled trial show that in patients with and without pseudoexfoliation undergoing

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cataract surgery the choice of a 1- or 3-piece intraocular lens or use of a capsule tension ring did not affect outcomes.

- **261 Capillary density measured by optical coherence tomography angiography in glaucomatous optic disc phenotypes.** Eren Ekici, Sasan Moghimi, Christopher Bowd, Huiyuan Hou, Rafaella C. Penteado, James Proudfoot, Diya Yang, and Robert N. Weinreb

This cross-sectional study demonstrates that the discriminating ability of optical coherence tomography angiography parameters to detect glaucoma is influenced by optic disc phenotype and clinicians should be aware when evaluating patients for glaucoma.

- **271 Contemporary outcomes and prognostic factors of 23-gauge vitrectomy for retained lens fragments after phacoemulsification.** Errol W. Chan, Elizabeth Yang, Mohab Eldeeb, James W. Bainbridge, Lyndon da Cruz, Paul S. Sullivan, Mahi M. Muqit, David G. Charteris, Miriam Minihan, Eric Ezra, and Louisa Wickham

Following 23-gauge vitrectomy of retained lens fragments, 62.9% and 15.5% of eyes achieved 6-month best-corrected visual acuities (BCVAs) better than 20/40 and worse than 20/200, respectively. Independent predictors of poorer final BCVA were older age, worse precataract surgery visual acuity (VA), diabetic macular edema, postvitrectomy persistent cystoid macular edema, suboptimal corneal clarity delaying vitrectomy by >2 weeks, and final aphakic status. These are inferior outcomes unlike after uncomplicated cataract surgery. Intraocular lens type or timing of placement do not impact VA outcomes.

- **284 Sex differences in the repair of retinal detachments in the United States.** Natalia F. Callaway, Daniel Vail, Ahmad Al-Moujahed, Cassie Ludwig, Marco H. Ji, Vinit B. Mahajan, Suzann Pershing, and Darius M. Moshfeghi
- Retinal detachment is a potentially blinding emergency that requires intervention. This administrative claims study

examines sex differences in retinal detachment repair and finds that insured women have 34% lower odds of surgical repair compared to insured men after adjusting for available confounders. Women are also more likely to undergo repair with scleral buckle or pneumatic retinopexy compared to pars plana vitrectomy. The reason for this difference remains poorly understood and requires further study.

- **295 Long-term In Vivo Stability of Posterior Chamber Phakic Intraocular Lens: Properties and Light Transmission Characteristics of Explants.** Tomoaki Nakamura, Naoki Isogai, Takashi Kojima, Yoko Yoshida, Yasuo Sugiyama, Yoshiki Tanaka, and Kazuo Ichikawa

This study evaluated the in vivo durability of the surface and optical properties of implantable Collamer lenses (ICLs). ICL explants of patients ($n = 10$) who developed cataracts were analyzed using ultraviolet-visible light spectroscopy, light microscopy, and scanning electron microscopy. The ICLs remained in-eye for >10 years without deterioration in the surface and optical properties of the Collamer, despite interaction with the aqueous humor components. This study shows long-term in vivo stability of the ICL.

- **303 Incidence and outcome of uveitic glaucoma in eyes with intermediate, posterior, or panuveitis followed up to 10 years after randomization to fluocinolone acetonide implant or systemic therapy.** John H. Kempen, Mark L. Van Natta, David S. Friedman, Michael M. Altaweel, Husam Ansari, James P. Dunn, Susan G. Elner, Janet T. Holbrook, Lyndell L. Lim, Elizabeth A. Sugar, and Douglas A. Jabs, for the Multicenter Uveitis Steroid Treatment (MUST) Trial and Follow-up Study Research Group

The long-term risk and outcomes of glaucoma in eyes with noninfectious intermediate, posterior, and panuveitis managed with systemic or fluocinolone acetonide (0.59 mg, "implant") therapy were studied prospectively over 7-10 years. Risk of glaucoma was substantially higher with

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implant than systemic therapy, even after adjusting for intraocular pressures observed during follow-up. After glaucoma diagnosis, most glaucomatous eyes avoided progressive visual field loss and cup-to-disc ratio worsening, but a minority worsened despite expert management.

• **317 Ability of 24-2C and 24-2 grids to identify central visual field defects and structure-function concordance in glaucoma and suspects.** *Jack Phu and Michael Kalloniatis*

24-2C returns the same global visual field results as 24-2, and although it identifies a greater number of central visual field defects, its test locations fall outside the optical coherence tomography ganglion cell analysis test zone. There macular structure-function using the 24-2C requires further optimization. A framework for visual field test location selection is proposed herein.

• **332 Differences in clinical features of myelin oligodendrocyte glycoprotein antibody-associated optic neuritis in White and Asian race.** *Tanyatuth Padungkiatsagul, John J. Chen, Panitha Jindahra, Tetsuya Akaishi, Toshiyuki Takahashi, Ichiro Nakashima, Takayuki Takeshita, and Heather E. Moss*

Race is known to be an epidemiologic factor associated with clinical features and visual prognosis in demyelinating optic neuritis. This study aims to characterize differences in clinical features and visual outcome of myelin oligodendrocyte glycoprotein antibody-associated optic neuritis between White and Asian subjects. White subjects were more likely to report pain, have recurrent attacks, and have bilateral optic nerve involvement, although visual outcomes were similar between both races.

• **341 Exploratory use of fluorescent SmartProbes for the rapid detection of microbial isolates causing corneal ulcer.** *Rameshkumar Gunasekaran, Prajna Lalitha, Alicia Megia-Fernandez, Mark Bradley, Rachel L. Williams, Kevin Dhaliwal, N. Venkatesh Prajna, and Bethany Mills*

This study explored the feasibility of using optical SmartProbes to aid in microbe identification from corneal scrapes collected from 267 microbial keratitis patients in South India. Fluorescence was measurable within seconds of SmartProbe addition and data were comparable to results obtained by direct microscopy and culturing. Thus this opens a new avenue for optical molecular imaging within the field of microbial keratitis.

• **351 *Mycoplasma pneumoniae*-induced rash and mucositis: A longitudinal perspective and proposed management criteria.** *Ryan Gise, Abdelrahman M. Elhusseiny, Christina Scelfo, and Iason S. Mantagos*

This retrospective chart review examines the treatment and ophthalmic outcomes, including longitudinal follow-up, of a group of pediatric patients diagnosed with *Mycoplasma pneumoniae*-induced rash and mucositis. It is an entity that was only recently described as unique from Stevens-Johnson syndrome and erythema multiforme. Although patients with *Mycoplasma pneumoniae*-induced rash and mucositis generally have excellent clinical outcomes, there remains risk of ophthalmologic sequelae. A proposed treatment algorithm is also included.

• **357 Lid-related keratopathy in Stevens-Johnson Syndrome: natural course and impact of therapeutic interventions in children and adults.** *Swapna S. Shanbhag, Sahil Shah, Madhu Singh, Chirag Bahuguna, Pragnya R. Donthineni, and Sayan Basu*

This paper demonstrates that definitive therapy in eyes with lid-related keratopathy secondary to Stevens-Johnson syndrome in the form of concurrent use of lid margin mucous membrane graft and prosthetic replacement of the ocular surface ecosystem lenses changed the natural course of the disease and helped in preserving and improving the best-corrected visual acuity in these eyes.

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Jason Peragallo, Axel Petzold, Prem S. Subramanian, Judith E.A. Warner, Marianne Wegener, Sui Wong, and Steffen Hamann, ODDS Consortium • 370 **Reply to comment on: Morphologic features of buried optic disc drusen on en face optical coherence tomography and optical coherence tomography angiography.** Min Seok Kim, Kyoung Min Lee, Jeong-Min Hwang, Hee Kyung Yang, and Se Joon Woo

- **A1 Amblyopia outcomes through clinical trials and practice measurement: Room for improvement: The LXXVII Edward Jackson Memorial Lecture.** Michael X. Repka

Clinical trials of amblyopia treatment have provided evidence of a beneficial effect from several treatments, with substantially reduced doses compared with prior recommendations being effective for some patients. Registry “big data” found amblyopia to be common in clinical practice. The data were used to analyze outcomes in clinical practice identifying substantial residual visual acuity impairment among all ages and races, but especially among minorities including African Americans and Hispanic Americans.

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