

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 Honglerntapakul, 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.

Conclusions: Children with ASD may be at increased risk for ophthalmologic disorders. Prospective studies are necessary to further characterize this association. Pediatric ophthalmology referral should be considered in children with ASD.

070 Histopathologic findings after selective ophthalmic arterial injection (soai) of melphalan for retinoblastoma. Ho-Min Chen, Sherine J. Ong, An-Ning Chao, Kuan-Lyin Liou, Shih-Ming Jung, Ling-Yuh Kao

Introduction: To describe histopathologic observations in eyes enucleated after selective ophthalmic arterial injection (SOAI) of melphalan for retinoblastoma (Rb).

Methods: Histopathologic analysis of 14 eyes (13 patients) from May 2008 through January 2015 at Chang Gung Memorial Hospital.

Results: The eyes after SOAI were enucleated due to tumor viability ($n = 7$, 2 with vitreous hemorrhage), neovascular glaucoma ($n = 4$), lens drop to vitreous with total hyphema and elevated intra-ocular pressure ($n = 1$), retinal detachment progressed ($n = 1$) and persistent retinal detachment with phthisis change ($n = 1$). Almost all of the eyes showed vitreous seeding ($n = 11$ eyes) before treatment. After the treatment of SOAI, the histopathological examination revealed complete regression in 4 eyes with one was clinically diagnosed as viable tumor and progression, one with retinal detachment progression and two as neovascular glaucoma. Six eyes showed invasion into the optic nerves, reaching the lamina cribrosa in 5 eyes, and 6 eyes with invasion into the choroid were observed. All of the cases with lamina cribrosa involvement showed tumor progression before enucleation, 4 cases with lamina cribrosa involvement expired later.

Discussion: The cause of enucleation in our cases were related to SOAI complications, recurred vitreous and subretinal seedings or tumor progression. Treating advanced cases ICRB Gr D or E, repetitive SOAI with prolonged treatment course sometimes could increase the risk of metastasis.

Conclusions: Although retinoblastoma can be controlled effectively with SOAI, but for refractory cases after SOAI, earlier decision of enucleation may be needed.

071 Prevalence and natural history of consecutive exotropia in botulinum toxin chemodenervation for esotropia. Crystal S. Cheung, Linda R. Dagi, David G. Hunter, Michael J. Wan, Ankoor S. Shah

Introduction: The purpose of this study is to report the prevalence and natural history of consecutive exotropia following botulinum toxin chemodenervation for esotropia.

Methods: Medical records of patients treated with botulinum toxin for infantile and acquired esotropia were retrospectively reviewed at two tertiary centers. Exclusion criteria included prior or concomitant strabismus surgery or <6 months of follow-up. The primary outcome measure was defined as the prevalence of non-resolving consecutive exotropia at 6 months after treatment. Secondary outcomes measures were persistent consecutive exotropia at 18 months and prevalence of corrective procedures.

Results: Record review revealed 140 patients of whom 123 met inclusion criteria. Median onset of esotropia was 2.8 years (IQR2.8-5.7), and median age of treatment was 4.0 years (IQR2.5-7.5). Nine patients (7.3%) had nonresolving consecutive exotropia at 6 months. Of these 9, 7 had persistent consecutive exotropia at 18 months (77.8%), 1 spontaneously improved at 15 months, and 1 did not have 18-month follow-up. Moreover, 3 of the 7 patients (42.8%) required additional corrective procedures, all performed after 18-month follow-up.

Discussion: The prevalence of nonresolving, consecutive exotropia following botulinum toxin is 7.3%, similar to a prior study. The natural history suggests that at least 77.8% of patients with consecutive exotropia will not spontaneously improve after 6 months.

Conclusions: This study implies that surgical intervention, which has been shown to be successful, should be considered earlier than previously reported for patients who develop consecutive exotropia following botulinum toxin for esotropia.

072 The use of 3-D reconstruction technology in the treatment of severe bilateral ocular and facial trauma from dog bite. Catherine S. Choi, Alison Callahan, Andrew Scott

Introduction: Dog bites affect 4.5 million Americans per year and account for up to 1% of emergency room visits in the United States. In young children, dog bite injuries typically affect the head and neck, but the protective blink reflex makes direct trauma to the globe uncommon. We report a case of a 17-month-old girl who sustained severe facial trauma and bilateral globe injuries from a dog bite. Surgical repair was guided by 3-D technology for orbital reconstruction.

Methods: A 17-month-old girl sustained severe dog bite trauma to her face and presented with a large scleral rupture of the right eye. She also had multiple full-thickness right eyelid lacerations causing transection of the right levator muscle, and complete luxation of the left globe caused by crushing nasal bone injuries displacing fragments of bone into the left orbit.

Results: One week after acute surgical repair, the pediatric otolaryngology team performed a complex reconstruction of the patient's nasal and orbital defects using 3-D reconstructive imaging and printing models.

Discussion: 3-D modeling tools are useful in the preoperative planning of complex craniofacial defects and help to decrease the cost and time of surgery. They can also be instrumental in accurately positioning and placing any reconstructive tissues or implants, as seen in our case.

Conclusions: Globe injuries secondary to dog bite trauma are uncommon. We present a rare case of a child who sustained bilateral globe injuries from a severe dog bite and underwent surgical repair that was guided by 3-D reconstructive technology.

073 Strabismus is correlated with gross motor function in children with cerebral palsy. Heeyoung Choi, Hyeshin Jeon, Jaeho Jung

Introduction: Ophthalmic evaluation is limited and often neglected in patients with cerebral palsy (CP) because of the poor cooperation. This study was to investigate the correlation between clinical features of strabismus and motor dysfunction classified according to the Gross Motor Function Classification System (GMFCS) in patients with CP.

Methods: Sixty-five patients who are diagnosed with CP who had an ophthalmic examination between 2006 and 2014 were included in this retrospective study. The types of CP were classified as diplegia, hemiplegia, or quadriplegia for distribution of motor impairment; spastic, hypotonic, or mixed for abnormal muscle tonicity. The GMFCS was used to grade gross motor dysfunction, which was then classified as mild (grade 1, 2 and 3) or severe (grade 4 and 5). The relationship between strabismus characteristics and the level of GMFCS and type of CP were assessed.

Results: Thirty-eight and 27 patients had mild or severe motor deficit, respectively. Thirty-five patients had strabismus, which was more