

Results: We included 175 patients, 57 with AS and 118 with NAS. No significant difference in primary alignment was noted between AS and NAS for esotropia ($P = 0.60$ early; $P = 0.17$ final) or for exotropia ($P = 0.40$, early; $P = 0.11$, final). Success rates were similar ($P = 0.19$), and there was no significant difference in reoperation rates ($P = 0.19$).

Discussion: Although we acknowledge limitations in this retrospective study, our results suggest that AS overall were not associated with improved alignment or surgical success in adults with esotropia or exotropia compared to NAS.

Conclusions: We believe adjustable sutures may be beneficial in cases involving uncertain restrictive or contractile forces, but we no longer use AS in routine cases.

063 Socioeconomics of retinopathy of prematurity screening and treatment in the United States. Shagun Bhatia, Lance Siegel, Rebecca Braverman, Robert Enzenauer, David Granet, Shira L. Robbins

Introduction: Retinopathy of prematurity (ROP) screening, an integral part of pediatric ophthalmology, is time consuming and resource intensive. The purpose of this study is to evaluate the socioeconomics of ROP screening and treatment amongst pediatric ophthalmologists in the United States.

Methods: An online survey was distributed to pediatric ophthalmologists in the U.S. Survey results were compiled and responses were deidentified and analyzed.

Results: A total of 97 responses were collected. Almost half of respondents worked in private practice settings. Over 75% of respondents had a formal contract to perform ROP care, but only 23% had the assistance of an attorney to negotiate their contract. Just over half of respondents felt adequately compensated for their services. The amount of time spent performing screenings and coordinating care varied greatly with about half of respondents spending more than 2 hours per week of administrative time coordinating ROP services. Most respondents enlisted both the hospital and their office staff to coordinate follow-up outpatient care.

Discussion: When compared to data from previous studies, it appears that more pediatric ophthalmologists are obtaining contracts for their services. Despite a larger percentage of pediatric ophthalmologists having contracts, the long-term risks and liability remain. Many expend large amounts of time tracking patients and coordinating outpatient care.

Conclusions: Our survey highlights that despite increased contractual agreements, concerns for under-compensation, time usage and large liability persist. This calls into question the sustainability of current models for providing ROP services for this vision threatening disease in a most vulnerable population.

064 Psychosocial functioning in parents of patients with retinoblastoma. Jana A. Bregman, Mary Louise Z. Collins, Carol L. Shields, Rachel Schewndeman, Chloe Koo, Elizabeth Elimimian, Jennifer Ford

Introduction: Prior work has established that parents of children with chronic illness suffer from higher levels of stress. However, few studies have examined the psychological health of parents of patients with ocular conditions, and none in retinoblastoma. This study examines stress, anxiety, and depression in parents of children with retinoblastoma.

Methods: Longitudinal, self-reported, study using validated instruments: Parental Stress Index 4 - Short Form (PSI-4), Beck Anxiety Inventory (BAI), and Beck Depression Inventory - II (BDI-II).

Knowledge Assessment (KA) and demographic forms were also administered to each parent (or legal guardian) at study enrollment and at 6 months post-enrollment.

Results: Of 121 study participants to date, 60% have children with unilateral disease and 23.7% were diagnosed within 6 months of enrollment. PSI-4 scores were significantly higher in cases of parental depression ($P < 0.05$ and child developmental delay ($P < 0.01$). A trend toward higher PSI-4 scores resulted with more time since treatment ($P = 0.058$). BDI-II scores were significantly higher in the bilateral group ($P < 0.05$). Overall KA scores were significantly lower in the bilateral group ($P < 0.05$) with a majority incorrectly answering questions regarding risk of second malignant neoplasms and heritability ($P < 0.05$ for both). An analysis of 6-month data is ongoing and will also be included.

Discussion: This study is the first to perform a longitudinal analysis of a comprehensive look at stress, anxiety and depression in parents of children with both newly diagnosed and treated retinoblastoma.

Conclusions: Both parent and patient factors impact stress and depression levels in parents of patients with retinoblastoma. Important retinoblastoma knowledge is lacking in certain patient subgroups. Ophthalmologists caring for retinoblastoma patients need to be aware of these risk factors to optimally care for their patients and families.

065 The changing face of adult strabismus surgery. Frederick R. Burgess, Alan O. Mulvihill

Introduction: Adult strabismus surgery rates increased by 24% in the UK from 2000-2014. This study aims to highlight changes in the subtypes of strabismus being operated on over the past decade.

Methods: Retrospective case study. All adults receiving strabismus surgery from 2008-2017 were included. All patients were operated on by one attending surgeon. Case notes were examined for demographic, diagnostic and operative data.

Results: A total of 492 operations were performed on 466 patients, with an average year-on-year increase in total number of adult strabismus operations of 16% over 10 years. Consecutive or residual strabismus remained the most common subtype throughout the study period and showed increasing rates as a percentage of all operations. Operative rates proportionately decreased for all other subtypes, except for those with esotropia or exotropia associated with myopia.

Discussion: Although the mainstay of adult strabismus surgery remains consecutive or residual strabismus, a new subtype emerged over the study period. That myopia is associated with late-onset esotropia (with lateral rectus weakness) is well known. We identified a subgroup of myopic patients presenting in early adulthood with a decompensating esophoria and diplopia. These patients responded well to surgery and now comprise a significant proportion of our operative workload. The authors hypothesise that use of smartphones and associated sustained convergence are partially responsible for this subgroup.

Conclusions: More research is needed into the effect of sustained convergence on those with myopia and esophoria. The nature of strabismus surgery is changing, which has implications for training and workforce planning.

066 Differences in the microbiome by anatomic site with age. Kara M. Cavuoto, Santanu Banerjee, Darlene Miller, Anat Galor

Introduction: Recent publications have shown that the ocular surface microbiome (OSM) differs in adults and children. However little is known about how the composition of the microbiome of the

periocular tissues compares by age. We sought to characterize the OSM of the conjunctiva, eyelid margin and periocular skin in both children and adults.

Methods: Prospective, cross-sectional study using 16S sequencing to evaluate the OSM. Comparisons were made in bacterial yield and composition by sampling location (periocular skin, eyelid margin, or conjunctiva). 16S sequencing was performed using Illumina MiSeq 250 and analyzed using Qiime. Statistical analysis was performed using a two-sided *t* test and Monte Carlo permutations.

Results: Thirty patients (15 children [mean, 3.7 years], 15 adults [mean, 60.4 years]) were sampled. The periocular skin, eyelid margin and conjunctiva were all distinct in adults ($P = 0.028$); however in children, no significant difference was found between periocular skin and eyelid margin or eyelid margin and ocular surface. When comparing the periocular skin microbiome in adults to children, there was a greater abundance of Firmicutes ($P = 0.004$) and a lower abundance of Proteobacteria ($P < 0.0001$).

Discussion: The microbiome of the ocular surface in children is similar to the microbiomes of the eyelid margin and periocular skin, whereas the adult OSM showed distinct compositional differences between the periocular skin, eyelid margin and conjunctiva. This finding implies that there is tutoring of the host immune system and the microbial ecosystem with aging.

Conclusions: Age plays an important role in the evolution of distinct microbiomes at different periocular and ocular anatomic sites.

067 Utilizing optical coherence tomography for objective

assessment of ocular torsion. Haci Ugur Celik, Kara M. Cavuoto, Maja Kostic, Worawalun Honglertrapakul, Craig A. McKeown, Hilda Capo

Introduction: To evaluate ocular torsion objectively with optical coherence tomography (OCT).

Methods: Patients with subjective torsion by double Maddox rod (DMR) underwent imaging with the iVue OCT device. 6×6 scans of the optic nerve and macula of both eyes were obtained and overlaid. Objective torsion was assessed utilizing the disc-foveal angle (DFA), which was defined as the angle between a horizontal line through the disc center and the line connecting the fovea and disc center. The angle was measured with the scale option in Adobe Photoshop CS program for Macintosh. The objective torsion was analyzed using the sum and difference of the degrees of torsion in both eyes.

Results: Twelve patients were enrolled. The mean age was 49.58 ± 18.72 years. All patients had excyclotorsion, except for one. The range, of torsion via DMR was 7.5° of incyclotorsion to 40° of excyclotorsion. The range, of torsion via DFA was 2° of excyclotorsion to 45.3° . The Wilcoxon signed-rank test found the comparison between the DMR and DFA summation was statistically significant ($P = 0.002$); however there was no significant correlation between the DMR and DFA difference (Kendall's Tau = 0.188, Spearman's rank correlation = 0.238) or DMR and DFA summation (Kendall's tau = 0.326, Spearman's rank correlation = 0.452).

Discussion: The tendency is to measure less excyclotorsion by DMR. This may be related to the normal anatomic position of the fovea. Discrepancies between the objective and subjective torsion may be attributed to sensory adaptation and fusional amplitudes.

Conclusions: Initial findings suggest that utilizing the DFA may be an objective method to analyze torsion; however more data is needed for confirmation.

068 Early recurrence of retinopathy of prematurity after initial intravitreal ranibizumab monotherapy—experience from a tertiary referral center in Abu Dhabi, UAE. Tin T. Chan, Abeer A. Al Ali, Ahmed A. ElBarky, Fiona F. Dean, Fatima F. Habroosh, Manal M. Alzaabi, Rawdha R. Al Nuaimi

Introduction: To evaluate recurrence rate of retinopathy of prematurity (ROP) after initial intravitreal ranibizumab injection (IVR) monotherapy for infants with type 1 retinopathy of prematurity (zone I and posterior zone II) and threshold disease.

Methods: A retrospective study of electronic medical files was performed on 38 infants (75 eyes) seen between May 2013 to July 2017. They received initial intravitreal ranibizumab monotherapy (IVR) only for type 1 or threshold disease retinopathy of prematurity (ROP). All babies received 0.25mg/0.025ml (IVR) 1.75 to 2.00 mm posterior to the limbus.

Results: Success rate, measured by ROP resolution post-initial IVR injection monotherapy was 61.3 % (46/75 eyes) in 23 infants, whereas 38.7 % (29/75 eyes) of 15 infants had an early recurrence. The early (first) recurrence occurred 5-8 weeks post initial monotherapy of IVR injection (mean, 7 weeks). The second recurrence in 4/15 eyes was 1-8 weeks post-treatment (mean, 4.2 weeks) and 1 eye had third recurrence 8 weeks post-treatment. Mean follow-up was 12 months post IVR.

Discussion: Early recurrence after initial injection occurs in 38.7 % of infants and the mean onset of recurrence is 7 weeks. None of the infants developed recurrence after 52 post menstrual age (PMA). Recurrence with intravitreal bevacizumab injection is reported to occur at 16 weeks or later but in our study using intravitreal ranibizumab monotherapy, recurrence of ROP occurred earlier.

Conclusions: We highly recommend a stringent follow-up protocol to look for recurrences post IVR injection, especially in the initial 3-month period.

069 Ophthalmologic disorders and risk factors in children with autism spectrum disorder (ASD). Melinda Y. Chang, Nandini Gandhi, Mary O'Hara

Introduction: Autism spectrum disorder (ASD) is increasingly prevalent, estimated to occur in 1.68% of children in the United States. Little is known about the risk factors and types of ophthalmologic disorders in this population.

Methods: We conducted a retrospective chart review of all children (0-17 years old) with an ICD diagnosis of ASD seen at a single university over a 10-year period (2007-2017). In patients evaluated at the university eye clinic, demographic data, birth history, co-morbidities, and ophthalmologic findings were recorded. Multiple logistic regression was used to identify risk factors for ophthalmologic disorders.

Results: 2,555 children with ASD were seen at the university during this time period, and 380 (15%) were evaluated in the ophthalmology clinic. Eye exam revealed an ophthalmic diagnosis in 71% of children, of which the most common were significant refractive error (42%), strabismus (32%), and amblyopia (22%). Optic neuropathy occurred in 14 (4%) children. Cerebral palsy (CP) was a significant risk factor for refractive error (OR 3.22; $P = 0.016$), strabismus (OR 3.59; $P = 0.012$), amblyopia (OR 3.49; $p = 0.0097$), and optic neuropathy (OR 14.0; $P = 0.0009$).

Discussion: Ophthalmic disorders occurred in 71% of children with ASD, and the rates of significant refractive error, amblyopia, strabismus, and optic neuropathy exceeded those of the general pediatric population. ASD and CP may have additive risk for the aforementioned disorders.