

Resident / Fellow Research Day
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Anthony Panarelli, MD

Comparison of Ultrasound Biomicroscopy and Optical Coherence Tomography for Imaging of Anterior Segment Structures through an Opacified Cornea. Anthony J. Panarelli, MD; Julian P.S. Garcia, Jr., MD

Background: Many clinical settings in ophthalmology require an accurate depiction of the structures in the anterior segment of the eye. Such settings include refractive corneal surgery, glaucoma evaluation of the anterior chamber angle, as well as iris and ciliary body masses. High resolution images recorded in real time are desirable in such evaluations. High frequency ultrasound biomicroscopy (UBM) has been used with increased frequency for imaging of anatomically narrow anterior chamber angles. UBM does, however, require immersion of the eye in a liquid medium and may therefore be time consuming and cumbersome to patients. Optical coherence tomography (OCT) is another method of imaging the anterior segment of the eye. Whereas UBM measures the reflectivity of sound waves, OCT measures the reflectivity of light waves. Low-coherence interferometry is used to produce cross-sectional false-color images of light reflected and backscattered from internal tissue structures. This noncontact, noninvasive diagnostic imaging technique provides spatial resolution of 10-20 micrometers. While both high frequency UBM and anterior segment OCT have demonstrated success in evaluating anterior segment structures, these techniques have not been extensively assessed in the setting of an opacified cornea.

Methods: In a 25 year-old female patient with bilateral opaque corneas secondary to a severe chemical burn, both high frequency ultrasound and anterior segment optical coherence tomography were performed. Prior to ultrasound, the patient's eyes were immersed in a saline solution via an eye cup. A high frequency probe attached to a HF 30-50 High Frequency Ultrasound system was dipped into a liquid medium and a set of real time digital movie recordings was obtained. A semiconductor optical amplifier light source of low coherence light with a central wavelength of 1300 nm was used to obtain real time OCT images. No contact was made with the patient's cornea.

Results: In the right eye, a highly reflective line in both vertical cuts from the UBM and OCT images represents the anterior surface of the cornea that has undergone conjunctivalization. This surface is more reflective and clearly delineated from the underlying stroma in the anterior segment OCT images. The cornea stroma is represented by a low reflective signal, the details of which are more clearly defined in the anterior segment OCT images. Another highly reflective area in contact with the posterior cornea represents the iris, which is better differentiated from the cornea in the UBM images. The lens is not well visualized in either the UBM or OCT images. In a horizontal section of the same right eye, the anterior corneal surface and stroma, including shadows representing blood vessels, are seen in greater detail in the anterior segment OCT images. The iris lies in contact with the posterior surface of the cornea. As in the vertical sections, the contrast between the iris and cornea is better delineated in the UBM images. The lens is also not well visualized in either the UBM or OCT images.

Joseph Capriotti, MD

The etiology of infectious corneal ulceration in Sierra Leone. Capriotti, JA¹; Shah, M¹; Caivano, DM²; Turay, P³; Ritterband, DC¹. *The New York Eye and Ear Infirmary, New York and New York Medical College, Valhalla N.Y.*¹ *Mount Sinai Medical Center, New York, N.Y.*² *Holy Spirit Hospital, Makeni, Sierra Leone*³.

Purpose: To identify the microbial etiology of infectious corneal ulceration in Sierra Leone.

Methods: Patients either presenting to district health centers or encountered on rural surveillance expeditions with suspected infectious ulcerative keratitis were recruited into the study. Infectious corneal ulceration was defined as clinical evidence of corneal infection with epithelial defect with or without hypopyon. Cultures were obtained in a standard fashion and subsequent microbial analysis performed on all specimens.

Results: Seventy-four (74) cases of suspected infectious ulcerative keratitis were obtained between January 2005 and January 2006. The most commonly isolated organisms from microbial cultures of infected eyes were Gram negative bacteria (45.2%), fungal species (37.0%), and Gram positive bacteria (35.6%). Mixed bacterial and fungal organisms were isolated from 10 eyes (13.7%) and no organisms were isolated from 4 eyes (5.5%).

Conclusions: There is a high incidence of Gram negative and fungal ulcerative keratitis in the population studied in Sierra Leone. Empiric therapy for corneal ulceration in this region should be aimed towards treatment of bacterial, fungal and mixed infections.

Jesse Pelletier, MD

A Survey of Normal Ocular Flora in Healthy Eyes from a Rural Population in Sierra Leone. *Pelletier, JS¹, Capriotti, JA¹, Shah, M¹, Caivano, DM², Ritterband, DC³*. 1. New York Eye and Ear Infirmary, 310 E. 14 Street,, New York, NY, 10003. 2. Mount Sinai Medical Center, One Gustav Levy Place, New York, NY, 10029.

Purpose: To identify the normal conjunctival flora from a rural population in Sierra Leone. To compare the normal ocular flora of a developing country with that of the developed world.

Methods: Conjunctival swabs obtained from 276 healthy right eyes of residents of Masungbo, Sierra Leone were analyzed for microbial growth.

Results: 234/276 (84.8%) of patients had positive cultures from their conjunctiva. The most commonly isolated organisms from conjunctival swabs were *coagulase-negative staphylococcus* (28.6%), fungal species (26.0%) and *S. aureus* (19.9%).

Conclusions: There is a high prevalence of bacterial and fungal colonization of healthy eyes. A relationship may exist between resident normal flora and the etiology of ocular infections.

Justin Anderson, MD

Postoperative Astigmatism and Visual Acuity Following Implantation of Foldable Intraocular Lenses in Pediatric Patients. *J.E. Anderson^{1,2}, S.M. Brown², W.A. Graham³.*

Purpose: To assess final astigmatism and visual acuity (VA) in children having cataract extraction with foldable intraocular lens (IOL) implantation through a securely sutured 4mm scleral tunnel incision.

Methods: A retrospective chart review of all pediatric patients undergoing cataract extraction with foldable IOL implantation in the practice of one surgeon from 2000 to 2002 was performed. The same technique was used in all cases. Incisions were closed with multiple non-absorbable sutures. Data regarding patient age, cataract etiology, fellow eye refraction, pre- and post-operative refractions, keratometry, and final visual acuity were collected.

Results: Fourteen eyes of 12 children were included. Seven cataracts were traumatic (5 corneal or corneoscleral lacerations and 2 blunt injury), 5 were congenital, and 2 were uveitic secondary to juvenile rheumatoid arthritis with chronic steroid use. The mean follow-up for final postoperative refraction was 6.0 months (range 1.5 to 13 months). The mean preoperative cylinder was +2.05 D for all eyes in which it could be obtained (n = 8) and was +1.82 D excluding lacerations (n = 7); mean postoperative cylinder was +2.20 D for all eyes (n = 14) and +2.00 D excluding lacerations (n = 9); mean fellow eye cylinder was +1.00 D for all eyes that had not undergone prior surgery (n = 11). For 12 eyes, it was possible to record a corrected Snellen visual acuity. For these eyes, the median corrected final visual acuity was 20/36; the mean corrected final visual acuity was 20/59 (range 20/20 to 20/200). Excluding eyes with visual acuity reduction secondary to confounding disease processes, the mean corrected final visual acuity of 9 subjects was 20/36 (range 20/20 to 20/64).

Conclusions: Placement of foldable IOLs in children through 4mm scleral tunnel incisions that are securely sutured does not induce significant permanent astigmatism. In eyes without confounding disease processes such as amblyopia or significant corneal irregularity due to traumatic scarring, the visual acuity outcome is generally good. Surgeons should not hesitate to securely suture scleral tunnel incisions in the elastic pediatric eye.

Ilya Rozenbaum, MD

Medical Treatment of Uveitis with Adalimumab. I Rozenbaum, K Narayana, PA Latkany, S Schwartzman, CM Samson

Purpose: Tumor necrosis factor (TNF) has been identified as a cytokine with a central role in the pathogenesis of many chronic inflammatory diseases. TNF blockade is currently indicated for rheumatoid arthritis, Crohn's disease, ankylosing spondylitis and psoriasis. The role of TNF blockade in the treatment of ocular inflammation is as yet undefined. Of the three available agents; etanercept, infliximab and adalimumab, adalimumab (Humira) has been the least investigated for its role in treating ocular inflammation. We investigated the efficacy of adalimumab in treating uveitis.

Methods: Retrospective chart review of 9 patients, inadequately controlled on currently available therapy, who were treated with adalimumab for refractory uveitis at a uveitis specialty clinic. Specific diagnoses included necrotizing and diffuse scleritis, non-granulomatous and granulomatous anterior uveitis, idiopathic iritis, and panuveitis. All but one of the patients were female, age range 9 to 71. The patients were treated with subcutaneous injections of adalimumab for an average of 12.6 months (range 2.5 to 26.2 months). We evaluated the visual acuities and level of inflammation pre- and post-treatment and steroid sparing effect of the drug.

Results: Five of the patients had previously failed several other steroid-sparing agents, including methotrexate, cyclosporine, mycophenolate mofetil, etanercept. Out of nine patients in the study, 1 developed pulmonary side effects and discontinued the drug. All of the other participants either maintained or had improvement in visual acuity, although two of them had cataract extraction surgery with improvement of visual acuity. All but one patient had reduction of ocular inflammation. Six patients required lower doses of steroids after addition of adalimumab. Overall, one patient could not tolerate the drug, two patients did not respond to the drug favorably with continued flare-ups of uveitis, and six had improvement of symptoms and signs of their ocular disease.

Conclusions: Adalimumab may be a useful adjunct to the management of refractory uveitis. Controlled studies are needed to further evaluate its efficacy and safety.

Sean Lalin, MD

Short-Term Outcomes in over 500 Intravitreal Bevacizumab Treatments for Retinal or Choroidal Vascular Disease at the New York Eye & Ear Infirmary

Objective: Investigate the efficacy of intravitreal bevacizumab (Avastin) in the treatment of ocular neovascularization or macula edema in retinal or choroidal vascular disease

Purpose: Assess the short-term outcomes in patients who received intravitreal Bevacizumab, an anti-vascular endothelial growth factor monoclonal antibody, for the treatment of retinal or choroidal vascular disease.

Methods: This is a retrospective review of over 500 consecutive intravitreal injections of Bevacizumab (Avastin) at the New York Eye and Ear Infirmary. The patients received treatment for ocular neovascularization or macula edema secondary to retinal or choroidal vascular disease. The initial patient evaluation included fluorescein angiography and ocular coherence topography (SLO-OCT or OCT). Patients underwent indocyanine green angiography if there was significant hemorrhage or scarring. The outcome measures were visual acuity, retinal thickness and retinal topography evaluated both pre- and post treatment. The patients were also monitored for potential side-effects.

Results: Patients treated for ocular neovascularization included those with a diagnosis of age-related macular degeneration, diabetes, vaso-occlusive disease, neovascular glaucoma, myopia, angioid streaks, and IRVAN; patients treated for macula edema included those with a diagnosis vaso-occlusive disease, diabetes, idiopathic polypoidal choroidal vasculopathy and radiation retinopathy. 42% of patients improved at least one or more lines of vision post-injection while the vision remained the same in 34%; 23.7% of patients lost one or more lines of vision with none losing more than two lines of vision. Retinal thickness and topography were improved in all the patients even when the visual acuity was the same or worse. 3 cases of mild inflammation that resolved with or without topical medication were noted post-injection. Of the patients with previous photodynamic therapy, only one developed mild inflammation post-injection. There were no incidences of endophthalmitis or retinal detachment.

Conclusions: The treatment of retinal and choroidal vascular disease leading to fluid accumulation with intravitreal Bevacizumab appears to decrease retinal thickness and improve retinal surface contour maps based on SLO-OCT imaging with no significant side-effects. In addition, patients without extensive scarring may potentially recover functional vision with anti-VEGF treatment.

Ariadna Gonzalez, MD

Uveitis in Sickle Cell Trait and Sickle Cell Disease at the New York Eye and Ear Infirmary - a report of 4 patients. *A.Gonzalez¹, C.M. Samson^{1,2}, J.Laio³, K.Narayana¹, J.Capriotti¹, S.Schwartzman⁴*, ¹Ophthalmology, New York Eye and Ear Infirmary, New York, NY; ²New York Medical College, New York, NY; ³Brooklyn College, New York, NY; ⁴Rheumatology, Hospital for Special Surgery, New York

Purpose: To describe the first series of patients developing uveitis in association with sickle cell trait and sickle cell anemia

Methods: Retrospective chart review, looking for associated ocular and systemic conditions and characteristics of uveitis and its response to therapy seen at a tertiary center.

Results: Four patients, two males and two females, with a mean age of 43.5 (range 27 - 66) developed iritis in the setting of sickle cell anemia (one patient) or sickle cell trait (three patients.) These patients had a mean follow-up of 9 months (range 1-31 months) and active inflammation for a mean period of 9 months. One patient had prior history of hypertension; none of them had history of arthritis, sarcoidosis, or inflammatory disease. Characteristics of uveitis included recurrent acute episodes in two cases, acute single episode in one case, and chronic iritis in the fourth patient. There was good response to topical steroids in all cases except in one patient with panuveitis, who required oral prednisone. Visual acuity was maintained in three patients. The fourth patient, with elevated homocysteine and history of CRVO, had progressive deterioration of visual acuity. Uveitis was under control in all the patients during the most recent visit.

Conclusions: Acute uveitis responsive to topical steroid therapy can develop in patients with sickle cell anemia or sickle cell trait in patients with otherwise negative uveitis work up. Larger prospective studies would be required to make more definitive and statistically significant conclusions.

Michael Banitt, MD

Treatment Of Choroidal Neovascular Membranes in Patient's with Angioid Streaks With Intravitreal Bevacizumab (Avastin)

Purpose: Evaluate the efficacy of intravitreal Bevacizumab, an anti-vascular endothelial growth factor (VEGF) monoclonal antibody, in the treatment of choroidal neovascularization that develop in patients with angioid streaks.

Methods: Retrospective chart review of four patients treated with 1.25 mg of intravitreal Bevacizumab for choroidal neovascularization (CNV) secondary to angioid streaks. The diagnosis of CNV was confirmed by fluorescein angiography. Outcome measures included visual acuity, retinal thickness and retina surface contour maps based on SLO-OCT, and degree of leakage on fluorescein angiography.

Results: **Patient #1** is a 28 year-old man with angioid streaks who extensive subretinal fibrosis and cont-fingers vision in his left eye despite treatment with photodynamic therapy for CNV who now presented with 20/50 vision, metamorphopsia and a new CNV in his right eye. At one week post-injection with intravitreal Bevacizumab his vision improved to 20/25 but started regressing at 6 weeks to 20/40 and was re-treated at 8 weeks. SLO-OCT imaging demonstrated an initial decrease in retinal thickness and a more regular retinal surface contour map with regression starting at 6 weeks. **Patient #2** is an 80 year-old man with angioid streaks who presented with decreased vision in his left eye and fluorescein angiography consistent with a new CNV. Post-injection, the SLO-OCT imaging demonstrated decreased retinal thickness with an improved retinal surface contour despite a further one line decrease in his vision. **Patient #3** is a 52 year-old woman with pseudoxanthoma elasticum and extensive geographic atrophy who developed new choroidal neovascularization correlated on fluorescein angiogram. The patient had a pre-injection visual acuity of 20/200. Post-injection, the fluorescein angiography demonstrated markedly decreased hyperfluorescence with stable visual acuity. **Patient #4** is a 54 year-old man also diagnosed with pseudoxanthoma elasticum who presented with new occult choroidal neovascularization and 20/150 vision and was subsequently treated with intravitreal Bevacizumab.

Conclusions: In our cohort of patients with angioid streaks and choroidal neovascular membranes intravitreal Bevacizumab appears to improve visual acuity in some patients with corresponding improvement on SLO-OCT imaging and fluorescein angiography.

Andrew Brown, MD.

Retrobulbar Nerve Block Premedication: A Comparison Between Remifentanyl and Propofol Prior to Block Administration

Objective: To compare the efficacy and utility of Propofol and Remifentanyl given before retrobulbar nerve block.

Materials and Methods: Thirty two (32) consecutive retrobulbar blocks given by one surgeon were studied, with premedication given by the anesthesia staff consisting of either 0.5mg/kg of Propofol or 0.3mg/kg of Remifentanyl. The anesthesia staff was allowed to choose the premedication regimen based on personal preference and patient assessment. Twenty (20) patients received Remifentanyl and twelve (12) received Propofol given 60 seconds or more prior to placement of retrobulbar block. Each patient was assessed for movement of limbs, movement of the eye, cooperation, and pain following administration of the block.

Results and Conclusion: The patients given Remifentanyl showed significantly higher levels cooperation (60% vs 0%) and decreased movement of limbs (25% vs 41%). Subjective measurements of pain were difficult to obtain and interpret secondary to the hypnotic properties of Propofol. Subjective measurements of pain with the use of Remifentanyl demonstrated effective anesthesia during block administration. (65% stating no pain, 20% stating only mild pain, 15% gave no answer). Remifentanyl with its ultra-short acting profile may offer a safer and more effective way to reduce patient pain and increase patient safety during retrobulbar nerve block.

Elad Feldman, MD

Treatment of Idiopathic Polypoidal Choroidal Vasculopathy (IPCV) with Intravitreal Bevacizumab (Avastin) Appears To Decrease Retinal Thickness and Retinal Surface Contour Based SLO-OCT Imaging. E. Feldman, S.C. Lalin, P.M. Garcia, R.C. Gentile, R.B. Rosen. New York Eye and Ear Infirmary, New York, New York. New York Medical College, Valhalla, New York

Purpose: To assess the efficacy of Intravitreal Bevacizumab, an anti-vascular endothelial growth factor (VEGF) monoclonal antibody, in the treatment of patients with Idiopathic Polypoidal Choroidal Vasculopathy (IPCV).

Methods: Retrospective review of 4 patients with IPCV treated with 1.25mg Intravitreal injection of Bevacizumab. The diagnosis of IPCV was confirmed by both fluorescein and indocyanine angiography. The outcome measures included pre and post-injection visual acuity (Va) as well as SLO-OCT imaging of the retinal thickness and retinal surface contour maps.

Results: **Patient #1** is a 54 year-old woman who presented with decreased visual acuity OU (Va 20/80 OD and 20/200 OS). Post-injection, the vision improved from 20/80 to 20/60 in the right eye with decreased retinal thickness and a more regular retinal surface contour on SLO-OCT imaging. The patient's left eye received a total of 3 injections over 8 weeks. Despite the SLO-OCT retinal thickness and retinal surface contour maps demonstrating improvement in the immediate post-injection phase, the patient's left eye experienced multiple recurrences with vision worsening to count-fingers as lipid deposits collected in the sub-foveal region **Patient #2** is a 72 year-old man with OD IPCV treated with Intravitreal Bevacizumab for recurrent disease, which had previously responded poorly to photodynamic therapy and intravitreal kenelog. Post injection the retinal thickness decreased 12.2% with an improved retinal surface contour and stable vision. **Patient #3** is a 70 year-old woman who presented with decreased vision OD (Va 20/400). Post-injection, the retinal thickness decreased 65.8% in addition to a more regular anatomic contour with a formed foveal depression. The visual acuity remained stable. **Patient #4** is a 65 year-old man with OD IPCV treated with intravitreal Bevacizumab after presenting with decreased visual acuity to 20/100. Post-injection, the retinal thickness decreased 22.6% with improved retinal surface contour maps on SLO-OCT imaging and stable vision.

Conclusions: The treatment of Idiopathic Polypoidal Choroidal Vasculopathy with intravitreal Bevacizumab appears to decrease retinal thickness and improve retinal surface contour maps based SLO-OCT imaging. In this small cohort of patients with IPCV, treatment with Bevacizumab demonstrates measurable anatomic improvement without further deterioration of the vision.

Michelle Gatto, MD

Lagophthalmos: Incidence, Associated Signs, Symptoms, and Conditions. Michele Gatto, MD; Robert Latkany, MD

Purpose: To determine the incidence of lagophthalmos in a general eye clinic. To evaluate associated signs and symptoms in lagophthalmic patients.

Methods: In this ongoing prospective study patients were questioned regarding dry eye symptoms and sleep patterns. Examination consisted of external adenexal inspection and ocular surface staining with fluorescein and lissamine green.

Results: Preliminary results indicate that lagophthalmos may have a higher incidence in the general population than previously reported.

Conclusion: The incidence of lagophthalmos may be higher than previously reported. Attention to lid structure and function as well as a detailed history can help improve the detection of lagophthalmos and treat its signs and symptoms.

Gaurang Trivedi, MD

The Use of Intravitreal Bevacizumab (Avastin) As A Pre-Surgical Adjuvant In The Treatment Of a Combined Tractional-Rhegmatogenous Retinal Detachment With Severe Retinal Neovascularization . G. Trivedi, S. Lalin, R. Rosen, J. Romero

Purpose: The purpose of this study is to report the novel use of an intravitreal anti-angiogenic agent, Bevacizumab (Avastin), as a pre-surgical adjuvant in the management of a patient with severe retinal neovascularization to minimize intra-operative bleeding during retinal surgery.

Methods: This is a case report of a 45 year-old woman with a hemi-retinal vein occlusion who developed severe fibrovascular proliferation that led to a combined tractional-rhegmatogenous retinal detachment. The patient presented with hand-motion-vision and severe retinal neovascularization that included extensive areas of the optic disc. The patient was treated with 1.25mg of intravitreal Bevacizumab three weeks prior to retinal surgery to control retinal neovascularization and to minimize intra-operative bleeding. The patient was followed with pre- and post injection fluorescein angiography prior to surgery and as well as after surgery. In addition, the fibrovascular membrane excised at the time of surgery was analyzed with immunohistochemistry and ultrastructurally with light microscopy and electron microscopy.

Results: Prior to surgery, the patient's repeat fluorescein angiogram demonstrated a marked decrease in the degree of active neovascularization and leakage three weeks after injecting intravitreal Bevacizumab. At the time of surgery, the patient experienced minimal intra-operative bleeding because of the significant regression of the neovascularization after injection with intra-vitreous Bevacizumab. The histopathology of the fibrovascular membrane that was excised during retinal surgery revealed pre-retinal membranes with neovascular channels, highlighted by a CD34 immunohistochemical stain. Ultrastructural analysis with electron microscopy revealed a collagen matrix with few smooth muscle cells and capillaries with non-specific degenerative changes; the basal lamina was also noted to be highly discontinuous in the tissue sample.

Conclusions: Intravitreal Bevacizumab may be a useful adjuvant pre-operatively to reduce neovascularization in order to decrease intra-operative bleeding complications in patients with severe retinal neovascularization requiring retinal surgery.

Alex Liu, MD

Study in Outcomes of Sarcoid Uveitis Patients at a Tertiary Referral Center

Purpose: To determine outcomes in patient with sarcoid-associated uveitis at an uveitis subspecialty clinic at an eye hospital.

Methods: Retrospective chart review based on the following factors:

- 1) control of inflammation at 6 months, 1 year, and 2 year follow up
- 2) comparison of Snellen Chart vision acuity at 6 months, 1 year, and 2 year from initial vision at treatment onset.
- 3) adverse outcomes to any treatment offered at NYEEI and necessity to convert to steroid sparing agents

Results: 1) Inflammation was uncontrolled in 100% of patients at initial visit, 67% at 6 months, 38% at 1 year, and 28% at 2 year. Control of inflammation was defined as less than 1+cell in the anterior chamber, no signs of intermediate or posterior involvement. Minor flare-ups of rare or trace cell in the anterior chamber (on or off treatment) were not considered to be uncontrolled inflammation.

2) Vision loss was 11% at 6 months, 16% at 1 year, and 6% at 2 years. The most common cause of worsening vision was glaucoma.

3) 40% of patients had adverse reactions to steroids. Of these patients, 85% of them required immunomodulatory therapy (IMT) to control their inflammation. Of the patients on IMT, only 1 developed an adverse reaction (hypertension) which was controlled on medication.

Conclusions: Patients with sarcoidosis-associated uveitis experience a significantly high number of complications related to steroid use. Patients often require use of IMT, and benefited in terms of decreased vision loss and less medication-associated adverse reactions.

Boris Ovodenko, MD

Propionibacterium Acnes Keratitis. *B.Ovodenko*^{1A}, *M.Shah*^{1B}, *R.J. Yang*^{1A}, *D.C. Ritterband*^{1A}, *J.A. Seedor*^{1A}, *R.S. Koplín*^{1A}. ^AOphthalmology, ^BLaboratory Medicine, ¹New York Eye & Ear Infirmary, New, NY.

Purpose: To characterize the microbial keratitis associated with cultures positive for *Propionibacterium acnes*.

Methods: A retrospective analysis of the medical records was performed of all patients who had corneal ulcers (CUs) that were positive for *P. acnes* at the New York Eye and Ear Infirmary from January 1, 2004 through November 15th, 2005. Data collected included ulcer location and size, keratitis risk factors, presence of corneal thinning, type of microbiology media generating growth, and incubation time. CUs were defined as central (less than 2 mm from fixation), peripheral (less than 2 mm from the limbus), or paracentral (area in between). CU size was defined as small (less than 2mm), medium (2 to 6mm), and large (over 6mm).

Results: Of the 961 corneal ulcers positive for bacterial growth in that time period 62 (6.5%) were positive for *P. acnes*. In 21/62(33.9%) of the *P. acnes* cultures, other organisms were also isolated. Of the 62 CUs, 19(30.6%) were associated with contact lens wear, 10(16.1%) had stromal thinning, and 2(3.2%) progressed to perforation. CUs tended to be small (36, 58%) and widely distributed. The locations were central (17, 27.4%), paracentral (33, 53.2%), and peripheral (12, 19.6%). 57 of 62(91.9%) organisms grew in 5% sheep-blood agar in an anaerobic environment (average time of incubation 6.72 days; range: 5-10 days). 51 of 62(82.3%) organisms grew *P. acnes* in thioglycolate broth (average time of incubation 6.63 days; range: 4-9 days).

Conclusions: *P. acnes* are ubiquitous organisms that have been known to cause conjunctivitis, orbital cellulites, and delayed-onset post-cataract endophthalmitis. Although once thought to be a contaminant of cultures, several recent reports have identified *P. acnes* as a cause of visually significant corneal infection. Our results confirm that *P. acnes* can cause significant corneal infection with varying presentations and may be more prevalent than previously thought. Cultures for *P. acnes* should include thioglycolate broth and 5% sheep-blood agar in an anaerobic environment and be incubated for a minimum of 7 days.

Ganesh Rau, MD

Enterococcus Keratitis: A Retrospective Case Series.

Purpose: To study the incidence, clinically relevant factors, and antibiotic sensitivity profile of cases of Enterococcus keratitis presenting at the New York Eye and Ear Infirmary between January 1, 1996 and December 31st 2005.

Method: This is a retrospective case series. The records of all corneal cultures performed in the microbiology laboratory of the New York Eye and Ear Infirmary between January 1, 1996 and December 31, 2005 were reviewed. All cases that were positive for Enterococcus Faecalis were identified and the corresponding patient's medical records obtained and studied.

Results: There were fifteen cases of Enterococcus keratitis identified during the study period, and all were faecalis species. The age of the patients ranged from seventeen to ninety eight years old (mean age = 57.5). Twelve of the patients were female. Two patients had keratitis in existing corneal grafts. Two patients were on topical steroid medications. Fourteen of the fifteen had abnormalities of the ocular surface due to contact lens wear or ocular surface disease. Eight of the patients (53%) were soft contact lens wearers. Only one case was directly attributable to trauma. Fourteen of the bacterial isolates (93%) were sensitive to vancomycin. One case had intermediate sensitivity.

Conclusions: Enterococcus Faecalis keratitis is associated with abnormal corneal surface, either from contact lens wear or ocular surface disease. The majority of the isolates were sensitive to vancomycin although one was of intermittent sensitivity, the importance of which is not known.

Natalia Rodriguez, MD.

Acute Post-operative Complications Following Simultaneous Penetrating Keratoplasty and Glaucoma Drainage Implant Insertion

Purpose: To review the acute post-operative complications after simultaneous penetrating keratoplasty (PK) and pars plana glaucoma drainage implant (GDI) insertion.

Methods: The medical records of 114 eyes in 112 patients were reviewed. 85 eyes underwent PK with primary placement of a pars plana GDI and 29 eyes underwent PK with reposition of a GDI through the pars plana. All acute post-operative complications found in the first 6 weeks were recorded.

Results: We recorded 1 retinal detachment, 4 choroidal hemorrhages and 2 clogged tubes with vitreous. There were 3 serous choroidal effusions and 2 vitreous hemorrhages that spontaneously resolved. There were no strabismus or wound dehiscence.

Conclusions: Despite the complex nature of the combined procedure, our review found only a small number of complications, most of which can be addressed medically or surgically.

Elyse Trastman-Caruso, MD

Pterygium Surgery Response To Steroids In The Hispanic Population

Elyse Trastman-Caruso, MD, Dr. Ritterband, Dr. Yang/Dr Bhargava

Purpose: To determine the incidence of clinically significant elevations in intraocular pressure (IOP) in Hispanic patients with post-operative use of prednisolone acetate 1% eye drops following pterygium excision surgery.

Methods: A retrospective analysis of the medical records was performed of all patients who had undergone pterygium surgery at the New York Eye and Ear Infirmary between 2000 and 2005. Clinical information recorded included race, initial visual acuity, final visual acuity, slit-lamp exam, IOP at all post-operative visits, and dosage and frequency of prednisolone acetate 1% usage. A clinically significant elevation in IOP was defined as greater or equal to 10 mmHg at any clinical visit from the baseline IOP (on the initial examination) for three months following surgery.

Results: 72 patients who underwent pterygium excision were identified. 49 patients were of Hispanic origin and 23 were of non-hispanic origin. IOP elevation of greater or equal to 10 mmHg occurred in 13 Hispanic patients and in 1 non-hispanic patient. The average increase in IOP elevation was 12.6 mmHg in the steroid responding patients. 27% (13/49) of the Hispanic patients developed a clinically significant elevation in IOP compared to 4% (1/23) of the non-hispanic patients. The difference was not statistically significant using the t test with insufficient power.

Conclusions: The incidence of clinically significant elevations of IOP after pterygium surgery was higher in the Hispanic pterygium population than in the non-hispanic population but did not reach statistical significance. More non-hispanic patients are needed to achieve statistical power and prove significance. Whether this population is at greater risk for the future development of ocular hypertension or glaucoma deserves further study.

Ragui W. Sedeek, MD

Purpose: To report the clinical risk factors for Cytomegalovirus retinitis (CMVR) among HIV+ patients after the widespread use of the highly active antiretroviral therapy (HAART).

Methods: A retrospective case control study of nine HIV+ patients with CMVR on HAART. Clinical and laboratory data were compared between HIV+ patients with and without CMVR.

Results: The CD4 cell count of CMVR patients ranged from 5-200 cells/ μ l. CMVR patients differed significantly ($p \leq 0.05$) from control group in all the following: mean CD4 cell count (51.3 vs. 335.4 cells/ μ l), mean CD4/CD8 cell ratio (0.078 vs. 0.312), mean HIV-VL (277k vs. 85k copies/ml), history of HIV vasculopathy (OR=4.35), history of opportunistic infections (Mycobacterium avium-intracellulare (OR=10.50), Varicella zoster ophthalmicus (OR=8.67), Pneumocystis carinii pneumonia (OR=6.09)), co-morbidities (Hepatitis B (OR=11.73), Hepatitis C (OR=4.72)), and history of change in the HAART regimen (>2 nucleoside analogue reverse transcriptase inhibitors (OR=4.21), >2 protease inhibitors (OR=4.09)).

Conclusions: With the widespread use of HAART, prevalence of CMVR is decreased. However, it is occurring in HIV+ patients with higher CD4 cell count. Risk factors include: low CD4 cell count, low CD4/CD8 cell ratio, high HIV-VL, history of HIV vasculopathy, of multiple opportunistic infections, of viral hepatitis, and of multiple HAART regimen failure.

Anuj Bhargava, MD

The Efficacy of Liquid Bandage (2-octyl Cyanoacrylate) as a Wound Sealant in Clear Corneal Cataract Surgery. Anuj Bhargava MD, Richard Koplun MD, David Ritterband MD, Seth Meskin MD, Daniel Shapiro MD, John Seedor MD.

Purpose. To determine the efficacy of Liquid Bandage™ (2-octyl cyanoacrylate) as an adjunct for wound closure in topical clear corneal cataract surgery.

Methods. 25 eyes of 25 patients underwent clear corneal cataract surgery. At the completion of surgery the paracentesis and wound were hydrated. A .12 forceps was placed at the anterior or posterior wound lip to induce leakage. A manometer connected to the eye was used to determine the pressure at the time of leakage. The eye was refilled with BSS. A cellulose sponge with 2 drops of Liquid Bandage™ was applied to the wound and allowed to dry and seal the wound. Pressure was applied to the eye with a .12 forceps in a similar fashion to distort the wound and induce leakage. If no leak occurred the pressure with the .12 forceps was increased until the wound was grossly distorted up to a pressure of 40 mm Hg.

Results. All clear corneal wounds without Liquid Bandage™ leaked at applied pressures of between 8 mmHg and 25 mm Hg. No wounds leaked after the application of Liquid Bandage™ (2-octyl cyanoacrylate) up to a pressure of at least 40 mmHg.

Conclusions. Liquid Bandage™ (2-octyl cyanoacrylate) is an effective clear corneal wound sealant up to an applied pressure of 40 mm Hg. This tissue adhesive may serve as an added safety measure in clear corneal wounds that may leak with IOP variation or manual pressure thereby potentially limiting bacterial inflow through the wound.

Renee Yang, MD

Trends in Contact Lens Related Corneal Ulcers at the New York Eye and Ear Infirmary. Renee Yang MD, David C Ritterband MD, Natalia Rodriguez MD, Alice Hong MS, Mahendra Shah MS, Anuj Bhargava MD, John A Seedor MD, Richard Koplin MD. The New York Eye and Ear Infirmary and New York Medical College, Valhalla, NY.

Purpose: To determine the frequency and microbiologic profile of contact lens (CL) related corneal ulcers and its relationship to contact lens type.

Methods: The clinical and microbiologic records of all patients presenting with corneal ulcers to the New York Eye and Ear Infirmary from January 1, 2003 to July 30, 2005 were retrospectively reviewed. All patients with CL related corneal ulcers were identified and information regarding lens type, usage, cultures, and other risk factors were recorded.

Results: 1499 cases of corneal ulceration were recorded. 151 of these were CL related. 128 cases were culture positive and 23 culture negative. 91 patients were wearing frequent replacement lenses, 9 daily disposable lenses, 4 therapeutic CL's, 7 gas permeable CL's, and 18 conventional soft CL's. 25 were wearing soft lenses but the CL-type was not recorded in the chart. 51 patients admitted to sleeping in their lenses one to two evenings prior to their infection. The most common microorganisms isolated were in descending order *S. aureus* (29), *S. epidermidis* (28), *P. acnes* (28), *P. aeruginosa* (22), and *S. marcescans* (8). Polymicrobial infections were seen in 19 eyes.

Conclusions: The CL type most frequently associated with corneal ulcers was the soft daily-wear frequent replacement lens. The number of *S. aureus* and *P. acnes* ulcers and the number of polymicrobial infections was greater than reported in the literature. Despite an industry shift to frequent replacement lenses corneal ulcers continue to be a frequent problem.

Kannan Narayana, MD

Prescription and Inpatient Medication Order Errors in a Tertiary Referral Eye and Ear Center. *K.M. Narayana1A, L.James1B, J.R. Rosenthal1C, L.Klingos1D, M.Ellen1E, C.M. Samson1F.*

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Purpose: To describe the nature of prescription and inpatient medication order errors made by physicians at a tertiary referral eye and ear center in the eastern USA.

Methods: The pharmacy at the New York Eye and Ear Infirmary routinely screens all prescriptions for accuracy of information as per the quality standards policy of the hospital. Interventions are made and appropriate action is initiated to rectify the errors. This data was generated from the log of these interventions made by the pharmacy at the New York Eye and Ear Infirmary during the Calendar year 2005 (January to December).

Results: A total of 54,804 medication orders were received by the New York Eye and Ear Infirmary Pharmacy (38,656 inpatient orders and 16,148 outpatient prescriptions). A total of 1622 (about 3%) prescriptions required intervention. Six hundred and seventy eight of those (about 1.24% of total, 41.80% of those needing intervention) were considered errors with significant potential adverse events. Pharmacy intervention may have prevented adverse events in every one of these prescription errors. Pharmacy intervention prevented these potential consequences. The most common errors included wrong dosage (27.3%), use of prohibited abbreviations (16.3%) and prescribing medications that were contraindicated due to allergy or diagnosis (14.4%) or prescribing the wrong frequency or rate (10.2%) (Table 1).

Other interventions included incomplete orders (absence of one or a combination of data including patient name, age, date, signature, stamp etc), illegibility needing communication for clarification (Table 2) .

Conclusions: The pharmacy has an important role in preventing potentially dangerous consequences of prescription errors. This data emphasizes the important role of additional screening mechanisms. Physicians must to be aware of these potential errors and be cautious while writing prescriptions

Jon Page, MD

Intravitreal bevacizumab (Avastin) treatment of macular edema in retinal vein occlusions and diabetic retinopathy. Page JP, Lalin SC, Gentile RC, Rosen RB New York Eye & Ear Infirmary, NY, USA.

PURPOSE: To report the short term anatomic and visual outcomes in the treatment of macular edema due to branch and central retinal vein occlusion (BRVO/CRVO) and diabetic retinopathy (CSME) with intravitreal bevacizumab (Avastin, Genentech).

METHODS: Retrospective, non-comparative review of patients treated with intravitreal bevacizumab (1.25 mg in 0.05 mL) for macular edema due to BRVO/CRVO and CSME. Outcome measures were Snellen visual acuity (converted to logMAR acuity) and retinal thickness based on optical coherence tomography (OCT).

RESULTS: There were 13 eyes (2 CRVO, 4 BRVO, 7 CSME) of 13 patients with a mean age of 62.1 years given a total of 17 intravitreal injections of bevacizumab. Focal laser treatment had been previously performed on 6 patients. Intravitreal triamcinolone had been previously administered to 3 patients and subtenons triamcinolone had been previously administered to an additional 2 patients. The patients with previous treatment by either laser or steroids were either treatment failures or developed glaucoma post-treatment with triamcinolone. Only one adverse event was observed after intravitreal injection of bevacizumab, consisting of increased intraocular pressure; no cases of endophthalmitis, persistent inflammation, retinal tears or detachment were reported in any patient. The mean central macular thickness at baseline was 414 μm which decreased to a mean of 270 μm after injection. The mean baseline logMAR acuity was 1.0 (Snellen 20/200) and the mean acuity after injection was 0.66 (Snellen 20/100+).

CONCLUSION: Treating patients with macular edema secondary to BRVO/CRVO and CSME with intravitreal bevacizumab improves visual acuity and decreases macula edema in the short-term. The limited number of patients and relatively short follow-up period in this pilot study precludes any specific treatment recommendations, but the favorable short-term results suggest further study is warranted.

Josh Hedaya, MD

Changes in Choroidal Blood Flow in Response to the Treatment of Diabetic Macular Edema. J. Hedaya, S.B. Barone, S.C. Lalin, R.C. Gentile, J. Garcia, R.B. Rosen The New York Eye & Ear Infirmary, New York, NY and New York Medical College, Valhalla, NY.

Purpose: Evaluate changes to retinal thickness and choroidal blood flow in the foveal avascular zone in response to focal laser or intravitreal triamcinolone treatment for clinically significant diabetic macula edema.

Methods: A retrospective series of four patients who were treated for diabetic macular edema with focal laser or intravitreal triamcinalone were evaluated pre- and post treatment with an average follow-up interval of 6.5 weeks. The outcome measures were visual acuity, central retinal thickness quantified by ocular coherence tomography, and fovealor choroidal blood flow assessed with laser doppler flowmetry, the measurement of the shift in frequency of incident light scattered by moving red blood cells according to the Doppler effect.

Results: The pre-treatment visual acuity remained stable or improved at the post-treatment follow-up 6.5 weeks later (visual acuity range count-finger to 20/20). The average central retinal thickness decreased 23.0%. The choroidal blood flow in the foveal avascular zone decreased 39.6% while the choroidal blood velocity decreased 36.0% in the treated eye compared to the untreated eye which was used as the control in this study.

Conclusions: The choroidal blood flow and volume in the foveal avascular zone decreased post-treatment in our cohort of patients correlated with decreased central retinal thickness. We postulate that the decreased choroidal blood flow and volume may reflect improved retinal oxygenation post-treatment in the foveal avascular zone.

Jonathan Leon-Rosen, MD

Peripheral Retinal Imaging Using A Prototype Anterior Segment OCT/SLO. J.L. Rosen, R.B. Rosen, J. Garcia, P.M. Garcia, M. Van Velthoven, R. Canovas, S. Lalin

Purpose: To investigate the utility of a prototype Anterior Segment OCT/SLO system for imaging normal anatomy and pathologic lesions of the peripheral retina and pars plana.

Method: 30 patients were culled from multiple subspecialty clinics at the NYEEL, each with various peripheral pathologies. Each patient was seated at the Anterior Segment OCT/SLO system and instructed as to direction of gaze. Imaging was obtained by a scanning laser with a maximum field of view of 15 x 15 mm, with imaging limited to a region within 15 mm of the corneal limbus. Working distance was placed at 10-15mm and at no time did the imaging system contact the patient. Imaging was obtained in both longitudinal (B-scan) and coronal scans (C-scan).

Results: Lesions imaged included pars plana foreign bodies, peripheral retinal pathologies including injuries with resultant detachments of the retina and choroid as well as scleral buckles, and sclerotomy sites. Imaging was optimal in patients with good horizontal and vertical excursions. The quality of images obtained were dependent on numerous factors including lid and adnexal structures, ability of patient to master and maintain directed gazes, as well as the inherent optical properties of ocular structures. Ocular structures and foreign bodies, either iatrogenic or accidental, that lay immediately adjacent to the peripheral retina were reliably imaged. Ocular implants such as IOL haptics or glaucoma tube implants that lay within the posterior chamber were not reliably imaged.

Conclusion: The Anterior Segment OCT/SLO System offers a uniquely non-invasive high-resolution technique for examining the anterior portions of the retina and pars plana. The non-contact aspect of procedure was especially useful for evaluation of recently injured or post-operative patients. The ability to obtain scans in various imaging planes allows for unique views of peripheral lesions that may prove critical in difficult cases.

Samuel Barone, MD

The Incidence of Microbial Isolates and Sensitivities in Posterior Segment

Intraocular Foreign Body Injury — A 10 Year Review. *Samuel B. Barone M.D., Sean C. Lalin M.D., Anthony J. Terraciano M.D., Mahendra Shah M.S., Steven A. McCormick, M.D., David C. Ritterband M.D., Richard B. Rosen M.D., Ronald C. Gentile M.D.* The New York Eye and Ear Infirmary; New York Medical College

Purpose: Evaluate the incidence of endophthalmitis and microbial contamination with microbial spectrum and sensitivities in posterior segment intraocular foreign body (IOFB) injuries.

Methods: Cultures were performed on intraocular fluids or the IOFB. In-vitro sensitivities were performed on all positive cultures and compared to convention as established by the Clinical Laboratory Standards Institute.

Results: Cultures were performed on the intraocular fluid or the IOFB in 49 of 80 eyes. Twenty-three eyes had microbial contamination with 7 eyes presenting with clinical evidence of endophthalmitis. Of the 16 eyes with microbial contamination but without clinical evidence of endophthalmitis, 7 received no intra-vitreous antibiotics at the time of surgery. None of the eyes developed endophthalmitis post-operatively. 80% of the isolates were gram positive. Two isolates were anaerobic and 2 were yeast. Six cases were polymicrobial. The most common organisms isolated were coagulase-negative *Staphylococcus* (52.2%) followed by *Bacillus cereus* (21.7%) and coagulase-positive *Staphylococcus* (17.4%). All the gram-positive organisms were sensitive to vancomycin. An *Escherichia coli* isolate was the only gram-negative organism resistant to ceftazidime.

Conclusion: The incidence of microbial isolates (47%) was much greater than the rate of clinical endophthalmitis (9%) in patients who presented with posterior segment IOFB. Early vitrectomy with or without the use of intraocular antibiotics appears to prevent progression to clinical endophthalmitis. The combination of vancomycin and ceftazidime covered 96% of the microorganisms isolated.

Rodrigo Barros, MD

Ocular Pulse Amplitude (OPA) in High Myopia, Glaucoma, and Normal Subjects using Pascal Dynamic Contour Tonometer.

R. Barros, F.N. Kanadani, M.J. Pro, M. Shimmyo, V. Mahurta, C. Tello, J.M. Liebmann, R. Ritch

Purpose: Increasing degrees of myopia are a risk factor for glaucoma. Ocular pulse amplitude (OPA), the difference between minimum (diastolic) and maximum (systolic) values of the intraocular pressure (IOP) has been reported to be increased in patients with high-tension glaucoma (HTG) and reduced in both normal-tension glaucoma (NTG) and high myopia (HM). Pascal Dynamic Contour Tonometer (PDCT) is a new device that measure simultaneously IOP and OPA. The purpose of this study was to determine the OPA between high myopic, glaucoma, and normal eyes, using PDCT.

Methods: 258 eyes from 129 patients (49% were males and mean age was 56.6 ± 13.9 years) were enrolled in this prospective trial. Participants were divided into six groups according to the pre-existing history and the ophthalmologic examination. Group A (27 patients with HM and HTG); Group B (15 patients with HM and NTG); Group C 20 patient with HM without glaucoma); Group D [22 patients with emmetropia (EMT) and HTG]; Group E (20 patients with EMT and NTG); and Group F (25 patients with EMT without glaucoma). IOP and OPA were measured using PDCT in all patients included in this study by the same examiner.

Results: OPAs for each group are listed in the table. Highly myopic eyes demonstrated significant lower OPA ($p < 0.001$) when compared with emmetropic eyes of similar glaucoma status. Among highly myopic eyes there was no difference in OPA regardless of glaucoma status ($p = 0.53$). Among emmetropic eyes, OPA was significant lower in NTG compared with HTG and normal eyes (both $p < 0.05$). Although not statistically significant, there is a suggestive negative correlation between the degree of myopia and the OPA.

Conclusion: high myopic eyes have lower OPA and in emmetropic eyes, NTG is associated with lower OPA. There is a tendency of negative association between the degree of myopia and OPA. Pascal Dynamic Contour Tonometer is a new device, easy to use and potentially useful method for further studies involving OPA.

OPA [mmHg (mean \pm SD)

	High Myopia	Emmetropia
HTG	1.7 ± 0.5	3.4 ± 1.1
NTG	1.6 ± 0.4	2.8 ± 0.9
No Glaucoma	1.8 ± 0.7	3.4 ± 1.2

Tomas M. Grippo, M.D.

Purpose: To compare latencies of conventional visual evoked potentials (cVEP) and multifocal VEP (mfVEP) in the same patients. Previous reports of prolonged cVEP latency suggest a vehicle for detecting abnormal ganglion cells and for monitoring neuroprotection.

Methods: Seventy-five glaucomatous eyes (47 patients), 75 suspect eyes (46 patients) and 41 control eyes (22 subjects) underwent a full eye exam, achromatic automated perimetry, mfVEP and cVEP testing. The mfVEP stimulus was a scaled dartboard with 60 sectors, each a reversing checker display. The cVEP stimulus was a reversing dartboard with checks of either 15' or 60' in width.

Results: Relatively few glaucomatous eyes had latencies that fell outside the range of control eyes and there was little difference between the cVEP and mfVEP results. Twelve-point-three percent (15' cVEP), 8% (60' cVEP) and 17.3% (mfVEP) of the glaucomatous eyes and 5.3% (15' cVEP), 6.7% (60' cVEP) and 5.3% (mfVEP) of the suspect eyes exceeded the normal range. The glaucomatous eyes had, on average, relatively small increases in latency, 6.3 ms or less, as compared to the control and suspect groups. Further, the latency of both the mfVEP and cVEP bore no obvious relationship to the mean deviation of the visual field.

Conclusions: Contrary to previous reports, prolonged VEP delays appear in a minority of glaucoma patients. If damaged ganglion cells, as opposed to dead ganglion cells, produce delayed VEPs, then few patients exhibit evidence of damaged cells.

Edgar Espana, MD

Objective: To report the long term clinical outcome of a surgical technique for implantation of the silicone tube of the Baerveldt glaucoma device (BGD) in the ciliary sulcus.

Design: Non comparative, interventional case series.

Participants: Eight eyes of 8 consecutive patients who underwent implantation of BGD with the silicone tube placed in the ciliary sulcus between 1998 and 2005 were enrolled.

Intervention: Implantation of a BGD in the ciliary sulcus.

Main outcome measures: Control of intraocular pressure (IOP), number of pressure lowering medications, visual acuity, and surgical complications.

Results: Eight eyes of 8 patients with an average age of 76.4 years (range, 62 – 94 years) were included in the study. The IOP was reduced from a preoperative mean (\pm S.D.) of 27.3 ± 14.5 mmHg to $12.6 \text{ mmHg} \pm 5.8\text{mmHg}$ at 1 year. The mean number of preoperative medications for IOP control was reduced from 2.6 ± 1.8 to 1.6 ± 1.4 medications in the same period. No complications were observed during surgery or follow-up.

Conclusion: Placement of the silicone tube in the ciliary sulcus is a safe and effective alternative technique for IOP control in pseudophakic patients that could potentially reduce the likelihood of corneal endothelial loss and avoid the need for pars plana vitrectomy and posterior segment tube insertion.

Noga Harizman, MD

Detection of Glaucoma Using Operator-Dependent Versus Operator-Independent Classification in the HRT-III. *N.Harizman¹, J.R. Zelefsky^{2,3}, E.Ilitchev¹, O.Antequera¹, C.Tello^{1,4}, R.Ritch^{1,4}, J.M. Liebmann^{2,3}.* ¹Glaucoma, New York Eye and Ear Infirmary, New York, NY; ²Ophthalmology, NYU School of Medicine, New York, NY; ³Ophthalmology, The Manhattan Eye Ear and Throat Hospital, New York, NY; ⁴The New York Medical College, Valhalla, NY.

Purpose: To compare the abilities of a new Glaucoma Probability Scoring system (GPS) and Moorfields Regression Analysis (MRA) to differentiate glaucomatous from normal eyes using HRT-III software and race-specific databases.

Methods: In this prospective study, one eye (refractive error $\leq 5D$) of consecutive normal and glaucoma patients were enrolled. All subjects underwent a full eye examination, standard achromatic perimetry (SITA-SAP, 24-2) and confocal scanning laser ophthalmoscopy (Heidelberg Retinal Tomograph, HRT-II) within one month. Glaucoma was defined based on SAP visual field (VF) loss (PSD $<5\%$ and/or GHT outside normal limits) on two consecutive VFs. Normal subjects had two normal VFs (PSD $>5\%$ and GHT within 99% normal limits) and a normal clinical examination. HRT-II exams were exported to the HRT-III software (version 3.0). HRT-III uses an enlarged race-specific database, consisting of 733 white and 215 black eyes. GPS is a new automated algorithm that takes into account optic disc topography and surrounding parapapillary retinal nerve fiber layer measurements to give a percentage for probability of damage consistent with glaucoma without contour line placement (operator independent). Race-adjusted MRA for the most abnormal sector (operator dependant contour line placement) was compared to the global race-adjusted GPS scores. MRA sectors outside the 99.9% confidence interval limits (“outside normal limits”) and GPS $>64\%$ were considered abnormal.

Results: 140 normal and 84 glaucoma patients (98 white, 126 black) were enrolled (mean age, 50 ± 14.5 years). The average VF mean deviation was -7.3 ± 6.7 db for the glaucoma group and -0.4 ± 1.1 db for the normals ($p<.001$). Mean GPS scores were 0.22 and 0.73 for normals and glaucoma respectively ($p<.001$). Sensitivity and specificity for GPS was 75.9% and 89.1% and for MRA was 71.4% and 91.4%.

Conclusions: In this cohort, GPS software increased sensitivity at the expense of specificity compared to MRA. The development of software to detect glaucoma without a contour line is critical to improve the potential use of the HRT as a tool for glaucoma screening.

Boonchai Wangsupadilok, MD

A method to detect progression of glaucoma using the multifocal visual evoked potential technique. B Wangsupadilok³, FN Kanadani³, TM Grippo³, VC Greenstein^{1,2}, E Ilitchev³, R Ritch³, JM Liebmann^{2,3}, DC Hood¹ ¹Columbia University, New York; ²NYU School of Medicine, New York; ³New York Eye and Ear Infirmary, New York

Purpose: To describe a method for monitoring progression of glaucoma. The multifocal visual evoked potential (mfVEP) is used to detect visual field deficits in glaucoma. No study has used the mfVEP to assess progression.

Methods: Two groups with open-angle glaucoma (defined by gonioscopy, glaucomatous optic neuropathy and visual field defects) were tested. Group I, comprised 27 patients (44 eyes) who had repeat mfVEP testing within 50 days, and group II, 29 patients (44 eyes) with repeat tests 7-45 months apart. Monocular mfVEPs were obtained using a pattern reversal dartboard stimulus pattern. Monocular and interocular analyses were performed [1]. Data from the two visits were compared. The total number of abnormal test points with $p < 5\%$ within the visual field (total scores) and number of abnormal test points within a cluster (cluster size) were calculated. A cluster was defined as: 1) two contiguous points exceeding 1% or 2) three contiguous points exceeding 5% with one exceeding 1% and 3) contiguous points were within a hemifield. Data for group I provide a measure of test-retest variability independent of disease progression. Data for group II provide a measure of progression.

Results: For group I the correlations for the total scores for the interocular and monocular comparison for visit 1 vs. visit 2 were higher ($r = 0.95, 0.87$) than for group II ($r = 0.83, 0.82$). The correlations for cluster size were also higher for group I ($r = 0.94, 0.86$) than for group II ($r = 0.87, 0.80$). The difference in the total scores for group II between visit 1 and visit 2 for the interocular and monocular comparison was significant ($p < 0.05$) as was the difference in cluster size for the monocular ($p < 0.05$).

Conclusion: The change in the total scores and cluster size from visit 1 to visit 2 for eyes followed for > 6 months provides a possible method for assessing progression of glaucoma with the mfVEP technique. 1. Hood & Greenstein (2003) Prog Ret Eye Res.

Syril Dorairaj, MD

Short-Time Recovery after Accommodation-induced changes in Iris Curvature.

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Purpose: To explore the dynamic response after accommodation induced changes in iris curvature on anatomically narrow angle (NA), normal and pigment dispersion eyes (PDS).

Methods: Eyes were imaged using high-frequency; high-resolution, anterior segment ultrasound biomicroscopy. A radial perpendicular image in the horizontal temporal meridian detailing the iris configuration was obtained for the right eye by having the subject focus on a distant (~ 6 m) target (unaccommodated state) with the fellow eye under standardized room lighting conditions. The subject was then instructed to focus on a near (~ 0.33 m) target (accommodated state) and to continue focusing on the same target for three minutes. Images were acquired at 0, 1, 2, and 3 minutes. Images were ported to the NIH image-analysis program ImageJ, and iris curvature was determined by measuring the maximum distance between the posterior iris surface and a line drawn from the iris root to the pupil margin.

Results: Immediately after accommodation, all three groups experience a drop in curvature. The change is marginally significant for the PDS group (n=15, p = 0.01) and not significant for the NA (n=16, p>0.2) or control (n=22, p>0.2). The overall curvature of NA group had significantly higher curvature than the normal group, which had significantly higher curvature than the PDS group, at all time points.

Conclusions: The results confirm the time-dependent nature of iris contour response, with significant differences observed between the initial observation after accommodation and the observation three minutes later. The observations of normal subjects were generally consistent with previous theoretical analysis (Heys and Barocas, *IOVS* 43:700, 2002), which predicted an initial decrease in curvature followed by a steady increase over the next three minutes. PDS eyes showed a faster anterior motion of the iris recovering from the initial posterior displacement than the other two groups most likely due the initial presence of reverse pupillary block in PDS. Our UBM model demonstrates aqueous production of mean 2.5 μ L/m consistent with previous studies on aqueous humor dynamics.

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Fabio Kanadani, MD

Structural and Functional Assessment of the Macular Region in Patients with Glaucoma.

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Purpose: To assess the agreement between functional [Static automated perimetry (SAP) and multifocal visual evoked potential (mfVEP)] and structural [optical coherence tomography (OCT)] tests of the macular region in glaucoma.

Methods: Thirty-seven patients (47 eyes) with open-angle glaucoma were enrolled and tested with Humphrey Field Analyzer (HVF) (10-2 program), mfVEP and OCT3 (macular scan). Inclusion criteria were glaucomatous optic neuropathy and defects on 24-2 HVF. They also had defects within the central 10 degrees with clusters of ≥ 3 points in the pattern deviation plot in a hemifield with a P value of $< 5\%$, one of which had a P value of $< 1\%$. Monocular mfVEPs were obtained using a pattern reversal dartboard stimulus pattern.[1] The mfVEP was considered abnormal if the interocular or monocular probability plot had two or more adjacent points with P values $< 1\%$, or 3 or more adjacent points with $P < 5\%$ and at least one of these points with a P value $< 1\%$. The HVF 10-2 was analyzed using the same cluster criteria as used for the HVF 24-2. Two criteria were used for the macular OCT: 1) 2 or more sectors with $P < 5\%$ or 1 sector with $P < 1\%$ and 2) 1 sector with $P < 5\%$.

Results: Forty-six of the 47 eyes (97.9%) showed a 10-2 HVF defect. Forty-two (89.4%) had an mfVEP defect in the central 10 deg. The two OCT criteria resulted in sensitivities of 85.1% and 91.5%. When both functional tests showed a defect [41/47 eyes (87.2%)], the OCT was abnormal in 36/41 eyes (87.8%) (criterion 1) and in 38/41 eyes (92.7%) (criterion 2). When HVF and OCT were abnormal, the mfVEP was normal in 4/42 (9.7%) and when mfVEP and OCT were abnormal, HVF was normal in 1/39 (2.5%) eyes. The inferior sectors of OCT had the most abnormalities, corresponding to the region (superior hemifield) with the most defects on both the mfVEP and HVF. The central region was the least affected on OCT, HVF and mfVEP.

Conclusions: Macular abnormalities in glaucoma can be detected by OCT and are consistent with both SAP and mfVEP. 1. Hood & Greenstein (2003) Prog Ret Eye Res.

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