ILLINOIS COLLEGE OF OPTOMETRY

2017 RESEARCH PRESENTATIONS

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Visual Abnormalities and Dissociated Horizontal Intermittent Strabismus in Septo–Optic Dysplasia

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INTRODUCTION

Septo-optic dysplasia (SOD), also known as de Morsier Syndrome, is a rare congenital anomaly that is characterized by a classic clinical triad of: optic nerve hypoplasia (ONH), pituitary abnormalities such as hypopituitarism or endocrine dysfunction leading to conditions such as diabetes insipidus, and midline brain malformations with the most common being an absent septum pellucidum and thinning of the corpus callosum. It is found to be present in 1:10,000 live births, has an equal predilection between males and females, and is the 3rd leading cause of vision impairments in children. Patients frequently suffer from developmental delays, epilepsy, behavioral problems, autism, and hearing abnormalities. Visual complications include a range of visual impairment from mildly reduced acuity to 20/200 or worse. Other visual signs may include: optic nerve hypoplasia, absent fixation, nystagmus, strabismus, and poor pursuits/saccades. An MRI is used to confirm the diagnosis of SOD.

Case Presentations: All Patients Were Diagnosed with SOD via MRI demonstrating thinning of Corpus Callosum and/or an Absent Septum Pellicidum

Exam Findings	Case 1: 14yo HF	Case 2: 5yo WF	Case 3: 11mo AM	Case 4: 13yo HM
Visual Acuity	OD: 20/25-2 OS: 20/25-2	Able to F&F OD and OS	Able to F&F OD and OS	OD: 20/20 OS: 20/20
Refractive Error	Compound myopic astigmatism	Compound Hyperopic Astigmatism	Simple Hyperopia	Simple Myopia
Ocular Alignment	see video	Orthophoria	10pd CRXT	Orthophoria
Posterior Segment	Optic Nerve: (-)ONH OD C/D: 0.7/0.7 OS C/D: 0.75/0.75 *1-2+ Temporal Pallor OU	Optic Nerve: (+)ONH with Pallor OD/OS	Optic Nerve: (+)ONH	Optic Nerve: (+)ONH
Pertinent Patient Hx	Born early term at 37 weeks, (+) h/o hearing loss, developmental delays, asthma, and diabetes insipidus	(+) h/o Diabetes insipidus, hearing loss, tendon release issues and microcephaly	Born premature at 33 weeks	MRI (+) for hypoplastic pituitary infundibulum and (+) for hypoplastic optic nerves

FIGURE 1
Clinical Triad of SOD: ONH, Pituitary Abnormalities, Midline Brain Malformation

FURTHER INVESTIGATION AND PERTINENT FINDINGS: CASE 1

Case History: A 14y/o Hispanic female presented to the IEI for a comprehensive eye exam. She reported stable vision in current SRx over the last year and had no other visual complaints. Patient was asymptomatic for diplopia, asthenopia, and headaches.

Medical History: Significant for early term traumatic birth at 37 weeks that involved the patient suffering from multiple seizures along with a cerebral bleed. This prompted further testing, which led to a diagnosis of SOD. Patient also has hearing loss on the left side, developmental delays, and diabetes insipidus.

Ocular History: LEE 1 year ago. (+)Myopia and Lattice Degeneration OU; history of past orthoptics was done for vergence and motilities with minimal improvement two years prior.

Current SRx: OD: -5.00-3.25x175 OS: -4.50-3.50x180 Add: +1.00

FIGURE 2
MRI Demonstrating Absence of Septum Pellucidum in SOD

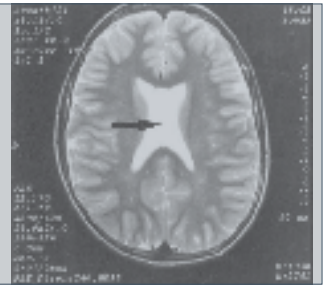

FIGURE 3
Double Ring Sign in ONH

BINOCULAR VISION WORK UP: CASE 1

Cover Test: Patient has a dissociated horizontal intermittent strabismus. She showed an eso deviation in the left eye while manifesting an exo deviation in the right eye through PACT. Deviation was found to be greater with near fixation when compared to distance and made worse thru near addition lenses. (see video)

Worth Four Dot/Stereopsis: Patient demonstrated deep left central suppression and no tertiary stereopsis.

Accommodation (Minus Lens Amplitudes): OD 7.5D OS 4.0D

NPC: 10cm/13cm (-)diplopia and OS out

DISCUSSION

Based on our patient's current lack of symptoms, an updated glasses prescription was given for full time wear. The bifocal segment was removed due to the increased deviation observed at near and the fact that no improvement in subjective visual acuity or patient symptoms was noted. Restarting vision therapy was not recommended at this time due to absence of patient symptoms and the presence of deep central suppression in the left eye. Although our patient did not have ONH, she did have large and slightly asymmetric C/D ratios and temporal pallor in each eye. Based on these findings we will continue to monitor yearly with comprehensive eye exams.

CONCLUSION

When presented with patients that have SOD it is important to not only manage and treat their ocular findings, but also consider the potential for further systemic complications such as diabetes insipidus, adrenal crisis, or various neurological conditions. SOD can often present with differing ocular sequelae i.e. abnormal ocular motility, (+/-) ONH, and varying levels of visual acuity. As a result, it is up to eye care providers to be diligent in examining these patients and referring for imaging when a definitive diagnosis has not yet been made. If an undiagnosed patient is found to have ONH, a referral for an MRI is warranted to rule out SOD and any other underlying endocrine abnormalities. Cases such as these provide optometrists with the unique opportunity to co-manage alongside a wide variety of disciplines such as neurology, endocrinology, audiology, as well as with teachers/aids in the school system.

REFERENCES

Available upon request

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Ocular Anomalies in an Adolescent Patient with Incontinentia Pigmenti

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ABSTRACT

A case study of recent-onset ocular anomalies presenting in an adolescent female with incontinentia pigmenti demonstrates the importance of thorough ocular examinations of this population into adulthood, contrary to previously published guidelines.

BACKGROUND

- Incontinentia pigmenti (IP) is a rare genetic dermatologic disorder (X-linked dominant) found almost exclusively in females (97%) that presents as a benign rash in infancy and as hyper- and hypo-pigmentation of the skin in adulthood. The condition also affects the teeth, central nervous system and eyes.
- Retinal disease, including retinal hemorrhage, vitreous hemorrhage and tractional retinal detachment, is the most frequently reported ocular complication of IP. Other common findings include strabismus (frequently linked to retinal disease) and cataracts. Ocular anomalies are prevalent, progressive and can lead to severe vision loss.

CASE REPORT

12 y.o. AAF was seen for a comprehensive eye exam with complaint of blurred distance vision since breaking her glasses 2 weeks prior. Denies blurred vision or diplopia with most recent Rx received last year. Denies flashes or floaters. Observed habitual posture: right head tilt.

MEDICAL HISTORY: Incontinentia Pigmenti diagnosed in infancy upon presentation of characteristic skin lesions, positive family history (mother) and genetic testing – history of abnormal EEG and general developmental delays. ADHD managed with Focalin.

OCULAR HISTORY: Peripheral vitreo-retinal changes superior/superior-temporal OS, previously documented as vitreous degeneration and flat retinoschisis without holes, tears or retinal detachment. Normal binocular vision without evidence of strabismus OU.

PERTINENT FINDINGS:

-Dermatological: incontinentia pigmenti Stage 3 hyperpigmentation on the trunk (Figure 1)

-Significant changes to refraction and binocularity are shown in Table 1

-Anterior Segment Findings: unremarkable OD and OS, without evident lenticular changes

-Posterior Segment Findings: unremarkable OD; OS was remarkable for the following:

- Peripheral non-perfused retinal vessels (Figure 2)
- Peripheral vascular remodeling (Figure 3)
- Scattered peripheral retinal hemorrhages from 7-11 o'clock (Figure 4)
- Elevation of peripheral retinal tissue 360˚ (Figure 5)

TABLE 1
Significant changes to refraction and binocularity

	2013	2017
Wet Refraction	OD: -0.75 sph BCVA: 20/25 OS: -0.75 sph BCVA: 20/25	OD: -4.25-0.25 x180 BCVA: 20/20 OS: -4.50-1.00 x180 BCVA: 20/25
Cover Test	orthophoria - 2 exoP distance and near	4$^{\Delta}$ exoP, 6$^{\Delta}$ CLHypoT distance and near
Stereopsis (Randot)	(+) Forms, 40" circles	(-) Forms
Worth 4 Dot	--	shallow, intermittent OS suppression alternating with fusion at all distances
NPC	TTN	10/20cm, (-) diplopia, OS out
Accommodative Amplitudes	12.00 D OD (pull away) 12.00 D OD (pull away)	8.75 D OD (minus lens) 1.50 D OS (minus lens)

FIGURE 1
Stage 3 hyperpigmentation on the trunk

FIGURE 2
Peripheral non-perfused vessels OS

DISCUSSION

Ocular anomalies associated with IP occur in 35% of patients, 20% of whom develop vision-threatening disease. These findings are typically unilateral or highly asymmetric and can be debilitating. Though there is no treatment or cure for the condition of incontinentia pigmenti, appropriate diagnosis and management of ocular conditions associated with IP can improve patients' quality of life.

In this case, the presence of peripheral atrophic retinal vessels (Figure 2) indicates that areas of retinal non-perfusion likely exist. Vascular inflammation in IP results in occlusion of the microvasculature in the retina and RPE with subsequent ischemia. Though most frequently occurring before the age of 6, neovascularization has been reported up to 17 years after initial presentation and rhegmatogenous retinal detachments (RRDs) originating at the border of perfused and non-perfused peripheral retina have been documented in young adults. Thus, timely referral to a retinal specialist (Table 2) for additional evaluation of this patient's vascular changes (Figures 3 & 4) and elevated retinal tissue (Figure 5) is warranted.

Following retinal consultation and management, an additional binocular vision examination is indicated to determine appropriate management of the patient's strabismic, accommodative and refractive changes (Table 2). If findings are stable, base-up prism in the left eye or a near Add will be considered to improve binocular function. However, evidence of non-comitancy or progression may warrant further investigation by neuro-ophthalmology.

Published guidelines for ophthalmic evaluation of patients with IP consider the first six years of life to be most critical. However, as this case demonstrates, vision-threatening ocular disease may develop in adolescence or early adulthood. It is critical to properly educate patients and parents regarding ocular abnormalities associated with IP, the life-long risk of loss of vision or binocularity and signs of ocular disease progression.

FIGURE 3
Retinal vascular remodeling OS

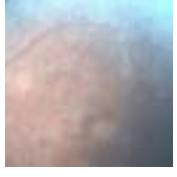

FIGURE 4
Retinal hemorrhages OS

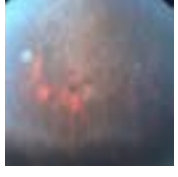

FIGURE 5
Retinal elevation OS

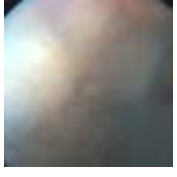

TABLE 2
Assessment and plan

	Assessment	Plan
1.	Compound hyperopic astigmatism OD, OS	• Released new SRx for full time wear • Assess MEM and facility at follow up
2.	Constant hypotropia, OS	• RTC for strabismus evaluation after resolution of retinal disease • Assess posture in 9 DAFs, stereo, Worth 4-Dot, Park's 3-Step, vertical vergences
3.	Vascular remodeling and intra-retinal hemorrhage, OS	• Referral to retinal specialist - next available • Consider FA to assess retinal ischemia • Consider laser photocoagulation
4.	Retinoschisis vs. rhegmatogenous RD, OS	• Referral to retinal specialist - next available • Consider barricade laser or surgical repair

CONCLUSION

Optometrists play a crucial role in the management of patients with incontinentia pigmenti by completing thorough ocular examinations and initiating treatment when indicated. Contrary to traditional guidelines which outline the necessity of optometric care until the age of six, this role should continue into adolescence and adulthood. Patients and parents must be properly educated regarding ocular anomalies and the risk of vision loss.

REFERENCES

Available upon request.

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Effect of Orthokeratology on Peripheral Refraction in Young Adults

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BACKGROUND

Orthokeratology (ortho-k) is a commonly employed method that corrects low to moderate myopia via overnight wear of reverse geometry rigid contact lenses that results in corneal reshaping. Previously presented data from this same cohort of patients demonstrated ortho-k's ability to shorten axial length as compared to spectacle or soft contact lens wearing controls. Previous reports in the literature have demonstrated that ortho-k primarily affects the refraction in the central +/- 10° visual axis, leaving the peripheral field refraction relatively unchanged, and thus relatively myopic.

PURPOSE

The purpose of this study was to measure refraction across the central 30° of the horizontal visual field in young adults exposed to high educational demands before and during 12-month orthokeratology treatment. This relative myopia can be a vehicle towards the reduction of myopic progression, which can then lead to a decrease in sequela associated with degenerative myopia, such as retinal detachment, glaucoma, vitreal degeneration and focal retinal changes.

METHODS

A total of 33 optometry students at the Illinois College of Optometry were recruited into the study. See inclusion/exclusion criteria below. Subjects were randomized into ortho-K or control (spectacle or soft contact lens correction) groups. All ortho-k subjects were fit empirically with the Emerald™ Contact Lens for Overnight Orthokeratology (Oprifocon A, Euclid Systems Corporation).The following measurements were collected at the enrollment, 6-month, and 1-year examinations: logMAR acuity, subjective manifest refraction, anterior segment examination, corneal topography (including pupil measurement), IOLMaster measurement of axial length and anterior chamber depth, ultrasound pachymetry and autorefraction (with cycloplegia). Central and peripheral refraction were measured along the central 30° of the horizontal visual field with the Grand Seiko WAM5500 open-field auto-refractor. Five, 20/400 size targets were placed on a flat wall 2.5m in front of the patient, five degrees apart. Five measurements were taken for each data point and averaged. Only right eye data was used for statistical analysis. Refractions were converted into mean spherical equivalent (M), 90° to 180° astigmatism (J_{180}), and 45° to 135° astigmatism (J_{45}) components. Paired t-test was performed to compare the 12-month change in central and peripheral refraction in the Ortho-K group to the ones in the control group.

Inclusion/Exclusion Criteria of Subjects

- Age: 21 to 35 years old
- Best-corrected visual acuity: 20/25 or better in each eye
- Myopia: -0.50 to -4.50 D with astigmatism no more than -1.25D
- No history of refractive surgery, strabismus, and retinal disease

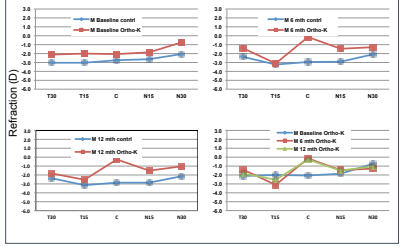
RESULTS

Twenty-four subjects completed 12-months visit (11 in ortho-K group and 13 in control group) with 9 subjects either being lost follow up or not able to tolerate ortho-K lenses. Table 1 shows the general characteristics of our subjects. Both the control and ortho-K groups showed relatively constant mean sphere refraction across the field or relative hyperopia in the periphery as compared with the central refraction. Mean spherical equivalent changed from -2.05 D (enrollment visit) to -0.24 D (12-month visit) in the ortho-K group and from -2.75 D to -2.86 D in the control group, with a statistically significant difference between the two groups (P <0.001). Peripheral refraction showed no significant change during the 12 months in the control group. As a result of 12-month ortho-K treatment, myopia decreased at a reduced rate out into the periphery, which resulted in a relative peripheral myopia. Changes of M, J_{180}, and J_{45} components from baseline to 6-month and 12-month follow up are shown in Figures 1, 2, and 3.

TABLE 1
Demographic Characteristics of the Subjects (n = 24)

	Control Group (n=13)	Ortho-K Group (n=11)	*P* value
Gender			
Female (n, %)	10 (76.9)	8 (72.7)	>0.05
Male (n, %)	3 (23.1)	3 (27.3)	
Age (years)			
Mean (SD)	25.2 (2.1)	25.0 (2.2)	>0.05
Refractive Error (spherical equivalent, D)	-2.75 (1.5)	-2.05 (1.17)	>0.05

FIGURE 1
Average central and peripheral spherical equivalent (M) in control and Ortho-K group at baseline, 6 months, and 12 months visit.



CONCLUSIONS

1. Orthokeratology successfully corrected myopia in the central ±5° of the visual field with less myopia correction in the periphery (from 10° to 30° on both temple and nasal side in the horizontal meridian), thus it converted the peripheral refraction from relative emmetropia or hyperopia to relative myopia in young adults.
2. Ortho-K has minimum impact on J_{180} and J_{45} across the central 60° of the visual field in the horizontal meridian.

FIGURE 2
Average central and peripheral astigmatism (90° to 180°, J0) in control and Ortho-K group at baseline, 6 months, and 12 months visit.

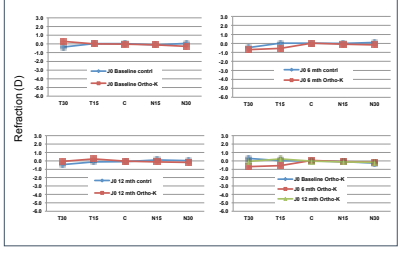
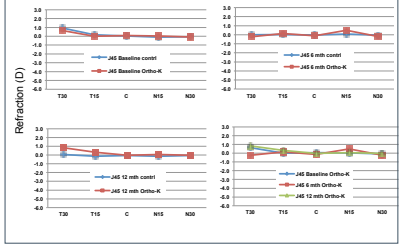


FIGURE 3
Average central and peripheral astigmatism (45° to 135°, J0) in control and Ortho-K group at baseline, 6 months, and 12 months visit.



DISCUSSION

Myopia is now recognized as a worldwide epidemic, with an estimated 2 billion people affected and predictions that that number could rise to 5 billion by 2050, with 1 billion at risk of blindness. Those staggering statistics are a call to action for all eyecare providers to seek a remedy for myopia control and progression. Ortho-k is a proven and safe alternative for both children and young adults for myopia correction in low to moderate corrections. The finding that relative peripheral myopia in ortho-k wearers appears to be a factor in the reduction of myopic progression as well, when compared to age and refractive error matched controls, would then appear to be a factor in the reduction of the potentially blinding consequences of degenerative myopia, such as retinal detachment, glaucoma, vitreal and macular abnormalities.

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Acute Syphilitic Posterior Placoid Chorioretinopathy

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CASE HISTORY

62 year-old Caucasian male

Chief complaint
Intermittent rectangular strobing light OU x 5-6 days lasting 1-2 hours. Worsening vision OD with superior central scotoma.

Ocular History
High myopia OU
EKC OD>OS- resolved

Medical History
Borderline HTN
HIV
Hepatitis A and B Virus
Depression
Leukocytoclastic vasculitis
Factor VIII deficiency
Erectile dysfunction
Episodic Atrial fibrillation
Autoimmune colitis

Medications
Bupropion HCL, Dilitiazem, Genvoya, Hydrochlorothiazide, Lamotrigine, Sildenafil, Multivitamin

Recent lab testing by Infectious Disease
HIV: positive
HIV PCR quant: <20 CD4: 771 cells/uL
Syphilis CIA: Reactive RPR: 1:128
Quantiferon gold: negative

TABLE 1
Pertinent Findings at Initial Examination

BCVA	OD: 20/50 PHNI	OS: 20/20-1
Pupils, ADAG, CVF	NL	NL
Anterior Segment	Mild, (-) cell/flare	Mild, (-) cell/flare
Posterior Segment	Optic: 1+ NS Cup/Disc: 0.3 V/H (+) edema Macula: OD: fine yellow drusen-like deep retinal lesions Vitreous: PVD Vessels: 1+ AV nicking Periphery: mild lattice	Optic: 1+ NS Cup/Disc: 0.3 V/H (-) edema Macula: NL Vitreous: PVD Vessels: 1+ AV nicking Periphery: mild lattice
Amsler grid:	OuS: relative defect superior to visual axis	NL
HVF 10-2:	Relative superior temporal defect	NL
Macular OCT:	RPE pillar like elevations with IS/OS junction loss	NL
FA:	No staining or leakage. Leopard spotting noted.	NL

FIGURE 1

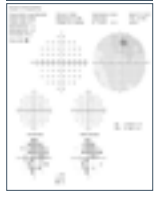


FIGURE 2

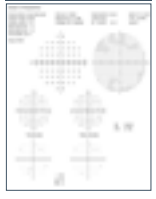


FIGURE 3

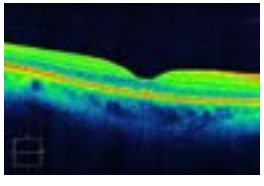
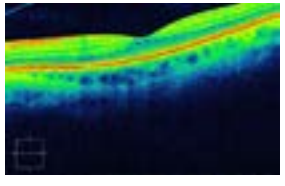


FIGURE 4



DIFFERENTIAL DIAGNOSIS

Acute Syphilitic Posterior Placoid Chorioretinopathy
Acute multifocal placoid pigment epitheliopathy
Persistent placoid maculopathy
Relentless placoid chorioretinitis
Sarcoidosis
Posterior uveitis
Occipital cortex lesion
Dry ARMD
Multifocal choroiditis
Tuberculosis

ASSESSMENT & PLAN

Diagnose ASPPC/likely neurosyphilis
- Refer to Infectious Disease and Neurology, admitted for treatment of neurosyphilis
- Lumbar puncture for CSF testing upon admission
  - o Lymphocytosis
  - o VDRL: reactive
  - o Proteins: elevated

TREATMENT & MANAGEMENT

- Treatment for neurosyphilis: PCN G 18-24 million units per day for 10-14 days.[1]
  - o Subsequent 4 fold decrease in titer by same nontreponemal test is evidence of response to treatment.[1]
- Testing for both neurosyphilis and HIV coinfection.
  - o Coinfection rate of HIV with ASPPC was found to be 40%. HIV coinfection percentage ranges from 2.7% to 60%. [2]
- Avoid use of intraocular corticosteroids in eyes with syphilitic uveitis.[2]

FIGURE 5

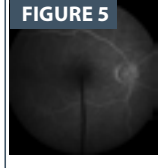


FIGURE 6

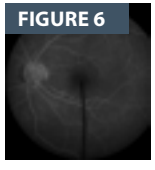


TABLE 2:
Diagnostic testing

Lab testing:	Treponemal specific tests
Macular OCT:	Loss of IS/OS and OS/RPE bands with prominent nodular elevations of RPE
OFA:	
FAF:	
FA:	Early phase FA shows "leopard spotting": hypofluorescence or faint hyperfluorescence with scattered hypofluorescent spots in the area of yellow specifications.[3]

PERTINENT FINDINGS AT FOLLOW UP EXAM

Following 2 weeks of IV penicillin G.
- VA improved to 20/20.
- Visual field defects resolved.
- Drusen-like lesions found on Macular OCT improved.

FIGURE 7

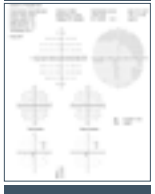


FIGURE 8

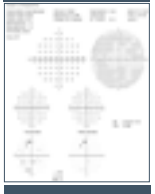


FIGURE 9

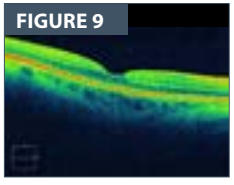


FIGURE 10

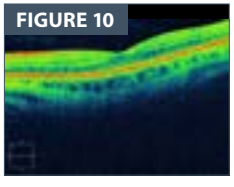


FIGURE 11

FIGURE 12

DISCUSSION

- ASPPC is a variant of syphilitic chorioretinitis characterized by one or more large, deep, yellowish, circular or oval placoid lesions involving the posterior pole.[1]
- ASPPC is thought to be result of inflammatory reaction at the level of the choriocapillaris-RPE-retinal photoreceptor complex causing drusen like lesions.[2]
- Improvement of vision and outer retinal abnormalities seen in 93.3% after treatment.[1]
- Median age when HIV coinfection is 37, median age when HIV negative is 66.[3]
- 10.6 million incident cases of syphilis each year worldwide.[4]

Ocular manifestations of and associated with ASPPC:[2]
Placoid, yellow outer retinal lesions.
Focal, yellow, deep retinal lesions.
Anterior uveitis, vitritis, iritis, necrotizing retinitis.
Macular neurosensory retinal detachment with exudates.
Optic disk edema or pallor.

CONCLUSIONS

Important to consider ocular syphilis in immunocompromised individuals. Anatomical changes due to syphilis in ASPPC are reversible with proper antibiotic treatment. Very early manifestation and treatment can lead to resolution.

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Management of Near Total Vision Impairment From Dural Sinus Thrombosis Attributed to Factor V Leiden

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INTRODUCTION

Patient Demographics: 28-year old Caucasian female
Chief Complaint: Would like to walk dogs again and would like help cooking
- Referred for low vision rehabilitation, compensatory strategies, and devices by neuro-ophthalmologist

Ocular and Medical History:
- Chronically elevated ICP from dural venous sinus thrombosis
- Multiple failed shunts and shunt revisions
- History of Factor V Leiden

Medications: Warfarin, Brimonidine, Diamox, Tegretol, Nortriptyline

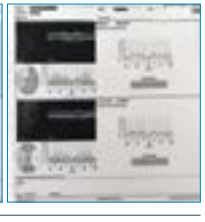
EXAM FINDINGS

Clinical:
- **VA:** HM @ 3ft OD, CF 3ft OS
  - VA prior to event is unknown, but presumed to be normal
- **Visual Field:** Unable to test
- **Contrast:** Unable to test
- **Anterior Segment:** WNL OU
- **Fundus Exam:** See **Figures 1a-b OCT**
  - Diffuse pallor OD, OS.
  - No ONH edema. CD 0.1R OD, OS

Laboratory/Radiology studies:
- Blood work: Factor V Leiden
- MRI

FIGURE 1A
OCT Findings

FIGURE 1B
OCT Findings



DISCUSSION

Primary/Leading: Blindness and near total vision impairment secondary to optic atrophy
Differential Diagnosis: None, referral and confirmed diagnosis
- **DDx of dural sinus thrombosis:** Asymmetric anatomy, arachnoid granulations, asymmetric flow in transverse or sigmoid sinus **Figure 2a-c**

Diagnoses:
Factor V Leiden is a hypercoagulability mutation
- Can lead to heart attack, stroke, pulmonary embolism

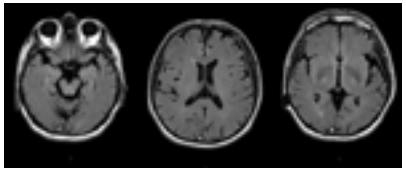
Dural sinus thrombosis
- Patients can be asymptomatic; can cause coma or death
- Many patients present with blurred vision and headaches
- Treatment: anti-coagulants, thrombolysis, shunts for increased ICP

Optic Atrophy secondary to increased intracranial pressure

UNIQUE FEATURES

- Unknown how long ICP was elevated before patient lost vision
- Vision rehabilitation in sudden, acquired blindness OU
- Implications in a younger patient: vocational rehab, psychosocial, genetic counseling, pregnancy risks

FIGURE 2A-C
MRI Findings



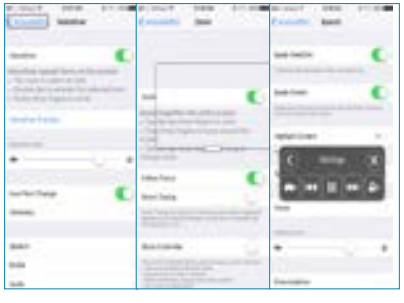
TREATMENT, MANAGEMENT

Treatment and response to treatment
- No optical solution (glasses, hand held magnifiers, telescopes)
- Auditory based adaptive technology is best route
  - Accessibility features, like Siri
  - CCTV with OCR (text to speech)

Figure 3a-c: Apple Accessibility features
- Refer to OT for ADLS
  - Safety
  - Compensatory strategies
  - Orientation and mobility
  - Consider braille instruction

Figure 4: Contrast bars in shower
- Refer for counseling/support groups, state vocational services and employment programs
- Prognosis: Fair: motivated and cognitive

FIGURE 3A-C
Apple Accessibility Features



CONCLUSION

This case highlights the multi-disciplinary effort to maintain independence and safety with MD, OD low vision, OT and COMT involvement. Leading to optometrists' greater understanding of the role of optometry in blind rehabilitation and the role of other health professionals.

This case is also a unique presentation of optic atrophy adding to optometrist's understanding of pathologies associated with increased intracranial pressure and optic atrophy.

REFERENCES

Available upon request

FIGURE 4
Contrast Bars in Shower

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Drawing the Line on Neurosyphilis: A Unique Visual Field Presentation

Emily Eng OD, MS | Charles W. Kinnaird OD - Jesse Brown VAMC | Chicago, Illinois

A patient lost to follow up with a history of syphilitic optic neuropathy and inadequate initial treatment presents complaining of decreased vision with progression on Goldmann Visual Field.

CASE HISTORY

57 yo AAM lost to follow up x 1 yr

Chief Complaint: Fluctuating/decreased vision throughout the day

Ocular History:
- h/o syphilitic optic neuropathy OU
- Type 2 DM without retinopathy OU
- HIV without retinopathy OU
- Cataract OU

Medical History:
- h/o latent syphilis s/p IM injections x3
- HIV
- Type 2 IDDM
- Coronary artery disease/myocardial infarction
- Hypertension
- Chronic kidney disease
- Previous smoker

Medications:
albuterol, amlodipine, atorvastatin, carvedilol, vitamin D, gabapentin, insulin, losartan, aspirin, ranitidine

PERTINENT FINDINGS

BCVA:
OD: 20/400, decreased from 20/200
OS: 20/100, decreased from 20/70

Pupils:
OU: (+) Direct and consensual, (-) APD; sluggish but equal to light and near

CVF:
OD: superior and inferonasal constriction
OS: superior constriction

Color:
OD, OS: 0/8 Ishihara

Anterior Segment:
OU: (-) signs of active inflammation; 1+ NS, 1+ cortical spoking

IOP:
OU: 11 mmHg

Posterior segment:

FIGURE 1

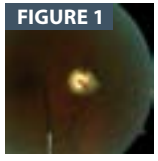
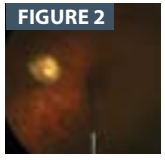


FIGURE 2



ONH OU:
0.85v/0.85h; 3+ diffuse pallor
Periphery OU: (-) signs of active inflammation

GVF:
Baseline

FIGURE 3

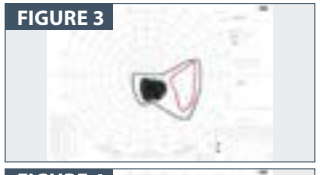
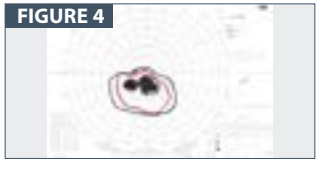


FIGURE 4



Presenting

FIGURE 5

FIGURE 6

Lab Tests & Imaging:
1. Syphilis: CIA (+), RPR 1:8, FTA-ABS (+)
2. CSF: protein elevated, VDRL (-), HSV (+) likely viral shedding
3. HIV: CD4/CD8 227 cells/uL, viral load 67 cells/uL
4. TB: Quant Gold (-)
5. MRI brain: evidence of prior microemboli, no restricted diffusion to indicate acute ischemia
6. CT Head: no acute intracranial findings

DIFFERENTIAL DIAGNOSIS

Primary: Syphilitic optic neuropathy

Other: Ischemic optic neuropathy, HSV, tuberculosis, sarcoidosis, intracranial mass

DISCUSSION

Organism: Treponema pallidum

Incidence: 62.3 per 1000 person-years in HIV group vs 0.8 per 1000 person-years in non-HIV group in the US[4]

ONH Manifestations: Inflammatory disc edema (optic neuritis, perioptic neuritis), neuroretinitis, retrobulbar neuritis, atrophy/pallor, optic nerve gumma[2]

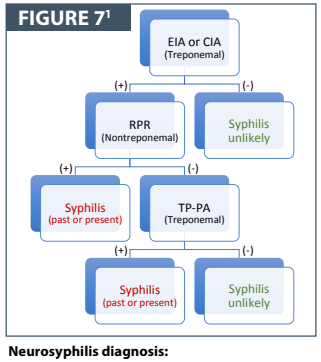
Visual Field Defects:
- Characteristic: Concentric progressive constriction
- Other: Diffuse, peripheral, quadrant, central defects
- Produces either a slowly progressive loss of vision due to a parenchymal optic atrophy or a rapid reduction from an acute optic neuritis[3]

Retrospective Review of 35 patients[5]:
54.3% HIV+ group
- Statistically significantly younger (37 vs 66)
- Majority male
- Anterior uveitis statistically significantly more common
- Optic nerve involvement more frequent
- Higher prevalence of previous syphilis treatment

TREATMENT & MANAGEMENT

Serologic Testing: Nontreponemal vs treponemal

FIGURE 7[1]



Neurosyphilis diagnosis:
(+) Treponemal specific test AND
CSF showing one of the following
1. Elevated cell count
2. Elevated protein levels
3. VDRL (+)

- If syphilis serology is (+), HIV testing is also indicated
- Ocular syphilis with active clinical manifestations is treated as neurosyphilis[2]
  - Patients with confirmed syphilitic uveitis should also have examination of CSF
- Congenital, latent, or late latent syphilis can produce ophthalmic abnormalities without evidence of active clinical disease – treatment is expected to prevent further damage[2]

Treatment:
- Aqueous crystalline PCN G 18-24 million units per day administered as 3-4 million units IV q4h or continuous infusion for 10-14 days1
  - CSF examination should be repeated every 6 months until the cell count is normal
  - If the CSF cell count or protein is not normal after 2 years, retreatment should be considered
- Use of corticosteroids to modulate degree of inflammation is undefined[2]

PATIENT'S TREATMENT

Referred to infectious disease: started on aqueous crystalline PCN G, 3 million units q4hr x 2 weeks

12 days after starting treatment
BCVA: 12 days after starting treatment
OD: 20/400, stable
OS: 20/70, improved to baseline

GVF: 12 days after starting treatment

FIGURE 8

FIGURE 9

CONCLUSION

- Despite prior IM PCN treatment, must still consider neurosyphilis may be present.
- Some features of ocular syphilis may be more common in HIV patients.
- Ocular syphilis with active clinical manifestations should be treated as neurosyphilis.
- Syphilis should be included in differentials for both active clinical inflammatory processes and ophthalmic abnormalities without evidence of an active clinical disease.
- Prompt treatment with IV penicillin G may improve visual loss.

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Students' Perceptions of Clinical Grading

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PURPOSE

Grading clinical education is complex and less prescriptive than classroom grading. Considerable research has been done exploring how faculty should deliver effective feedback. Theoretically the approach to feedback should be evidence-based, suggesting that we need a better understanding of what is consistently working for clinical grading. This study surveyed students who were seeing patients at Illinois College of Optometry about their perceptions of clinical feedback. The results of this study will help faculty understand how students value feedback, how they use it to amend their clinical habits and skills, and ultimately may assist in shaping how faculty provide feedback.

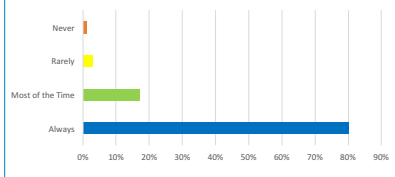
METHODS

A survey was completed by 221 second, third and fourth year optometry students at the Illinois College of Optometry. The survey was anonymous and asked questions regarding their opinions on the current way that they receive feedback on their clinical performance. It asked questions about how often they read the evaluations, how often they have written feedback and if they find it constructive, if they feel there is variability in grading between doctors, and how accurate a representation they feel the evaluation is of their performance. There were 14 questions and they had the opportunity to write comments for several.

RESULTS

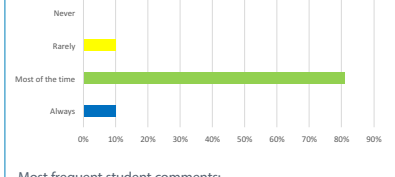
79% of the students "always" read their clinical evaluations [*Figure 1*]. 80% feel that the feedback is constructive "most of the time" [*Figure 2*]. 68% of the students said they had written comments on their evaluation form "most of the time" [*Figure 3*] which encourages 52% of them to modify their clinical habits "most of the time." 78% use Meditrek to track their patient numbers and 62% use the information to try to see more patients if they perceive the total patient number to be low. 93% of students feel that there is a notable difference in grading between attending doctors [*Figure 4*]. 62% of the students feel it is "very hard" to get an "honors" grade in clinic and 45% feel it is "hard" to get an "unsatisfactory" grade in clinic. 83% of students feel the clinical evaluation is typically an accurate representation of how they performed "most of the time' [*Figure 5*]. 58% of students said they get written feedback in clinic "most of the time" and 59% feel verbal and written feedback is "equally" valuable [*Figure 6*].

FIGURE 1
How often do you read your clinical encounter evaluations?



Most frequent student comments:
- *"Some doctors wait to do evaluations and then forget what happened during the encounter and just give straight 3's. Also, the delayed evaluations doesn't allow us to improve before the next shift."*
- *"With inconsistent criticism and evaluations that don't help improve my clinical ability, what is the point of checking them?"*
- *"Part lazy, and partly it's hard to remember which case is which when reading them."*

FIGURE 2
Do you feel like the feedback you receive is constructive?



Most frequent student comments:
- *"A lot of the feedback aims to point out what we're doing wrong or inefficient, but they don't give suggestions on how to improve."*
- *"Sometimes attending doctors don't write anything which makes it hard to see what you did right or wrong."*
- *"It would be more beneficial if I could receive the feedback within a day or two, instead of 2 weeks later."*

FIGURE 3
How often do you have written comments on your evaluation form?

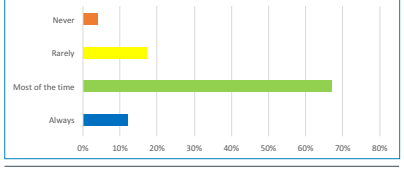


FIGURE 4
Do you feel that there is a notable difference in grading between the attending doctors?

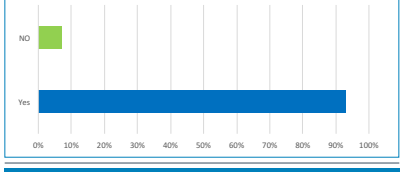
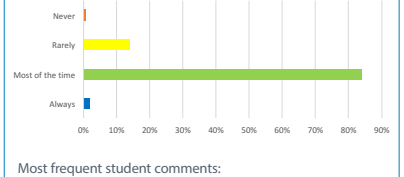
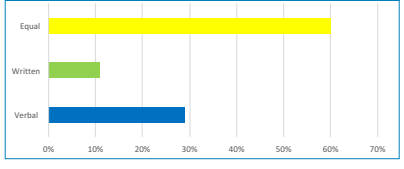


FIGURE 5
Do you think the clinical evaluation is typically an accurate representation of how you performed for the encounter?



Most frequent student comments:
- *"There is so much variability between the attendings' attitudes, personalities, and grading styles, that I truly don't think it's realistic to try to make reviews more standardized."*
- *"If they do the grading soon after the encounter, it is typiclaly more personal. If the grading is delayed a week or more, it is typically very generic."*
- *"Way too subjective."*

FIGURE 6
Which type of feedback do you find more valuable, verbal or written?



CONCLUSION

Overall students find a value in receiving written feedback. This feedback helps most students modify their clinical behavior and track patient numbers. Students feel that the current method of receiving written feedback makes it difficult to stand out and receive clinical honors. Students note a distinct discrepancy between various attending doctors and student comments strongly argue for a better way of standardizing expectations and creating more equality in the grading process.

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Giant Pituitary Adenoma Masquerading as Glaucoma

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BACKGROUND

Pituitary adenomas account for 12-18% of symptomatic intracranial neoplasms. Of this, 72% fall into the category of non-secreting – meaning the pituitary gland is not influenced to over-secrete its otherwise naturally produced hormones. These lesions are uncommon before age 20 and increase in prevalence after the 4th decade. The average age for pituitary adenoma diagnosis is 50-55. Pituitary adenomas can be classified by size: microadenomas are less than 1cm largest diameter, macroadenomas range from 1cm to less than 4cm largest diameter, and giant adenomas are 4cm or greater largest diameter. These lesions are most commonly diagnosed based on patient signs and symptoms secondary to the tumor's mass effect on surrounding neural structures. These manifest as headaches, visual field defects, decreased visual acuity, optic nerve atrophy, hypopituitarism, cranial nerve paresis, and seizures. The diagnosis of pituitary adenoma is confirmed with MRI testing.

CASE REPORT

CC: 61 y.o. Hispanic female presented for gradual decreased vision OS>OD with noticeable peripheral vision loss over the past 2 years accompanied by occasional headaches. She had previously been diagnosed with glaucoma at eye examination in Mexico three months prior and was prescribed dorzolamide HCL 2% BID OU for IOP control. OCT was reportedly performed at last examination. Medical history included benign hypertension controlled with diet and exercise and anxiety. Systemic medications included Clonazepam 2mg PO TID.

VA: OD: 20/25-3, NI PH; OS: 20/100-1, NI PH
Pupils: OD: PERRL; OS: PERRL, 1+APD
CVF: Constricted temporal and superior field OU
CT: 14 CLXT distance; 10 CLXT near
IOP: 20mmHg OD, 18mmHg OS
ONH: OD: 0.20h/0.25v; OS: 0.20h/0.30v; (+) temporal pallor OU
MRI: Markedly enlarged 2.5x4.0x3.5cm homogenously enhancing mass in pituitary fossa with significant mass effect on optic chiasm – displaced superiorly. (+) encasement of bilateral carotid arteries, (-) sphenoid invasion, (+) suprasellar cistern occlusion, (+) cavernous sinus invasion

Diagnosis: Non-secreting Giant Pituitary Adenoma
Differential Diagnoses: Secreting Pituitary Adenoma, Meningioma, Craniopharyngioma, Aneurysm, Glioma, Toxic Optic Neuropathy

FIGURE 1
Right eye fundus photo displaying temporal optic nerve pallor

FIGURE 2
Left eye fundus photo displaying temporal optic nerve pallor

FIGURE 3
RNFL OCT: OD displays temporal RNFL thinning; OS displays temporal RNFL thinning

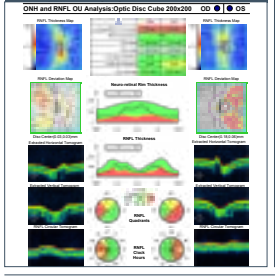

FIGURE 4
GCC: OD displays 360 thinning; OS displays 360 thinning

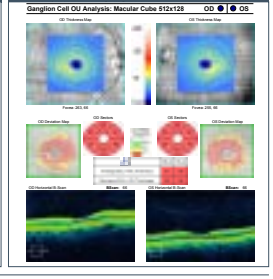

FIGURE 5
Left eye visual field displaying temporal hemianopia with nasal crossover

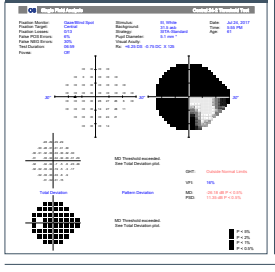

FIGURE 6
Right eye visual field displaying temporal hemianopia with nasal crossover

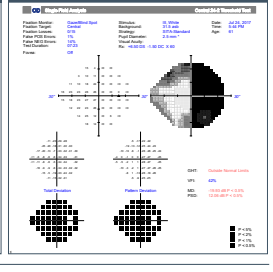

FIGURE 7
MRI transverse section T2 pre-Gadolinium and T1 post-Gadolinium

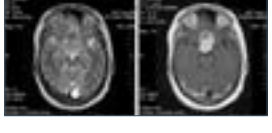

FIGURE 8
MRI sagittal and coronal section T1 post-Gadolinium

TREATMENT AND MANAGEMENT

After diagnosis is confirmed with MRI imaging, transsphenoidal resection is first line therapy for all pituitary adenomas excepting prolactinomas. This surgical procedure has a 40-83% chance of gross total resection. If remnants of the tumor remain post-surgically or if the lesion displays invasion of the cavernous sinus, the chance for recurrence increases. Given these facts, if pre-surgical imaging suggests total removal may be hindered using a transsphenoidal approach, the surgeon may consider transcranial surgical resection. If either approach results in tumor remnant or post-surgical MRI imaging reveals regrowth, radiotherapy can be considered to decrease the lesion's size or prevent progression.

After surgical resection, an MRI is repeated 3 months post-operatively and then yearly for the next 3-5 years. A post-operative eye examination with visual field testing should be performed within the first month after resection, at 1-4 months post-resection, and then annually. This follow up schedule mimics the expected recovery of visual field after mass removal. Visual field recovery can be broken down into three separate phases: fast, slow, and late. Fast phase recovery occurs within minutes to days after tumor resection and is thought secondary to restoration of nerve fiber axonal flow. Slow phase recovery occurs 1-4 months post-resection and is accounted for by post-laminal remyelination. Finally, late phase recovery occurs 4 months to 3 years post-operatively and is explained by continued remyelination along with remodeling within the anterior visual pathways.

CONCLUSION

Pituitary adenomas require prompt diagnosis and treatment in order to best restore visual acuity and visual field. Initial discovery is frequently made through formal visual field testing. Larger adenomas present for a longer duration correlate with worse post-surgical acuity and visual field deficits. For all pituitary adenomas excepting prolactinomas, transsphenoidal surgical removal is first line therapy. Close management with repeat MRI and dilated eye examination with visual field testing is used to monitor for visual improvement and signs of tumor regrowth.

REFERENCES

Available upon request.

CONTACT INFORMATION

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Humidity Levels and Temperature Effects on Dry Eye Symptom Scores

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PURPOSE

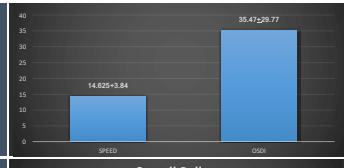
In warm and dry climates tear evaporation increases, contributing to dry eye symptoms. The goal of this study was to determine how dry eye is affected by temperature, humidity, and breathing indices by geographic location.

METHODS

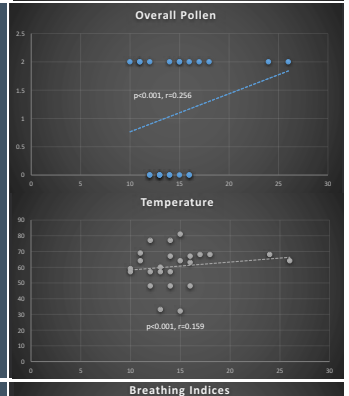
- Sixteen investigator-designed questions related to allergy and dry eye as well as the ocular surface disease index (OSDI) and standard patient evaluation of eye dryness survey (SPEED) surveys were administered to patients at four clinical sites in accordance with each site's Institutional Review Board.
- Subjects were provided a link to search the allergy index, pollen counts, and breathing indices for their geographic location (https://weather.com/forecast/allergy/l/4812:4:US).

FIGURES 1, 2 AND 3
Allergy Index, Pollen Counts, and Breathing Indices per Geographic Location (Example: Chicago, IL)

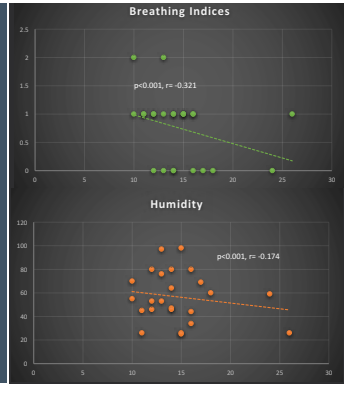
FIGURE 4: Average SPEED and OSDI Scores for Participants



FIGURES 5A and 5B: SPEED Scores Worsened as Pollen and Temperature Increased



FIGURES 6A and 6B: SPEED Scores Improved as Breathing Indices and Humidity Increased



FIGURES 7A, 7B, and 7C: OSDI Scores Negatively Correlated with Increasing Pollen, Breathing Indices and Humidity

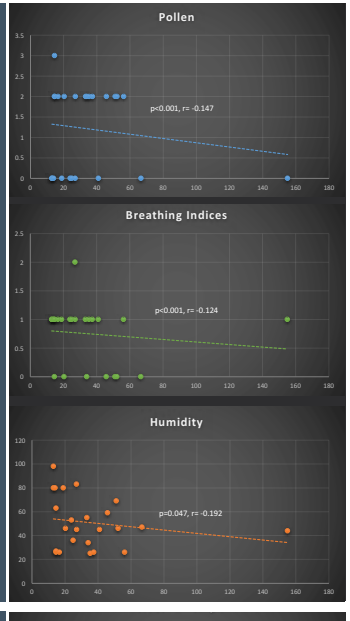
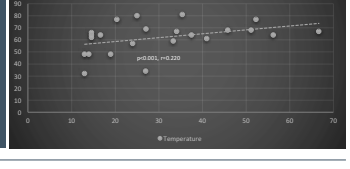


FIGURE 8: OSDI Scores Positively Correlated with Increased Temperature



RESULTS

45 participants responded.

- The average age was 35.6 +14.8 (range 15 to 70) and 68.9% (31) were female.
- 53.3% (24) were considered dry by the SPEED questionnaire and the average score for this cohort was 14.625 + 3.84.
- 53.3% (24) were considered dry by OSDI with an average score of 35.47+29.77.
- SPEED scores worsened as overall pollen (p<0.001, r=0.256) and temperature (p<0.001, r=0.159) increased.
- SPEED scores improved (decreased) as breathing indices (p<0.001, r=-0.321) and humidity (p=<0.001, r=-0.174) increased.
- As overall pollen (p=<0.001, r=-0.147), breathing indices (p=<0.001, r=-0.124), and humidity increased, OSDI scores showed a negative correlation (p=0.047, r=-0.192).
- Higher OSDI scores showed a positive correlation with increased temperature (p=0.0002, r=0.220).

CONCLUSIONS

- Dry eye can be a great burden to patients and a common trigger can be the environment, specifically humidity.
- In climates with low humidity, dry eye signs and symptoms often worsen as tear evaporation increases.
- This study demonstrated that as humidity increased dry eye scores improved and as temperature increased alone without humidity as a factor, dry eye symptom scores worsened.

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Impact of Make–Up on Ocular Comfort and Meibomian Gland Atrophy

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PURPOSE

Meibomian gland disease presents with varying degrees of symptoms and signs. Eye make-up may aggravate an already dry eye, contributing to increased tear evaporation. The purpose of this study was to evaluate the impact of make-up wear on ocular comfort and on the ocular surface.

METHODS

- Sixteen investigator-designed questions related to ocular comfort, make-up wear and dry eye were administered to patients at four clinical sites in the United States and one in Canada.
- Clinical tests performed included lower lid staining, Meibomian gland expression, and PULT classification of Meibomian gland atrophy.
- Pearson correlations and frequency analyses were completed.

FIGURE 1
PULT MG Atrophy Grading Classification

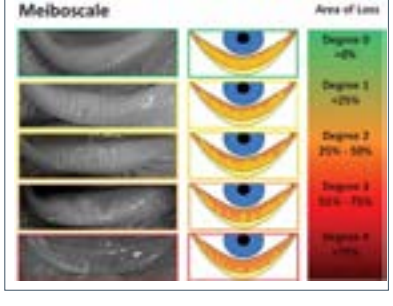
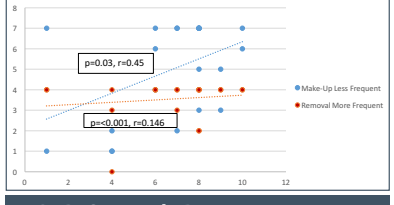
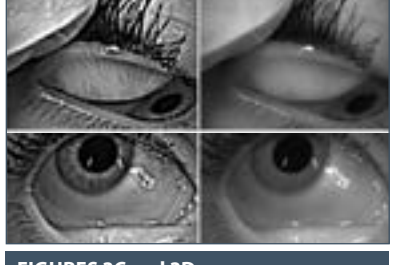


FIGURE 2
Perceived Ocular Comfort Showed a Positive Correlation Between Less Hours of Make-Up Wear and More Frequent Removal



FIGURES 3A and 3B
Degree Zero Area of Loss (PULT Classification) of Upper and Lower Meibomian Glands in a 23-year-old Who Always Removes Make-Up



FIGURES 3C and 3D
Degree 2 Area of Loss (PULT Classification) of Upper and Lower Meibomian Glands in a 27-year-old Who Wears Waterproof Make-Up and Removes Once Weekly

FIGURE 4
Comfort Scores Showed Moderate Correlations to MG Atrophy for the Lower LIds

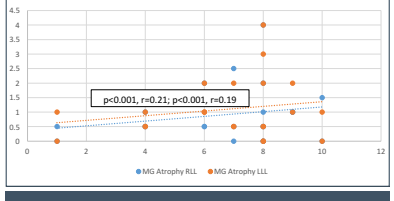


FIGURE 5
With Lower Levels of MG Expression, Comfort Increased

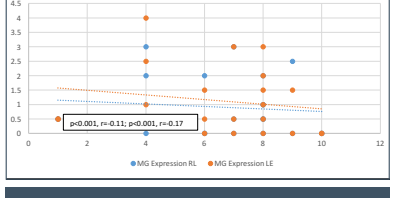
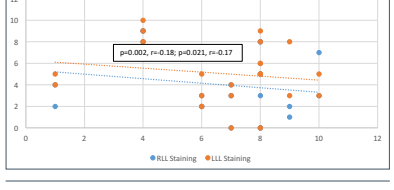


FIGURE 6
Comfort Decreased with Increased Lower Lid Staining



RESULTS

- 45 subjects were enrolled, 55.5% (25) wore make-up on or around the eye an average of 5.08 + 2.25 days/week and removed their make-up 3.56 + 0.96 days/week.
- The average ocular comfort score for make-up wearers was 6.68 + 2.51 (scale of 1 to 10, 10 being most comfortable).
- Patients who wore make-up less and removed it more often showed a positive correlation to their perceived ocular comfort (p=0.03, r=0.45; p=<0.001, r=0.146).
- Comfort scores also showed a moderate correlation with the PULT severity levels of MG atrophy for the lower lids (p<0.001, r=0.21; p<0.001, r=0.19).
- With lower levels of MG expression, comfort increased (p<0.001, r=-0.11; p <0.001, r=-0.17), and with increased lower lid staining, comfort decreased (p=0.002, r=-0.18; p=0.021, r=-0.17).

CONCLUSIONS

- Make-up may worsen dry eye signs and symptoms.
- As patients wore make-up less often and removed more frequently comfort scores improved.
- A positive correlation was found between patients' perceived comfort scores and severity level of MG atrophy.
- Further study is needed to look at a larger cohort of patients.

CONTACT INFORMATION

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Proliferative Retinopathy and End–Stage Renal Disease in a Young Patient

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INTRODUCTION

Retinal neovascularization is a rare complication of hypertensive retinopathy that is poorly documented in literature. Neovascularization develops in response to widespread chronic retinal ischemia, and subsequent upregulation of angiogenic factors. Studies show that hypertensive patients have increased expression of VEGF. In addition, hypertension is a known risk factor for the development and progression of diabetic retinopathy. In this case, we believe the severe attenuation of the arterial system and capillary nonperfusion led to profound retinal ischemia, and thus the release of angiogenic factors. We present a case of severe proliferative retinopathy associated with severe hypertension and end-stage renal disease.

CASE REPORT

A 48 yo AAM presented with blurred vision OS>OD for the past 2 weeks. His ocular history was unremarkable, but he had not been examined since childhood. His medical history was remarkable for hypertension for the past 3 years with end-stage renal disease. He reported poor compliance with current medical therapy, which included labetalol, amlodipine, hydralazine and isosorbide.

BCVA OD: 20/20- OS: 20/125 PH NI

CVF FTFC OD, abnormal field temporally OS

BLOOD PRESSURE 240/150 mmHg right arm seated

SLIT LAMP unremarkable, (-)NVI OU

DFE

	OD	OS
Vitreous	Clear	Old and new vitreous hemorrhage
ONH	Diffuse pallor	Fibrous proliferation
Vasculature	Severe attenuation of retinal arterioles and capillary nonperfusion, no venous tortuosity or sheathing	Severe attenuation of retinal arterioles and capillary nonperfusion, no venous tortuosity or sheathing
Background Retina	Few intraretinal hemorrhages, neovascularization	Scattered intraretinal hemorrhages, extensive fibrous proliferation

FLUORESCEIN ANGIOGRAPHY arteriolar attenuation in all quadrants, delayed arterial filling, profound mid-peripheral and peripheral capillary nonperfusion with neovascularization OU

FIGURE 1
Severe arteriolar attenuation

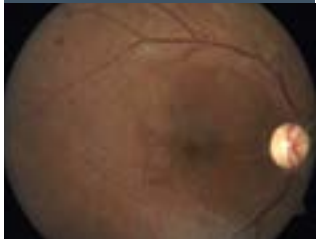


FIGURE 2
Extensive fibrovascular proliferation

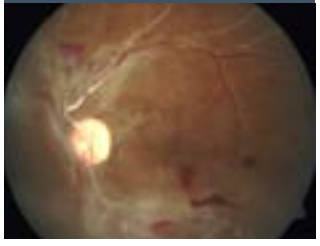


FIGURE 3
Active neovascularization, capillary remodeling and nonperfusion

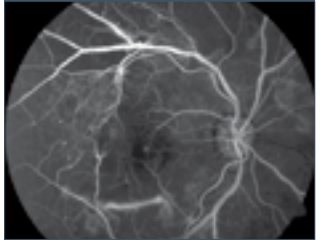


FIGURE 4
Active neovascularization and extensive capillary nonperfusion

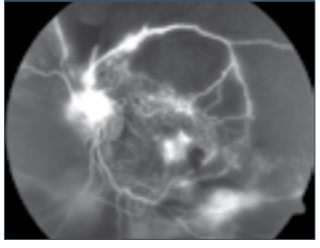
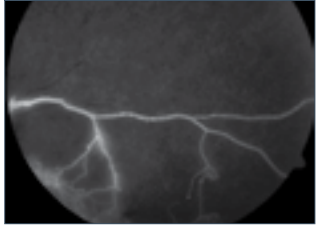


FIGURE 5
Featureless retina of the left eye

FIGURE 6
Severe peripheral capillary nonperfusion of the left eye



SEROLOGY ruled out diabetes mellitus, autoimmune or inflammatory disease, and sickle cell disease/trait

DIFFERENTIAL DIAGNOSES Proliferative Diabetic Retinopathy, Retinal Vasculitis, Sickle Cell Retinopathy

CONCLUSION

Hypertensive retinopathy is a well-known and well-studied complication of uncontrolled hypertension. The most common features include arteriolar narrowing, arterio-venous nicking, cotton wool spots, hemorrhages, exudates and papilledema. The pathophysiology of this involves changes to the retinal arteriolar system. Thickening of the elastic lamina and hyaline degeneration in the vessel wall causes generalized arteriolar narrowing, focal constrictions and compression of arteriovenous crossings; nerve fiber layer ischemia and eventual breakdown of blood-retinal barrier leads to hemorrhage and exudation.

While uncommon, proliferative retinopathy can occur with prolonged uncontrolled hypertension. Fluorescein angiography will confirm the extent of capillary nonperfusion and direct the course of treatment. Clinical evaluation to rule out diabetes, sickle cell disease and autoimmune or inflammatory disease, is important prior to treating proliferative retinopathy. Our patient's severe hypertension and resultant kidney failure, exacerbated by poor compliance with medical treatment, led to his development of proliferative hypertensive retinopathy. Treatment was initiated with pan-retinal photocoagulation OU, with multiple treatments recommended on alternating weeks. The patient was educated on a guarded visual prognosis of the left eye due to profound retinal ischemia, which may ultimately require vitrectomy.

REFERENCES

Available upon request

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Atypical, Unilateral Nanophthalmos with Glaucoma in a Young Patient

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INTRODUCTION

Nanophthalmos is a rare developmental condition marked by a smaller than average eye with high lens to eye volume ratio. Both posterior and anterior segments of the eye in nanophthalmos are involved with axial length typically less than 21 mm. Nanophthalmos is generally bilateral and may be syndromic in nature. Angle-closure glaucoma is a documented complication of nanophthalmos, occurring past the 5th decade with increasing lens size. This is a unique case presentation of unilateral, atypical nanophthalmos with glaucoma in a young patient.

CASE REPORT

A 19 year old Caucasian female was referred for evaluation with self-reported history of congenital asymmetric eye size and a known history of unilateral elevated IOP. Her medical history was unremarkable. Pertinent examination findings in the 'small eye' over a series of visits were unilateral elevated IOP (30 mmHg at initial visit with Tmax of 45 mmHg), moderate anterior chamber depth, non-occludable angles per gonioscopy, asymmetric corneal thickness without signs of edema, and axial length difference of 1.74 mm with 2.00 D difference in refractive error.

Optic cube OCT (Zeiss, Cirrus TM HD-500 OCT) demonstrated neural retinal rim thinning in the smaller, left eye. Ganglion cell complex thinning was present in the left eye in the area associated with the location of the optic nerve head changes. Macular cube OCTs (both Zeiss Cirrus TM HD-500 and Heidelberg Spectralis) also revealed overly robust thickness of the macula, a shallow foveal pit and significantly increased sub-foveal choroidal thickness in the left eye.

After her initial visit, the patient began to experience episodes of unilateral blur and haloes after emotional crying. The symptoms would last for less than one hour and were accompanied by unilateral temporal headache. The patient reported relief with sleep. Suspicion was high for intermittent partial angle closure following the episodes of emotional crying particularly after segmental iris bowing was noted during a follow up examination, though non-occludable. Combigan® was initiated in the nanophthalmic eye with good response.

Following several months of treatment, the patient self-discontinued Combigan® and again experienced intermittent blur with haloes with unilateral IOP spike of 45 mmHg. After restarting OHTN medication, the symptoms abated and her IOP has been stable at 18 mmHg in the smaller eye.

FIGURE 1A AND 1B
Macular and Choroidal Thickness Asymmetry OD<OS

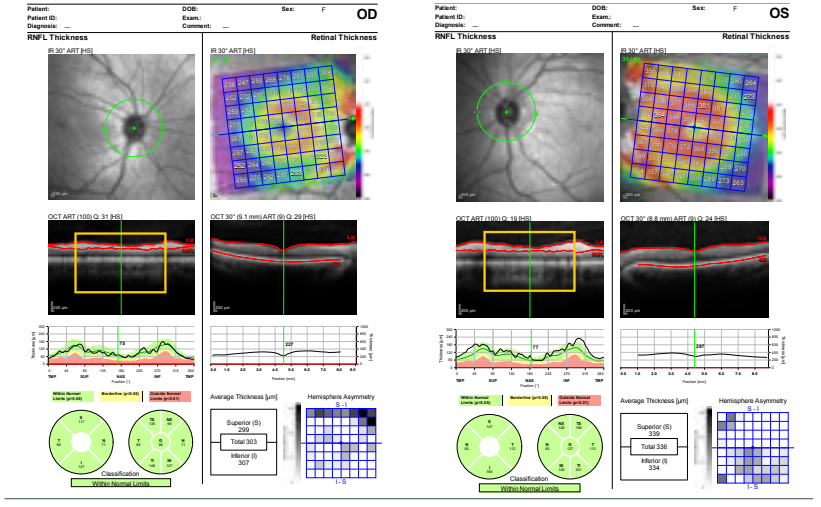


FIGURE 2
Asymmetry of Eye Size OD<OS

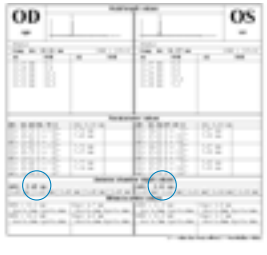


FIGURE 3
Optic Disc Cube Demonstrating NRR Thinning OS

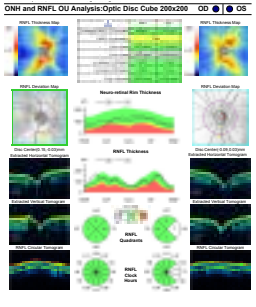
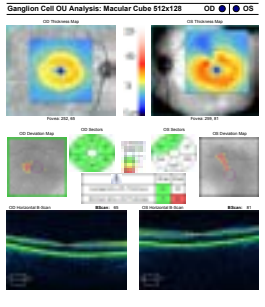


FIGURE 4
Ganglion Cell Complex Demonstrating Early Changes OS



DISCUSSION

Nanophthalmic eyes are caused by a halt in the embryologic development of the eye. This arrested development results in shorter axial length, small diameter corneas, presence of narrow angles, shallow anterior chambers, macular hypoplasia, and thickened retina, choroid, and scleral layers. Thicker outer nuclear layer and aberrant maintenance of the ganglion cell layer, inner plexiform layer, inner nuclear layer and outer plexiform layer with the foveal avascular zone is frequently present in nanophthalmos, contributing to foveal hypoplasia.

Nanophthalmic eyes are prone to development of glaucoma, specifically angle closure glaucoma in regards to miniature eye size with normal lenticular biometry. Angle closure glaucoma generally develops around the 5th decade of life in nanophthalmos as the lens naturally thickens, taking up more space and threatening an already crowded anterior chamber with physiological narrow angles.

Additionally, the thickened sclera, due to abnormal collagen fibrils as found in nanophthalmic eyes, may contribute to increased IOP. Increased scleral thickness with decreased scleral elasticity may lead to choroidal congestion and increased episcleral venous pressure, putting the patient at risk for both uveal effusion and elevated intraocular pressure via obstruction of the uveoscleral aqueous outflow.

Threats to vision may be caught early if nanophthalmic eyes are frequently monitored.

CONCLUSION

This patient is unique in that she has an asymmetric eye size and has developed early glaucoma resulting from ocular hypertension and then subsequently developed intermittent angle closure at a younger age than expected for nanophthalmos. She will be returning for laser peripheral iridotomy consult and continued to be monitored for glaucomatous progression.

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Optometric Care of an Infant with Bilateral Peters Anomaly and Congenital Glaucoma

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CELEBRATING 145 YEARS

INTRODUCTION

A 3 month old male with bilateral Peters Anomaly (PA) and Congenital Glaucoma presents to an optometric clinic. The severity of the presentation requires surgical intervention for the glaucoma. Peters Anomaly is a congenital disorder resulting in abnormal development of the anterior segment. 50-70% of patients with PA have glaucoma.

FIGURE 1
3 Month Old with Type I, Bilateral Peters Anomaly

Ocular Findings in Peters Anomaly

*present in our patient***
Glaucoma**
Cataract
Microphthalmia
Cloudy/ opaque Cornea**
Amblyopia**
Strabismus**
Iris Hypoplasia
Aniridia
Coloboma
Optic Disc Hypoplasia
Bilateral > unilateral**

Peters Anomaly

A rare form of anterior segment dysgenesis in which abnormal cleavage of the anterior chamber occurs at the end of the 3rd week of gestation.
This condition is one of a group of disorders known as congenital corneal opacities which result from abnormal development of the structures of the anterior segment leading to incomplete separation of the cornea from the iris or lens

An estimated prevalence of Peter's anomaly is 3 to 6 individuals per 100,000

Most cases of Peters Anomaly are sporadic without an identified genetic cause

Other names for condition:
irido-corneo-trabecular dysgenesis
Peters congenital glaucoma

Types of Peters Anomaly

Peters anomaly Type I *Our patient has Type I*	incomplete separation of the cornea and iris and mild to moderate corneal opacity
Peters anomaly Type II *Our patients older brother has Type II*	incomplete separation of the cornea and lens and severe corneal opacity
Peters-plus syndrome	an inherited condition that is characterized by the ocular findings noted above in addition to a short stature, a cleft lip with or without an opening in the roof of the mouth (cleft palate), distinctive facial features, and intellectual disability.

CLINICAL FINDINGS

Evaluation noted bilateral corneal opacities due to incomplete separation of the cornea from the iris. The corneal opacity OS is larger and more significant than that OD. Evaluation reveals minimal fixation and no ability to track an object. B scan reveals that the lens is not adhered to the cornea thus likely a Type I Peters Anomaly. Dilated fundus examination reveals normal optic nerve head appearance. Repeated IOP measurements of high 20s OD and high 40s OS are noted. An Intermittent Esotropia is present in the left eye. The associated ocular findings of microphthalmos, iris hypoplasia, aniridia, coloboma and optic disc hypoplasia do not appear to be present. No observable systemic defects have been detected in this patient.

FIGURE 2
Intermittent Left Esotropia

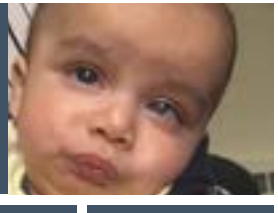
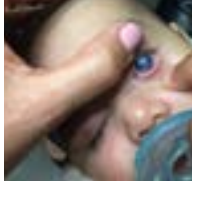


FIGURE 3
Mild Corneal Opacity Right eye

FIGURE 4
Moderate-severe Corneal Opacity Left Eye



CLINICAL TREATMENT

The two months of optometric care focused on controlling IOP and minimizing the risk of amblyopia. Muro 128 was prescribed to treat the corneal edema, the combination of Cosopt and Latanoprost proved most effective in controlling IOP. 0.5% Cyclopentalate was installed daily to allow for expansion of the visual axis around the central opacities. Occlusion therapy was prescribed to address concerns of amblyopia development. A referral was made for evaluation by glaucoma and corneal specialists. A trabeculectomy was performed OS only to treat the glaucoma. A corneal specialist is monitoring the progress of corneal findings in order to determine the need for a penetrating keratoplasty in the future. A complete low vision evaluation is scheduled to address the patient's refractive and overall visual needs.

Clinical Finding	Clinical Treatment
Inability to fixate and follow	
0.2 Round C/D ratio	
Bilateral corneal opacities OS>>>OD	**Muro 128**
B scan determined lens is not adhered to cornea	**Type I Peters Anomaly**
IOP OD high 20s IOP OS high 40s	**Cosopt** **Latanoprost** **Trabeculectomy performed OS**
Intermittent Esotropia OS	**More common with visual asymmetry** ***Noted due to corneal severity OS vs. OD***
Amblyopia Risk OS (high likelihood)	**0.5% Cyclopentalate** **Occlusion therapy**

Guarded Visual Prognosis Based on presence / absence of	Amblyopia Treatment
Glaucoma	Goal is to provide a clear pupil
Structural abnormalities	Frequent refractions to monitor refractive error needs
Intraocular surgeries / post - operative complications	Early treatment of amblyopia
Anisometropia	Monitor for post - operative complications

Surgical Options	Surgical Complications
Penetrating Keratoplasty	**Graft failure**
****Trabeculectomy**** *This procedure was performed on our patient OS only*	**Cataract**
Trabeculotomy	**Inoperable retinal detachment**
Goniotomy	**Phthisis**
Molteno shunt implantation	**Poor visual acuity**
Cyclodialysis	
Cyclocryotherapy	

Long term visual outcomes differ based on disease severity

FIGURE 5
Pre – op

FIGURE 6
Post-op Trabeculectomy procedure OS only

SUMMARY

The clinical and systemic features of Peters Anomaly differ from case to case. Bilateral Peters Anomaly is often associated with systemic malformations and increased ocular severity. Optometric care presents a path to directly treat the disease as well as prepare a future for development of the patient's best visual potential.

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Anterior Uveitis Secondary to Discontinuation of Truvada

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INTRODUCTION

In 2012 the FDA approved Truvada (emtricitabine/tenofovir) in combination with safer sex practices as the first drug for pre-exposure prophylaxis (PrEP) to reduce risk of sexually acquired HIV-1 in adults. Truvada is a nucleoside reverse transcriptase inhibitor that boosts the immune system, specifically enhancing the CD4 cell count while blocking the pathway for early HIV infection. Discontinuation can therefore put a patient at risk of a systemic inflammatory response, according to the Truvada label, due to sudden depletion of upregulated adaptive immunity. This case report demonstrates ocular inflammation after discontinuation which has not been previously reported in the literature.

CASE REPORT

A 33 year old African American male presented to the urgent care clinic with redness, photophobia, and mild discomfort OU.

MEDICAL HISTORY
Recent discontinuation, 5 days prior to presentation, of prophylactic Truvada after ending a relationship with his HIV positive partner.

EXAM FINDINGS
BCVA: 20/20 OD, OS
Biomicroscopy: 2+ conjunctival injection with 1+ cells OD
1+ conjunctival injection with +0.50 cells OS
(-)flare/hypopyon (-)KPs OD, OS
IOP was 18mmHg OD, 16mmHg OS
Fundus Exam: unremarkable and revealed no signs of posterior inflammation OD, OS.

MANAGEMENT
1) Initiation of prednisolone acetate qid OU and cyclopentolate tid OU with slow taper of steroid over 7 weeks

Systemic Inflammatory Work-up			
Disease	**Test**	**Normal Range**	**Results**
Lupus	ANA	NEGATIVE	NEGATIVE
Rheumatoid Arthritis	RF	<14 [IU]/mL	9
Sarcoidosis	ACE	9-67 U/L	33
Wegener's granulomatosis	c-ANCA	WNL	WNL
Vasculitis, Polyarteritis nodosa			
Human leukocyte antigen B27	HLA-B27	NEGATIVE	NEGATIVE
Syphilis	FTA-ABS, RPR	NEGATIVE, WNL	NEGATIVE, WNL
Gout	BUN CREATININE	WNL 0.60-1.35 mg/dL	WNL 0.99
Tuberculosis	Quantiferon Gold	NEGATIVE	NEGATIVE
Lyme disease*	Lyme titer	NEGATIVE	NEGATIVE *cleared by an infectious disease doctor*
Non-specific	CBC with differential ESR CRP	WNL < OR = 15 mm/h 1.0-3.0 mg/L	WNL 6 WNL

Sexual Transmitted Disease (STD) Results			
Disease	**Test**	**Normal Range**	**Results**
Neisseria gonorrhea		NOT DETECTED	NOT DETECTED
Hepatitis C	antibody. serum	<1.00 NON-REACTIVE	0.02 NON-REACTIVE
Hepatitis B	surface antigen core antibody, total	NON-REACTIVE NON-REACTIVE	NON-REACTIVE NON-REACTIVE
Hepatitis A	antibody, total	NON-REACTIVE	NON-REACTIVE
Chlamydia	NAAT	NOT DETECTED	NOT DETECTED
HIV	HIV-CMIA HIV rapid testing	NON-REACTIVE NON-REACTIVE	NON-REACTIVE NON-REACTIVE

IMAGE 1A AND 1B
Initial presentation showing palpebral conjunctival injection OD greater than OS

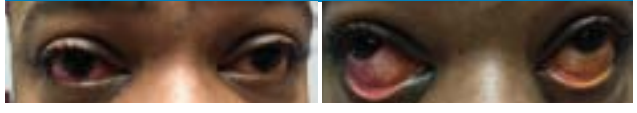


IMAGE 2
Macular OCT OD, OS showing normal foveal contour and retinal integrity

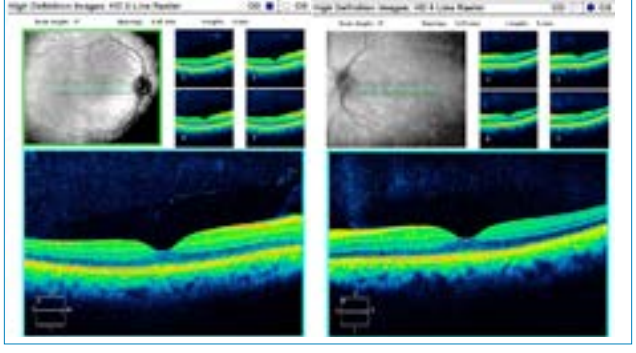
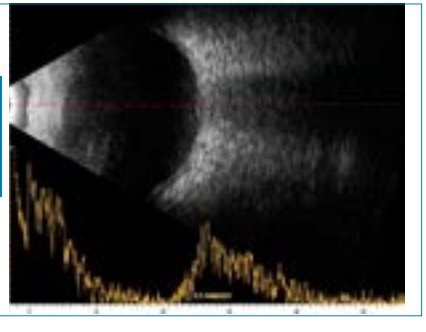


IMAGE 3
B-scan OD showing no posterior inflammation (OS scan same as OD)



DISCUSSION

In 2016 it was recorded by the World Health Organization that 36.7 million individuals are living with HIV and 19.5 million are under antiretroviral treatment (ART). In 2015, it was estimated that 44% of new HIV infections occurred among high risk populations. High risk populations include men having intercourse with other men, individuals who are having intercourse with HIV positive individuals, people who inject drugs, incarcerated populations, and transgender people.

Truvada is currently the only FDA approved PrEP drug available to the public. It is a combination of Emtriva (emitricitabine) 200mg and Viread (tenofovir disoproxil fumarate) 300mg and is dosed orally once a day. The first randomized controlled trial in humans of PrEP was called iPrEx (Pre-exposure Prophylaxis Initiative) and was completed in November of 2010. The results showed there was a decrease in HIV infection rate by 44% compared to the placebo. Interestingly, 93% of trial subjects reported taking the drug as prescribed and blood tests shown only 51% did. This would have improved the efficacy of Truvada regimen from 73% to 92%. The drug is covered by some insurances but on average the estimated cost of a monthly Truvada supply is $1,258. Other medications currently under clinical trials and FDA approval include Maraviroc, Rilpivirine, Dapivirine, and Tenofovir. None of these medications have currently met standards of effectiveness compared to Truvada.

Side effects from Truvada reported by the public and included in the label are related to lactic acidosis, worsening of Hepatitis B infections and liver problems. Symptoms of systemic inflammation have also been reported after missing doses. iPreEx Truvada's efficacy was shown to reach 99% after 7 days of continued dosage and missing doses can reduce efficacy to 94% with 4 pills a week and to 76% with only 2 pills a week. This is the first reported case of bilateral, anterior uveitis after discontinuation of Truvada. Truvada has created an upregulation of the patient's immune system and therefore after discontinuation created an inflammatory response.

CONCLUSIONS

Truvada's PrEP has shown a 44% decrease in the risk of acquiring the HIV-1 infection but unregulated stopping and starting of HIV medications can leave residual levels of inflammation within the body.

Specifically, missing doses of Truvada can cause systemic inflammation in addition to immediate risk of infection. This is a unique case of ocular inflammation after discontinuation of Truvada.

REFERENCES

Available upon request

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Optic Neuritis Secondary to Mycobacterium Infection in a Child

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BACKGROUND

Optic neuritis (ON) is defined as inflammation of the optic nerve. Females are affected at a higher rate than males at a ratio of 3:1 and the condition is seen more commonly in young adults. Patients may present with a triad of symptoms: vision loss, pain on ocular movement, and dyschromatopsia. Atypical cases may present without these symptoms. While it is often idiopathic, other etiologies include autoimmune conditions, infectious disease, or inflammatory causes.

This case report details a unique etiology of ON: non-tuberculosis mycobacterium infection. Present in soil and water, mycobacterium abscessus complex primarily infects young immunocompetent children. This multi-drug resistant microbe is a growing public health concern. The classic presentation is a unilateral lymphadenitis.

CASE REPORT

A 7 year old African American Male presented to a school based vision clinic for a routine eye exam without ocular complaint.

OCULAR HISTORY: Unremarkable

MEDICAL HISTORY: Positive for left submandibular lymphadenitis due to exposure to mycobacterium contaminated water during a dental procedure eight months prior. Completed treatment included drainage of abscess, lymphadenectomy, and an intravenous course of Amikacin and Cefoxitin.

MEDICATIONS: None

	IEI Visits 04/03/17, 04/05/17	
	OD	OS
VA	20/20 sc	20/125 sc BCVA 20/40
EOM	FROM	FROM
Pupils	WNL	2+APD
CVF	FTFC	FTFC

ANTERIOR SEGMENT: Unremarkable OD, OS

DFE: OD - Unremarkable
OS - ONH appeared hyperemic, elevated, and gliotic with chorioretinal striae extending to macula. Blunted foveal reflex. Pigmentary changes and superior demarcation line. See photos.

OCT: Average RNFL thickness OD 97 microns, OS 223 microns.

Oral Fluorescein Angiography (FA): FA revealed hyperfluorescence of the disc; likely staining but could not rule out leakage of disc. Unable to compare early and late images with oral fluorescein.

MRI: No intracranial lesions on MRI of brain and orbits.

FIGURE 1: OS Posterior Pole

FIGURE 2: OD Optic Nerve Head

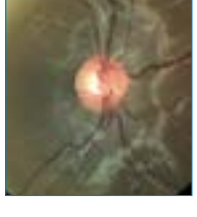
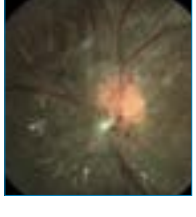


FIGURE 3: OS Optic Nerve Head



SEROLOGY: Prior lymph node cultures were positive for mycobacterium chelonae-abscessus complex. Blood work was negative for TB Quantiferon, syphilis, and bartonella.

DIAGNOSIS: Optic Neuritis OS secondary to Non-tuberculosis mycobacterium infection

DIFFERENTIAL DIAGNOSIS: Optic Neuritis vs. Neuroretinitis with possible infectious etiologies such as bartonella, mycoplasma, toxoplasmosis, toxocariasis, and mycobacterium

TREATMENT: Observation was elected on consultation with a retinal specialist, neuro-ophthalmologist, pediatric ophthalmologist, and infectious disease specialist.

FIGURE 4: OCT RNFL Analysis

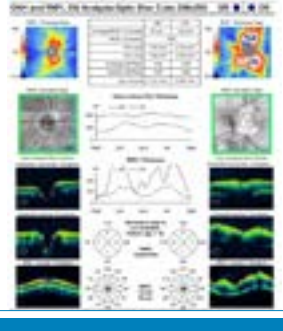


FIGURE 5: Oral Fluorescein

CONCLUSION

Management of optic neuritis is dependent on the root cause and requires additional testing before determining the most appropriate treatment option. Infectious causes of ON must be ruled out as they may be detrimental to vision and possibly life threatening. While steroid treatment is routinely used in optic neuritis, it may be withheld if an infectious etiology is discovered. In infectious cases, anti-infective agents may be used.

On identification of mycobacterial infection, excision is advocated over drainage as a potentially curative treatment option. Pending parent preference and risk of damage to the facial nerve during excision, antimicrobial chemotherapy or observation are also treatment options.

This patient had undergone both antimicrobial chemotherapy and lymphadenectomy. No additional treatment was elected due to the resolving nature of the optic neuritis and chorioretinitis.

REFERENCES

Available upon request.

ACKNOWLEDGEMENTS

Oral fluorescein image provided by Sarah Hilkert, MD at University of Chicago.

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Corneal Melt Induced by Long Term Use of Ketorolac in a Compromised Cornea

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BACKGROUND

NSAIDs are commonly used in practice in the post-operative care of cataract and refractive surgery, treatment of cystic macular edema post cataract surgery, and short term for ocular allergies. In atypical cases, NSAIDs can also be used to treat macular edema when unable to use Anti-Veg F or steroids injections as possible treatment options. Common side effects of NSAIDs include burning, stinging, and conjunctival hyperemia, while more serious complications can lead to corneal infiltrates, ulcers and melts. Those patients who have a history of compromised corneas or systemic conditions associated with poor healing time are predisposed to these more serious complications. This case outlines the treatment and management of a corneal melt induced by long term use of Ketorolac in a patient with a compromised cornea.

CASE REPORT

73 y.o Hispanic male presented to clinic with a mild foreign body sensation accompanied by gradual worsening in vision OS. Denied redness or discharge of the eye. Patient had been using Ketorolac 0.4% for 2 months for the treatment of macular edema induced by Herpes Simplex Keratitis, prescribed by the Retinal specialist. The patient was lost to follow up and not seen by an eye care provider in 2 months.

OCULAR HISTORY

- DMII without Diabetic Retinopathy OU, Pseudophakia OU, Trichiasis of eyelid with entropion secondary to trauma OS, Corneal scarring, neovascularization, and symblepharon secondary to longstanding Trichiasis OS *(see figure 1)*, Herpes Simplex Keratitis OS (2 instances treated to complete resolution with Oral Acyclovir), Macular edema secondary to Herpes Simplex Keratitis OS, treated with Ketorolac *(see figure 2)*.

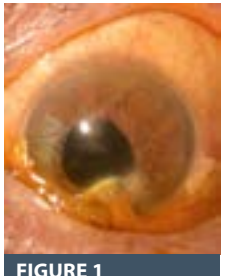

FIGURE 1

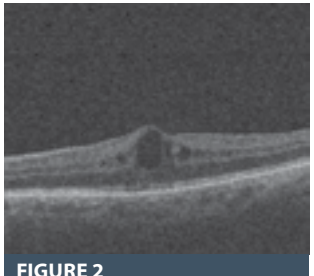

FIGURE 2

MEDICAL HISTORY

-DM II treated with Metformin

CLINICAL FINDINGS

-BCVAs: OD: 20/40, PH 20/25; OS: 20/200 PH 20/125

-EOMs: FROM OD, OS

-PUPILS: PERRL OD, fixed surgical pupil OS (-)APD

-ANTERIOR SLIT LAMP
OD: Circular anterior stromal scarring, all other findings unremarkable
OS: Anterior stromal scar with adherent iris, diffuse neovascularization inferior, symblepharon inferior, 2X2 superior nasal ulceration with thinning, and decreased corneal sensitivity. (See figure 3). Corneal sensitivity was measured with a corneal aesthesiometer after discontinuation of Ketorolac and showed that sensitivity was regained.

POSTERIOR FINDINGS
OD: Unremarkable
OS: Cystic macular edema

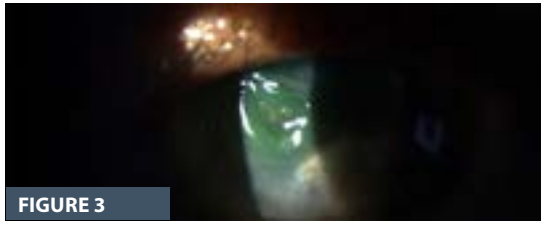

FIGURE 3

DIFFERENTIAL DIAGNOSIS

-Neurotrophic Keratitis: Ruled out because patient regained corneal sensitivity after discontinuation of Ketorolac

DIAGNOSIS

-Corneal Melt induced by long-term use of Ketorolac

MANAGEMENT

-Typical management begins with lubrication, punctal occlusion, bandage contact lenses, and antibiotic drops for prophylaxis. In severe cases tarsorrhaphy or an amniotic membrane may be necessary to promote re-epithelization. In long-term treatment, Doxycycline can be used to inhibit MMPs and Vitamin C to stimulate collagen production. In cases of perforation, referral for direct suturing or corneal gluing may be necessary.

FIG 4A: Corneal Visante image Day 2

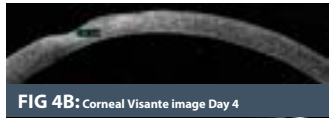

FIG 4B: Corneal Visante image Day 4

FIG 4C: Corneal Visante image Day 5 (wearing BCL)

-This patient was followed daily for a week and then weekly. At the final visit, the corneal melt resolved and BCVAs improved to PH 20/80. The patient was treated with Moxeza QID, bandage CLs (frequent replacement), and ATs q2hrs OS until full resolution. The patient was also followed closely with Visante OCT to monitor for perforation and re-epithelization *(See figure 4A, 4B, 4C)*.

DISCUSSION

"Studies show that MMP expression that normally occurs in wound healing is unregulated with NSAID use, creating an imbalance and corneal melt[1]". Systemic conditions that may predispose a patient to a corneal melt include sarcoid, rosacea, diabetes, bone marrow transplant, and graft vs host. Predisposing ocular conditions include previous herpetic disease, keratitis, dry eye, and abnormal lid function. Given the serious side effects that can arise from longstanding use of NSAIDs, it is important to manage carefully those patients who are at a higher risk for developing a corneal melt. Treatment is aimed to promote re-epithelization and prevent infection. Vistante OCT can be a useful tool in the management corneal melts.

REFERENCES

Available upon request

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Anterior Subcapsular Cataract Secondary to Black Mold Exposure

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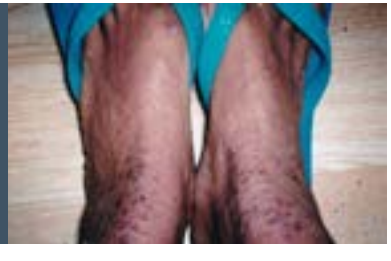
INTRODUCTION

Hypersensitivity reactions are triggered by exposure to allergens. Reactions that involve the skin in the form of atopic dermatitis are considered a type one hypersensitivity reaction, and most patients with this manifestation will have an episode of atopic dermatitis before the age of five. Anterior subcapsular cataract is an uncommon sequela of this condition. Black mold exposure is a known allergen, though anterior subcapsular cataract in a patient with no previous signs or symptoms of atopy has not been reported.

FIGURE 1
Adnexal atopic dermatitis seen after exposure to black mold

FIGURE 2
Atopic dermatitis of the feet and legs seen after exposure to black mold

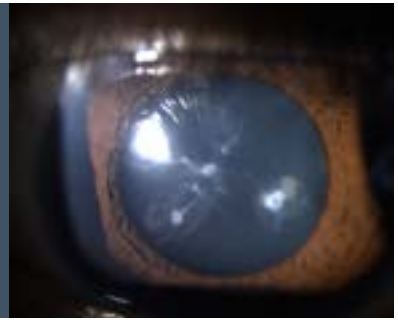


CASE REPORT

We present a case of a 31 year old African American female who presented to an urban eye clinic with complaints of blurry vision. The patient reported a primary dermatological hypersensitivity reaction at age 28 to black mold in her apartment precipitating a change in vision due to cataract. Prior to this episode there was no history of allergy. Recent re-exposure to black mold triggered another severe dermatological reaction (Figures 1 and 2) associated with worsening acuity. Upon examination, the previously noted bilateral anterior subcapsular cataracts had progressed in both eyes, more so in the right eye to and the acuity was reduced to 20/30 (Figures 3 and 4). Intraocular pressure was 20 OD and OS. Dilated ocular health examination was unremarkable OU. Subsequent allergy testing revealed that the patient was now highly allergic to grasses, trees, molds, animals, and food.

FIGURE 3
Anterior subcapsular cataract in section, OD

FIGURE 4
Anterior subcapsular cataract, OD (similar appearance OS)



DISCUSSION

Atopic disease affects between 2 to 15% of adults [2,6] though diagnostic criteria is poorly defined. Typically, a diagnosis is made based on clinical signs [2] and is commonly characterized as a triad including atopic dermatitis, allergic rhinitis, and asthma. Cataract formation is an uncommon result of atopic disease, though it is estimated to occur in 1.2 to 2.8% of patients with atopic dermatitis [5]. Patients with atopic disease are also reported to have a higher incidence of recurrent conjunctivitis, keratonconus, and retinal detachment [1,2,5].

Both anterior subcapsular and posterior subcapsular cataract have been linked to atopic etiologies, though anterior subcapsular cataract is more pathognomonic for this condition [1]. Anterior subcapsular cataract formation is typically rapid [1] and appears as a central gray -white plaque [6]. These cataracts are more common in young patients and their formation is more likely in severe atopic presentations [5,6]. The mechanism driving the formation of the lens opacity is unknown, but exists even in the absence of corticosteroid use.

CONCLUSION

Anterior subcapsular cataract is a known manifestation of atopic dermatitis and chronologically follows dermatological signs[1]. However, in the absence of an extensive atopic history by age 28, this reaction to black mold is unusual.

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Vision Therapy Intervention Post Brain Surgery

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INTRODUCTION

Thirty-seven percent of primary brain tumors in the United States are meningiomas with most occurring in adults 65 years of age or older. These tend to be noncancerous with a 10-year survival rate of 78% (20 to 44 years) and 37% for those 75 and older. Even if the surgery is successful, numerous post-surgical adverse side effects can be particularly challenging and will significantly detract from the patient's quality of life. These adverse effects included post-surgical homonymous left hemianopia and cranial nerve (CN) III palsy (restricted right gaze). Treatment modalities may include using lenses and prism, training the patients to efficiently use their available field of vision and to attempt to recover functionality in areas of residual vision. Our treatment goals were to reduce or all eliminate symptoms and to improve the patient's quality of life. This case report demonstrates the need for multiple interventions including vision therapy to address the many issues of patients with surgically induced brain injury.

CASE REPORT

A 63 Y/O WF (FA) first presented in 2012 with numerous functional limitations due to the removal of a pituitary tumor. This surgical intervention resulted in a CNIII nerve palsy, optic atrophy, and left hemianopsia, as well as; diplopia, dry eye and visual impairment. She also exhibited a ptosis, a fixed/dilated right pupil, and photophobia. Our patient had multiple medical problems including stroke, trauma from a car accident, and ADHD. She also reported diabetes, depression, headache and various allergies. FA is taking numerous medications that include but are not limited to Adderall, Crestor, Boniva, and Synthroid. After prioritizing her goals, interventions that included low vision/vision rehabilitation, anterior segment disorder management and vision therapy were utilized to improve or eliminate her many symptoms.

TABLE 1: Systemic Conditions and Surgeries

Date	Condition
2005	Fibroids Abnormal pap smear Salpingo-oophorectomy
2007	Chalazion surgery
2008	LASIK Monovision
2009	Diabetes Insipidis Pituitary Meningioma
Pre-2009	Osteoporosis High cholesterol Asthma Optic neuropathy
02/03/12	Thyroid Depression
12/18/14	Hypothalamic Obesity Narcolepsy Sleep Apnea (No longer as of 06/06/16)
04/18/2017	Keratoconjunctivitis sicca, not specified as Sjogren's Bilateral

TABLE 2: Medications

Date	Medication
Before Suprasellar resection in 2009	Tylenol Zoloft Zocor Peri-Colace Pepcid
2/03/12	Zoloft (anti depressant) (Stopped on 12/18/2014) Aplenzin (anti depressant) duloxetine (anti-depressant) Modafinil (treats narcolepsy) Xyrem (treats narcolepsy) Adderall XR (stimulant) Adderall Singulair (prevents asthma/allergies) Prilosec (for GERD) Synthroid (to treat hypothyroidism) DDAVP (synthetic vasopressin replacement) Crestor (lowers LDL) Boniva (prevents osteoclast-mediated bone resorption)
03/02/2015	Wellbutrin
01/29/2016	Tobradex ST (stopped 02/05/2016)
04/18/2017	Muro 128 5%

TABLE 3: Patient Symptoms

Mobility problems (managing curbs)	Dry eyes
Problems with reading, sewing, TV watching	Headache
Near/distance blur	Problems writing
Diplopia (Horizontal/Vertical)	Photophobia

TABLE 4: Treating Homonymous Hemianopias

Substitution strategies	Compensation strategies (each patient to efficiently use their functional field of view)	Restoration strategies
Prism Digital reading aids	Saccadic eye movements (scanning) Visual search Stop/Look/Listen/Proceed	Expand field of vision (variable outcomes)

TABLE 5: Cranial Nerve III Palsy Intervention

Non-surgical intervention	Surgical intervention
Patching Prism Botulinum toxin injections Vision Therapy	Better outcomes for partial CN III palsies Goal is to align eyes in primary position of gaze 90% gain *cosmetically acceptable* results after 3 surgeries (Only 52 subjects)

TABLE 6: Therapeutic Interventions

Spectacles (Multiple Rx changes over time occurred)

Final

Distance

+1.50-.50X100 OD -.50-1.25X095OS (all prism removed)

Reading

+3.50-.50X100 2BD OD +2.00-1.25X005 2BU OS

Computer

+2.75-.50X105 +.75 add 2BU 2.5BO OD PL-.50X136 +75 add 2BD 2.5 BO OS

Low Vision Devices

Type	Brand	Acuity/Mag	Field
Mounted Coil	Coil	10/32	10
Handheld	Walter		

Comments: Although her intial response to the use of low vision devices was quite positive, she soon discarded them because of adaptation issues

Cornea/Dry Eye

Using artificial tears, warm mask, and ointment at bedtime. No longer using Muro ointment. Start Omega 3s.

Vision Therapy

Phase 1	Phase 2	Phase 3	Phase 4
Monocular	Biocular	Binocular	Integration
Oculomotor	Oculomotor	Oculomotor	Stabilization
Hand-eye	Hand-eye	Hand-eye	
		Fusion	

Comments: We did not necessarily following this phase sequence in therapy, but rather worked on those functional skills that would help meet the needs and goals of the patient.

DISCUSSION

Those with brain injury have numerous oculo-visual anomalies that optometrists need to address. It is important to have patients prioritize their outcomes so that improved function relates to these desired outcomes. FA needed to be able to perform well at all distances, near, intermediate and far point. For example, vision therapy was specifically designed for FA to improve her oculomotor and fusional skills so that she could sew her daughter's wedding dress and eliminate/reduce diplopia. She also frequently used the computer (and intermediate distance) and required improved mobility so that her ability to lead a more normal life could occur. These tasks required three separate pairs of glasses, low vision aids, vision therapy and behavior modification in dealing with her everyday demands. This behavior modification included learning to move her head to help eliminate diplopia. We also taught her how to stop, look and listen when approaching intersections in hallways and before proceeding through doorways to avoid collisions. And finally, we reminded her that success needed to be measured from her immediate post-surgical adverse outcomes and not her pre-surgical abilities. This way she could realize the amount of improvement obtained with our interventions and how her dedicated commitment to improving her quality of life was worthwhile.

Initially the patient was almost constantly diplopic, had mobility issues and could not readily use a computer or read. At the last assessment she reports diplopia less than 10% of the time at distance and less than 30% of the time at near. When she is diplopic, she can now voluntarily fuse the image. Many of FA's goals have been met and she not only attended her daughter's wedding, but did make her daughter's wedding dress. Therapy has been discontinued at this time. We will continue to monitor her progress and she is scheduled for a follow-up assessment in 3 months.

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Retinitis Pigmentosa presents with associated Juvenile Glaucoma

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INTRODUCTION

Juvenile glaucoma is a rare condition typically occurring in myopic children and showing autosomal dominant transmission. Onset occurs between the ages of 3 and 40, with markedly elevated IOP as the presenting sign. Unlike the other primary developmental glaucomas, it is not associated with systemic abnormalities, neoplasms, ocular syndromes, or infection. Lack of symptoms and sometimes subtle presenting signs may delay diagnosis until progressive damage has occurred. Treatment often involves surgery, as traditional topical and laser intervention is less successful. Retinitis pigmentosa (RP) is a genetic disorder characterized by progressive peripheral vision loss and nyctalopia. Ocular signs may be found in isolation or in addition to systemic disease. Prevalence in the United States is 1 in 4000. Age of onset may vary, although it is usually diagnosed in early adulthood. Retinal changes are typical, with confirmation generally via electroretinography. There is no known cure. Patients do not become completely blind, and many benefit from low vision aides and devices.

CASE REPORT

An 11 year old African American female presented to clinic having lost the glasses prescribed to her at age 8. Previous records noted 20/20 vision OD, OS, low hyperopia, elevated IOP (22mmHg OD, 33mmHg OS) and moderate ONH cupping. Fundus photos were taken, but follow up appointments were not kept as recommended. Current acuity is now 20/20 OD, LP OS, with the patient denying that she had realized vision in her left eye was reduced. IOP was 20mmHg OD, 42mmHg OS, with 0.4 OD and 0.99 cupping OS. Anterior chamber angles were deep OU but somewhat anomalous, with PAS interspersed through ciliary body OD, and TM OS although closed inferotemporally. Dilated exam revealed bone spicule changes OU, not previously noted. The patient was diagnosed with retinitis pigmentosa OU and juvenile glaucoma OS. Subsequent electrodiagnostic testing confirmed RP, with a marked reduction of both rod and cone signals. Topical medications prescribed OS lowered the IOP to 20mmHg. Low vision evaluation provided glasses as well as activity/performance recommendations. At this time no other family members are known to be affected.

FIGURE 1a, b: Initial fundus photos, age 8

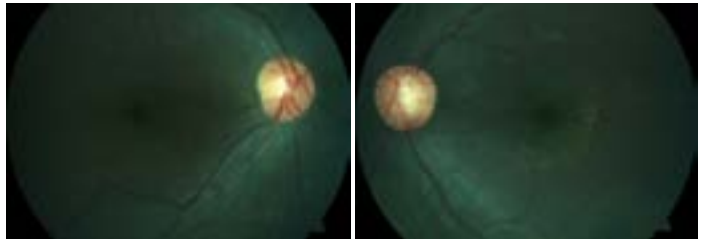


FIGURE 2a, b: Subsequent fundus photos, age 11

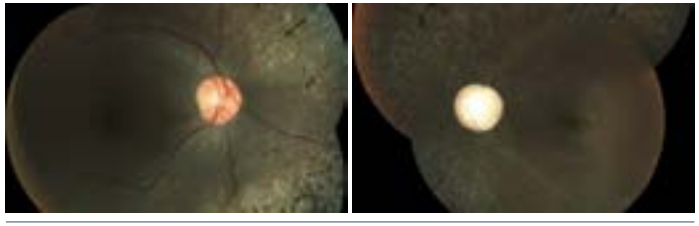


FIGURE 3
Visual field result

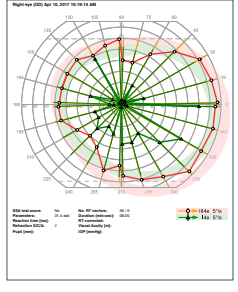
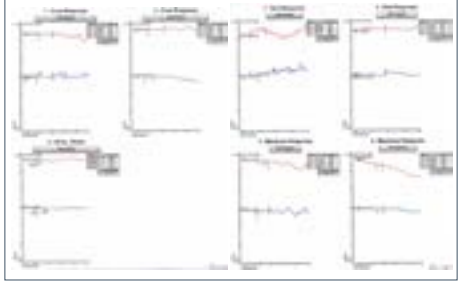


FIGURE 4a, b
ERG result



DISCUSSION

The first case of retinitis pigmentosa associated with glaucoma was recorded in 1862. Since that time, most of the correlation between RP patients and glaucoma involves acute angle closure or ICE syndromes, with a prevalence of up to 2.3%. Isolated reports exist in literature without any unifying characteristic or typical anomalous finding. Increased pigment in the trabecular meshwork was at one time suggested, but it occurs at such low grade as to be incapable of obstructing outflow channels. RP has not been associated with any of the primary or secondary juvenile glaucomas. This patient at this time, like so many others in a review of literature, appears to be an isolated case. However, ocular anatomic structures will be monitored over time to ensure that anterior chamber angle or other anomalies do not develop.

ABBREVIATED REFERENCES

full list upon request.

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The authors would like to thank Dr. Leo Wang.

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New–Onset Right Hypertropia: A Sequela of Inflammatory Orbital Pseudotumor

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CASE HX

A 45 year old African American male presents as a walk-in with a new vertical deviation of his right eye. He reports slow onset over the past six months, gradually worsening. He notes constant vertical diplopia. He denies eye pain. His comprehensive eye exam six months earlier was unremarkable. No vertical deviation was noted. A mild prescription was released for distance and near. Medical conditions include carpal tunnel, osteoarthritis, and poorly controlled Type 2 diabetes mellitus with a fluctuating HbA1c. He has a history of Bell's Palsy affecting the right side of his face, but the condition has been resolved for fifteen years without recurrence. The patient is currently taking metformin and tramadol for joint pain.

PERTINENT FINDINGS

The patient was afebrile without nausea or fatigue. No recent illnesses were noted. Clinical examination indicated a vertical hypertropia OD greater than 40 prism diopters (see Figure 1). Pupils were normal. EOMs indicated incomplete depression OD in downgaze and slight abduction limitations OD. CVFs were full to finger counting OD, OS. Hertel exophthalmometry was 30 OD, 25 OS (see Figure 2 for proptosis). Color vision was normal. On slit lamp exam, 2-3+ periorbital edema OD was noted without tenderness. There was 2+ conjunctival chemosis with trace injection OD. No follicles or papillae were noted. The patient's left eye was completely uninvolved. No anterior chamber reaction was noted OD,OS, and IOP was 23 mmHg OD, 18 mmHg OS. Upon dilated examination, all posterior health was unremarkable. No nerve edema or abnormalities were noted OD or OS.

The patient was sent for an MRI with and without contrast. A multisequential multiplanar MRI of the head was obtained. The radiology report indicated proptosis OD (see Figure 3) with enlargement of the superior and lateral recti (see Figure 4). The left eye was normal. A 1.5 cm retention cyst was noted in the right maxillary sinus (see Figure 5). All other sinus and cerebral structures were normal.

FIGURE 1
Hyepertropia

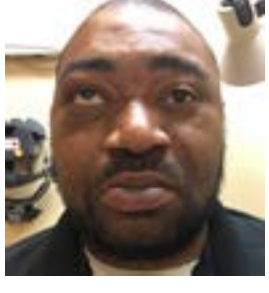
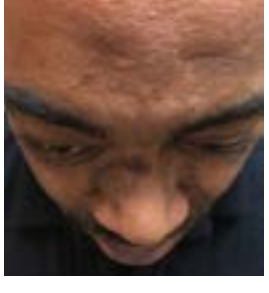


FIGURE 2
Proptosis



DIFFERENTIAL DIAGNOSIS

The differential diagnoses were inflammatory orbital pseudotumor (idiopathic orbital inflammatory syndrome) versus infectious orbital cellulitis. The patient has a history of normal thyroid levels, so thyroid eye disease was not a concern. The patient had a history of chronic sinusitis, a common underlying cause of orbital cellulitis. The co-managing ophthalmologist also consulted an oculoplastics ophthalmologist to consider conducting a biopsy to rule out lymphoma if conservative treatment was ineffective. The biopsy was intended to confirm if the muscle bellies were enlarged, or infiltrated with invasive cell types.

DIAGNOSIS AND DISCUSSION

Inflammatory orbital pseudotumor generally presents with unilateral periorbital edema, proptosis, redness, double vision, pain, and blurred vision. It can appear as acute, recurrent, or chronic in nature.[1] The inflammation is non-infectious and space-occupying, with no systemic association.[2] Restricted motility is frequently noted, as EOMs are inflamed and inhibited. Involvement of the EOMs is noted on imaging as enlarged muscle bellies and associated tendons. The subcategory of inflammatory orbital pseudotumor that involves the muscles versus general orbital tissue is called orbital myositis.1 Psuedotumor is the third most prevalent inflammatory orbital condition, following thyroid eye disease and lymphoproliferative disease.[3]

FIGURE 3
Pseudotumor proptosis

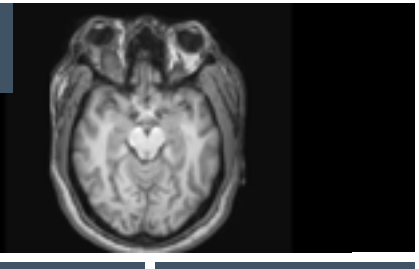


FIGURE 4
Muscle Enlargement

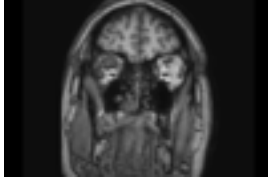
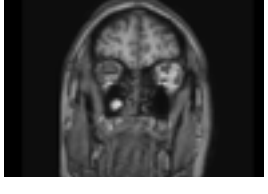


FIGURE 5
Sinusitis



Important tests to conduct for diagnosis include a history to rule out malignancy, exophthalmometry, IOP, and a dilated view of the nerve for edema from a space-occupying lesion. A fever noted in office indicates active infection, as with an orbital cellulitis. Blood work to consider includes an ESR, CBC with differential, ANA, BUN, creatinine (before imaging with contrast), and fasting blood sugar prior to beginning the patient on oral steroids. A CBC with differential indicates active infection, while an ESR or ANA will provide information regarding inflammation. If concern for granulomatous conditions is present, a chest x-ray with an ACE test is pertinent. Because this condition is non-infectious, the mainstay of treatment is oral steroids to decrease inflammation. A biopsy of orbital tissue may be conducted to rule out malignancy if the patient is not responsive to steroid treatment.[1]

TREATMENT, MANAGEMENT

The patient was started on 80 mg of oral prednisone daily with 20 mg of omeprazole for prostaglandin protection, as is the standard of care.[1] He was monitored at one week for progress. Exophthalmometry readings indicated 2mm of improvement in proptosis OD at one week. The abduction and depression deficits began to decrease after two weeks of steroid treatment, as function to the lateral rectus and superior rectus were gradually restored. The frequency of the right hypertropia became more intermittent instead of constant by week two. Diplopia lessened. The patient was followed weekly for follow up and progress evaluation until symptoms resolved entirely. Four weeks of oral prednisone treatment was ultimately required to decrease the orbital inflammation. The length of this treatment was longer than anticipated, but improvement in the condition at weekly intervals indicated treatment was working, albeit gradually. Once the proptosis and periorbital edema had subsided, the patient was placed on a four-week prednisone taper to prevent rebound inflammation.

CONCLUSION

Inflammatory orbital conditions may pose a threat to the health of a patient, or be indicative of serious systemic health concerns. Access to imaging and co-management with ophthalmology ensures the management of the condition are seamless, and treatment is maximized for quick resolution.

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Tinted Gas–Permeable Contact Lens Fitting in a Patient with a History of Temporary Keratoprosthesis

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INTRODUCTION

Penetrating keratoplasty (PKP) is a widely successful and common procedure involving a full-thickness corneal transplant. In the United States alone, there are approximately 33,000 PKP operations per year. Typically, these corneal surgeries are performed secondary to anterior segment complications such as keratoconus, contact-lens related ulceration, and corneal dystrophies or degenerations, in order to improve a patient's visual potential. The average lifespan of a healthy corneal transplant is patient-dependent, with a survival estimate of 64% at 10 years, 27% at 20 years, and 2% at 30 years. If a patient has instances of recurrent ectasia or decompensation, it becomes necessary to repeat the PKP procedure.

In instances where multiple keratoplasties have been attempted and fail, a Keratoprosthesis (K-Pro) becomes an option. A K-Pro implant is an artificial cornea in the place of the patient's diseased cornea or failed graft. Although not without its own adverse events (most common being extrusion of the prosthesis), if properly maintained, a K-Pro can last an entire lifetime, and is therefore generally considered a longterm solution. However, in the event where posterior segment complications exist alongside anterior segment opacification, a temporary keratoprosthesis may be of benefit to allow a clear view for evaluation and management of the posterior segment condition.

CASE REPORT

KH is a 39 year-old asian female who entered the Illinois Eye Institute with complaints of poor cosmesis and vision of the left eye after penetrating keratoplasty five months prior.

Ocular History: Acute retinal necrosis of the left eye with secondary retinal detachment, repaired with silicone oil tamponade in 1997, causing significant corneal opacification. Panretinal photocoagulation (PRP) of the left eye, with use of temporary keratoprosthesis followed by standard penetrating keratoplasty in November 2016

Medical History: Unremarkable

Medications: Prednisolone Acetate 1% four times per day, left eye only

VA sc:
OD: 20/20
OS: CF at 1 foot

Slit Lamp Findings:
- Trace scurf on lashes OD / OS
- Standard Penetrating Keratoplasty OS: Clear central graft, diffuse corneal edema, haze at graft / host junction with no neovascularization or signs of rejection with 15 intact sutures
- Aniridia OS
- Aphakia OS

Imaging:
The following imaging was done prior to the gas-permeable lens fitting of the patient
- Anterior segment photos: Figure 1
- Anterior segment OCT: Figure 2
- Topography / Pachymetry: Figure 3

FIGURE 1
Appearance of corneal transplant

FIGURE 2
Anterior segment OCT

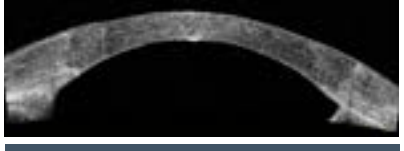
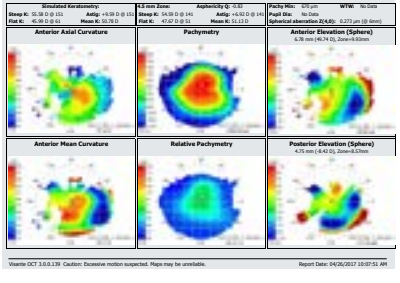


FIGURE 3
Topography indicating 9.59 diopters of corneal astigmatism and minimum pachymetry of 670 microns



Lens Design
The patient was successfully fit into a 10.70mm diameter Rose K2 Irregular Cornea (Blanchard Contact Lens Inc. Manchester, NH) aspheric gas-permeable lens with a power of +18.00 DS, and a base curve of 7.89. In addition, this lens was tinted brown in order to allow not only for better vision, but improved cosmetic matching between the eyes and decreased photophobia.

Final Lens Examination: See Figure 4
- VA cc OS: 20/250, with no over-refraction
- Lens fitting: Well-centered, Lid-attachment fit, Adequate 1.5mm movement, Adequate central alignment with scattered pooling along areas of graft, Mid-peripheral bearing, Adequate edge lift 360
- Adequate comfort as per patient
- Excellent cosmesis as per patient

DISCUSSION

Although more commonly a longterm solution to corneal opacification, a temporary keratoprosthesis (TKP) can be useful in cases where posterior and anterior segment pathologies exist concurrently. There is a higher success rate and decreased complications of a TKP done with a vitreoretinal surgery, if completed within one month of one another. However, many procedures are done the same day, as in the case of our patient. In addition, despite successful surgery, both posterior and anterior, visual prognosis in these cases is likely poor, ranging from 20/200 to no light perception (NLP). Although a large range of survival rates exist, it is likely that the lifespan of a PKP status-post TKP with posterior segment surgery is similar to that of a PKP alone.

FIGURE 4
Fluorescein pattern of final dispensed lens

In addition, corneal surgeries can cause necessary rigid contact lens wear to correct for significant astigmatism and irregularities. Not only does the lens used for this patient serve to correct for her high, irregular refractive error, having the lens tinted allows for improved cosmesis and decreased photophobia for the patient.

CONCLUSION

In the case of our patient, significant pathology of the posterior segment caused secondary anterior segment complications. This necessitated the use of a TKP for further surgical intervention, followed by a PKP for improved vision. Although our profession is likely to see these types of patients after their surgery, it is critical to be aware of the uses for TKP, and intervene with devices such as rigid contact lenses to improve vision, as well as cosmesis, after surgical intervention. In addition, careful monitoring of the subsequent corneal graft for any signs of rejection is also necessary for proper care of our post-transplant patients.

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Progressive Visual Field Loss Following Cessation of Hydroxychloroquine Therapy in a Patient with Systemic Lupus Erythematosus and Sjögren's Syndrome

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INTRODUCTION

Chloroquine (CQ) and hydroxychloroquine (HCQ) are mainstay therapy in the treatment of systemic lupus erythematosus (SLE) and Sjögren's syndrome. Duration of use and daily dose are risk factors for the development of retinal toxicity, which is irreversible and may be progressive following cessation of the medication.[1-6] The overall risk of retinal toxicity is less than 1% at 5 years, but can be as high as 20% at 20 years.[1] Automated visual field testing and SD-optical coherence tomography (OCT) are the recommended screening tests for retinal toxicity given they are sensitive to and highly specific for early changes.[1,7,8] Once toxicity is identified, it is imperative for the optometrist to communicate that to the treating physician so that decision to cease therapy with CQ or HCQ and try alternative medications can occur.

FIGURE 1
Automated 10-2 visual field showing dense annular scotoma OU. Right eye MD -15.32 DB, PSD 5.54 DB. Left eye MD -12.14 DB, PSD 7.33 DB.

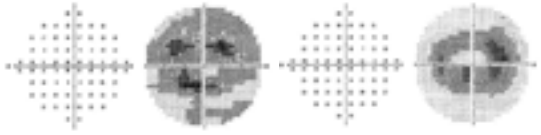
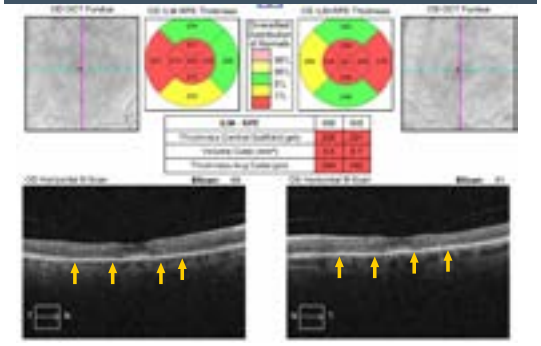


FIGURE 2
SD OCT showing pronounced central and paracentral thinning OU, along with early loss of the photoreceptor outer segment lines (arrows).



CASE REPORT

A 59-year-old CF with SLE, Sjögren's syndrome, and thyroid disease presented for specialty contact lens fitting to treat her severe chronic dry eye symptoms. Weighing 105 lbs., she had been taking Plaquenil 300 mg qd for 4 years. Entering acuity was 20/20 OD, 20/25 OS. Baseline 10-2 automated perimetry revealed dense annular scotoma OU (Fig. 1A OD, 1B OS) and macular SD OCT indicated severe thinning OU (Fig. 2). Thirteen months after HCQ cessation, her vision had declined to 20/25 OD, 20/30 OS, and the annular scotoma (Fig. 3A OD, 3B OS) and macular thinning had progressed (Fig. 4).

FIGURE 3
Automated 10-2 visual fields with progression of annular scotoma OU following cessation of HCQ. Right eye MD -18.00 DB, PSD 9.01 DB. Left eye -15.58 DB, PSD 9.79.

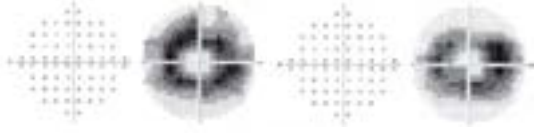
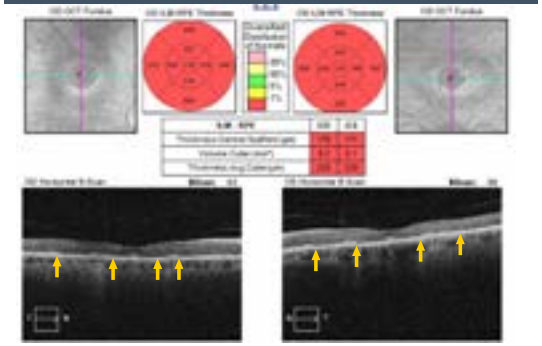


FIGURE 4
SD OCT showing progressive central and paracentral macular thinning with increased loss of the outer photoreceptor segment line (arrows).



DISCUSSION

The use of automated visual fields in conjunction with SD OCT is recommended for all patients on CQ and HCQ.[1,4] The 10-2 field should be utilized, but for Asian patients a wider pattern should be utilized.[1] The superonasal field often shows early damage, however inconclusive results warrant repeat testing for confirmation.[1] SD OCT screening of the parafoveal region helps identify focal disruption to the photoreceptor outer segment line.[1] Localized loss of this photoreceptor outer segment line is highly suggestive of toxicity. Other objective tests (fundus autofluorescence & multifocal ERG) can be used if needed, but are not required for screening.

CONCLUSION

The recommendations for screening for CQ and HCQ toxicity were updated in 2016.[1] HCQ retinal toxicity is considered rare, and may lead to lack of review of pertinent guidelines. While uncommon, the annular scotoma associated with retinal toxicity is visually devastating and may progress following cessation of CQ or HCQ.[3-5,7] This case report demonstrates the importance of all eye care providers to understand the current guidelines, and make the appropriate referrals and recommendations to the treating physician. Failure to detect subtle toxicity may lead to deleterious quality of life outcomes.

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Repeatability of Tablet Computer – Based Near Visual Acuity Measurement

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CELEBRATING 145 YEARS

PURPOSE

With the recent advances in technology, computerized tests have been used to measure visual function, including visual acuity (VA) and contrast sensitivity (CS). Computerized equipment can generate similar results as gold standard charts if test distance and position of the test screen are correct and external glare are limited. However, many of those systems have not yet been validated. The purpose of this study was to determine the repeatability of a tablet computer-based near visual acuity (VA) measurement and its agreement with the gold standard chart-based measurement in normal subjects and in subjects with reduced VA.

METHODS

Fifty-one subjects were tested (ages 22 to 91 years), including 33 subjects with normal VA (20/25 or better) and 18 subjects with reduced VA (20/30 to 20/100). Near VA of one eye from each subject was measured at 40 cm with the M&S Technologies tablet computer system (M&S-NVA) and the Precision Vision chart (P-NVA) in a random sequence. Subjects were retested one week (± 3 days) later. Forty-eight subjects (94%) completed the retest. Repeatability was evaluated using the 95% limits of agreement (LoA) between the two visits.

RESULTS

Table 1 lists demographic characteristics of the subjects. The average difference between the M&S-NVA and the P-NVA was 0.02 ± 0.10 logMAR (one letter difference) without statistical significance via the Wilcoxon signed ranks test (**Figure 1**). The average difference between the two visits for both M&S-NVA and P-NVA was 0.02 logMAR (one letter) with no statistical significance (**Figures 2 and 3**). The M&S-NVA had good agreement with the P-NVA, with 95% LoA of ± 0.19 logMAR. The M&S-NVA showed slightly better repeatability (95% LoA = ± 0.20) than the P-NVA (95% LoA = ± 0.24) among all subjects.

TABLE 1
Demographic Characteristics of the Subjects (n = 51)

	Number of Subjects (%)
Visual Acuity	
20/25 or better	33 (64.7)
20/30 to 20/100	18 (35.3)
Gender	
Female	42 (82.4)
Male	9 (17.6)
Race	
Black	22 (43.1)
Hispanic	8 (15.7)
White	16 (31.4)
Asian	5 (9.8)
Age (years)	
Range	22.6-91.1
Mean (SD)	46.7 (17.5)

FIGURE 1
Agreement between the tablet computer-based near VA test and the chart-based near VA test. The difference between the first administration of each test is plotted against the average for the two tests.

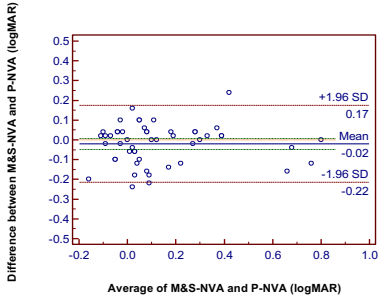


FIGURE 2
Repeatability of the tablet computer-based near VA test. The difference between the first and second administration of the tablet computer-based near VA test is plotted against the average of the two tests.

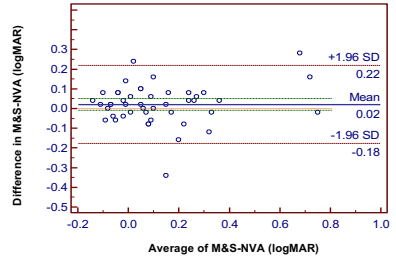
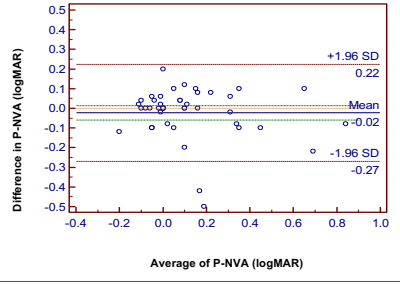


FIGURE 3
Repeatability of the chart-based near VA test. The difference between the first and second administration of the chart-based near VA test is plotted against the average of the two tests.



CONCLUSIONS

- The tablet computer-based M&S Technologies near VA test shows good repeatability and agreement with the gold standard Precision Vision chart-based near VA test.
- The automated tablet computer-based near VA test is a useful and practical alternative to chart-based near VA measurements.

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Repeatability of Tablet Computer – Based Intermediate Visual Acuity Measurement

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PURPOSE

With the recent advances in technology, computerized tests have been used to measure visual function, including visual acuity (VA) and contrast sensitivity (CS). Computerized equipment can generate similar results as gold standard charts if test distance and position of the test screen are correct and external glare are limited. However, many of those systems have not yet been validated. The purpose of this study was to determine the repeatability of an automated computer tablet-based intermediate visual acuity (VA) measurement and its agreement with the gold standard chart-based measurements, Precision intermediate VA test, in normal subjects and subjects with reduced VA

METHODS

Fifty-one subjects were tested (ages 22 to 91 years), including 33 subjects with normal VA (20/25 or better) and 18 subjects with reduced VA (20/30 to 20/100). Intermediate VA of one eye from each subject was measured at 66 cm with the M&S Technologies tablet computer system (M&S-IVA) and the Precision Vision chart (P-IVA) in a random sequence. Subjects were retested one week (± 3 days) later. Forty-eight subjects (94%) completed the retest. Repeatability was evaluated using the 95% limits of agreement (LoA) between the two visits.

RESULTS

Table 1 lists demographic characteristics of the subjects. The average difference between the M&S-IVA and the P-IVA was 0.02 ± 0.10 logMAR (one letter difference) without statistical significance via the Wilcoxon signed ranks test (**Figure 1**). The average difference between the two visits was 0.02 ± 0.12 logMAR and 0.01 ± 0.10 logMAR for M&S-IVA and P-IVA, respectively (**Figures 2 and 3**). The M&S-IVA had good agreement with the P-IVA, with 95% LoA of ± 0.20 logMAR. The M&S-IVA showed slightly better repeatability (95% LoA = ± 0.16) than the P-IVA (95% LoA = ± 0.20) among all subjects.

TABLE 1
Demographic Characteristics of the Subjects (n = 51)

	Number of Subjects (%)
Visual Acuity	
20/25 or better	33 (64.7)
20/30 to 20/100	18 (35.3)
Gender	
Female	42 (82.4)
Male	9 (17.6)
Race	
Black	22 (43.1)
Hispanic	8 (15.7)
White	16 (31.4)
Asian	5 (9.8)
Age (years)	
Range	22.6-91.1
Mean (SD)	46.7 (17.5)

FIGURE 1
Agreement between the tablet computer-based intermediate VA test and the chart-based intermediate VA test. The difference between the first administration of each test is plotted against the average for the two tests.

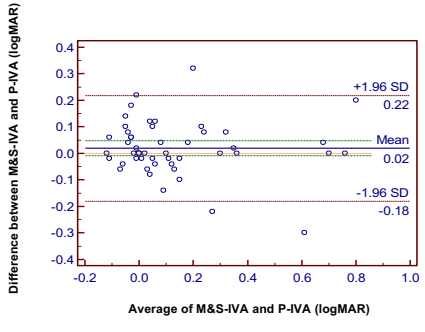


FIGURE 2
Repeatability of the tablet computer-based intermediate VA test. The difference between the first and second administration of the tablet computer-based intermediate VA test is plotted against the average of the two tests.

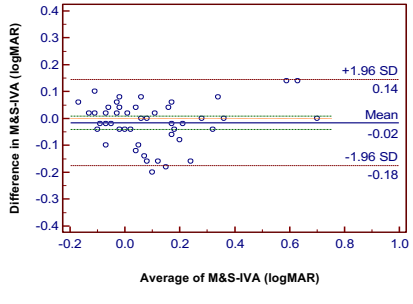
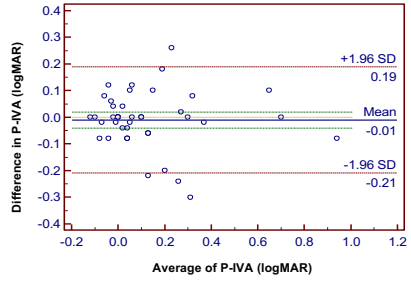


FIGURE 3
Repeatability of the chart-based intermediate VA test. The difference between the first and second administration of the chart-based intermediate VA test is plotted against the average of the two tests.



CONCLUSIONS

- The tablet computer-based M&S Technologies intermediate VA test shows good repeatability and agreement with the gold standard Precision Vision chart-based intermediate VA test.
- The automated tablet computer-based intermediate VA test is a useful and practical alternative to chart-based intermediate VA measurements.

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Co-Management of Hypotony Status Post Ex-PRESS Shunt in a Monocular Patient

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BACKGROUND

Many studies have shown that Ex-PRESS has fewer postoperative complications, interventions, and has a higher success rate when compared to standard trabeculectomy. Despite Ex-PRESS shunt showing fewer complications, a small subset of patient demographics increases the risk for hypotony maculopathy after the procedure. Young age, male gender, myopia and African American ethnicity were found to be significant risk factors for the development of hypotony maculopathy after glaucoma filtering surgery. The first three are possibly due to low scleral rigidity while African Americans are also thought to have a higher number of fibroblasts present in their conjunctivas. The use of mytomycin C intra-operatively has been shown to increase the risk for hypotony as the bleb takes longer to scar.

CASE REPORT

36 year-old AAM presents with blurry vision 1 week status post laser suture lysis following Ex-PRESS shunt with mytomycin C OD 3 weeks ago

Ocular History: (+) blunt trauma OU after being mugged and beaten 2010; (+) 2nd blunt trauma OS in 2011 resulting in enucleation and prosthesis; (+) traumatic glaucoma OD diagnosed in 2016

Medical History: unremarkable

Ocular Medications: prednisolone acetate 1% TID OD that was gradually tapered down over two months

Clinical Examination

	6/22/17 (pre-suture lysis)	6/29/17	7/13/17	8/10/17	8/15/17
PH VA	20/30	20/80	20/125	20/100	20/80
Anterior Chamber	Ex-PRESS shunt in place	2+ cell	1+ cell	0.5+ cell	0.5+ cell
IOP	21 mm Hg	4 mm Hg	2 mm Hg	1 mm Hg	0 mm Hg

Anterior segment: Shallow anterior chamber; large, pale, flat, diffuse, and avascular bleb with (-) Seidel sign at every visit; anterior synechia and corneal folds present on 8/15/17

DFE: glaucomatous cupping and pale optic nerve, choroidal folds and macular striae in posterior pole

Macula OCT: choroidal folds & hypotony maculopathy
B-Scan: thickening of the posterior sclera and choroid

FIGURE 1
Corneal Folds

FIGURE 2
Large, Pale, Flat, Diffuse, and Avascular Bleb

FIGURE 3
Posterior Pole Color

FIGURE 4
Posterior Pole IR

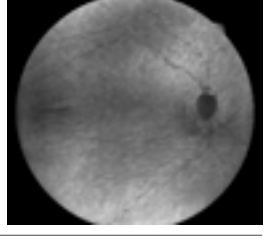


FIGURE 5
OCT Demonstrating Hypotony Maculopathy

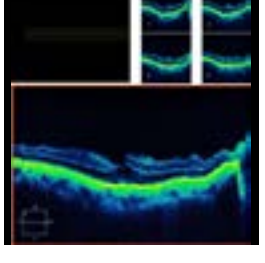
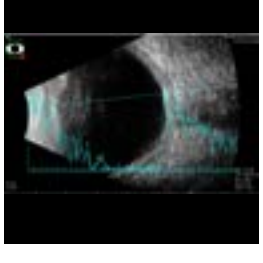


FIGURE 6
B-Scan



DISCUSSION

- Due to the over filtration of the bleb, the initial treatment was to taper the prednisolone acetate. Steroid discontinuation should allow for the patient to scar, leading to increased IOP.
- After almost two months of unresolved hypotony and a diagnosis of choroidal folds and hypotony maculopathy, the patient was referred back to the surgeon for further treatment.
- Treatment options in this case for hypotony maculopathy include: autologous blood intrableb injection, compression sutures, or full revision.
  - Autologous blood injections have been found to be over 60% effective in increasing IOP. It is thought that the fibrin and erythrocytes block the fluid from flowing through the bleb easily and possibly promoting scarring.
  - Compression suture have been shown to be effective 64% of the time for over filtering blebs. Sutures are inserted through the conjunctiva to help adhere the conjunctiva to underlying structures and decrease outflow.
  - Full revision is a more invasive option, but 89% of patients' vision improved to 20/30 or better after. This consists of opening the flap and re-suturing with two sets of sutures.
- The increase in pressure with autologous blood injection may not be sufficient and since his bleb is flat, compression sutures may not be effective. The patient is scheduled for a full revision.

CONCLUSION

- Co-managing post-operative glaucoma surgery patients can be difficult. Despite the same surgical technique, outcomes can vary due to the unpredictable healing process of each patient.
- As surgical techniques improve, possible complications have become rarer. Optometrists need to be aware of patients' risk factors when co-managing glaucoma surgery post-op patients and referring patients for surgical consults. Ex-PRESS implantation typically has fewer complications when compared to standard trabeculectomy; however, this patient was a high-risk case owing to his monocular status, advanced glaucoma, race, young age and male gender.
- Though our case presents a hypotonic eye with poor vision post-surgery, it has been shown that there was no statistical difference in final outcomes between the eyes with chronic hypotony and the eyes without in visual acuity or Humphrey visual field mean deviation. Cause for concern is after six months of hypotony, as it is possible for permanent chorioretinal fibrosis to occur. Hypotony intervention is dependent on the case, treating those at higher risk for hypotony maculopathy sooner, rather than later.

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Relationship Between Childhood Tobacco Smoke Exposure, Remnants of the Anterior Tunica Vasculosa Lentis, and Long Anterior Lens Zonules

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PURPOSE

The long anterior zonule (LAZ) trait is characterized by zonular fibers that extend more anterior on the anterior lens capsule than usual (Fig. 1).[1-4] The fibers appear as radial, fine lines that can become pigmented due to rubbing against the posterior iris pigment epithelium which may cause melanin granules to get "pushed" into the zonular tissue.[2,4,5] Other pigment dispersion signs may be present including Krukenberg spindles and trabecular pigmentation.[5,6] LAZ may rarely be associated with a mutation in the complement 1q tumor necrosis factor-related protein 5 (C1QTNF5 or CTRP5) gene that causes late-onset retinal degeneration (L-ORD).[7,8] Another LAZ variety, possibly with 2% prevalence, appears to have different etiology and is being studied as a potential risk factor for glaucoma resulting from open- or narrow-angle mechanisms.[5,9-11] In an earlier case-control study, association was found between remnants of the anterior tunica vasculosa lentis (RATVL) and LAZ (Fig. 2), adding suspicion that this LAZ type may also result from genetic mutation.[9,12] With new study, we further investigated LAZ and RATVL.

METHODS

As part of ongoing study of the LAZ trait, information was collected during 2011-2016 on consecutive patients belonging to several practitioners at an urban academic eye care facility in Chicago, Illinois, USA. To be included, subjects had to: 1) be >18 years of age; 2) provide written consent and complete a short questionnaire to obtain additional demographic and health information; and 3) have exam that included pupillary dilation. Relevant data was collected from the exam, from the health record, and from the questionnaire. Eyes were excluded with history of intraocular surgery, uveitis, or significant ocular trauma. Multivariable regression was used to assess the LAZ-RATVL relationship and to explore potential relationship to other factors (Table 1, 2). Statistical analyses were performed using the SAS® System, Release 9.3 for Microsoft Windows® (SAS Institute Inc., Cary, NC).

RESULTS

There were 2,468 subjects whose characteristics are shown in Table 3. Among right eyes, 377 (15.5%) had RATVL and 121 (4.9%) had LAZ. RATVL prevalence was 27.3% among LAZ eyes vs. 14.7% among non-LAZ eyes (P<0.001). Adjusting for other factors, eyes with RATVL were 2.5x more likely to exhibit LAZ (OR=2.5; 95% CI=1.6 to 3.9; P<0.0001), and more likely to belong to younger (P<0.0001), hyperopic (P<0.01) females (P<0.01) reporting childhood smoke exposure in the home (OR=1.3; 1.1 to 1.7; P<0.01). The factors most likely present among LAZ eyes (excluding RATVL) were older age (P<0.0001), hyperopia (P<0.001), female gender (P<0.01) and a history of childhood exposure to smoking in the home (OR=1.7; 1.0 to 2.8; P<0.05) (Tables 4, 5).

TABLE 1
Variables Explored in Regression Models

Demographic	Ocular	Systemic
Age	Long zonule trait presence	Body mass index
Gender	Refractive error	Systolic / diastolic blood pressure
Race	Remnants tunica vasculosa lentis	Hypertension
Education		Diabetes
		History of cancer
		Smoking
		Alcohol
		Cholesterol medication

TABLE 2
Reported Childhood Exposure to Smoking in Home

When you were a child, did anyone regularly smoke inside the home?
- ☐ Yes: a heavy amount of smoking
- ☐ Yes: a moderate amount of smoking
- ☐ Yes: a minimal amount of smoking
- ☐ No

Smoke Exposure	Subjects (N)	Percentage
Heavy	456	18.5
Moderate	626	25.4
Minimum	393	15.9
None	993	40.2
Categorization Used For Final Regression Analyses		
Heavy / Moderate	1082	43.8
Minimum / None	1386	56.2

TABLE 3
Subjects

Total Subjects	2,468
Age (years)	‡51.2 ± 15.5 (18-94)
Gender	
Females	64%
Males	36%
Race	
African-American	82.5%
Hispanic	7.3%
White	5.7%
Asian	1.5%
Other	3.0%

‡Mean ± Standard Deviation (Range)

TABLE 4
Multivariate Analysis
RATVL[‡] as Dependent Variable - Right Eyes

Variable	Coefficient	Standard Error	P-value	Odds Ratio	95% CI
Intercept	-1.76	0.33	--	--	--
Age (by decade)	-0.20	0.04	<0.0001	1.2	1.1 to 1.3
Gender (female)	0.38	0.12	<0.01	1.5	1.1 to 1.9
Refractive error (SE, per diopter)	0.07	0.02	<0.01	1.1	1.0 to 1.1
LAZ trait present	0.91	0.22	<0.0001	2.5	1.6 to 3.9
Childhood smoke exposure	0.30	0.11	<0.01	1.3	1.1 to 1.7

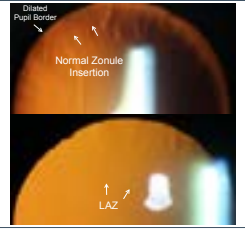
‡Abbreviations: CI, confidence interval; LAZ, long anterior zonule; SE, spherical equivalent;

TABLE 5
Multivariate Analysis
LAZ[‡] as Dependent Variable - Right Eyes

Variable	Coefficient	Standard Error	P-value	Odds Ratio	95% CI
Intercept	-9.50	1.00	--	--	--
Age (by decade)	0.64	0.10	<0.0001	1.9	1.6 to 2.3
Gender (female)	0.84	0.32	<0.01	2.3	1.2 to 4.3
Refractive error (SE, per diopter)	0.22	0.07	<0.001	1.1	1.1 to 1.4
Childhood smoke exposure	0.51	0.26	<0.05	1.7	1.0 to 2.8

‡Abbreviations: CI, confidence interval; LAZ, long anterior zonule; SE, spherical equivalent;

FIGURE 1
Normal zonule insertion zone (top) compared to LAZ trait (bottom).

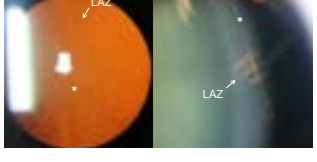


DISCUSSION

This analysis helps confirm earlier observation, that LAZ and RATVL are associated. This is helpful toward an evolving understanding of what constitutes features of the LAZ clinical phenotype. A reason why this association is of interest is that the congenital presence of RATVL may also suggest congenital predisposition to the LAZ variety being studied, which is suspected because the LAZ variety that occurs with L-ORD has been shown to be due to genetic mutation.[7,8] We believe the LAZ phenotype studied herein deserves study because of its prevalence and its potential association with glaucoma. It is noteworthy that in their study of L-ORD and LAZ, Ayyagari et al. developed suspicion for glaucoma related to the phenotype but were unable to prove it due to low statistical power.[7] This, along with past observations of non-L-ORD subjects with LAZ,[5,6,9,10,13] raises interest in the hypothesis that LAZ is a risk factor for glaucoma.

This analysis also helps identify an environmental factor, i.e., childhood exposure to secondhand smoking, that could be related to genetic mutation or clinical expression of the LAZ phenotype among those genetically predisposed. Although RATVL are congenital, we have found LAZ rarely in people <50 years of age.[6,14] Thus, there is question whether LAZ are always expressed in those predisposed. Clearly, although early smoke exposure has potential for health consequences,[15,16] smoke exposure could also simply be a confounder for other early, directly causal exposures.

FIGURE 2
Examples of LAZ trait with accompanying remnants of the tunica vasculosa lentis (asterisks).



CONCLUSIONS

This study confirms earlier observations that the LAZ phenotype includes RATVL. It also suggests that early exposure, in utero or otherwise, to tobacco smoke or related factors might be influential toward development of RATVL and possibly LAZ. More study is warranted.

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Strengths Assessment in First Year Optometry Students

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BACKGROUND

The purpose of this study is to describe optometry students' Signature Themes using the Clifton StrengthsQuest (SQ) program (Gallup, Inc, Washington DC). Assessment of optometry students' strengths has not been comprehensively studied since the 1980s by Kegel-Flom[1,2].

The SQ program consists of a 30 minute online evaluation tool rooted in positive psychology (Clifton StrengthsFinder), as well as an associated suite of development tools that help the participant initiate a strengths-based development process. It is commonly used in employment and academic settings.

The Clifton StrengthsFinder (CSF) evaluation consists of 180 paired-comparison descriptor items classified into 34 groupings, called themes. The precise scoring of the CSF as well as its specific questions, are proprietary to Gallup, Inc. A general description of the scoring method is presented here so you can better understand the tool. The descriptors are placed as if anchoring opposite poles of a continuum. The respondent is asked to choose which statement best describes him or her, and also the extent to which that chosen option is descriptive of him or her (or whether they feel neutral about both items). The participant is given 20 seconds to respond to a given item before the system moves on to the next item[3].

At the conclusion of the evaluation, the participant immediately receives a report that lists their top five themes of talent in order of dominance. Each theme also has a corresponding leadership domain (Executing, Influencing, Relationship Building, or Strategic Thinking)[4].

TABLE 1
The 34 Signature Themes (and associated Leadership Domains)[4] of the Clifton StrengthsFinder

Signature Themes Arranged Within The Four Domains of Leadership Strength			
Executing	Influencing	Relationship Building	Strategic Thinking
Achiever Arranger Belief Consistency Deliberative Discipline Focus Responsibility Restorative	Activator Command Communication Competition Maximizer Self-Assurance Significance Woo	Adaptability Developer Connectedness Empathy Harmony Includer Individualization Positivity Relator	Analytical Context Futuristic Ideation Input Intellection Learner Strategic

METHODS

An email invitation and general informed consent was sent to 172 incoming optometry students in the ICO class of 2020 via email ahead of their on campus arrival in Fall 2016.

Consent forms were completed and SQ online access codes were sent to 118 students.

A total of 74 students (63% of those sent a code; 43% of the incoming class) completed the full SQ assessment.

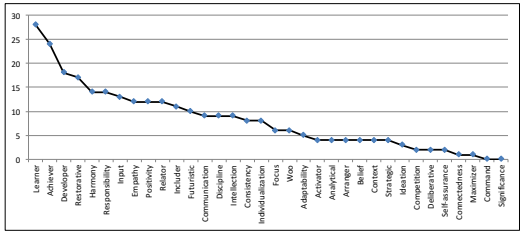
After the assessment, each student received their top 5 Signature Themes. The investigator was able to access an online dashboard containing each students' themes.

RESULTS

The incoming class was 72% female and 27% male. Of those who completed the study, 76% were female.

The top four Signature Themes among first year optometry students were: Learner, Achiever, Developer, and Restorative. Tied for fifth were Harmony and Responsibility. The next four most common themes were Input, Empathy, Positivity and Relator.

FIGURE 1
Frequency distribution of the 34 themes: this represents how many times a theme was found as one of the top 5 themes of the 74 students completing the study (370 total themes).



In previous studies of CSF among the general population as well as those in higher education, Achiever is the most common theme. Additionally, Learner and Input are often found together. In this study of optometry students, Learner was the most common top theme, followed by Achiever.

Most optometry students' Signature Themes fall under the Leadership Domain of Relationship Building. None of the top ten themes in this study were in the Leadership Domain of Influencing.

CONCLUSIONS

The themes displayed commonly in optometry students are similar to those noted in a 2015 study of pharmacy students[5].

In a professional setting, StrengthsQuest may allow consideration of how students' talents align with the evolving practice of optometry. Insights could be gained into recruitment, admissions, career opportunities and preferences in professional roles and responsibilities.

Knowledge of Signature Theme distribution among optometry students could assist the academy in preparing optometrists to best engage in the profession. Assessment of talent themes in relation to academic program success (GPA, graduation rates) or ultimately, satisfaction with optometric practice, may prove useful.

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FINANCIAL SUPPORT

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Comparison of Near Vergences with Traditional Prism Bar and with Rotary Prisms in an Automated Phoropter

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INTRODUCTION

Traditional methods for measuring vergences include prism bar (PB) and Risley prism. Previous studies have demonstrated that these two methods of vergence measurement are different from one another. [1-5] Newer digital phoropters contain rotary prisms which progress in small step increments of variable magnitude. While vergences measured with a digital phoropter can be considered in-phoropter, the patient is required to make a small jump vergence rather than a smooth vergence. The purpose of this study was to compare near vergences measured with an automated phoropter to those measured with PB.

METHODS

Twenty-seven adult subjects with normal binocular vision were recruited from the Illinois College of Optometry student population. Baseline refraction with binocular balance was performed and utilized as control lenses for each patient. The Reichert VRx Digital Phoroptor® with rotary prism was used to measure vergences set at an increment of 1 prism diopter (PD) per eye, or 2 PD total (2PD auto). Subjects were randomized between PB and 2PD auto and allowed a 5 minute rest period between methods of measuring near horizontal vergence measurements.

Paired t-test (or Wilcoxon Signed Ranks Test for non-parametric data), Bland-Altman[6, 7] and Pearson correlation analyses were performed to compare base-in (BI) and base-out (BO) break and recovery values between PB and 2PD auto. Agreement was assessed by determining the 95% limits of agreement (LoA): ± 1.96 SD of the mean difference between the two tests.

RESULTS

The average for each measurement is shown in Figure 1. Mean BI differences between PB and 2PD auto (± SD) were -7.4 (± 3.9) PD for break ($P < 0.001$, Figures 1 and 2) and -4.4 (± 5.5) PD for recovery ($P < 0.001$, Figures 1 and 2). Mean BO differences between the tests (± SD) were +0.1 (± 7.7) PD for break ($P = 0.84$, Figures 1 and 2) and -3.4 (± 9.8) PD for recovery ($P = 0.08$, Figures 1 and 2). BI break and recovery were strongly correlated between the two tests ($r = 0.73$, $P < 0.001$ and $r = 0.63$, $P < 0.001$, respectively). BO break and recovery were moderately correlated ($r = 0.51$, $P = 0.01$ and $r = 0.48$, $P = 0.01$, respectively). Agreement between the two tests was better for BI than BO with 95% LoA: 7.5 PD for BI break, 10.8 PD for BI recovery, 15.1 PD for BO break and 19.2 PD for BO recovery (Figure 2).

FIGURE 1: Mean of near vergence measurement.

Values are mean ± standard error. N = 27 for each method of measurement. Significant differences ($P < 0.05$) between methods for each measurement are indicated by (*).

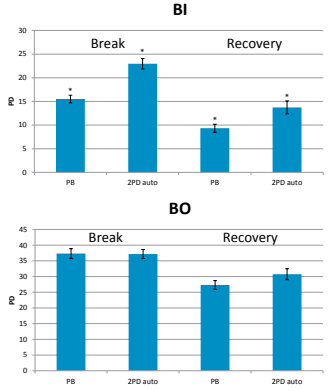
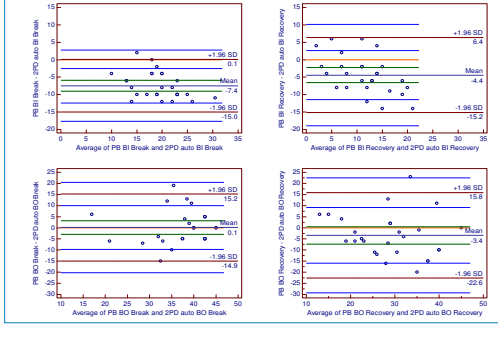


FIGURE 2: Difference vs mean Bland-Altman plots of vergence method comparisons for near.

The solid dark blue line in each plot represents the mean difference (MD) of PB and 2PD auto vergence. The coarsely dashed dark red lines represent the lower and upper 95% LoA (MD ± 1.96 SD).



CONCLUSIONS

Though this digital phoropter measures vergences in small jump increments, the measurement of BI break and recovery differs between PB and this digital phoropter. While the measurement of BO break and recovery is not statistically different between the two methods, the agreement between the two methods is relatively poor.

It is not recommended to utilize these two methods interchangeably to monitor vergences on an individual patient. In addition, clinicians should use caution when comparing vergence ranges measured digitally with published norms for PB vergences. With increasing popularity of digital phoropters, establishing normative data for vergences measured in various small step increments within a digital phoropter is warranted.

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The Effect of Sustained Reading on Accommodation

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INTRODUCTION

Visual efficiency has the potential to impact both current and future academic success. The expectations for the amount of time spent reading intensifies as we progress throughout school. We seek a better understanding of the potential variations in accommodation during sustained visual tasks. To investigate this, we evaluated if the lag of accommodation, measured using an open field auto-refractor (Grand Seiko WAM-5500 Optometer), and various near testing measurements changed following extended periods of reading.

METHODS

Ten subjects, Illinois College of Optometry students, with best corrected visual acuities of 20/20 were tested (see Table 1). A self-reported Convergence Insufficiency Symptom Survey and near work-up were administered both before and after reading a passage. See Figures 1 and 2 for more detail.

FIGURE 1
Grand Seiko WAM – 55000 Optometer. Measuring lag of accommodation using 11 point Arial font on iPad mini.

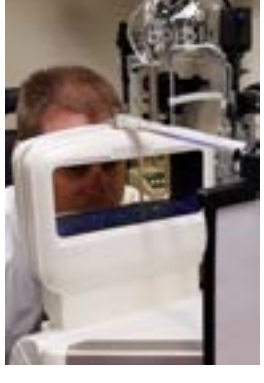

FIGURE 2
Prism Bar Vergences. Measuring horizontal vergences using 20/40 near target at 40cm until blur/ break/recovery.

RESULTS

See Comparing questionnaire results, we found that the total pre-testing CISS scores did not vary from the post-testing results (p=0.613). There was no statistical difference in lag of accommodation, amplitudes of accommodation and negative fusional vergence before and after reading. Although not statistically significant, post 1st and 5th near point of convergence were receded compared to pre testing and are trending towards significance. Positive fusional vergence recovery at near was significantly lower in the post test group (p<0.05) (Table 2), with 7 of the 10 participants having lowered measured recoveries.

TABLE 1
Means, Standard Deviations, and Ranges for Subject Characteristics (n = 10)

	Control	Convergence Insufficiency
	N = 5	N = 5
Age (in years)		
Mean	25	22.2
SD	2.345	2.489
Range	23-29	18-24
Gender		
Female	5	4
Male	0	1
Race		
African American	1	2
White	4	1
Other	0	2
CISS Score		
Mean	13.6	32.8
SD	4.037	4.463
Range	10-20	25-44

TABLE 2
Means scores before and after reading a passage from Robert Galbraith's "The Cuckoo's Calling" on an iPad mini for 30 minutes.

	Non-Convergence Insufficiency		Convergence Insufficiency	
	N = 5		N = 5	
	Pre	Post	Pre	Post
Mean (SD) Phoria (eso +)				
At Near	0	1.2	-2	-3.4
At Distance	0	0	0	0
Mean (SD) NPC 1st (cm)				
Break	2.6	2.6	3.4	6.8
Recovery	3.6	3.6	4.2	8.6
Mean (SD) NPC 5th (cm)				
Break	2.8	2.8	5.8	12.8
Recovery	4.2	4.2	7.4	15.6
Mean (SD) Monocular Accommodative Amplitude Right Eye (D)	11.572	10.424	9.528	9.86
Mean (SD) Negative Fusional Vergence (Δ)				
Blur	15.6	16.8	16.8	15.8
Break	15.6	16.8	19.2	19.4
Recovery	11.2	11.6	11.6	12.4
Mean (SD) Positive Fusional Vergence (Δ)				
Blur	24.6	23.8	25.6	21.4
Break	25.6	23.8	25.6	21.4
Recovery	19.8	16.8	24	18.6
Mean (SD) Accommodative Accuracy- Right Eye (lag +D)	0.802	0.665	0.64	0.639

CONCLUSIONS

Current research suggests that lag of accommodation changes with reading, but these studies may not adequately represent real-world situations. Contrary to our initial hypotheses, the results of this pilot study suggest that the lag of accommodation remains stable after 30 minutes of reading. Additionally, we found that sustained reading had little effect on several clinical measurements. A notable finding in our study was a significant deterioration in convergence recovery at near. Our study found that PFV recovery declines after 30 minutes of sustained reading. Further research needs to be done in this area to analyze changes in vergence and accommodation following extended periods of reading.

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To Be or Not to Be: A Case for Wilbrand's Knee

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BACKGROUND

Anterior chiasmal syndrome is a condition that affects the junction of the optic nerve and the chiasm often caused by the presence of a mass or lesion. Characteristically, anterior chiasmal syndromes often affect the ipsilateral optic nerve fibers along with the contralateral inferonasal fibers that are known to pass more anteriorly in the chiasm compared to the superonasal fibers that pass more posteriorly. Classical teaching, based on research conducted by Wilbrand in 1904, argued that after crossing at the chiasm the inferonasal fibers briefly looped anterior back into the contralateral optic nerve sheath before returning to form the optic tract. This anterior bend into the contralateral optic nerve is famously referred to as Wilbrand's Knee.

CASE PRESENTATION

A 61 y.o. Hispanic male presented to the Illinois Eye Institute with a chief complaint of progressive, painless loss of vision that had been gradual over the last five months with the left eye being significantly worse when compared to the right eye.

Patient Ocular History: LEE 6 months prior, BCVA 20/20 OD and OS, (+) Presbyopia OU, and (+) ERM OS

Patient Medical History: LME 6 months prior, (+) Type 2 Diabetes and Hypertension, both well controlled with current medications. (-) Symptoms of headaches, galactorrhea, fatigue, changes in body weight, or heat/cold intolerance.

FURTHER INVESTIGATION AND PERTINENT FINDINGS

BCVA OD: 20/20- OS: 20/400 PH: NI

Entrance Testing
- EOM: FROM OU
- Pupils: equal, round, reactive, (-) APD
- CVF: OD: Right superior temporal constriction OS: Complete Temporal Field Loss

Slit Lamp Exam: Anterior Segment Unremarkable
DFE: 1+ Temporal Pallor OU (See Fig. 1)

Additional Testing Done on Initial Visit
- HVF 24-2: (see Fig. 2)
  - o OD: Right superior temporal quadrantanopia
  - o OS: Complete left hemianopia affecting central fixation
- Cirrus OCT RNFL/GCC: (See Fig. 3)
  - o OD: RNFL WNL, GCC Mild Nasal Thinning
  - o OS: RNFL WNL, GCC Mild Nasal Thinning

FIGURE 1
Fundus OS

FIGURE 1
Fundus OD

FIGURE 2
HVF 24-2 OS Before

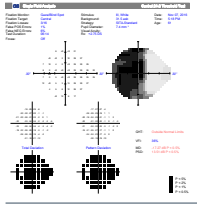


FIGURE 2
HVF 24-2 OD Before

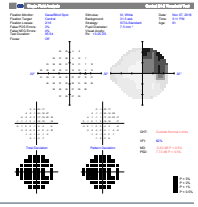


FIGURE 3
OCT GCC Before

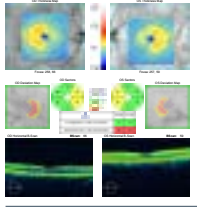


FIGURE 3
OCT RNFL Before

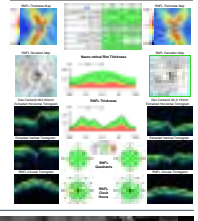
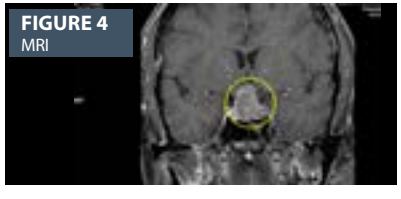


FIGURE 4
MRI



MRI FINDINGS AND DIFFERENTIAL DIAGNOSIS

Based on clinical exam findings our patient was referred for an MRI of the brain and orbits with/without contrast with dedicated sella/pituitary protocol. The neuro-radiology report indicated the presence of a heterogeneously enhancing solid/cystic sellar-based mass that had suprasellar extension and partial invasion into the left half of the cavernous sinus severely impinging the optic chiasm (See Fig. 4). Based on these findings our differential diagnosis included: Rathke's Cleft Cyst vs. Non-Secreting Pituitary Macroadenoma

DISCUSSION

A Rathke's Cleft Cyst is a pouch formed by the meeting of the anterior and posterior aspects of the pituitary gland. This pouch normally closes in early fetal development, but in some people a remnant can persist and form a cleft. The cleft can fill with fluid over time forming a cyst. Rathke's Cleft Cyst's are more common in adults with a greater predilection for females vs. males.

A Non-secreting Pituitary Macroadenoma is a benign epithelial neoplasm composed of adenohypophysial cells. These tumors are the most prevalent type of pituitary macroadenomas. They have no predilection for race, are more common in females compared to males, and have the highest incidence in people between the third and fourth decades of life.

FIGURE 5
Comparison of Signs and Symptoms

FIGURE 6
HVF 24-2 OS After

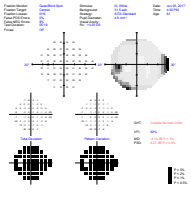


FIGURE 6
HVF 24-2 OD After

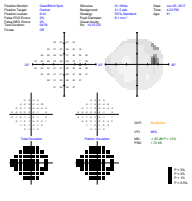


FIGURE 7
OCT GCC After

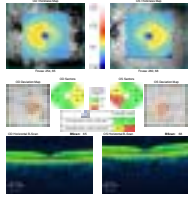
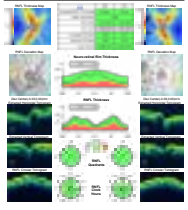


FIGURE 7
OCT RNFL After



TREATMENT AND MANAGEMENT

Patient was referred for a neuro-surgical consult and a trans-sphenoidal resection was performed to remove the mass. A histo-pathology report received after removal confirmed a non-secreting pituitary macroadenoma. At the one month follow-up the patient reported a subjective improvement in vision. When the patient returned for his four-month follow-up BCVA was 20/20 OD and OS. A repeat of the HVF 24-2 showed complete resolution of the previous defects in both eyes (See Fig. 6) and a repeat OCT GCC showed mild residual nasal thinning OD and OS (See Fig. 7). Patient will be monitored yearly with DFE and HVF 24-2 although it is rare for a non-secreting pituitary macroadenoma to reoccur once it has been removed.

CONCLUSION

Research dating back to 1904 has argued for and against the existence of "Wilbrand's Knee". Although research done by Horton in 1997 served to disprove the existence of Wilbrand's Knee, our patient's visual field defect serves as a topic of discussion. A non-secreting pituitary macroadenoma encroaching anterior toward the left optic tract would affect the left nasal fibers first producing the complete left temporal field defect. This macroadenoma would also encroach on the crossing inferonasal fibers from the right eye producing a right superior temporal field defect. This defect is often referred to as a junctional scotoma. Even though the anatomical existence of Wilbrand's Knee is often debated, the ability to localize visual field loss to the junction of the optic nerve and chiasm remains valuable in the diagnosis and management of patients with progressive vision loss, since anterior chiasmal compression alone can result in the contralateral superotemporal visual field defect present in this case.

References: Available upon Request

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Dilation or No Dilation for Threshold Visual Field Testing: Optometric Practice Patterns

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INTRODUCTION/ PURPOSE

Perimetry is valuable method for evaluating patients with a variety of ocular diseases. There are differences in philosophy for visual field (VF) testing however, there has been no study showing the percentage of optometrists that dilate or choose not to and for what reason. The purpose of this study was to assess whether optometrist in different modes of practices dilate patients or not before performing a threshold visual field test such as 24-2 Humphrey Visual Field.

METHODS

An electronic survey was developed. See Table 1. A link to this survey was sent to: Deans of the Schools/Colleges of Optometry, American Academy of Optometry Comprehensive Care Section members, Illinois College of Optometry faculty, as well as posted on 'ODs on Facebook'. Those who received the survey link were asked to share it.

TABLE 1
SURVEY DILATION OR NO DILATION FOR THRESHOLD VISUAL FIELD

I am an optometrist and agree to participate in this survey.
Optometry school/university from which you graduated:
How many years have you been in clinical practice since completing your training?
What is the location of your primary optometry practice?
Which of the following best describes your primary practice setting?
Do you typically dilate patients before performing threshold visual fields such as a Humphrey 24-2 visual field?
If answered YES or SOMETIMES • What is the typical minimum time between diagnostic pharmaceutical instillation and visual field testing? • What is your reason(s) for dilating patients prior to threshold visual field testing? • Please specify the pupil size you use to determine if patients need to be dilated.
If answered NO- What is your reason(s) for not dilating patients prior to threshold visual field? It is
Has your philosophy regarding dilating or not dilating patients for threshold visual fields testing changed during your years in practice
If your philosophy has changed, do you dilate your patients
Do you actively manage glaucoma cases in your primary practice?
What is number of visual fields you order in an average week?

TABLE 2
Location of Respondents Primary Practice

Location	Frequency	Percent
Alabama	12	1.90
Arizona	11	1.74
California	76	12.03
Canada	22	3.48
Colorado	11	1.74
Connecticut	1	0.16
DC	2	0.32
Delaware	2	0.32
Florida	33	5.22
Georgia	3	0.47
Hawaii	3	0.47
Idaho	4	0.63
Illinois	56	8.86
Indiana	22	3.48
International	27	4.27
Iowa	4	0.63
Kentucky	6	0.95
Louisiana	3	0.47
Maine	3	0.47
Maryland	3	0.47
Massachusetts	12	1.90
Michigan	23	3.64
Minnesota	10	1.58
Missouri	11	1.74
Montana	3	0.47
Nebraska	7	1.11
Nevada	5	0.79
New Hampshire	3	0.47
New Jersey	7	1.11
New Mexico	2	0.32
New York	18	2.85
North Carolina	10	1.58
Not Listed	12	1.90
Ohio	19	3.01
Oklahoma	13	2.06
Oregon	9	1.42
Pennsylvania	11	1.74
Puerto Rico	3	0.47
Rhode Island	4	0.63
South Carolina	2	0.32
South Dakota	2	0.32
Tennessee	37	5.85
Texas	28	4.43
United States	37	5.85
Utah	4	0.63
Vermont	1	0.16
Virginia	8	1.27
Washington	14	2.22
West Virginia	3	0.47
Wisconsin	8	1.27
Wyoming	2	0.32

FIGURE 1
Mode of Practice

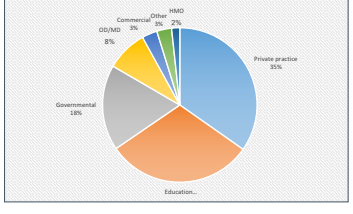


FIGURE 2
Dilation and VF

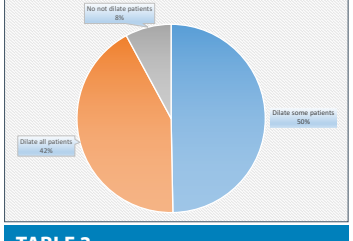


TABLE 3
Optometry school/college from which respondents graduated

	Frequency	Percent
Ferris State University/Michigan College of Optometry	28	4.4
Illinois College of Optometry	89	14.1
Indiana University	35	5.5
InterAmerican University of Puerto Rico	4	0.6
Midwestern University- Arizona College of Optometry	2	0.3
New England College of Optometry	38	6.0
Northeastern State University	13	2.1
Nova Southeastern University	12	1.9
Ohio State University	29	4.6
Pacific University	36	5.7
Pennsylvania College of Optometry/Salus University	44	7.0
Southern CA College of Optometry/Ketchum University	49	7.8
Southern College of Optometry	46	7.3
State University of New York	30	4.7
University of Alabama at Birmingham	23	3.6
University of California-Berkeley	54	8.6
University of Houston	28	4.4
University of the Incarnate Word	4	0.6
University of Missouri at St. Louis	22	3.5
University of Montreal	5	0.8
University of Waterloo	12	1.9
Western University of Health Sciences	5	0.8
Other	23	3.6

FIGURE 3
YEARS IN PRACTICE

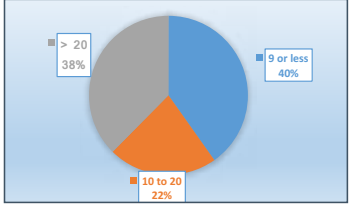


FIGURE 4
Reasons For Dilating

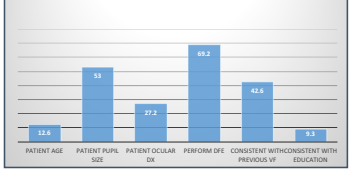
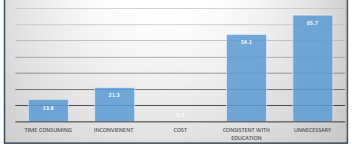


FIGURE 5
REASONS FOR NOT DILATING



RESULTS

There were **632** who completed the survey (THANK YOU IF YOU COMPLETED THIS SURVEY!!!). They reported graduating from 22 different Optometry schools/universities (highest ICO 14%) and practicing in 47 states (highest California 12%), DC, Puerto Rico, Canada and 12 other countries. See Table 2, Table 3 and Figures 1-5. Most reported their philosophy has not changed (70.1%). However of those whose philosophy has changed, most (65.6%) reported less dilation. The majority (84.8%) reported managing glaucoma. Most (67.4%) order <9 VF/ week while 25.4% ordered 10-20 and 7.2% >20.

CONCLUSIONS

Practice patterns for VF and reasoning varied among the wide variety of respondents. Interestingly both who dilate and those who do not indicated that this practice was 'consistent with their education'. Further research is needed to provide guidance in this area.

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Infection Control: Should Keyboards in Eye Care Facilities be Regularly Cleaned?

Ethan J.K. Wyles • Elizabeth Wyles, OD, FAAO

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PURPOSE

Computer keyboards are commonly used in eye care settings and are rarely regularly cleaned. The risks for ocular infection associated with this have not been previously studied. This study investigated the need to include keyboards in infection control protocols in an eye care setting by verifying the presence of microorganisms on keyboards. Additionally, the efficacy of cleaning with a commercially available germicidal cloth was evaluated.

METHODS

In an eye care facility that does not regularly clean keyboards, swabs of the F key in 12 primary care exam rooms were cultured onto 5% sheep's blood agar plates using a technique to allow for single colony growth (Figures 1 and 2). Subsequently, the keyboards were wiped once in each direction with a commercially available germicidal cloth with n-Alkyl dimethyl ethylbenzyl ammonium chlorides and n-Alkyl dimethyl benzyl ammonium chlorides as the active ingredients (Figure 3). After 10 minutes, the J key was swabbed and cultured using the same technique. The agar plates were incubated at 37°C (Figure 4). Colonies were counted at 24, 48, and 72 hours (Figures 5 and 6). Data were analyzed using a paired t-test.

FIGURE 1
The F keyboard key being swabbed with a sterile cotton-tipped applicator prior to wiping with a germicidal cloth.

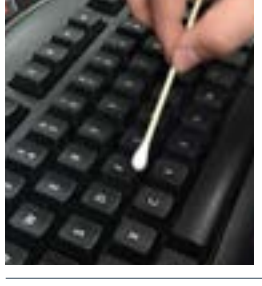


FIGURE 2
Streaking agar plate for single colony growth with cotton-tipped applicator after F key had been swabbed.

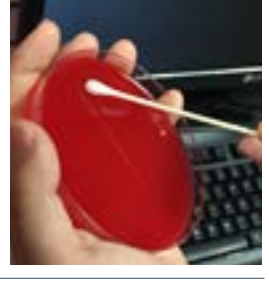


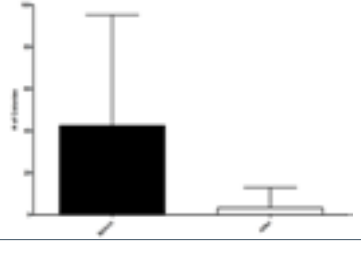
FIGURE 3
Keyboard cleaning, once in each direction, with a commercially available germicidal cloth.

FIGURE 4
Incubator thermometer showing 37°C (body temperature), for optimal microbial growth.

FIGURE 5
Example of agar plate growth at 72 hours. This growth was from the F key on uncleaned keyboard #6.

FIGURE 6
Example of agar plate growth at 72 hours. This growth was from the J key on cleaned keyboard #6.

FIGURE 7
The mean number of colonies before cleaning was 42.50 with a standard deviation of 52.71 (thin line). The mean number of colonies after cleaning was 3.33 with a standard deviation of 9.71 (thin line). There was a significant difference in the 72 hour data when comparing cleaned to uncleaned keyboards ($p = 0.0136$).



RESULTS

Analysis of the 72 hour data showed the mean number of colonies and standard deviation were 42.50 ± 52.71 before cleaning, and 3.33 ± 9.71 after cleaning. There was a significant difference in the 72 hour data when comparing cleaned to uncleaned keyboards with a p-value of 0.0136 (Figure 7).

CONCLUSION

This pilot study suggests that keyboards in eye care settings that are not cleaned harbor microorganisms which could be a source of risk for ocular infection. It also implies keyboards should be included in infection control protocols and perhaps handwashing frequency should be increased when keyboards are used during patient care. The study's limitations are that only 12 keyboards were evaluated and microorganisms were not identified to assess the level of ocular infection risk. However, these results have prompted further evaluation of keyboards within the studied eye care facility. A follow-up study is under way and includes multiple clinical services and microorganism identification to better weigh the risks of infection. Moreover, the studied eye care facility is leading the eye care profession by revising infection control and handwashing protocols as they apply to the use of keyboards to limit patient exposure to pathogens found on computer keyboards.

REFERENCES

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Disclosure Information: None to disclose

ACKNOWLEDGEMENTS

Thank you to the Chicago Archdiocese of Catholic Schools supporting St. Louise de Marillac School, whose rigorous 7th grade science curriculum lead to this research. And a special thank you to Illinois College of Optometry faculty, Robert Donati, PhD, Ruth Trachimowicz, PhD, OD and Rebecca Zoltoski, PhD.

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Stress-Induced Esotropia in an Optometry Student

Maggie Bailey, OD and Kelly Frantz, OD, FAAO, FCOVD
Illinois College of Optometry / Illinois Eye Institute

Abstract

Patients with intermittent strabismus often experience an increase in deviation frequency when tired or stressed. A A 24yo female was referred for symptomatic high frequency IAET. After 19 sessions of vision therapy concentrated on binocular/divergence activities, the patient was significantly less symptomatic, and was even able to obtain stereopsis behind the slit lamp for the first time.

Case History

- 15-25 pd IAET
- Symptomatic: diplopia, asthenopia, cosmesis
  - Increased significantly since beginning optometry school
  - Exacerbated by fusion-based evaluation of clinic patients
    - SLE, BIO
- Low hyperopia with low bifocal add, 20/20 OD,OS
- Highly motivated to achieve comfortable fusion without prism.

Vision Therapy

VT exercises that encourage divergence / relaxation of accommodation:

In office: Vectograms
Telebinocular
VTS4 computer vergence activities

At home: Accommodative rock with emphasis on plus
Brock string push-aways
Variable Tranaglyphs
Visual Hygiene (refer to figure)

Abstract

Patients with intermittent strabismus often experience an increase in deviation frequency when tired or stressed. A 24yo female was referred for symptomatic high frequency IAET. She could appreciate no stereopsis without prism, but demonstrated 250” global and 40” local Randot stereopsis through 20 pd base-out (BO). Symptoms of diplopia, asthenopia, and cosmetic concerns had been present since childhood but had significantly increased since beginning optometry school and were exacerbated by the studying demand and by having to perform fusion-based evaluation of clinic patients (slit lamp and BIO). Previous treatment had included bifocal spectacles for low hyperopia, but no prism or vision therapy had been implemented. She was highly motivated to achieve comfortable fusion without the need to wear prism.

Vision therapy was initiated with emphasis on binocular/ divergence activities. The patient quickly saw a decrease in symptoms, demonstrated 40” of local Randot stereopsis without prism in place, and was even able to obtain stereopsis behind the slit lamp for the first time. She now is able to maintain fusion consistently except for brief periods of diplopia after several minutes of viewing through the slit lamp. She continues to perform maintenance therapy.

Click headings to further view content

Figures/Graphs

1. Deviation and symptoms before VT
2. Visual Hygiene measures
3. Improvement during and after VT

Results

With appropriate binocular activities, vision therapy greatly improved this optometry student’s control of intermittent esotropia and allowed her to gain stereopsis. She reports a major increase in quality of life due to no longer seeing double at the end of patient care and study sessions.

Conclusions

- Need time, patience, motivation, and persistence.
- VT positively affects quality of life.
- Personalize VT to simulate daily activities.

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Caloroso, E., Rouse, M. “Management of Esotropias.” *Clinical Management of Strabismus.* 1e. Stoneham: Butterworth-Heinemann, 1993. 249-277. Print.

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AEVR

1 ICO PRESENTATION

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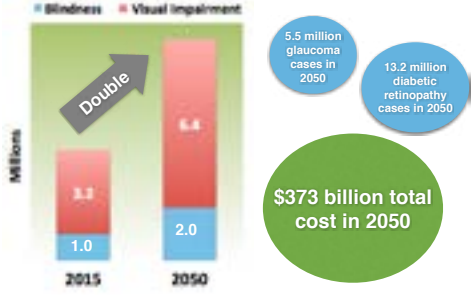
A robust psychophysical method to assess contrast sensitivity in visual pathways

Xiaohua Zhuang [1], Dingcai Cao [2], Joel Pokorny [3]

[1] **Illinois College of Optometry, IL, USA, Email: zxhelsa@gmail.com**; [2] University of Illinois at Chicago, IL, USA; [3] University of Chicago, IL, USA

1. INTRODUCTION

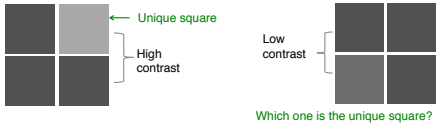


My Research: To develop cost-efficient and non-invasive technique that can detect vision loss at early stage.

2. BACKGROUND

Contrast sensitivity: measures the ability to differentiate small changes of brightness.

Contrast discrimination:



Two primary visual pathways:

Parvocellular (PC):

- Color Perception

- Form Perception

Magnocellular (MC) :

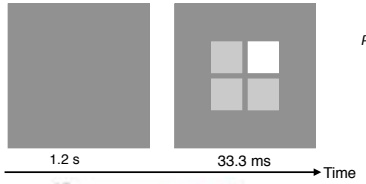
- Motion Perception

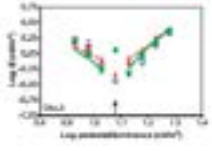
- Luminance Perception

The two pathways have distinct physiological properties, and respond very differently to brightness contrast.

3. PEDESTAL PARADIGMS

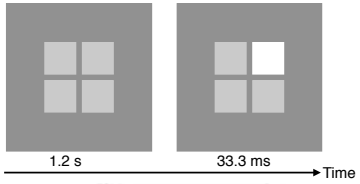
Paradigm 1: PC-pathway Sensitivity

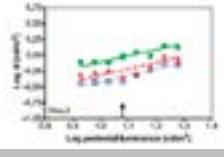




Pedestal paradigms separately measure sensitivity of the PC and MC pathways

Paradigm 2: MC-pathway Sensitivity





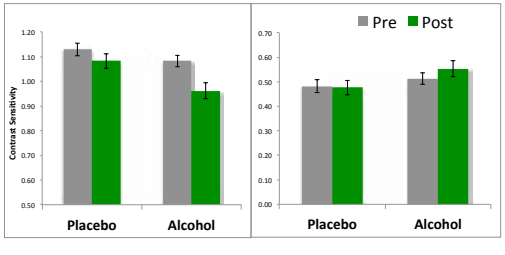
*These results from our **non-invasive** method are **consistent** with results from **invasive** method on primate.*

4. APPLICATIONS

Eye-diseases Studies:

Application Field	Published Papers	Findings
Amblyopia	Zele, Pokorny, Lee, and Ireland (2007)	Reduced sensitivity in both pathways
Glaucoma	Sun et al. (2008)	Reduced sensitivity in motion pathway
Optic neuritis	Cao et al. (2011)	Reduced sensitivity in motion pathway
Autism	Plaisted Grant and Davis (2009)	Reduced sensitivity in motion pathway

Alcohol Studies:



5. SUMMARY

- Results from our non-invasive pedestal paradigms are consistent with results from invasive electrophysiology studies on primate.
- The pedestal paradigms have been applied to investigate deficits of the two pathways in various conditions, including eye diseases, neuropsychological disorders and under influence of alcohol.
- These paradigms can be further developed into tools to better measure contrast sensitivity in clinic and to help early detection of vision disorders.

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ARVO

8 ICO PRESENTATIONS

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Investigating Differences in the Cirrus OCT Results for Hispanic and Black Children from 9 Through 17 Years of Age

Sandra S. Block, Adrianna Hempelmann
School-Based Vision Clinic, Illinois College of Optometry, Chicago, Illinois
3241 South Michigan Avenue, Chicago, Illinois 60616

PURPOSE

The purpose of our poster was to investigate our results of the Cirrus OCT screening of the retinal nerve fiber layer and macular thickness that we have been conducting covering children 9-17 years of age. The data was originally collected to provide a reference database for a School-Based Vision Clinic serving Chicago Public School students. While we had felt that the large cups we were seeing were physiologic, we still continued to refer our patients for baseline OCT's. Prior to our adding the OCT to our school-based vision program, we referred them to another clinic for the baseline testing. The population served failed to follow through with those referrals. Once the Cirrus OCT was added we began the collection of OCTs from sequential patients (Hispanic or Black) until a minimum of 20 per age category, race, and sex were obtained. Our goal was to create a database of normative data on these subgroups. Now that we have collected the data, we wanted to look at the subgroups. The literature does report on evidence that there is a gender difference yet no one has compared the group by age category.

METHODS

Patients who presented to IEI at Princeton vision clinic (11/14-11/16) for a comprehensive eye exam with dilation were invited to participate in the study. Patients were eligible if they were identified as Hispanic/Latina or Black/African American. Patients diagnosed with retinal anomalies, optic nerve problems, diabetes, hypertension or other ocular diseases were excluded as well. Eight subjects were also excluded due to mixed race.

DEMOGRAPHICS

Subjects ranged from 9.0 years to 17.9 years.

Age Category (years of age)	Frequency
9	97
10	100
11	117
12	99
13	115
14	108
15	81
16	83
17	102

Sex

Male	422
Female	480

Race

Black	510
Hispanic	421

Cirrus HD-OCT scans (version 3.0.0.64) and fundus photos were gathered on 984 subjects of which 83 were excluded.

Data on RNFL thickness, optic nerve head parameters and macular parameters were collected. The analysis looked at the comparison of these data by age category (by age in years), sex and race. Note: scans that were below a signal strength of 8 were excluded. The right eye was the eye chosen unless the scan fell below the criteria signal strength as stated. In those cases, the left eye was used instead.

RESULTS

The results for the horizontal/ vertical cup/ disk ratio did not show a significant difference by age or race, but was significant (0.004) for sex.

	C/D Horizontal				C/D Vertical			
Age	N	Mean	SD		Age	N	Mean	SD
9	97	0.346	0.129		9	97	0.346	0.129
10	98	0.358	0.142		10	98	0.357	0.142
11	114	0.325	0.128		11	114	0.325	0.125
12	98	0.341	0.140		12	98	0.341	0.139
13	113	0.342	0.126		13	113	0.341	0.125
14	108	0.313	0.115		14	108	0.313	0.115
15	78	0.344	0.133		15	78	0.343	0.132
16	80	0.339	0.110		16	80	0.343	0.117
17	100	0.344	0.134		17	100	0.343	0.134
Total	886	0.338	0.129		Total	886	0.338	0.129

ANOVA

		Sum of Squares	df	F	Sig.
C/D Horizontal	Between Groups	.143	8	1.075	.378
	Within Groups	14.606	877		
	Total	14.749	885		
C/D Vertical	Between Groups	.138	8	1.038	.406
	Within Groups	14.560	877		
	Total	14.698	885		

	Agecat	sex	race
C/D Horizontal	NS	0.004	NS
C/D Vertical	NS	0.004	NS

A review of the RNFL symmetry, rim area, disc area, and cup volume demonstrated no significant difference between age, sex, or race.

When looking at the individual quadrants results were variable with race being significant in Q1-Q2, sex in Q3-Q4, and age in Q1 -Q3. Looking at the average RNFL, age (.001) and race (0.013) were significant but sex was not.

	Agecat	sex	race
Average RNFL thickness	0.001	0.092	0.013
RNFL symmetry	NS	NS	NS
Rim Area	NS	NS	NS
Disc Area	NS	NS	NS
Average C/D Ratio	NS	NS	NS
Vertical C/D Ratio	NS	NS	NS
Cup Volume	NS	NS	NS
RNFL quadrant 1	0.002	NS	0.000
RNFL Quadrant 2	NS	NS	0.000
RNFL Quadrant 3	0.000	0.001	0.508
RNFL Quadrant 4	NS	0.035	NS

NS - Not significant

CONCLUSIONS

The data demonstrated a minimal effect of age or race in the findings of Hispanic and Black children who were seen in our community based school-health vision clinic.

Several studies that have supported the difference in sex but it does appear as if the RPE is only the primary contributing factor.

Our results suggest that is no significant difference in the C/D ratio by age category or race in this population.

Further testing should expand the database to other races.

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Reliability of the MapcatSF in a Young Healthy Population

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#2324

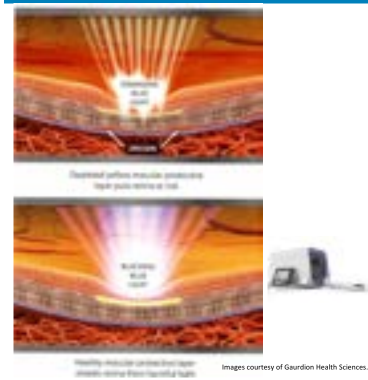
BACKGROUND

Studies suggest that macular pigment (MP) may play a protective role against the damaging effects of blue light while reduced levels may increase risk for developing age-related macular degeneration (AMD), open angle glaucoma and other conditions (**Fig.1**).
Until recently, there were two compact commercially available heterochromatic flicker photometry (HFP) instruments that measure MP in the USA. Previous studies with these instruments revealed significant variability between the instruments. From these limited studies, both instruments appear to demonstrate some reliability based on the mean macular pigment density (MPOD) readings and differences between those means. However, when critically reviewing each subject's data, there is significant variability. The MapcatSF is a new HFP instrument that measures MP density levels, and the goal of this project was to determine the reliability and variability of the instrument using a young, healthy, population of students at the Illinois College of Optometry.

METHODS

A total of 35 subjects (29 female, 6 male) were used for this study. At the initial appointment, subjects were shown a demonstration video. Once completed, we began recording MPOD from the right eye only. Subjects adjusted the focus of the cross hairs until they were clearest to them. Once the crosshairs were set, the researcher adjusted the frequency of the light to 24 Hz and started the flicker. The subject adjusted the flicker until it stopped. Once baseline was set, the subject gave up control of the flicker to the researcher. The researcher adjusted the flicker frequency until the subject stated that the flicker had stopped and this point was recorded. The process was continued until 4 to 5 readings had been recorded. This was repeated with a larger circle of light flickering at a frequency of 31 Hz. Once the recordings were made, the mean MPOD (+/- SD) from those readings was determined. This process was repeated for each subject at 24 hours, 1 week (6-8 days), 1 month (28-32 days), 3 months (11-13 weeks), and 6 months (24-26 weeks). Paired t-tests and ANOVA were done to analyze the statistical significance of the results.

Figure 1: Damaging Effects of Blue Light



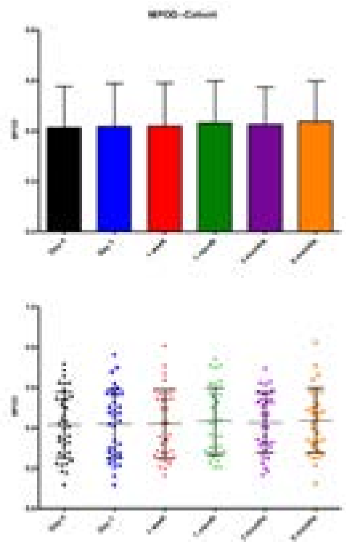
Images courtesy of Gaurdion Health Sciences.

There is increasing evidence of the damaging effects caused by blue light on the eye and in particular the retina, especially when macular pigment levels are diminished. Macular pigment levels need to be measured reliably to continue to validate their role in ocular disease. The MapcatSF shown is representative of the instrument that was used in this study.

Table 1
Individual subjects with their mean MPOD +/- SD over the 6 visits.

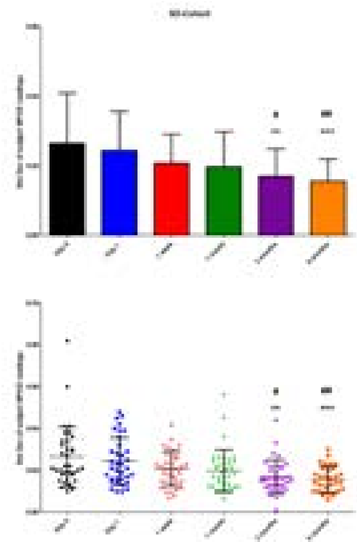
	1	2	3	4	5	6	7
Mean MPOD (6 visits)	0.1655	0.4937	0.2435	0.4137	0.3570	0.2872	0.2107
Std Dev (+/-)	0.0426	0.1132	0.0520	0.0547	0.0586	0.0292	0.0607
	8	**9**	**10**	**11**	**12**	**13**	**14**
Mean MPOD (6 visits)	0.6603	0.3043	0.4190	0.4885	0.2732	0.6375	0.3220
Std Dev (+/-)	0.0412	0.0675	0.0671	0.0828	0.0486	0.0753	0.0534
	15	**16**	**17**	**18**	**19**	**20**	**21**
Mean MPOD (6 visits)	0.5303	0.4426	0.2196	0.4627	0.7210	0.2715	0.4207
Std Dev (+/-)	0.0405	0.1211	0.0200	0.0572	0.1054	0.0344	0.0402
	22	**23**	**24**	**25**	**26**	**27**	**28**
Mean MPOD (6 visits)	0.2803	0.5483	0.5468	0.3162	0.5955	0.6232	0.5376
Std Dev (+/-)	0.0262	0.0401	0.0144	0.0617	0.0322	0.0537	0.0473
	29	**30**	**31**	**32**	**33**	**34**	**35**
Mean MPOD (6 visits)	0.4628	0.2370	0.2918	0.2970	0.5528	0.5487	0.6670
Std Dev (+/-)	0.0900	0.0609	0.0776	0.0376	0.0290	0.0421	0.0360

Figure 2: Macular Pigment Density Readings over a Six Month Time Frame.



The MapcatSF was used to measure the MPOD from the right eye of 35 adults aged 21-29 years old over a 6 month period of time. All of the time points show data from 35 eyes with the exception of the 6 month time point which has data from 31 eyes as 4 subjects left the study prior to the 6 month reading. The **TOP** graph is a standard bar graph with error bars showing the mean and SD of the cohort while the **BOTTOM** graph is a scatter plot that also shows the mean and SD of the cohort while also demonstrating the distribution of the readings from each subject. Each point on the graph represents the mean of 4 MPOD readings for each subject recorded at that visit. The mean of the cohort MPOD at each time point is as follows: Day 0= 0.4135 +/- 0.1639; 1 Day = 0.4184 +/- 0.1698; 1 Week = 0.4197 +/- 0.1708; 1 Month=0.4325 +/- 0.1655; 3 Months= 0.4256 +/- 0.1487; 6 Months= 0.4372 +/- 0.1609 There were no significant differences in the MPOD over the time course of this study.

Figure 3: Comparison of the Standard Deviations of Repeated MPOD Measurements from MapcatSF.



All of the points show data from 35 eyes with the exception of the 6 month visit which has data from 31 eyes as 4 subjects left the study prior to the 6 month reading. Each point on the graphs represents the SD of 4 MPOD readings for each subject recorded at that visit. The **TOP** graph is a standard bar graph with error bars showing the mean and standard deviation of the cohort while the **BOTTOM** graph is a scatter plot that also shows the mean and SD of the cohort while also demonstrating the distribution of the readings from each subject. An ANOVA analysis demonstrates that there was a significant difference in the SDs of the cohort over the time frame studied with a p= < 0.0001. The mean SDs at each time point were: Day 0= 0.0264; 1 Day= 0.02443; 1 Week= 0.0208; 1 Month= 0.01971, 3 Months= 0.01694; 6 Months= 0.01565. Bonferroni's Multiple Comparison Test showed significant differences between specific time points in the study. Day 0 vs 3 months,** p= < 0.005; Day 0 vs 6 months, ***p= < 0.0005; Day 1 vs 3 months, #p= < 0.05; Day 1 vs 6 months, ##p= < 0.005.

RESULTS AND CONCLUSIONS

- There was no significant difference between the mean MPOD readings from the initial visit to the 6 month visit or at any point in between (**Figure 2**).
- The mean SD of the cohort decreased at each subsequent time point from the initial visit culminating in the lowest SD at 6 months (**Figure 3**).
- Regarding the mean SD of the cohort, there is a significant difference between the initial and 6 month time points (p<0.0001) determined by ANOVA, Bartlett's test for equal variance, and Bonferroni's multiple comparison test (**Figure 3**).
- When looking at the overall SD of the MPOD readings of each subject over the combined visits, 17/35 subjects had an SD of 0.050 or less, 12/35 had an SD between 0.051 and 0.0755, and 6/35 had an SD greater than 0.0755 (**Table 1**). This is consistent with results from Bone and Mukherjee (2013).
- If MPOD is being monitored clinically to assess risk of AMD with the possibility of causing altered treatment/management regimens, the need for reliable data measurements is imperative.
- Results from this study suggest that the MapcatSF demonstrates reliability and the reliability increases each subsequent time the patient is tested, thus implicating a learning component.

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*RD is a member of the Guardion Health Sciences Scientific Advisory Board

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Assessing a New Battery of Risk Factors for Dry Eye: Dry Eye Risk Assessment (DERA)

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PURPOSE

In everyday patient care, the case history lends itself to often asked questions when there is any evidence of dry eye symptomatology prior to clinical exam. This effort was to uncover if any new risk factors or composite profile pointed to dry eye through a brief, 14-question patient profile survey.

METHODS

Fourteen investigator-designed questions (in 'A' and 'B' forms) and the ocular surface disease index (OSDI) were administered to clinic patients at seven clinical sites in accordance with each site's Institutional Review Board. Contact lens wearers were examined on a day they did not wear their lenses to reduce confounding of clinical findings related to contact lens removal at the time of examination.[1]

Subjects were defined as dry if their OSDI was ≥ 13 and normal if < 13.[2] Dryness was also confirmed with one or more of the following clinical tests and established cut points (TBUT[3], staining based on the Efron Scale, meibomian gland (MG) expression[4,5], phenol red thread test[6]).

Proportions and chi-squared tests were performed on the categorical responses by subjects.

FIGURE 1: Forms 'A' and 'B': Examiner-Designed Questions and OSDI

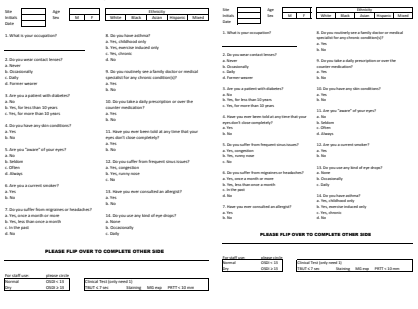


FIGURE 2: Subjects' Ethnicity

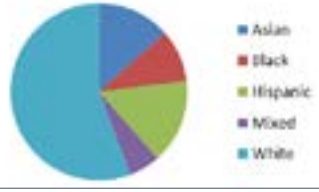


FIGURE 3: Contact Lens History; 63% (37) of Subjects had Never Worn Contact Lenses

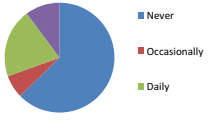


FIGURE 4: Diabetes History; 88% (53) of Subjects Did Not Have Diabetes

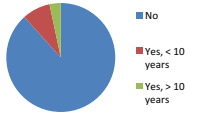


FIGURE 5: 85% (51) of Subjects Did Not Have Skin Conditions

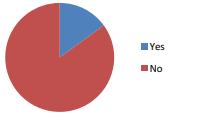


FIGURE 6: "Awareness" of Eyes; 28% (16) of Subjects Were "Always Aware" of Their Eyes

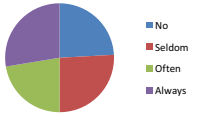


FIGURE 7: 95% (56) of Subjects Were Not Smokers

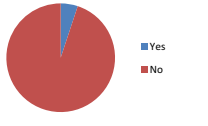


FIGURE 8: Migraine Headaches; 40% (24) of Subjects Had Suffered from Migraines

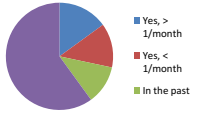


FIGURE 9: Asthma; 78% (47) of Subjects Had No History of Asthma

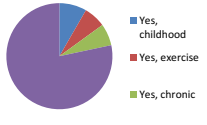


FIGURE 10: Routine Visit to Healthcare Provider: 67% (40) of Subjects Responded "No"

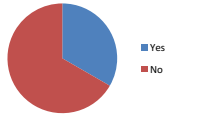


FIGURE 11: Daily Prescription or OTC Medications; 58% (35) Subjects Do Not Use Daily Medications

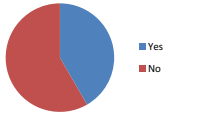


FIGURE 12: Have You Been Told That Your Eyes Fail to Completely Close? 95% (57) of Subjects Stated "No" as Their Response

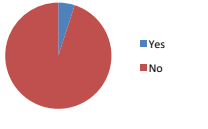


FIGURE 13: Suffer from Frequent Sinus Issues; 63% (37) of Subjects Do Not Suffer from Sinus Issues

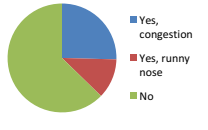


FIGURE 14: Consulted an Allergist; 55% (33) of Subjects Have Not Consulted with an Allergist

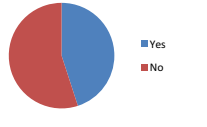
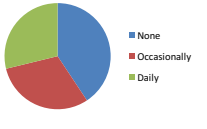


FIGURE 15: Use Any Kind of Eye Drops; 59% (35) of Subjects Responded to Using Eye Drops



RESULTS

60 subjects were included in this study, 44.3% were normal and 55.7% were dry. Average age was 50.8 (range 15 to 83) and 53% (29) were female.

The only responses that were statistically significant between dry and normal were:

- Sinus issues (p = 0.031)
- See a doctor for chronic conditions (p = 0.025)
- Migraines (p = 0.005)
- Use of eye drops (p = 0.004).

In addition, 45% of the sample had consulted an allergist in the past.

CONCLUSIONS

Migraine headaches and sinus issues are two new risk factors for dry eye as uncovered by this survey. Previous known risk factors such as diabetes and smoking were not significant. Future work entails assigning point values to these responses to define a cut point maximizing sensitivity and specificity for dry eye. Furthermore, a stronger association between allergy and dry eye may exist and needs continued investigation. This instrument has future implications in population studies as well as everyday clinical practice.

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TIME OF YEAR VARIATION OF INTRAOCULAR PRESSURE

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PURPOSE

To investigate intraocular pressure (IOP) variation according to month and time of year among a primary eye care population in an urban, academic eye care facility.

METHODS

As part of a separate investigation, IOP measurements were collected on patients belonging to several practitioners over approximately a five-year period at an urban, academic eye care facility in Chicago, Illinois. Data on ocular health status, general medical health, and other subject characteristics was also collected, with some information acquired with via a written questionnaire completed at time of examination. Subjects were excluded if they were <18 years of age, and eyes were excluded if there was a history of past intraocular surgery, uveitis, ocular trauma, or if IOP was not measured via Goldmann tonometry. Using multiple regression analysis, cross-sectional IOP level was explored as a function of numerous health and demographic variables.

RESULTS

The analysis included 2,407 subjects, which was mostly African-American (83%) and female (64%). Mean age of subjects was 50.3 +/- 15.2 years (18-94 years). Overall mean IOP was 15.1 +/- 3.6 mm Hg and 15.2 +/- 3.4 mm Hg for right/left eyes. Controlling for numerous other subject variables, including but not limited to gender, race, refractive error, presence of long anterior lens zonules, education level, smoking status, diastolic blood pressure, presence of diabetes, body mass index, presence of diabetes, and history of cancer (see Tables 1-3), regression analyses demonstrated that IOP level was significantly associated with time of year in terms of quarterly and bimonthly intervals (P<0.001). Using bimonthly grouping that included Dec/Jan, Feb/Mar, Apr/May, etc., eyes had statistically (P<0.05) highest IOPs in Dec/Jan (15.6 +/- 3.6 mm Hg) and lowest in Oct/Nov (14.7 +/- 3.3 mm Hg), see Tables 4 and 5. In additional to longer term, i.e., seasonal/quarterly variation in IOP, an observable, shorter-term cyclical pattern of IOP variation was also observed that appeared to have about two-month long intervals, see Figures 1 and 2.

TABLE 1
Demographic characteristics of 2,407 subjects.

Total Subjects	2,407
Age (years)	†50.3 ± 15.2 (18-94)
Gender	
Females	64%
Males	36%
Race	
African-American	83%
Hispanic	7%
White	6%
Asian	2%
Other	3%

†Mean ± standard deviation

TABLE 2
Variables explored in regression models to assess relationship of IOP to time of year.

Demographic	Ocular	Systemic
Age	Long zonule trait presence	Hypertension
Race	Rrefractive error	Systolic / diastolic BP†
Gender	Krukenberg's spindle	Diabetes
Education level	Glaucoma medication	Body mass index
Time of day	Corticosteroid use	History of cancer
		Smoking
		Alcohol
		Beta-blocker use
		Corticosteroid use
		Cholesterol medication

†**Abbreviations: BP, blood pressure; IOP, intraocular pressure**

TABLE 3
Multivariate analysis of IOP† as a function of time of year adjusting for other variables.

Variable	Coefficient	Standard Error	P-value‡
Intercept	12.7	0.63	--
Time of year IOP measured (bimonthly: Dec/Jan, Feb/Mar, etc)	-0.15	0.04	0.0002
Gender (female)	0.49	0.15	0.001
History of cancer	-1.13	0.36	0.002
Refractive error (SE, per diopter)	-0.09	0.02	0.0002
Long zonule trait present	1.10	0.40	0.008
Body mass index (per 10 units) (kg/m^2)	0.38	0.10	<0.0001
Diastolic blood pressure (per 10 mm Hg)	0.33	0.07	<0.0001
Diabetes	0.84	0.17	<0.0001
Ever smoke	-0.32	0.14	0.02
Education > high school	-0.43	0.14	0.003

†**Abbreviations: SE, spherical equivalent; IOP, intraocular pressure; kg/m2, kilograms per square meter; mm Hg, millimeters of mercury**
‡**Variables included on if significant at P<0.05 level**

TABLE 4
Summary table for bimonthly mean IOP OD.

Month	Mean IOP OD (mmHg)	Standard Deviation	Minimum IOP (mmHg)	Maximum IOP (mmHg)
Dec/Jan	15.60	3.60	8	31
Feb/Mar	15.06	3.18	7	30
Apr/May	15.46	3.66	6	38
June/July	14.99	3.15	7	28
Aug/Sept	14.83	4.61	8	79
Oct/Nov	14.70	3.30	7	36

TABLE 5
Summary table for bimonthly mean IOP OS.

Month	Mean IOP OS (mmHg)	Standard Deviation	Minimum IOP (mmHg)	Maximum IOP (mmHg)
Dec/Jan	15.64	3.52	8	28
Feb/Mar	15.20	3.44	7	38
Apr/May	15.51	3.87	7	46
June/July	15.05	3.25	8	28
Aug/Sept	14.70	3.12	8	24
Oct/Nov	14.85	3.27	8	32

FIGURE 1
Bimonthly mean IOP OD, OS including statistical significant comparison to the highest mean IOP (Dec/Jan).

FIGURE 2
Bimonthly mean IOP OD, OS demonstrating a bimonthly cyclical pattern.

DISCUSSION

The results in this 5 year cross-sectional analysis demonstrate IOP was highest in December/January, and lowest in August/September. These results agree with previous studies that have looked at seasonal or monthly IOP variation. Monthly IOP in the ocular hypertension treatment study demonstrated similar findings via analysis of individual IOP vs cross-sectional data, which we used in our study. Although the physiologic mechanism for this annual fluctuation in IOP is unknown, several hypotheses have been postulated, including melatonin secretion from the pineal gland. Melatonin is increased in the summer months with more daylight exposure. Melatonin increases the release of estrogen and progesterone, which have been shown to reduce IOP by increasing aqueous humor outflow. Interestingly, we found shorter-term two-month long intervals that demonstrate a cyclical IOP variation that has not yet been shown.

Conclusions. For this cross-sectional analysis, strong time of year variation in IOP was observed, which was also accompanied by shorter, approximately bimonthly cycles of fluctuation. These data further support that time of year should be considered as a potential confounder for cross-sectional investigations of IOP.

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Spectral Domain Optical Coherence Tomography Findings in Patients with Congenital Optic Nerve Hypoplasia

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PURPOSE

Cirrus spectral domain optical coherence tomography (SD-OCT) has been used successfully to measure the optic disc, retinal nerve fiber layer (RNFL), and macular ganglion cells. The purpose of this study was to evaluate SD-OCT parameters in eyes with congenital optic nerve hypoplasia (CONH) compared to fellow eyes in CONH subjects and control eyes in normal subjects.

METHODS

A total of 29 subjects with CONH (6-66 years old) and 64 normal subjects (6-64 years old, age and race-matched) were recruited. All CONH subjects had comprehensive eye exams prior to enrollment and were diagnosed with either unilateral or bilateral CONH, resulting in a total of 39 CONH eyes. Cirrus SD-OCT 5000 was performed on all subjects. OCT images were unobtainable in one subject with bilateral CONH (thus, 37 CONH eyes were included). Only left eye data from control subjects were used for data analysis. One-way analysis of variance was used to determine whether the OCT parameters differed among the CONH, fellow, and control eyes.

Table 1
Characteristics of CONH and Control Subjects

	CONH Subjects (%) (n = 29)	Control Subjects (%) (n = 64)	*P* value
Gender			0.35
Female	21 (72.4)	39 (60.9)	
Male	8 (27.6)	25 (39.1)	
Race/Ethnicity			0.09*
Black	16 (55.2)	48 (75.0)	
Hispanic	5 (17.2)	13 (20.3)	
White	2 (6.9)	2 (3.1)	
Asian	6 (20.7)	1 (1.6)	
Age (years)			0.50
Range	6.6 - 66.4	6.3 - 64.5	
Mean (SD)	28.9 (18.2)	26.1 (17.9)	

*Due to the small number of CONH subjects, *P* value indicates probability of black race vs. non-black race differing in the two groups.

Note: Chi-square test for gender and race, T-test for age.

Table 2
Optical Coherence Tomography Parameters in CONH (n=37), Fellow (n = 19), and Control Eyes (n = 64)

	CONH Eyes (mean, CI)	Fellow Eyes (mean, CI)	Control Eyes (mean, CI)	*P* Value
Optic disc parameters (µm)				
Disc area (mm^2)	1.46 (1.32 -1.59)	1.74 (1.56 -1.92)	1.89 (1.80 -1.98)	<0.0001
Rim area (mm^2)	1.29 (1.16 -1.41)	1.48 (1.35 -1.62)	1.42 (1.36 -1.48)	0.03
Average C/D ratio	0.27 (0.22 -0.33)	0.37 (0.25 -0.49)	0.46 (0.41 -0.5)	<0.0001
Average RNFL thickness (µm)	86.54 (79.23 -93.85)	97.79 (87.98 -107.6)	98.14 (95.3 -100.98)	<0.01
Ganglion cell analysis (µm)				
Average	71.68 (65.63 -77.72)	78.37 (74.68 -82.06)	82.88 (80.9 -84.85)	<0.0001
Minimum	60.89 (53.25 -68.53)	73.89 (68.93 -78.86)	79.86 (77.05 -82.67)	<0.0001
Superior	75.38 (67.98 -82.78)	80.00 (75.86 -84.14)	83.69 (81.15 -86.23)	0.03
Superior nasal	72.22 (64.94 -79.49)	81.63 (78.09 -85.17)	84.44 (82.28 -86.59)	<0.0001
Inferior nasal	68.38 (60.21 -76.55)	77.68 (73.14 -82.23)	83.20 (81.20 -85.20)	<0.0001
Inferior	69.81 (62.51 -77.12)	75.00 (70.44 -79.56)	81.86 (79.88 -83.84)	<0.001
Inferior temporal	72.11 (65.87 -78.35)	76.95 (72.87 -81.03)	82.72 (80.74 -84.69)	<0.001
Superior temporal	71.57 (65.76 -77.37)	77.37 (73.65 -81.09)	80.34 (76.88 -83.81)	0.02

Figure 1
Abnormal OCT Findings in a Subject with Left Eye CONH (12-year-old African American girl, BCVA OD: 20/20, OS: 20/200, Refraction OD: -4.50, OS: -1.00-1.75 x 065)

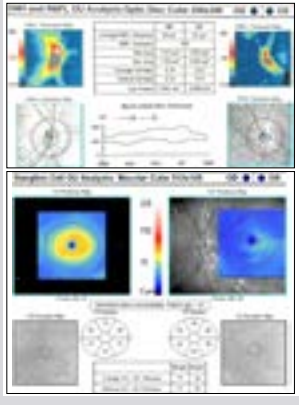
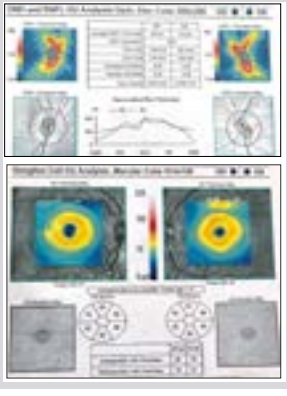


Figure 2
Normal OCT Findings in a Control Subject (11-year-old African American girl, BCVA OD: 20/20, OS: 20/20, Refraction OD: +1.75-0.50 x 180, OS: +1.25 sph)



RESULTS

Clinical characteristics of subjects with CONH and control subjects are listed in Table 1. OCT parameters in CONH, fellow, and control eyes are listed in Table 2. There were significant differences in all OCT parameters among the three groups, including disc area, rim area, C/D ratio, RNFL thickness, and macular ganglion cell measurements (P values in Table 2). Post hoc tests showed statistically significant differences in all OCT parameters between CONH and control eyes, but not between fellow and control eyes. Optic disc parameters were statistically significantly different between CONH and fellow eyes; however the difference in RNFL and macular ganglion cell measurements between CONH and fellow eyes did not reach statistical significance. OCT images of an ONH subject (Figure 1) and a control subject (Figure 2) are included.

CONCLUSION

- Abnormal Cirrus SD-OCT parameters discriminated between eyes with and without CONH. CONH eyes were characterized with smaller disc area, rim area and C/D ratio as well as reduced RNFL and macular ganglion cell thickness compared to the control eyes.
- No significant differences were found in disc area, rim area, C/D ratio, RNFL thickness, and macular ganglion cell thickness between fellow eyes of ONH subjects and control eyes.

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Assessment of Intraocular Pressure as a Function of Time of Day During Normal Patient Care Delivery Hours in a Primary Eye Care Teaching Facility

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PURPOSE

Although information has recently improved concerning the relationship between intraocular pressure (IOP) and time of day, there are still many gaps in knowledge related to this relationship among various populations and this relationship in terms of modifying factors. To begin further study of these relationships, we explored how IOP varies during normal patient care delivery hours in an academic primary care setting. Since most treatment decisions are made based on IOP measurements collected during this time period, we investigated the distribution of IOP collected in this setting in attempt to gain further insight as to how IOP levels may vary on average and whether there appeared to be any identifiable factors that might modify this measured relationship.

METHODS

As part of a separate investigation, ocular and general health information was collected during 2011-2016 on consecutive patients belonging to several attending faculty at an urban academic eye care facility in Chicago, Illinois, USA. To be included in the study, subjects had to: 1) be ≥18 years of age; 2) provide written consent and complete a short questionnaire in order to collect additional demographic and health information; 3) have their IOP measured via Goldmann tonometry on the day of exam; and 4) have examination that included pupillary dilation to allow for thorough assessment of eye health. Relevant data was collected from the current examination, from the existing health record, and from the questionnaire that was completed independently by subjects at the time of exam. Eyes were excluded from analysis with history of past intraocular surgery, uveitis, or significant ocular trauma. Multivariable regression analyses were conducted to explore the relationship between IOP and time of day, with search for numerous factors that might interact with time of day variation. Statistical analysis was performed using the SAS System, Release 9.3 for Microsoft Windows (SAS Institute Inc., Cary, NC).

FIGURE 1

IOP distributions relative to morning, afternoon, and evening patient care sessions. Least squares regression line (and 95% CI) shows relatively stable IOP with very slight trend downward as day progresses.

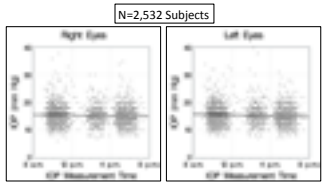


FIGURE 2

Example analysis: IOP distribution of patients with and without diabetes. Patients with diabetes show higher IOP on average throughout day, but there is no interaction with time of day, as reflected by similar regression line slopes (P>0.05).

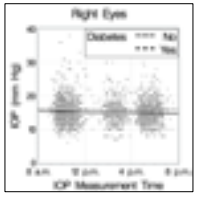


FIGURE 3

Example analysis: IOP distribution of "glaucoma suspects" vs "non-suspects." The glaucoma suspects show higher IOP, but there is no interaction with time of day (P>0.05).

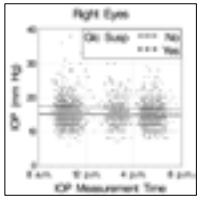
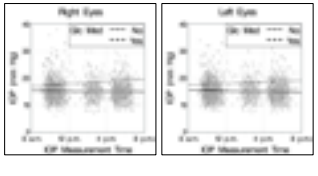


FIGURE 4

Example analysis of IOP distribution of patients on glaucoma medications vs. patients not on glaucoma medications. IOP among eyes receiving glaucoma medications show a positive interaction with time of day, reflected by the upward slope of the regression line. (P<0.001).



RESULTS

Analysis included 2,532 subjects (64.2% female, 82.7% African-American) who reflected facility demographics (Table 1). Univariate analysis of all subjects showed a mean IOP=15.2 ± 3.8 mm Hg among right eyes, which had a very slight downtrend as the day progressed over three clinical care sessions (morning=15.4 ± 3.6 mm Hg; afternoon=15.2 ± 3.5 mm Hg; evening=15.1 ± 4.1 mm Hg) (Figure 1). Left eye results were similar (Table 2). Multivariate control for numerous variables (Table 3, 4) showed remarkable stability of IOP during usual workday and early evening hours (P>0.05). Likewise, the analysis did not show patient subtypes whose IOP varied significantly with time of workday except for those taking glaucoma medications (n=126) (Figures 2-4). With control for other variables, their IOP trended significantly upward (P<0.001) as the day progressed.

TABLE 1

SUBJECTS

Total Subjects	2,532
Age (years)	[‡]51.1 ± 15.4 (18-94)
Gender	
Females	64%
Males	36%
Race	
African-American	82.7%
Hispanic	7.4%
White	5.4%
Asian	1.4%
Other	3.1%
[†]IOP (mm Hg)	
Right Eyes	[‡]15.2 ± 3.8 (6-79)
Left Eyes	15.3 ± 3.6 (7-46)

[†]Abbreviations: IOP, intraocular pressure; mm Hg, millimeters of mercury
[‡]Mean ± Standard Deviation (Range)

TABLE 2

[†]IOP LEVEL BY CLINICAL CARE SESSION

	MORNING (AM)	AFTERNOON (PM1)	EVENING (PM2)
Right Eyes (mm Hg)	[†]15.4 ± 3.6 (6-38)	15.2 ± 3.5 (7-30)	15.1 ± 4.1 (8-79)
Left Eyes (mm Hg)	15.5 ± 3.7 (6-46)	15.4 ± 3.9 (7-40)	15.0 ± 3.4 (7-31)

[†]Abbreviations: IOP, Intraocular pressure; mm Hg, Millimeters of mercury
[‡]Mean ± Standard Deviation (Range)

DISCUSSION

On average, IOP remained remarkably stable throughout standard patient care delivery hours in this primary care setting. In addition, although many variables were identified that had a relationship to IOP level, there appeared to be very little interaction of these factors with time of day during typical hours of operation. Eyes being treated with glaucoma medications, did however exhibit a time of day interaction, with apparent lessening of control as the day progressed. Similar analyses, with search for other influential factors on IOP level, can have significant value to patient care, and there should be a goal to understand other potential interactions as factors influential on IOP are identified. There should also be further investigation of traditional variables as relationships to IOP are typically still not fully understood.

TABLE 3

[†]IOP AND TIME OF DAY VARIABLES CONTROLLED FOR IN REGRESSION MODELS

Demographic	Ocular	Systemic
Age	Prefractive error	Body mass index
Gender	Krukenberg's spindle	Systolic / diastolic blood pressure
Race	Long zonule trait presence	Hypertension
Education	Corticosteroid use	Diabetes
Time of year	Glaucoma medication	History of cancer
		Smoking
		Alcohol
		Beta-blocker use
		Corticosteroid use
		Cholesterol medication

[†]Abbreviations: IOP, intraocular pressure

TABLE 4

MULTIVARIATE ANALYSIS OF IOP[†] AS A FUNCTION OF TIME OF DAY ADJUSTING FOR OTHER VARIABLES – RIGHT EYES

Variable	Coefficient	Standard Error	P-value[§]
Intercept	12.8	0.69	--
Time of day IOP measured	<0.001	<0.001	0.13
Gender (female)	0.42	0.15	0.005
Education >high school	-0.45	0.14	0.002
Refractive error (SE, per diopter)	-0.09	0.02	0.0002
Long zonule trait present	1.01	0.40	0.01
Diabetes	0.77	0.17	<0.0001
Body mass index (per 10 units) (kg/m^2)	0.43	0.01	<0.0001
Diastolic blood pressure (per 10 mm Hg)	0.33	0.07	<0.0001
History of cancer	-1.15	0.35	0.001
Ever smoke	-0.32	0.14	0.02
Time of year IOP measured (Ordered bimonthy: Dec/Jan, Feb/Mar, etc)	-0.13	0.04	0.002
Glaucoma medication	-1.40	1.33	0.29
Time of day x Glaucoma medication	<0.001	<0.001	0.0005

[†]Abbreviations: SE, spherical equivalent; IOP, intraocular pressure; kg/m2, kilograms per square meter; mm Hg, millimeters of mercury
[§]Variables included only if significant at P=0.05 level except for main effects of interaction terms

CONCLUSIONS

In this primary eye care teaching facility, Goldmann IOP level remained very stable on average regardless of the workday hour, and the only patient subgroup whose IOP appeared to be modified by time of day were those taking glaucoma medications. On average, IOP among those subjects increased as the day progressed, indicating that IOP control may not be as good during afternoon and evening sessions as compared to morning sessions.

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VA Low Vision Intervention Trial II: One-Year Outcomes

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BACKGROUND

A clinical trial was conducted to determine if low vision (LV) devices and rehabilitation with a therapist was more effective than LV devices dispensed without therapy. Participants were 323 Veterans with macular diseases and best-corrected distance visual acuity better-eye (BCDVAbetter-eye) of 20/50 to 20/200. During the trial, the LV rehabilitation group received LV devices, therapy and homework to teach device use, eccentric viewing and environmental modification. The Basic LV group received LV devices, initially without therapy, and standard of care LV therapy after the 4 month follow-up. Changes (baseline to 4 months) in overall visual ability and in 4 functional domains (reading, visual information, visual motor, and mobility) were estimated from responses to the 48-item Veterans Affairs Low Vision Visual Functioning Questionnaire (VA LV VFQ). Both treatments were found to be effective, but the added LV rehabilitation increased the effect only for patients with BCDVAbetter-eye worse than 20/63 to 20/200. (JAMA Ophthalmol. 2017;135(2):96-104.)

PURPOSE

To evaluate the effectiveness of LV rehabilitation one-year from baseline in two cohorts derived from VA LOVIT II.

METHODS

In a prospective study we observed all of the patients, (134 in LV rehabilitation group and 121 in Basic LV group) who completed the one-year LOVIT II follow-up. Overall visual ability and visual ability domain scores (reading, mobility, visual motor skill, visual information) were estimated using Rasch analysis of difficulty ratings on the 48-item VA LV VFQ. Mean changes (baseline to 4 months, 4 months to one-year, baseline to one-year) were compared.

RESULTS

TABLE 1
Mean Changes in Primary and Secondary Outcome Measures

VA LV VFQ-48[a,b]	Treatment Group (n=135)	Control Group (n=120)	Treatment vs. Control		
	Mean±SD	Mean±SD	Difference (95%CI)	p-value	Effect Size
Reading Ability					
Baseline	0.53±1.48	0.55±1.51	0.26	0.17	0.17
Change from baseline to 12 Months	0.74±1.68*	0.49±1.33*	(-0.12, 0.64)		
Mobility					
Baseline	0.67±1.30	0.73±1.20	0.11	0.09	0.09
Change from baseline to 12 Months	0.49±1.20*	0.38±1.28**	(-0.19, 0.42)		
Visual Information Processing					
Baseline	0.59±1.39	0.85±1.30	0.38	0.34	0.34
Change from baseline to 12 Months	0.61±1.17*	0.24±1.04**	(0.10, 0.65)		
Visual Motor Skill					
Baseline	0.68±1.41	0.82±1.39	0.13	0.09	0.46
Change from baseline to 12 Months	0.68±1.38*	0.55±1.46*	(-0.22, 0.48)		
Overall Visual Ability					
Baseline	0.59±1.15	0.73±1.03	0.21	0.08	0.22
Change from baseline to 12 Months	0.57±1.03*	0.36±0.87*	(-0.03, 0.45)		

* p<0.001 for within-group change.
** 0.0001<p<0.05
[a] All changes in visual ability are measured with the VA LV VFQ-48. Units are logits.
A 0.14 logit change in visual ability corresponds to the change expected from a 1-line change in logMAR visual acuity.
[b] Higher score indicates better ability or less difficulty in performing activities.

Mean changes in primary and secondary outcome measures from baseline to one-year (after the Basic LV group received standard of care LV therapy) indicate that both groups had significant improvement in all measures of visual ability (p≤0.05), but there were no differences between the treatment groups.

TABLE 2a
Pre Post Mean Changes in VFQ-48 by Follow-up for Low Vision Rehabilitation Group

VA LV VFQ-48[b]	Changes (gains) from baseline to 4 months		Changes (losses/gains) from 4 months to 1 year	
	Mean (SD) (n=135)	p-value[a]	Mean (SD) (n=135)	p-value[a]
Reading ability	1.4 (1.6)	<0.0001	-0.64 (1.2)	<0.0001
Mobility	0.37 (1.1)	<0.001	0.12 (1.0)	0.15
Visual information	0.74 (1.2)	<0.0001	-0.12 (1.1)	0.18
Visual motor skill	0.86 (1.4)	<0.0001	-0.18 (1.3)	0.12
Overall visual ability	0.78 (1.0)	<0.0001	-0.20 (0.8)	0.005

At baseline, there were no significant differences between groups. From baseline to 4 months, all domain scores and overall visual ability improved in both groups (p<0.01) except mobility in the Basic LV group. However, from 4 months to one-year, both groups lost visual reading ability (p<0.001). The actual loss was -0.64 logit for the LV rehabilitation group and -0.63 logit for the Basic LV group.

TABLE 2b
Pre Post Mean Changes in VFQ-48 by Follow-up for Basic Low Vision Group

VA LV VFQ-48[b,c]	Changes (gains) from baseline to 4 months		Changes (losses/gains) from 4 months to 1 year	
	Mean (SD) (n=120)	p-value[a]	Mean (SD) (n=120)	p-value[a]
Reading ability	1.1 (1.4)	<0.0001	-0.63 (1.4)	<0.0001
Mobility	0.14 (1.2)	0.21	0.24 (1.3)	0.05
Visual information	0.40 (1.1)	<0.0001	-0.17 (1.0)	0.07
Visual motor skill	0.36 (1.2)	0.002	0.19 (1.2)	0.08
Overall visual ability	0.46 (0.86)	<0.0001	-0.09 (0.8)	0.22

[a] Paired t-test for pre and post change.
[b] All changes in visual ability measured with the VA LV VFQ-48. Units are logits.
A 0.14 logit change in visual ability corresponds to the change expected from a 1-line change in logMAR visual acuity.
[c] Higher score indicates better ability or less difficulty in performing activities.

TABLE 3
Comparison of Means of Near Vision Acuity[a]

	LVR group	BLV group	Difference between LVR and BLV	p-value
Baseline	0.28	0.30	-0.02	0.68
4-Month	0.26	0.33	-0.07	0.21
1-Year	0.51	0.48	0.02	0.67
Change (loss) from 4 months to 1 year	0.25[b]	0.14[c]	0.11	0.09

[a] Near visual acuity measured in LogMAR
[b] p<0.0001 for within group change
[c] p<0.01 for within group change

The LV rehabilitation group experienced a greater loss in near visual acuity (0.25 logMAR, p<0.0001), while the Basic LV group had less loss (0.14 logMAR, p<0.01). However, no difference in such loss was found between the two arms.

Linear regression models were conducted to determine the predictors of loss of reading ability.

TABLE 4a
Predictors of Loss of Reading Ability for All Patients

N=251, Model R^2=0.13

Variable*	β Coefficient	SE	p-value
Intercept	0.067	0.58	0.91
Treatment	0.049	0.15	0.74
Age	-0.001	0.007	0.88
4 month near vision (logMAR)	-0.17	0.18	0.36
4 month reading ability score (logit)	-0.33	0.055	<0.0001

* Reference Group: Basic Low Vision group.

TABLE 4b
Predictors of Loss of Reading Ability for LVR Group

N=135, Model R2=0.11

Variable*	β Coefficient	SE	p-value
Intercept	-0.43	0.73	0.55
Age	0.005	0.008	0.57
4 month near vision (logMAR)	-0.17	0.26	0.52
4 month reading ability score (logit)	-0.29	0.076	0.0002

TABLE 4c
Predictors of Loss of Reading Ability for BLV Group

N=116, Model R2=0.16

Variable*	β Coefficient	SE	p-value
Intercept	0.71	0.94	0.45
Age	-0.008	0.011	0.47
4 month near vision (logMAR)	-0.18	0.27	0.51
4 month reading ability score (logit)	-0.36	0.08	<0.0001

The 4-month reading ability score predicted the loss of reading ability for both groups. Patients with more visual reading ability at 4 months lost more reading ability at one-year follow-up.

CONCLUSIONS

The LV rehabilitation protocol used in LOVIT II and VA standard of care LV therapy are both effective in improving visual ability in Veterans with macular diseases and BCDVA better-eye 20/50 to 20/200. As both groups lost reading ability from 4 months to one-year, patient follow-up for mild and moderate low vision is recommended at one-year.

FINANCIAL SUPPORT

VA Rehabilitation Research and Development Service C6958R

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Determining success of the OrCam MyEye/MyReader in Patients with Visual Impairment

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3271

INTRODUCTION

There is an estimated number of 223 million people worldwide who are visually impaired or legally blind (1). Vision impairment can affect employment, quality of life, psychological well-being and ability to perform activities of daily living. Expanding eyecare and vision rehabilitation to this population of patients can ameliorate the economic impact (2). Several rehabilitation strategies and devices are available to restore patient independence and help individuals regain their ability to read, remain employed, and enjoy their daily activities. With the advancement of technological devices, low vision patients find benefit in using text to speech and auditory methods in place of their vision (3), which many patients find more efficient than trying to use magnification of text.

A newer text to speech system is the OrCam, which is a device that mounts onto a pair of spectacles with a camera and built-in speaker that converts visual information into audio information. It is capable of product recognition, reading text and facial recognition, and is reported to help with the overall quality of life of patients who have used the device (4). There are two versions of OrCam, MyReader, and MyEye. MyReader focuses on text-to-speech functions that can be activated by either pressing a button or pointing a finger at the desired printed material, such as newspaper, books, computer screens, labels on a variety of products, restaurant menus, street signs, etc. MyEye has all the above features as well as the ability to recognize stored faces and to identify certain consumer products.

PURPOSE

OrCam is a device that uses optical character recognition technology in the form of a mounted camera that reads characters, recognizes faces and identifies products. This device is relatively new, therefore not much research has been done to evaluate the efficacy and characteristic patient population that would most benefit from its features. Our study aimed to identify which visually impaired individuals utilize the OrCam most and what specific tasks are most commonly used with the device. Using a post-consumer patient survey, we want to identify characteristics of patients who use OrCam's features and identify which factors contribute to being a successful user of the device including comparison against their usefulness with traditional low vision devices such as telescopes, magnifiers and CCTVs (electronic magnifiers) for everyday tasks.

METHODS

A telephone survey consisting of 18 questions was conducted with 14 patients from the Chicago Lighthouse and Spectrios Institute who have purchased the OrCam. Out of the 14 patients, 2 declined to be a part of the study. Subjects ranged in age from 18 to >60 years old, 8 of them being over the age of 60 and all had a documented vision impairment. Non-parametric statistical analyses used SPSS, with significance levels set at p<0.05.

SURVEY

Survey:

1. How old are you?
<30yrs 31-59yrs >60
2. What is your current best corrected visual acuity? (verify from chart if available)
<20/60 - 20/200 <20/400
3. What condition have you been diagnosed with? (verify from chart if available)
4. How long have you known about your condition?
1-2yrs 3-5yrs 5-10yrs 10-20yrs >20yrs
5. Which model of OrCam do you have?
MyEye MyReader
6. How long have you had the OrCam?
<3months <6months <1year 1-2 years >=3 years
7. What are the top 3 things you are using the device for? List them:
i. a) _____
ii. b) _____
iii. c) _____
8. How satisfied are you with OrCam when using it for: (on scale from 1 to 5)
1=dissatisfied, 2=somewhat dissatisfied 3=neutral 4=somewhat satisfied 5=highly satisfied
a). Facial recognition
b). Product identification
c). Reading
9. Prior to obtaining OrCam, have you used any other low vision or technology devices? If so please list:
i. _____
ii. _____
iii. _____
10. How many years have you used low vision devices?
<1year 1-2 years 3-5 years 5-10yrs >10-20yrs >20yrs
11. On average how many hours a day are you wearing the device?
Not every day <1hr 1-2hrs 2-3hr 3-5hrs >5hrs
12. Compared to other low vision devices, how often do you use OrCam?
Rarely <10% of the time Sometimes 50% of the time Often >50%
13. Do you use the OrCam more than your telescope? Y/N (if applicable)
14. Do you use the Orcam more than your hand held magnifier? Y/N (if applicable)
15. Do you use the Orcam more than your CCTV or electronic magnifier? Y/N (if applicable)
16. Is there a device you use more than the OrCam that we haven't mentioned, and what do you use it for?
17. Has OrCam allowed you to do anything that you were not able to do before with previous devices?
18. If you could add any feature to the OrCam, what would that be?

RESULTS

Figure 1
OrCam can be mounted on a pair of spectacles where the camera and audio feedback is attached to the temples. The controller is connected by a wire that the patient can keep in their pocket and has buttons for power on or off and volume control.

Figure 2
A subject here utilizing the device by using her finger to point at what she would like to be read

Table 1
Summary of Data Collected for Subjects Based on Visual Acuities

	All Subjects	VA 20/60-20/200	VA <20/400
VA Classification	12 (100%)	7 (58%)	5 (42%)
Age above 60	8 (67%)	6 (86%)	2 (40%)
Overall Satisfaction % (based on features used)	77%	82%	71%
Reading satisfaction scale (out of 5)	3.8	4.1	3.4
Number reporting reading is somewhat or highly satisfied	9 (75%)	6 (86%)	3 (60%)
Use My Eye	8 (67%)	4 (57%)	4 (80%)
Use Facial Recognition	5 (63%)	2 (50%)	3 (75%)
Facial Recognition satisfaction scale (out of 5)	3.4	3.5	3.3
Number reporting Facial Recognition is somewhat or highly satisfied	2 (40%)	1 (50%)	1 (33%)
Use Product Identification	5 (63%)	2 (50%)	3 (75%)
Production Identification satisfaction scale (out of 5)	3.4	3.0	3.7
Number reporting Production Identification is somewhat or highly satisfied	2(25%)	0 (0%)	3 (67%)
Use only Optical Devices	0	0	0
Use only Technology devices	7 (58%)	3 (43%)	4 (80%)
Use Both Optical and Technology devices	5 (42%)	4 (57%)	1 (20%)
How Long They Had OrCam	< 6 months	< 6 months	< 6 months
Average Frequency of Use Per Day of OrCam	1 – 2 hours	<1 hour	1 – 2 hours
Able to do things they were not able to before	10 (83%)	6 (86%)	4 80%)
Helped with Reading	8 (80%)	6 (100%)	2 (50%)
Average Duration of Use of Low Vision Devices	5 - 10 years	3 - 5 years	10 - 20 years

Table 2
Correlation Coefficient (top value) between Overall Satisfaction, Age, Visual Acuity, How Long They Had the OrCam, Frequency of Use of OrCam, and Duration of Use of Low Vision Devices. N=12 * = p<0.05

	Age	Visual Acuity	How long they had the OrCam	Frequency of Use of OrCam	Duration of Use of OrCam
Overall Satisfaction	0.21 p=0.50	-0.23 p=0.47	0.10 p=0.73	0.045 p=0.89	-0.24 p=0.44
Age		-0.500 p=0.09	-0.07 p=0.80	-0.08 p=0.78	-0.33 p=0.28
Visual Acuity			-0.20 p=0.50	0.16 p=0.62	0.56 p=0.05*
How long they had the Orcam				-0.62 p=0.03*	-0.17 p=0.59
Frequency of Use of Orcam					0.006 p=0.974

Figure 3
Ocular conditions of subjects sorted by retina, optic nerve or both. Retina conditions include age related macular degeneration, histoplasmosis, retinal detachment, retinitis pigmentosa, degenerative myopia. Optic nerve conditions include ischemic optic neuropathy and congenital glaucoma.

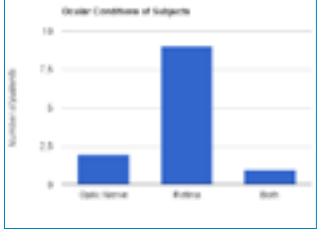
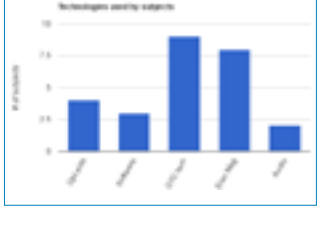


Figure 4
Other devices subjects used. Optical devices include telescopes, hand held magnifiers; Software includes JAWS and Zoom text; Over the counter (OTC) technology includes tablets, cell phones, computer, laptops; Electronic magnification includes portable or desktop CCTVs, Audio includes talking clock, audiobooks



CONCLUSIONS

- The most common function of the OrCam was continuous reading, despite capability for facial recognition and product identification
- All subjects have had previous exposure to assistive technology, this may indicate OrCam requires some level of technological knowledge or may be related to patient motivation to embrace technology
- Optical and electronic magnification are typically introduced as a first line strategy in vision rehabilitation, the OrCam is not a common device that is first introduced.
- OrCam should be introduced to patients regardless of visual acuity level and age
- However, power analysis suggests a total number of 20 subjects will be needed to approach significance.

FUTURE DIRECTION

- A study with more subjects will be useful in establishing how the OrCam is used and what leads to overall satisfaction with the system.
- With the rapid advancement of technology, the OrCam functions may be incorporated into cell phone

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BCLA

1 ICO PRESENTATION

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Initial Prescribing Trends of Specialty Lenses in a KC Population

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BACKGROUND

Keratoconus (KC) while once considered a chronic, non-inflammatory ocular condition has recently been associated with various inflammatory markers indicating a possible underlying inflammatory process[1]. This corneal disorder is hallmarked by progressive thinning of the cornea and a steepening of its curvature which results in a substantial change in overall quality of vision throughout a lifetime. KC has been consistently reported in literature with an annual incidence of 1 per 2,000 persons[2,3].

Corneal rigid gas permeable (GP) contact lenses have long been used as the standard to improve quality of vision for patients of KC when spectacles and traditional soft contact lenses are no longer an option[4]. The ability to customize base curve, tear exchange, and movement of the lens can allow for an improvement in fitting and in vision. Corneal GP lenses manipulate the tear film to correct the abnormalities and aberrations induced by the irregular corneal shape[5]. However many patients struggle with comfort with GPs and others have such severe disease for which GPs alone provide inadequate fit and vision.[7] The contact lens industry has stepped up to this challenge with advances in specialty soft lenses, hybrids and scleral lenses. With the development of improved GP materials, scleral lenses resurged onto the marketplace and many specialty meetings now focus on sclerals for fitting KC patients. The manner in which scleral lenses vault over the cornea makes them beneficial in a wide array of corneal diseases, including corneal ectasia, KC and ocular surface disease[8]. A well-fit scleral, allows for excellent corneal hydration and can reduce insult on the cornea, compared to corneal GP lenses. They may also provide added protection for these weakened corneas. [9]

The goal of this study was to determine if these advances in corneal GP, scleral GP, soft and hybrid lenses for the irregular cornea had changed initial lens selection in this KC population. We evaluated the prescribing trends of specialty contact lenses prescribed as initial fits for patients with KC at the Illinois Eye Institute from 2003 to 2015.

METHODS

With the approval of our institutional review board, the clinic electronic health record system was queried for all patients with KC diagnoses. This data was then cross referenced with the contact lens ordering system to determine the initial lens design ordered. The records of 385 KC patients were reviewed. This began with dates prior to the usage of scleral lenses in the clinics to determine a baseline usage for corneal GP lenses. Regression analysis was performed and arcsine transformations were calculated. Anova testing was also performed to evaluate usage of the four lens categories.

FIGURE 1: The clinic showed a steady growth in first time KC fittings.

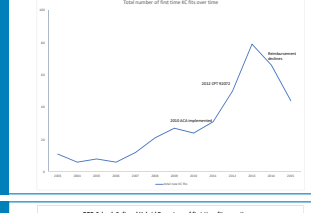


FIGURE 2: Regression analysis and comparison of fitting of modalities over time.

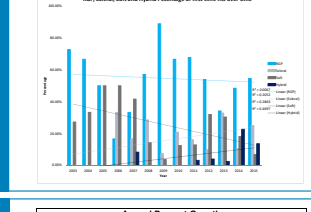
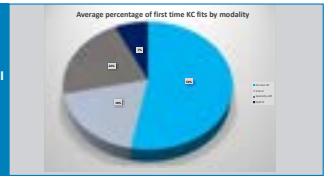


FIGURE 3: Average growth over time.

Annual Percent Growth			
RGP	Scleral	Soft	Hybrid
9.6%	20.9%	0.0%	25.1%

FIGURE 4: Average use overall of the various modalities in first time KC fits.



RESULTS

The clinic showed steady growth in prescribing for new patients with KC. (Figure 1) In 2010, there was a significant rise in fittings likely associated with improved coverage of our patient base through managed Medicaid plans that became available with the implementation of the Affordable Care Act (ACA). Medicaid plans account for over half of our payors at the institution. In 2012, fitting rates continued to increase with the new CPT code for KC fitting. Coverage by our non-Medicaid plans and vision plans increased during this time frame. About 18 months later, we experienced increased rejections, two year restrictions on materials that prevented patients who had previously received glasses from receiving contact lenses, and reduced reimbursements.

Figure 2 compares the four modalities over time. Overall corneal GP lenses are flat; soft lenses show a mild decline with a small spike with the launch of Kerasoft IC in our clinic; there was an increase in prescribing of both sclerals and hybrids. Scleral lenses grew at a rate of 20.9% over the nine years in which they have been fit at the institution. Hybrid lenses grew at a rate of 25.1% over their eight years with the highest growth in 2014 with the introduction of UltraHealth. Unfortunately, with reduced reimbursement this trend was very short-lived. The less expensive corneal GPs showed in 2013 with the increased challenges of insurance. However, overall regression analysis shows that GP lens growth is with despite the calculated 9.6% growth (figure 3) However, the overall average percentage of fits were 53.0% corneal GP, 18.4% scleral, 21.6% specialty soft, and 7.0% hybrid. (Figure 4)

CONCLUSIONS

Corneal GP lenses continue to be the first lens fit for KC in over half our patients, remaining the primary first lens choice for KC patients. Scleral lenses continue to grow but cost and insurance significantly impact their utilization. Specialty soft lenses have declined slightly but still are used in one-fifth of the patients. Hybrid lenses are increasing but their use has been limited due to costs. Reduced reimbursement may be impacting the use of newer designs in recent years. Further study including surveying faculty for their first choice of lens when cost is of no concern may provide added insight into the trends seen here.

While the GP corneal lens may be dead for mainstream practice as stated by Dr. Efron in his obituary for rigid lenses,[10] For the KC patient the remain the lens most commonly chosen for a first time KC fitting.

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COVD

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Our Children's Vision Inaugural Event in The United States: Vision Program in Gary, Indiana

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ABSTRACT

Our Children's Vision program was created to address uncorrected refractive error (URE) in children around the globe. It is suspected that 63% of visual impairment in children is due to URE. The Brien Holden Vision Institute (BHVI) who initiated the Our Children's Vision (OCV) campaign led an event on World Sight Day 2016 to provide vision assessment and comprehensive eye care for children in an elementary school in Gary, Indiana. OCV partnered with the Illinois College of Optometry, Indiana University, and local practitioners to provide the eye care services and the Major League Baseball Players Trust (retired professional baseball players) for media attention.

On October 13, 2016, faculty, students and residents from ICO, IU and Midwestern school alongside Gary practitioners screened and provided comprehensive eye care to 99 children from William School and 23 children enrolled in a local Little League program. The morning session was comprised of children who were prescreened by the nurse and found to have failed the vision screening. The afternoon group was screened with the Modified Clinical Technique MCT battery and examined if they failed. The last group was children from a local baseball program. Of the children seen, 39 (39.4%) children from William School and 14 (60.9%) children from the Little League program needed new corrections.

The children screened were those that were targeted for the program because of lost or broken glasses or a suspected vision problem. The poster will describe the vision findings for these children in more detail. The results suggest that there is a significant need to address URE in low socioeconomic areas where the children are not accessing needed eye care services. This program was unique in that representatives from three optometry schools collaborated to address children's vision issues. We hope to repeat this effort in the future.

BACKGROUND

OCV mission:

From the moment children wake in the morning, until they rest their heads at night – they use their eyes. To learn at school, they need to be able to see their texts and lessons on the board. To develop relationships with their peers, they need to be able to see faces and play safely. To take in the world around them – they use their eyes. For millions of children around the world, life without clear vision is normal. For them, not being able to see their lessons, or recognize the faces of their friends is normal. The crazy thing is that we have the solution and it doesn't require the latest technology or comprehensive strategies. We have had it for centuries - a simple pair of glasses.

We need to help every child, everywhere get access to the eye care and the glasses they need to change the course of their future for the better.

In celebration of World Sight Day, 2016, Our Children's Vision and the Illinois Eye Institute at Princeton partnered to provide an approved Indiana school vision screening and comprehensive eye care for children from a school located in a low income area in Gary, Indiana. On October 13, 2016, Our Children's Vision staff, IEI at Princeton faculty, staff and students along with faculty and residents from IU and Midwestern joined in to help provide service to students. The Retired Major Baseball players organization also joined in to help the media focus on the visual needs of children.

SUBJECTS

Children seen who attended the Williams Elementary School - 99
Age Range: 5.4-16.0 yrs – Average 9.2 yrs,
Female: 51 Male: 48
Children from school were referred for vision screening.

Children who were from the local Little League program - 23
Age Range: 5.3-14.3 yrs – Average 8.4 yrs
Female: 13 Male:10

Previous RX

No 79
Unknown 1
Yes 42
Rx Present 10
Broken 13
Lost 3
Missing 16

DATA FROM EXAMS

VA Far		
OD	OD	OS
20-32	83	87
40-63	28	25
70-200	8	7
poorer than 200	2	2

Near VA 20/32 or better -91 or 86% of students with near point data, 14 or 13% had reduced near point visual acuity.

REFRACTIVE ERROR

Sphere	OD	OS
≥+2.00	9	10
+1.75-+1.00	15	12
+0.75 - -0.75	75	76
-1.00 - -1.75	11	14
≤2.00	9	7
Cylinder		
1.00-4.25	30	37

Strabismus: 5 (1 esotrope, 1 constant exotope, 2 intermittent exotopes, 1 hypertrope)

Eye Health – 1- high IOP, 1 – iris coloboma, 2 – large/physiologic cupping, 1 retinal hole
New Corrections Provided at no cost to the child– 39

Four potential refractive amblyopes

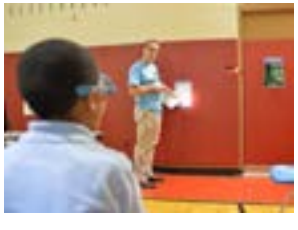
CONCLUSION

This was the first event in the United States focusing on the mission of Our Children Vision program to reduce uncorrected visual impairment due to refractive error. It was successful due to the strong reach of the Brien Holden Vision Institute out to the three optometry schools and local practitioners as well as the Major League Foundation. World Sight Day was the optimum time to focus on the needs within a high income country in an area where children do not always receive services that would allow them to see better and ultimately perform better in the academic setting as well as on the baseball field.

The partners are looking forward to continuing these efforts into the future.





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Vestibular Neuritis and Vision Therapy

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INTRODUCTION

Optometric vision therapy has been shown to improve vision function for a wide variety of conditions, but vestibular neuritis and all the symptoms associated with this condition, have not been fully explored. This case reports discusses this condition and how vision therapy can help patients and improve their quality of life.

CASE REPORT

EB was referred to Lyons Family Eye Care by the Hearing and Dizziness Institute of Chicago to determine if optometric vision therapy could help to improve or eliminate many of the symptoms noted by this patient. After a bout of shingles, she then contracted vestibular neuritis. EB noted she felt sick all the time, could not focus, could not use a computer, and had frequent headaches. She also experienced vertigo, nausea, diplopia and poor mobility, as well as walking into people on the street, loss of fixation, and an inability to watch television if the actors were moving. EB cannot read or work and her attention is variable.

Although her Attention Performance Index score on the Test of Variables Attention (TOVA) was within the expected range (3.7), the overall results of this test were borderline with impulsivity being an area of concern.

The Visagraph noted several areas of concern including duration of fixations, saccades, regressions, span of recognition and reading rate

After a visit a previous eye doctor, she was diagnosed with convergence insufficiency (CI). Therapy was recommended for the CI but it made her ill. She did participate in a program of vestibular therapy. EB saw a neurologist for an evaluation for Lyme disease (inconclusive).

Medications included: vitamins, Zyrtec, Zoloft, Trokendi, Lo Loestrin and Gabapentin. She also has sinus problems, anxiety, acid reflex and environmental allergies. She initially scored a 43 on the COVD Quality of Life Survey (QoL). After EB's latest progress evaluation, her COVD QoL survey scored a 22 and all of her vision problems were eliminated or improved.

Functional vision diagnosis includes convergence insufficiency, oculomotor dysfunction and accommodative anomalies

Table 1
Progress Evaluation Chief Complaint

Initial	#1	#2	#3	#4 (36 vision therapy sessions)
felt sick all the time	Therapy improving function/symptoms	significant improvement in most areas	pain management doing very well	pain worse (new diagnosis of Fibromyalgia)
could not focus	Went to Cubs game but could not	participating in pain management	Comprehension still poor	improved
could not use a computer	tolerate the sensory input	computer use improving	computer use still difficult	improved
frequent headaches	Intermittent word fusion	headaches variable	skipping words	improving
vertigo, nausea	not sick all the time	vertigo, nausea variable	comprehension needs improvement	improving
diplopia	improving	improving	emotional status much improved	NC
poor mobility	improving	improving	not ready to return to work	working from home
walking into people	improving	improved		diagnosed with fibromyalgia
loss of fixation	still a problem	improving	QoL 22	QoL 35 (new diagnosis of Fibromyalgia)
cannot read	little change	improved		
cannot work	little change	improving		
variable attention	improving	improving		
COVD QoL 43	improving	QoL 43		
sinus problems	improving	NC		
anxiety	improving	improved		
acid reflex	improving	NC		
environmental allergies.	No change (NC)	NC		

Table 2
Clinical Near Findings

CEE/VEE	PR#1	PR#2	PR#3	PR#4
Phoria 10BI	8BI	2BI	6BI	10BI
CT 12 BI	10BI	8BI	Ortho	10BI
BI Suppression	25/18	20/14	25/16	
BO 12/0	25/20	20/20	30/25	
Pursuits +3	NC	+3	NC	+3-4
Saccades +2	NC	+3	NC	+3-4
NPC with RL diplopia	RL TN	RL TN	TN	TN
MEM AM OD/OS	AM then WM	NC	+.50 OD/OS	NC
Randot +	NC	NC (9/9)	NC	NC
W4D 4	NC	NC	NC	NC
MAF (+/-2.00)	0	0	Variable	8cpm OD/OS
BAF (+/-2.00)				Dizziness

BEHAVIORAL OBSERVATIONS

EB was alert and cooperative during the testing. Rapport was easily established. Her attentional level would vary at times as we conducted the various assessment procedures. She was a delight to work with and maintained a great attitude and demeanor throughout our interactions.

DISCUSSION

The COVD Quality of Life (QoL) survey was somewhat variable during EB's therapy program. This was probably due to her many medical problems and how well they were managed. She recently decided to continue her therapy program after a renewed break out of shingles occurred which resulted in a setback of some functional abilities.

This case report demonstrates that optometric vision therapy can not only remediate the functional vision problems of patients with vestibular neuritis, but can also significantly improve their quality of life as well. At the end of therapy she was returning to work (at home), could read (for short periods of time), noted improved comprehension and significantly less problems with vertigo.

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Converging Cars: Adult Acute Onset Diplopia and the Treatment and Management with Fresnel Prism

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BACKGROUND

Adult patients with an acute onset diplopia all share the same problem of functional disability. When appropriate, prism can be a great tool to minimize symptoms and restore binocularity. This can improve quality of life. This case explores the treatment and management of an adult patient with an acute acquired esotropia with Fresnel prism.

CASE SUMMARY

A 55 year old male presented with a sudden onset of constant horizontal diplopia. This was related to his uncontrolled diabetes and was confirmed by several specialists. Initially, he had a 25△ intermittent alternating esotropia (IAET) that was noncomitant with an A pattern eso posture (Figure 1a, 1b). His versions/ductions were full with no restrictions. With a 25△ base out Fresnel Prism, fusion was achieved in primary gaze (Figure 2a, 2b). He was followed every 3-4 weeks to reduce the amount of prism. The angle of deviation was not resolving as one would expect from a vascular etiology, but the patient was able to fuse with lower amount of prism each visit. At his last visit, the patient was asymptomatic and discontinued the use of prism even though he measured 12△ IAET.

FIGURE 1a

FIGURE 1b

OD side	Maddox Rod OD w/ Transilluminator	OS side
	25△BO	
16△BO	16△BO	16△BO
	12△BO	

FIGURE 2a

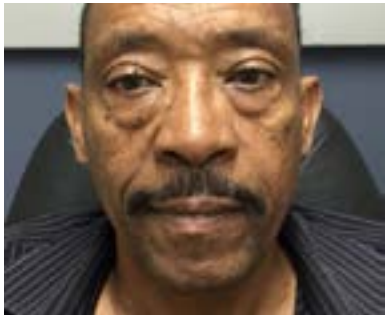

FIGURE 2b

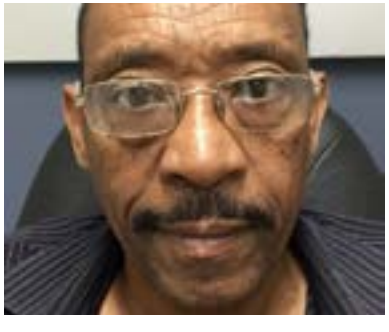

FIGURE 3

Visit	07/05/2016	07/12/2016	07/26/2016	08/23/2016	09/27/2016
Prism	None	25△BO vs. 20△BO	15△BO vs. 12△BO	12△BO vs. 9△BO	None
Plan	25△BO 1 wk F/U	3 wk F/U	4 wk F/U	4 wk F/U	6 wk F/U

TREATMENT AND MANAGEMENT

At the initial visit prior to treatment the patient measured 25△ IAET. At his final visit after treatment, the patient measured 12△ IAET. See Figure 3 for management with prism.

DISCUSSION

The question of whether this patient had a decompensation of an existing esophoria that was exacerbated by the uncontrolled diabetes was largely considered. No prior eye exams were performed at the same clinic, strabismus was denied, and old photos were not provided to support this. Interestingly, the Fresnel prism could have helped increase his fusional vergences similar to the effects of vision therapy so that he could compensate the residual amount of 12△ IAET.

CONCLUSION

It is important for clinicians to realize the value in utilizing prism compared to occlusion. When fitting the Fresnel, choose the patient's most useful direction of gaze, set realistic expectations, and closely monitor with frequent follow- up exams

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Applying Narrative and Integrative Medicine to Neurology Referrals for Visual Disorders in Post–Concussion Syndrome

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BACKGROUND

Traumatic brain injury results in a complex of physical, visual, neurologic, cognitive and psychiatric problems reported as post-concussion syndrome (PCS). Patient care requires a multidisciplinary approach to the evaluation and application of treatment needs. This complex care often results in patient confusion, non-compliance and reduced therapy outcomes. A narrative medicine model (Charon R.) enhances communication and understanding among patients and their medical providers. Integrative medicine focuses on mind, body, spirit, stress reduction and mind-body techniques, all helpful for improved quality of life.

INTEGRATIVE MEDICINE (IM)

The field of integrative health and medicine reaffirms the importance of the relationship between practitioner and patient, focuses on the whole person, is informed by evidence, and makes use of all appropriate therapeutic approaches, healthcare professionals and professions to achieve optimal health and healing. Simply put, integrative health and medicine offer best practices for optimal health and healing. ***Academy of Integrative Health & Medicine (AIHM)***

NARRATIVE MEDICINE (NM)

The effective practice of medicine requires narrative competence, that is, the ability to acknowledge, absorb, interpret, and act on the stories and plights of others. Narrative competence is a model for respectful, empathic, and nourishing and effective medical practice. With narrative competence, physicians can reach and join their patients in illness, recognize their own personal journeys through medicine, acknowledge kinship with and duties toward other health care professionals, and inaugurate consequential discourse with the public about health care. **(Charon R, JAMA 2001:286.1897-1902) (https://youtu.be/24kHX2HtU3o) Columbia University School of Professional Studies has a Master of Science program in NARRATIVE MEDICINE**

TABLE 1
Visual Sequelae with PCS

- Visual Sequelae with PCS
- Convergence insufficiency (CI)
- Binocular Vision Disorders
- Accommodative insufficiency (AI)
- Saccadic and Pursuit Disorders
- Diplopia – head compensation
- Light sensitivity/glare issues
- Visual-vestibular / balance
- Visual-perceptual skills
- Retina / Visual Field defects
- Pupillary function defects
- Dynamic visual acuity reduced
- Executive Function impaired

TABLE 2
Visual Symptoms with PCS

- Blurred vision / eyestrain
- Diplopia
- Headaches
- Anxiety/depression
- Dizziness/balance
- Irritability / inattention / Insomnia
- Poor concentration and memory
- Poor reading ability
- Loss of executive f unction
- Fatigue / nausea
- Noise and light sensitivity.
- PTSD

TABLE 3
Participating Specialties

- Optometry
- Primary Care Physician
- Neurology
- Ophthalmology
- Rehabilitation therapy
- Neuro-surgery
- Chiropractic
- OT / PT / Vestibular therapy
- Psychology / Psychiatry
- Life Coach
- Cognitive Therapy
- Nutritionists / Life style
- Physical training / Yoga

TABLE 4
Vision Therapy Protocols (Scheiman & Wick)

- **Convergence / Fusional Vergences**
  - o Amp, Ranges, Facility, Stamina, Cognitive level
- **Accommodation**
  - o Amplitude, Facility, Stamina, Cognitive level.
- **Ocular Motility (Saccades, Pursuits, Fixations)**
  - o Accuracy, Speed, Stamina, Cognitive level
- **Reading eye-movements**
  - o Sequential saccades (numbers, words, stories)
  - o Rate, Automaticity and Fluency
- **Visual-vestibular coordination**
  - o Target move, Head move, Target/Head/ Body move
- **Visual-perceptual skills** (TVPS – Visual and Visual-Motor)
- **Visual Attention**
  - o Integrative procedures, Memory games, Lumosity,
  - o Interactive Metronome, Tachistoscope
- **Computer Software Therapy Procedures**
  - o Track&Read, Dynamic Reader, SVI, Vision Builder
  - o K-D Reading Acceleration Program, Reading Plus,
  - o VTS4, HTS, AMB, PTV, PTS, CPT, Public domain

TABLE 5
Pre and Post Therapy Results

	Patient 1	Patient 2	Patient 3
Age	58	32	40
Etiology	Taxi-pedestrian	Assault	Car-passenger
Vocation	International researcher	College student	Professional
Disability	Unable to work & travel	poor concentration	Only work ½ T
Referral for	Convergence Insufficiency	Reading problems	Nausea-NV blur
Diagnosis	CI, AI, OM, HA	OM, AI, BV, CI, HA	CI, AI, OM, HA
QOL survey	46 pre / 15 post	34 pre / 20 post	39 pre / 21 post
NPC	14/20pre – 8/10post	8/10 pre / 6/8 post	9/18pre,6/8pos
NPFD	10/16pre – 6/8post	6/8 pre / 2/4 post	7/13pre,3/6pos
DEM	3 SD below / within 1 SD	2 SD below /within 1 SD	1SD below/avg.
KD	107sec Pre/ 70sec Post	14sec pre /62sec post	80 pre/53 post
Visagraph	GLE 2 pre / GLE 8 post	GLE 3 pre / GLE 10 post	GLE5pre/GLE11
Reaction time	650msPre / 480ms Post	610ms pre / 440 ms post	615ms / 435ms
TOVA – ACS	-4.75 pre / -0.15 post	-2.89 pre / +1.27 post	-1.50 pre/+0.45
Dynamic VA	4 line drop / 1 line drop	3 line drop / 1 line drop	3line drop/1pos
Anti-saccades	55%pre / 90%post	60% pre / 85% post	75% pre/95%
VT duration	1.5 years	9 months	12 months
Status Now:	unemployed	student	Full-time work

CASE SUMMARY

Three patients (2 female, 1 male, avg. age 43), in a cohort of neurology referrals for PCS, are presented with evidence-based procedures and protocol, from their initial exam, through therapy and summary of outcomes. Guidelines are provided for using narrative and integrative medicine to improve patient understanding, compliance and ability to follow multiple treatments within a complex life. Their trauma etiology included auto accidents and trauma. The Visual Sequelae and Visual Symptoms of PCS are listed in Table 1 and 2. Other issues are employment, relationships, mobility, litigation, insurance, and quality of life. Concurrently participating providers are listed in Table 3. We present evidence-based treatment protocols (Table 4.), pre and post results, and measured outcomes for each subject (Table 5). The elements of Integrative (IM) and Narrative medicine (NM) applied to this PCS cohort are listed in Table 6.

TABLE 6
Elements of IM and NM Applied:

- Act on the patient's medical "stories"
- Evidence-based care, explained to patient
- Integrated care by multiple providers
- Complementary treatment strategies
- Prioritizing necessary treatment needs
- Flexible home and office vision therapy
- Nurture empathic doctor-patient relationships
- Patient-centered medical care communications
- Enhance respectful professionalism among specialists
- Proactive communication among all providers.
- Written or verbal exchanging of information as needed
- Develop collegial alliances with shared research
- Attend to patient's Quality of Life goals and needs
- Foster patient's positive attitude, despite setbacks.
- Patient understanding of prognosis, short & long-term.
- Patient understanding of "Why" they are doing therapy.
- Patient advocate for:
  - o Employment, transitions back to work
  - o Mobility and transportation issues
  - o Patient / Family understanding
  - o Insurance /disability issues
  - o Legal actions and court issues
  - o Adapting new life skills / work
  - o Understanding among specialties
  - o Manageable treatment goals

DISCUSSION

These three cases confirm positive benefits of practicing narrative medicine, integrated with conventional and complementary therapies. Greatest improvement occurred with QOL survey, convergence, accommodation, reading eye-movements, reaction time, visual-vestibular abilities and dynamic visual acuity. Another positive outcome was patient understanding and empowerment to direct their health care and healing. Communication and cooperation improved among all providers and broadened the awareness of each specialty. We recommend practicing narrative and integrative medicine with complex visual disorders necessitating treatment from multiple providers.

Grant Support provided by ICO RRC and Brittany Research Fund

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CUCOH

1 ICO PRESENTATION

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An Evaluation of Privatized Healthcare at an Urban Chicago Eye Institute

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INTRODUCTION

Comprehensive eye examinations are important in the detection of ocular diseases and have the potential to detect signs of chronic systemic conditions. Careful examination of retinal blood vessels can provide information about underlying vasculopathic conditions such as hypertension and diabetes[1]. Early detection and treatment of these conditions can not only improve quality of life, but also reduce associated healthcare costs[1]. Given the importance of eye examinations, it is essential that individuals are adequately accessing this care.

The American Optometric Association (AOA) recommends that asymptomatic or risk free adults between the ages of 18 to 60 years should have an eye exam every two years, while adults 61 and older should have one annually[2]. At risk patients should be examined annually, or as recommended by their eye care physician. At risk patients include those with diabetes, hypertension, family history of ocular disease, those who wear contact lenses and those who are taking drugs with ocular side effects, for example[2].

Thus, it was of interest to determine whether the patient population at the Illinois Eye Institute has been receiving adequate eye care within the recommended timeframe outlined by the AOA. Additionally, we were interested in whether any significant differences existed in the access to eye and medical care between patients being seen in the urgent and primary care clinics. We inquired about patients' demographic factors as well as level of insurance coverage for eye and medical care to see if any of these factors were correlated to patient's decision to seek care.

METHOD

Surveys were distributed to patients waiting to be seen in the urgent and primary eye care clinics at the Illinois Eye Institute (IEI) over a 6 day period in June 2017. All patients over the age of 18 were approached to complete the survey. Informed consent was obtained from each study participant. As some of the patients surveyed were waiting for their pupils to dilate or had other visual impairments, those who had trouble seeing the questions had the survey read aloud to them by the co-investigator and their verbal response was recorded. The survey included questions about patient demographics such as date of birth, gender, and race. Multiple choice questions to assess level of insurance coverage for eye and medical exams, time since last eye and medical exams, and known chronic medical and ocular conditions were also included. Collected data was summarized as counts and/or percentages. Data was analyzed using SPSS software.

RESULTS

Of the 275 patients surveyed, 85.1% were seen in IEI's primary eye care clinic, while 11.6% were seen in the urgent eye care clinic. The patient population was 64.4% female, with a mean age of 52.2 years (18 – 89 years). The majority of patients surveyed identified as African-American (73.1%), with 11.6% and 6.2% of the patients identifying as Hispanic and Caucasian respectively (see Figure 1).

67.6% of patients had full medical coverage, while 64% reported having full eye care coverage. Since the introduction of the Affordable Care Act (aka. ACA, Obamacare) in 2009 in the USA, all Americans are mandated to have some form of health insurance[3]. Our study revealed that only 1.1% of patients at this time do not have medical insurance.

Most patients had an eye exam within the last two years (86.3%) and a medical exam within the last year (78.2%). Of the patients surveyed, 40% had known ocular disease (most common glaucoma, 15.4%), and 53.5% had chronic medical conditions (most common diabetes, 19.3%), see Figures 4 and 5.

A significant correlation was seen between the following variables:

- Patients presenting to the Urgent Eye Care Clinic and patients without eye/vision insurance (p=0.009, p<0.01).
- More recent medical examination and more recent eye examination (p=0.000, p<0.01).
- Previous ocular disease and systemic disease and more recent eye examination (p=0.000, p<0.01 and p=0.04, p<0.01, respectively). This is most likely due to the face that closer observation is required for patients with chronic ocular diseases, such as, glaucoma, diabetic retinopathy and dry eye disease.
- Higher body mass index (BMI) and higher prevalence of systemic disease (p=0.012, <0.05).
- Increasing age and ocular disease (p=0.000, p<0.01).

No significant correlation was seen between the following variables:

- Eye insurance and last eye examinations.
- Medical insurance and last medical examinations.
- Last eye exam between primary care and urgent care eye examinations.
- BMI and ocular disease.
- Eye/vision insurance and ocular disease.

FIGURE 1
Distribution of race.

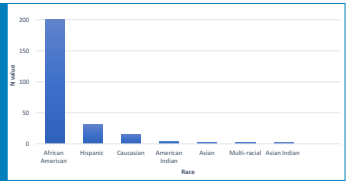


FIGURE 2
Distribution of last eye and medical examinations.

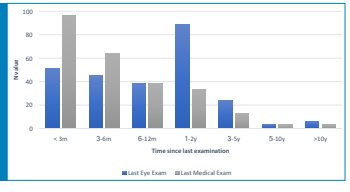


FIGURE 3
Distribution of eye and medical insurance.

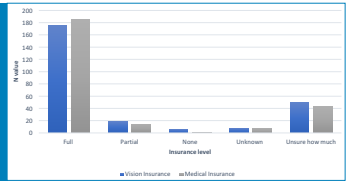


FIGURE 4
Known ocular disease to patients.

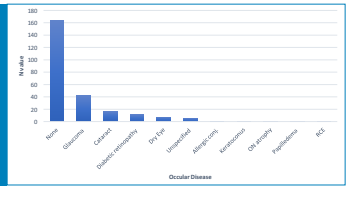
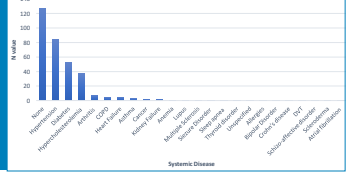


FIGURE 5
Known systemic disease to patients.



CONCLUSION

A high percentage (86%) of patients surveyed receive adequate eye care in a private healthcare setting. While the majority of patients reported having full coverage for eye and medical care examinations, there were a notable number of patients who were unsure of how much insurance coverage they had or whether they had insurance at all (eye insurance, 21.8%, medical insurance, 18.2%). Only 1.1% of patients surveyed had no medical insurance and 2.5% did not have insurance coverage for eye care. No statistically significant difference in the time since last eye examinations of patients in primary and urgent care were seen.

Providing adequate eye care services not only aids in reducing visual impairment, it can also provide early detection of systemic and ocular diseases which is an important element of delivering primary health care.

ACKNOWLEDGEMENTS

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Off–label Use of Prokera Cryopreserved Amniotic Membrane for the Treatment of Ocular Herpes Simplex Keratitis

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ABSTRACT

Herpes simplex keratitis is an ocular condition which possesses a standard protocol for treatment and management. This case report highlights the use of Prokera Cryopreserved Amniotic Membranes (PCAM) to treat herpes simplex keratitis and examines its unanticipated, previously unreported, anti-viral effect.

BACKGROUND

Herpes simplex virus (HSV) is the most common infectious cause of corneal blindness in developed countries.[1,3] HSV is transmitted during childhood; the primary infection is subclinical. The virus then retreats to the trigeminal ganglion where it remains dormant. Physical and mental stressors result in clinical reactivation, causing the various ocular presentations.

HSV can affect any orbital structure, most commonly the globe. Other structures include the surrounding adnexa, lacrimal gland, canaliculi, and lacrimal sac. Corneal presentation is most common[1,3], often seen as a dendrite or geographic ulcer; however, all layers of the cornea, including the epithelium, stroma, and endothelium, can be affected. Corneal anesthesia is a result of corneal trigeminal nerve damage due to active viral replication and will occur in conjunction with any corneal HSV presentation. In cases of epithelial compromise in the presence of corneal anesthesia, neurotrophic ulcers may form; this unique ulcer is difficult to manage and can be vision threatening.[1,3]

HSV also has the potential to affect the uvea, causing an iridocyclitis, and the posterior segment, resulting in conditions such as Progressive Outer Retinal Necrosis (PORN) and Acute Retinal Necrosis (ARN). [1]

CASE PRESENTATION

A 73-year-old white female presented to clinic with a chief complaint of severe ocular dryness, redness, and blurred vision in the left eye. She does not wear contact lenses. She has a history of dry eyes and uses preservative free artificial tears (PFAT). Medical, social and ocular histories were unremarkable. Day 1, Day 5, and 1 month photos and pertinent exam findings are below.

DAY 1

DAY 5

1 MONTH FOLLOW UP

DISCUSSION

HSV can affect any orbital structure, most commonly the globe, and requires aggressive and appropriate treatment. Continued management is critical in order to achieve a desirable outcome. According to the Herpetic Eye Disease Studies (HEDS) 1 & 2, all cases, including corneal (epithelial, stromal, and endothelial), uveal, and retinal, are treated with anti-viral medications.[4,5,8] Topical anti-viral are typically used in more anterior cases, while oral anti-virals are prescribed for internal and posterior cases. [4,5,8] Excluding epithelial involvement, all cases contain an inflammatory component and require a topical steroid. Topical steroids, when used in conjunction with topical anti-viral medications, reduced the amount of stromal scarring by 68%. [4,5,8] Adding an oral anti-viral in cases treated concomitantly with topical anti-virals and steroids has no evidentiary benefit, as it did not contribute to the resolution of stromal HSK, did not treat HSV iridocyclitis, and did not prevent progression of epithelial disease to other clinical subsets. [4,5,8] Oral anti-virals are, however, found to have prophylactic properties and are proven to reduce HSV recurrence rates from 32% to 19%.[4,5,8] Topical cyclopegic agents may be used to manage patient photophobia.

Prokera Cryopreserved Amniotic Membrane use as the sole treatment of herpetic eye disease is off-label and is not indicated or suggested. However, due to their ability to speed healing and promote regeneration of ocular tissue by encouraging re-epithelialization, reducing inflammation and scarring, preventing neovascularization, and improving patient comfort[6], PCAMs may be a strong addition to the herpetic eye disease "gold-standard" of treatment.

Composed of three layers - a single layer of epithelium, a thick basement membrane, and an avascular stroma[6] - PCAMs have a variety of unique, inherent properties which gives them their specialized treatment profile. The stromal layer is thought to be the mediator of inflammation, reducing the prevalence of inflammatory complexes that can lead to scarring. In addition, specialized fibroblast inhibition provides an anti-scarring effect as well. Furthermore, the tissue is naturally avascular, making it inherently anti- vascular endothelial growth factor (VEGF); the inhibition of VEGF migration allows the cornea underneath to receive the same antiangiogenic properties as the PCAM. [6, 7]

Clinical indications for PCAM include any condition causing damage to the surface cells or underlying stromal inflammation or scarring. These include recurrent corneal erosion, severe dry eye, ocular burns, and herpes simplex/zoster keratitis.[6, 7] There is a select group of patients in which the PCAM would be contraindicated: patients with glaucoma drainage devices or filtering blebs and/or patients with an allergy to ciprofloxacin or amphotericin B[6, 7], as the PCAMs are stored in a medium which contains both pharmacologic agents.

CONCLUSION

Resolution of HSV epithelial keratitis with the use of Prokera Cryopreserved Amniotic Membrane (PAM) alone gives rise to the possibility that cryopreserved amniotic membranes possess intrinsic anti-viral effects. While this is an isolated case with results isolated to this particular patient, it does promote possible research to explore potential inherent anti-viral properties of the Prokera Cryopreserved Amniotic Membranes. It may prove valuable to measure the possible effect of amniotic membranes against HSV and other viruses in vitro and in vivo.

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A Case of Pediatric HSV Keratitis: Challenges to Management and Vision Correction

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BACKGROUND

There are a variety of ocular manifestations of herpes simplex virus (HSV) including epithelial and stromal keratitis, conjunctivitis, lid lesions, and geographic ulcers. In children, eyelid involvement is more common. Children are also more susceptible to inflammatory. Pediatric patients with geographic ulcers are left with worse vision, scarring, increased flare ups, and irregular astigmatism. Improving vision in residual irregular astigmatism presents a difficult task. We present here the rehabilitation of a five-year-old girl with a geographic HSV ulcer.

CASE

A 5-year-old female presented to clinic with a worsening red, painful right eye. She had been taking oral prednisolone liquid of unknown dosage for one day which was prescribed by a pediatric urgent care clinic. In addition, the child was taking ophthalmic gentamicin drops during the day and gentamicin ointment at bedtime. Pediatrics immediately referred the child to the cornea center for a corneal lesion. (Figure 1) Slit lamp revealed a large fundus shaped geographic corneal ulcer consistent with HSV. All presenting medications were discontinued and the pediatrician was consulted. The new treatment regimen included oral acyclovir 200 mg/5ml suspension 7.5 ml three times a day and one chewable vitamin C tablet daily to help with corneal healing. Her new ophthalmic medications were atropine ointment qhs and preservative free artificial tears (PF AT) q1h. She was scheduled for a one day for a follow up.

At the one day follow up, the patient had only received the oral acyclovir but there was already some reduction in size of the lesion. By day six, the patient's right cornea was greater than 80% intact however stromal haze was evident. Therefore, her treatment regimen was adjusted to include an ophthalmic steroid: oral acyclovir tid, PF ATs q1h, loteprednol ung bid OD. After another week, the acyclovir and loteprednol were tapered until she was taking the acyclovir and the lotemax ointment at bedtime only.

After three weeks the photophobia and cooperation improved. The right eye had re-epithelized and it became apparent that there was scarring in the left eye as well. (Figures 2a and b)

At six weeks, topography was performed and both eyes exhibited significant irregular astigmatism (figures 3a and 3b). Upon cycloplegic exam, she was best corrected to 20/60 in each eye with a refraction of -0.50-6.25x020 and +0.25-4.00x005 for the right and left eyes respectively. Due to the irregularity of her corneas, she was fit specialty contact lenses in hopes of improving her vision.

FIGURE 1: Right cornea showing neovascularization and geographic ulcer with possible stromal disciform scarring

Lenses were chosen from the fit set as close to the mid-K as available. Initial diagnostic lens from fitting set. The right eye was fit with a base curve of 7.4 and the left eye with 7.3. With an over-refraction (OR) the right eye improved to 20/40. Vision with the left lens improved to 20/30. Both lens cleared the scarred area fully. The Rose K2 lenses were ordered as follows:
OD -3.00 7.4/9.1 and OS -3.00 7.3/9.1

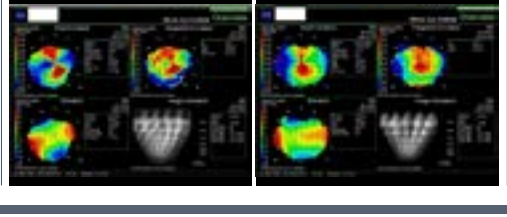
At dispensing, both lenses cleared the scarred areas and showed lid attachment (Figures 4a and 4b). Vision was improved to 20/40 in the left eye with no significant OR. The right eye was only 20/70 improved with -0.50 OR to 20/60. There was significant tearing and heavy blinking with the new lenses. Application and removal training required two additional visits the mother and uncle to achieve success. The patient returned for follow up after wearing the lenses for two weeks and vision in the left eye improved to 20/30 however the right eye now needed a -2.00 OR to bring vision back to 20/50. So a new right lens was ordered incorporating the additional power and with a 1 step steep periphery to improve the peripheral edge lift and lens awareness. The patient did well at dispense but was the lost to followup for three months.

When the patient returned she was under new guardianship, was not taking her medications and was not using her lenses consistently. Her vision had dropped, her astigmatism increased and she had developed additional haze. The family was re-educated about the importance of maintenance therapy and the need for lens wear to optimize her vision and minimize the development of amblyopia. Medications were restarted and she was asked to gradual begin wearing the lenses again. After about a month vision had returned to 20/50 and 20/30. We recommended six week followups but again she did not return for several months. This occurred several times and patient was subsequently referred to a corneal OMD for consultation who concurred that chronic treatment with the oral acyclovir and topical steroid would likely be needed at least until adolescence.

FIGURE 2A
improved scarring and epithelial healing in the right eye, 3 weeks after initial presentation to clinic.

FIGURE 2B
Apparent scarring in left eye is visible 3 weeks after initial presentation

FIGURES 3A AND B:
Topographies showing irregular astigmatism in both eyes

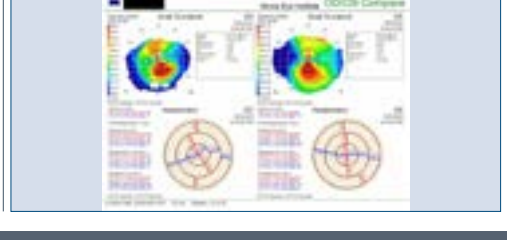


Patient returned for her one year follow up not wearing lenses but using her medications. There were no active corneal lesions (Figures 5a and 5b). Her topographies showed additional astigmatism however it was slightly more regular (Figure). Her BCVA had also improved with -2.00-4.25x015 in the right she was now 20/40 and the left improved to 20/25 with +0.50-2.00x170. With OR on her current lenses the right eye remained stable at 20/40 but the left improved to 20/20. New glasses and lenses were ordered. She currently takes a maintenance dose of oral acyclovir daily and wears her lenses intermittently for school.

FIGURES 4A AND B:
Dispensed lenses showing lid attachment and apical clearance

FIGURES 5:
Comparison map of Atlas axial topographies after one year

FIGURES 6A AND B:
Slit lamp photos of right and left eye after one year



DISCUSSION

Patients who experience recurrences of HSV keratitis, especially children, are left with scarred corneas and irregular astigmatism1. Vision through spectacles is usually insufficient for these patients, so a rigid gas permeable lens is the correction of choice[2]. An aspheric specialty contact lens is the ideal choice[3] because the scarring and irregular astigmatism from keratitis is comparable to that from keratoconus[2]. This is consistent with our management of this patient. The RoseK2 lens is a biaspheric design created to fit the irregular corneal surface with back surface asperhicity and to reduce visual aberrations with front surface toricity.

The critical period for amblyopia varies between 7-9 years of age, depending on the study referenced [4,5]. Unilateral and bilateral amblyopia are always a concern when working with young children, especially those who have a history of high refractive error[6]. This is one reason that that contact lenses should be fit as soon as possible, when the eye is quiet, especially in children[7]. Despite inconsistent use of the lenses, this five-year-old showed improvement in visual acuity and function. She has been referred back to the pediatrics service for further evaluation of her amblyopia in the right in hopes of recovering as much vision as possible.

CONCLUSION

Children can experience significant scarring with HSV and recurrences can be difficult to manage. Therefore, an accurate diagnosis is critical due to increased resistance to topical medication and susceptibility to amblyopia8. Practitioners need to be aware that children can present with severe cases of HSC which can be recurrent and recalcitrant. These cases require aggressive, chronic antiviral therapy.

In the case of a young child with significant irregular astigmatism, steps should be taken to maximize visual potential and minimize the risk of amblyopia. Specialty contact lenses, especially corneal GPs, may be necessary to enhance and preserve vision.

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Improved scleral lens performance with a new design for Asian eyes

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BACKGROUND

Multiple studies have shown that the Asian eye is smaller by about 0.5mm than their Caucasian counterparts.[1-5] The Chinese eye also tends to be more prolate especially in the vertical meridian, having a vertical corneal shape factor(VCSF) of .34 on average compared to Caucasians whose VCSF averaged .28. Interestingly the range of VCSF varied such that no Chinese subjects exhibited negative VCSF or oblate eyes.[3-4]

Contact lenses have a greater tendency to decenter on the Asian Eye. This has been seen with soft lenses[4,6] and now with scleral lenses.[7] These differences have been attributed to the smaller more prolate shape of the Asian cornea.[4,6] The lower lid angle and horizontal eye fissure difference also contributes significantly to decentration.[4] Miniscleral lenses are shown to decenter with reduced clearance in the superior nasal mid-periphery. The reduced corneal clearance in this quadrant resulted in sectoral corneal flattening.[7]

Therefore, the Asian eye with its smaller cornea, shallower sagittal depth, more prolate shape, and narrower lid angle suggests the need for a novel design to enhance limbal clearance and improve centration for these patients.

CASE

Two patients were seen in the Cornea Center with a strong interest in wearing scleral lenses. Both patients were struggling with dryness and quality of vision in their current contact lenses. Initial efforts to fit them with scleral lenses resulted in excellent vision but poor comfort and rubbing of the superior limbus due to lens decentration

Patient 1, a 31 year old Asian male, with a moderate myopic astigmatic correction and HVID of 10.7 as measured with the Eye check device (Figure 1) presented for a third attempt at scleral lenses to improve his dryness and quality of vision. His topographies were regular with flat K readings of 42.94 and SF of 0.45 in the right eye and flat K 43.00 with SF of 0.50 in the left. (Figure 2a-b). He refracted to 20/20 in each eye with a prescription of -5.00-2.00x153 and -5.75-1.75x025. He had previously tried Custom Stable and Digiform lenses. (Figure 3a-c). In both instances the lenses decentered and created an asymmetric wedge shaped clearance pattern. With each of these designs wearing time quickly diminished and superior limbal corneal staining began to develop.

At this visit, he was fit in the 14.7 Onefit A lens by Blanchard. The Onefit A is designed to be approximately 3mm larger than the HVID and to be fit on flat K. Based on the patient's flat K an initial lens of 7.8 would be selected. Because his cornea was 4mm smaller the next flatter lenses in the fit set were chosen to adjust for the slightly larger diameter than predicted. The lenses centered markedly better than previous designs.(Figure 4) The tear pattern was more even and less tilted in appearance.(Figure 5a-b) After 30 minutes of settling, there were 220 microns of central clearance in the right eye and 140 microns in the left. Since the clearance with the 8.2 lens in the left eye was slightly reduced from optimal the lens was ordered one base curve steeper to allow for an estimated 50 microns more of clearance. The final lenses were -3.75 8.00 in the right -3.75 8.10 in the left both with standard edges. The patient corrected easily to 20/20. The final lenses were well centered, with diffuse central fluorescein and limbal clearance. (Figure 6a-c) He experienced no corneal staining.

Patient 2, a 27 year old Asian female optometry student, presented to clinic with complaints of blur and dryness with her contact lenses. She refracted to 20/20 in each eye with -2.75-1.75x171 OD and -3.00-1.00x015 OS. Her topographies were regular.(Figures 7a-b) Her flat K in the right eye was 43.37 and 44.07 in the left eye. The patient had failed with several soft contact lenses for both vision and dryness concerns. Soft lens VA was often reduced to 20/30 when her eyes became dry. Over the course of two years she had tried six different soft toric lens designs: Air Optix Aqua, Biofinity, Dailies Aqua Comfort Plus, Oasys, One Day Acuvue Moist, Purevison 2.

During contact lens lab she had tried the Elara 15.5 scleral lenses and had noted an immediate improvement in comfort and vision. Unfortunately the lenses decentered inferiorly and touched the superior cornea. They were also laterally displaced showing a wedge shaped clearance pattern.(Figure 8). An eye check was performed to accurately assess her HVID. (Figure 9) The results were 11.33 OD and 11.37 OS. We chose to try the smaller Onefit 2.0 and while the 14.9 diameter centered better it still did not adequately clear the superior limbus(figure 10). We also evaluated her dry eye at this visit and found significant Meibomian gland atrophy.(Figure 11a-b) Her schirmer results were 22 and 35. TBUT averages 3sec in each eye and her Inflammadry results are negative. She had grade 1 conjunctival staining with lissamine green. She began treatment with Restasis and Alrex and chose to go part time wear with the daily disposable lenses.

She presented several months later wearing her glasses with an interested in any new developments in scleral lenses. She reported that she still struggled with dryness but felt things were slightly improved. There was no significant change in her dry eye testing. Since her previous visit the Onefit A lens was launched. Since the lens was smaller and had 100 microns of increased limbal clearance (figure 10) it was chosen for her next fitting.

While the fitting guide predicted 7.8 and 7.7 for the initial lenses based on flatK, we adjusted slightly steeper for each eye at 7.7 and 7.6. The Onefit A lens is .2mm smaller than Onefit 2.0 lens she had previously tried and we wanted to allow for the slight difference in diameter. The 7.6 on the left eye had optimal clearance at 250 microns. The right lens was slightly shallower (190 microns) and we tried the lens on from the left eye which then also cleared 250 microns. (Figure 12a-b) The lenses still decentered inferior and lateral giving a mild tear wedge. The lens was ordered with a toric PC (standard/1 steep) in hopes of improving the centration further. In addition, the right lens required a toric over-refraction to achieve 20/20. OverKs confirmed there was no flexure. So, the final lens order was OD -2.72-0.75x170 and OS -3.25sph. Both lenses were ordered in 7.6/14.7 with the toric pc.

Upon dispense and after 45 minutes of settling, the lenses continued to clear the superior limbus (Figures 13a-b). The vision in the new lenses were 20/20-2. The patient felt it was markedly better than any of her soft lenses. Over time her dryness complaints continued to improve.

FIGURE 1: Patient 1. Eyecheck evaluation showing small HVID

FIGURE 2A-B: Normal topography

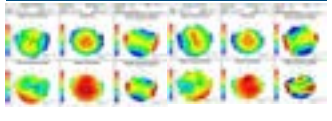


FIGURE 3A-B: Custom stable lenses as viewed with OCT on the right and left eyes respectively. Not significant wedge shaped clearance pattern.

FIGURE 3C: OCT of Digiform lens on the left eye also showing wedge shaped clearance pattern.

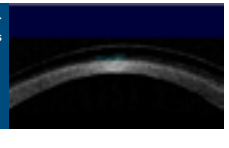


FIGURE 4: Overall image of the lens on the left eye showing minimal decentration.

FIGURE 5A-B: OCT of the Onefit A lenses on the right and left eye respectively with a more even clearance pattern.

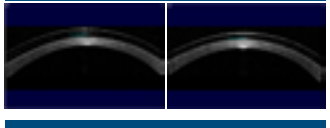


FIGURE 6A-C: Slit lamp photos with fluorescein showing clearance throughout the center and limbus.

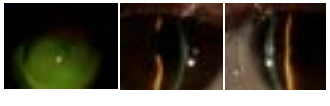


FIGURE 7A-B: Patient 2. Normal topography

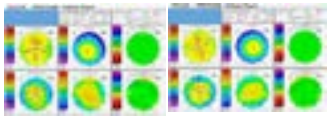


FIGURE 8: OCT image of the titled Elara lens with wedge shaped tear layer

Figure 9: Eyecheck evaluation showing small HVID

FIGURE 10: OCT of Onefit 2.0 with wedge shaped tear layer

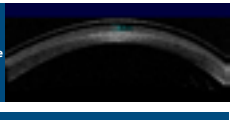


FIGURE 11A-B: Meibomian gland atrophy of right and left eyes respectively.

FIGURE 12 A-B: OCT of 7.6 Onefit A diagnostic lens on each eye, horizontal view.

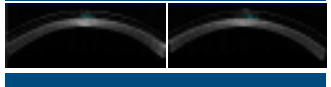


FIGURE 13 A-B: OCT of final lenses, vertically showing clearance even superiorly at the limbus.

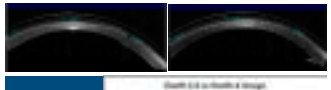
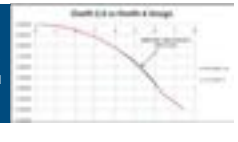


FIGURE 14: Difference in lens design of Onefit 2.0 and Onefit A



DISCUSSION

The Asian cornea is smaller and more prolate than the Caucasian eye.[1-5] In addition, the eyelids are positioned differently which has been correlated to decentration of soft lenses and likely contributes to decentration of scleral lenses.[4,6] As a result of these anatomical variances, scleral lenses can be more challenging to fit on the Asian eye. The peripheral cornea has been shown to be flattened when the superior cornea is not properly cleared with miniscleral lens designs on the Asian eye.[7] These studies suggest the need for a design to accommodate for these differences. The Onefit A design is smaller by 0.2mm than it's traditional counterpart, Onefit 2.0. The smaller lens allows for better positioning within the narrow fissure yet still allows ample room for the cornea. The average Asian cornea is between 11.3 and 11.7 depending on nationality and gender.[1-5] The 14.7 Onefit A still allows for at least 3mm of scleral landing. This design also takes into consideration the need for additional limbal clearance to prevent the peripheral corneal touch and resultant flattening of the cornea that has been noted in miniscleral lens wear in these eyes. Thus the Onefit A lens has an additional 100 microns of clearance at the limbus. (Figure 14)

Both patients presented here struggled with soft and scleral lens wear. With the Onefit A lens, they both achieved improved vision and comfort.

CONCLUSION

Practitioners should be aware of the anatomical differences associated with the Asian eye. These differences may lead to challenges in centration of lenses as well as challenges in clearing the superior limbus.[5-7] They should consider the benefit of a newer design which incorporates enhanced limbal clearance and smaller overall diameter like the Onefit A.

DISCLOSURES

Dr. Reeder is a speaker for Blanchard Contact Lenses. Blanchard also supports her laboratory experience for students at ICO with lenses, fitting sets, and technical support.

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The "cure" that wasn't

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BACKGROUND

Over the years many different surgical procedures have been used in the treatment of keratoconus (KC). The treatment options include various forms of keratoplasty cross-linking agent corneal rings and certain types of refractive surgery.[1-7] However most forms of refractive surgery have fallen out of favor due to the increased risk of progression, hydrops, blindness, infection and overall weakness of the cornea.8-12 However in certain regions of the world radial keratotomy (RK) is making a resurgence in the management of keratoconus.13 In 2009, circular keratotomy was recommended to improve vision in patients with early stages of KC in order to improve vision. Results were variable with approximately 10 percent of patients actually having worse vision.[4] In 2006, RK was evaluated in mild to moderate KC as well. In this study 20 percent of patients needed deepening of the incisions due to progressive astigmatism. An additional ten percent experienced hydrops, perforation, infection and infection. While the astigmatism was reduced initially the cylinder returned after about a year. In January 2016, mini asymmetric radial keratotomy (MARK) was recommended with corneal crosslinking (CXL)[7] for KC despite previous cases of RK incisions gaping after CXL.[8] We review here a case of RK performed on a known patient with keratoconus and the changes that ensued.

FIGURE 1A-B: Topographies of the right and left eye, respectively. Notice the asymmetry between the two eyes.

Figure 1a

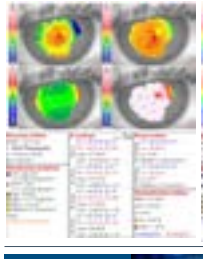


Figure 1b

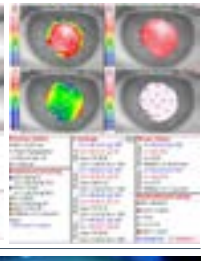


FIGURE 2
Prominent central scarring is seen in the post-hydrops left eye.

CASE

In 2011 an 18-year-old Eastern European male presented to the cornea center with complaints of blurred vision in his left eye of about six months duration. He had previously experienced an episode of hydrops in the left eye and was only wearing a lens in his right eye. Corneal topographies (Figures 1a and 1b) and slit lamp confirmed asymmetric keratoconus worse in the left eye which also had scarring. (Figure 2) The patient's best corrected vision with spectacles with 20/40 and 20/400, right and left eye respectively. The patient was initially with the ComfortKone lens in each eye and while his vision improved to 20/25 and 20/80 he was unable to tolerate the left lens. Therefore, we chose to initially piggyback the left lens but he still reported significant awareness. Next, a scleral lens was tried. He was fit with a 15.6 Jupiter lens which provided 20/40 vision but the patient again felt that it was uncomfortable. Approximately six months later, the Kerasoft IC was launched and he underwent fitting with the new soft lens product. He was quite successful with the lens and achieved 20/50 vision. At his final follow up with the Kerasoft IC lens he reported that he was returning to his native Kosovo and we discussed the possibility of CXL to prevent further progression particularly in his right eye that was seeing so well. At that time he was lost to follow up for two and a half years.

Upon his return to the US in 2014, he reported that he had received surgery to "cure" his keratoconus while he was in Europe. Presently he reported glare and monocular diplopia in the right eye and reduced vision with the left. (Figures 3a and 3b) He was not wearing contact lenses and did not know if he was able to after the surgery.

Upon slit lamp examination there were multiple incisions in each eye extending from the limbus of approximately 3mm in length. (figure 4) Thus, it was apparent that the surgical procedure that the young man had undergone was actually RK rather than the CXL we had discussed.

FIGURE 3A-B: Simulated VA charts, post RK for the R and L eye consistent with patient's visual complaints

Figure 3a

Figure 3b

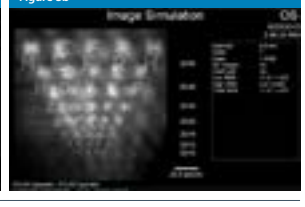
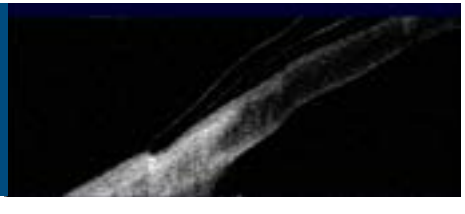


FIGURE 4
OCT image of the left eye showing a 3mm long, deep RK incision extending from the limbus.



Topographical evaluation showed increased irregularity of the cornea and progressive thinning. (Figure 5a-5d) The vision in the right eye while improved, fluctuated greatly. His best vision was a distorted 20/25. However on some visits his vision was as low as 20/40. He was also experiencing significantly more coma in the right eye which had increased from 2.01 to 3.60 microns. Unfortunately, the patient's distortion and glare complaints could not be eliminated with any lens design attempted. The left eye required a scleral lens but now only improved to 20/60. (Figure 6) Consultation with a corneal OMD resulted in recommendation of crosslinking in the right eye and penetrating keratoplasty (PKP)in the left eye.

FIGURE 5A-B: Initial postRK topographies.

Figure 5a

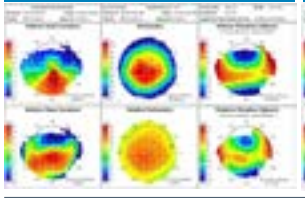


Figure 5b

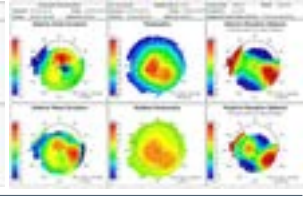


FIGURE 5C-D
Consecutive post-surgical difference maps showing continued progression in each eye after RK.

Figure 5c

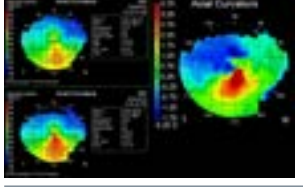


Figure 5d

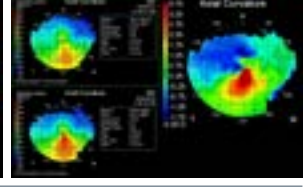
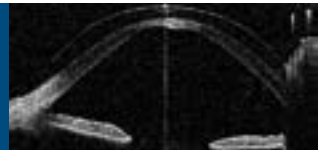


FIGURE 6
Best fit scleral OS showing highly asymmetrical cornea postRK.



DISCUSSION

While RK has been shown to reduce astigmatism and in early stages of KC improve vision, it is not without risks. Complications have included continued progression, hydrops, dehiscence and perforation.[8-12] Steinman et al reinforced these concerns using a porcine model. Reporting that MARK yes required 50-70 percent less force to rupture than in unoperated eyes.[11] The risk of rupture in traditional RK persists with cases occurring as late as 10-13 years after surgery.[8,12]

The most recent recommendations for incisional treatment of KC include MARK with CXL.[7,13] The theory is that you are working at to different levels and thereby enhancing the outcome of the procedure. MARK is performed with incisions that are limited to a maximum of 2mm in length and that occur only within the central 8mm of the cornea so that they fall within the trefine should the patient ultimately need a PKP.[4,7] The MARK procedure is to reduce the astigmatism and two years post MARK the patient has CXL. The goal of CXL to stop progression and possibly increase flattening at the microscopic level.[7] However, one patient who had undergone RK ten years prior to CXL experienced incisional gaping which ultimately required suturing.[1] The MARK and CXL procedures are now being touted on the internet as a cure for KC and are reportedly available in many countries throughout the world including Australia, China, France, Germany, Hungary, India, Italy, Japan, New Zealand, US, Qatar, South Africa, and United Arab Emirates.[13]

Our patient underwent traditional RK with long deep incisions extending to the limbus. As a result, the PKP recommended for the left eye will require peripheral suturing prior to trefine and strict monitoring during the post-operative period. The CXL for the right eye may also require suturing before during or after surgery.[4] Sadly, what he believed was a cure has put his long term eye health and vision at significant risk.

CONCLUSION

A variation of RK known as mini asymmetric RK has emerged in certain European countries where it is being recommended as an option to correct vision with KC.13 While the incisions in this case do not appear to follow the mini RK appearance but rather traditional RK scars, in both cases concerns of weakening of the cornea persist.11 Recent studies show that incisional surgeries result in persistent weakness and incomplete healing many years postoperatively.9,12 The latest suggestion is that they never fully heal thereby creating persistent risk of known complications including perforations and hydrops. This may occur as result of fractionation of the lamella as seen in KC that extends throughout the KC cornea.15 Eyecare providers need to be aware that this practice is emerging and patients undergoing these procedures may not be aware of the risks. Or in the case of our patient may not understand that there is a difference between CXL and MARK. Proper education and referral is crucial. Post-surgically these patients may require more advanced lens designs and additional surgical procedures to preserve their vision. Careful education postoperatively regarding long term risks and the need for protective eye wear is essential.

REFERENCES AVAILABLE UPON REQUEST

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BEYOND AREDS 2...IMPROVEMENT IN VISUAL ACUITY AND RETINAL INTEGRITY WITH LONGEVINEX® SUPPLEMENTATION

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INTRODUCTION

These case reports evaluate oral supplementation with a red wine-resveratrol based supplement, containing vitamin D3 and labile iron binding inositol hexaphosphate. We appraised function (VA) and structure (SDOCT) in 3 geriatric patients with atrophic AMD, without clinical alternatives.
Resveratrol (RV), the medicinal component found in red wine, was discovered in the 1940s . It was later found to have broad-spectrum anti- cancer, anti- cardiovascular disease and anti-inflammatory properties. This weak antioxidant is concentrated in red wine via fermentation, from grapes grown under stressful conditions of northern latitude, high altitude and cold temperature.

BACKGROUND

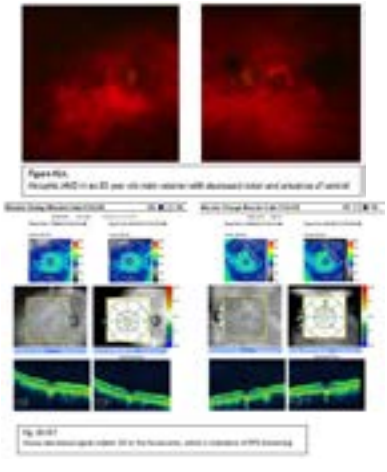
RV is a small molecular weight, polyphenol phytoalexin, able to transit all cells. RV sparked interest in the world of medicine because of the French Paradox, where consumption of red wine showed positive health benefits of decreasing cardiac mortality in a smoking population consuming fatty foods, as shown by the Melbourne Collaborative Research Study. RV's multiple actions against systemic disease contribute to its broad array of biological actions. RV is considered to have germicidal, anti-inflammatory, vascular, brain, metabolic, and anti-carcinogenic properties. The latter include prevention of all 3 cancer stages: initiation, promotion and metastasis. As a inti-inflammatory modulator, RV decreases COX2, CRP, and TNF. RV is considered to have superior anti-inflammatory action when compared to NSAIDs. In the vascular system, RV has anti-cholesterol, anti-hypertensive, anti-platelet and anti-plaque effects, as well as slowing early atherosclerotic markers in a randomized human clinical trial . RV has similar anti-clotting and analgesic qualities as aspirin without gastric complications. Neurologically, RV acts as an antidepressant by inhibiting monoamine oxidase (MOA), and reducing beta amyloid found in brain plaque and retinal drusen. Metabolically, RV also reduces blood sugar and rescues pancreatic beta cells.

Case 1:

A 96-year-old Caucasian female veteran presented to our clinic with complaints of progressively decreasing vision at both distance and near OS > OD for many years secondary to both exudative and non-exudative AMD. She was diagnosed with atrophic AMD and moderately severe nuclear – cortical cataract OD. She was diagnosed with exudative AMD (status post 10+ intravitreal anti-VEGF injections). She also has a prosthetic intraocular lens in her left eye and light perception only (OS).

	BASELINE	FOLLOW-UP
OD	20/50	20/70
OS	Light Perception	20/150

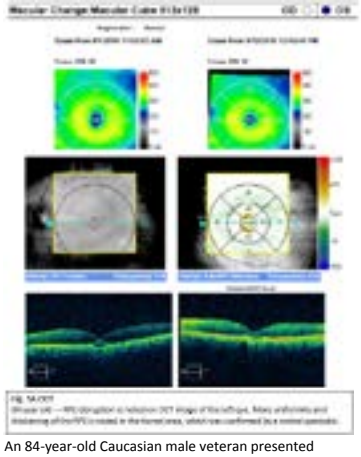
Case 2:



An 85 year old Caucasian male veteran presents to our clinic for driver's license renewal. He complains of seeing "holes" in his vision, at distance while driving, and at near while reading. The patient was diagnosed with primary open angle glaucoma, non-exudative AMD OS>OD and pseudophakia (implant, post cataract surgery) both eyes. The resulting binocular defect manifested as a disabling bilateral central foveal visual field defect.

	BASELINE	FOLLOW-UP
OD	20/50-2 (missing 2nd and 3rd letter consistently)	20/25+2
OS	20/50-2 (missing 3rd and 4th letter consistently)	20/25+1

Case 3:



An 84-year-old Caucasian male veteran presented initially with complaints of blurry vision distance and near OU. He had difficulties driving as well as reading newspaper print. He has a nuclear sclerotic cataract OD and prosthetic intraocular lens OS without secondary posterior subcapsular post-surgical opacification. The patient also has a mild epiretinal membrane and is a bilateral glaucoma suspect based upon suspicious optic nerve cupping and increased IOP.
He noticed that after 3 weeks he was able to see newspaper print better and also noticed his vision seemed improved while driving.

	BASELINE	FOLLOW-UP
OD	20/60-1	20/60-1
OS	20/50-2	20/40

RESULTS

Gradual continued improvement of vision was noted at each visit both objectively and subjectively in the better seeing eye for all 3 cases.
Case 1 Initial VA was 20/150 OD, Light Perception OS eventually improving to 20/70 OD (3 lines improved) and 20/150 OS (a large improvement), 2.5 years after Longevinex® Advantage was prescribed. SDOCT OD shows stability and a decrease in signal scatter, suggesting improved RPE integrity.
Case 2 The initial VA was 20/50 -2 OD, OS. Final VA was 20/25+2 OD, 20/25+1 OS (3 lines better) . OCT showed decreased signal scatter in the foveal area, indicative of RPE thickening. The patient was able to maintain his driver's license.
Case 3 Entrance VA was 20/60-1 OD, 20/50-2 OS. 1 lined of VA improvement (20/40) was noted in the better seeing eye at 1 month. Resolution of RPE disruption, more uniformity and thickening of the RPE in the foveal area was noted on OCT (and confirmed by our retinal specialist). The patient now has the ability to read the newspaper clearly and has sufficient a sufficient VA to pass his driver's license test without a night restriction

CONCLUSION

Low dose nutraceutical molecules can render benefits in aged patients with atrophic AMD. Improvement of both subjective and objective visual function and retinal integrity is consistent with our previous published reports, as well as reports across several medical disciplines, on the effectiveness of Longevinex ®. These accounts support the use of epigenetics to restore photoreceptor/ RPE function, when other measures have been exhausted by a retinal specialist.

REFERENCES

Available upon request

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Treatment and Management of Bilateral Alkaline Ocular Burns

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BACKGROUND

Chemical burns of all types require immediate treatment and daily follow-ups. While alkaline materials typically penetrate more deeply than acidic substances, all burns require similar management. Thorough rinsing of the globe in order to reach a neutral pH (7.0-7.4)[1] is required in order to facilitate healing. In cases of limbal blanching, Prokera Cryopreserved Amniotic Membranes (PCAM) may be used in order to preserve stem cell structure and function.[3, 4] If left untreated, pathological effects, including conjunctival and corneal necrosis, loss of limbal vasculature and stem cells, and damage to internal ocular tissues, are an absolute certainty.[2]

CLINICAL PRESENTATION

A 24-year-old black male presented to clinic with severe bilateral alkaline chemical burns. Initial pH was measured to be 8.4 OU. Five hours of rinsing with non-preserved saline was performed in-office.

CLINICAL TESTING

At the initial visit, visual acuity was reduced; 360 limbal blanching OU; 4+ diffuse hyperemia; and adnexal and conjunctival chemosis OU. The patient left the office with a pH of 7.4 OU.

PLAN

The patient was prescribed a topical antibiotic 1gtt OU QID; a topical steroid 1gtt OU QID; and Preservative Free Artificial Tears 1gtt OU every 30 minutes. PCAM was placed on both eyes at the 1day follow-up.

TREATMENT

After removal of the Prokera, 8.6mm bandage contact lenses were placed on both eyes. Daily patient follow-up was initiated until corneal epithelial tissue was completely healed. The medication schedule remained unchanged.

DISCUSSION

Prokera Cryopreserved Amniotic Membrane use as the sole treatment of ocular burns is off-label and is not indicated or suggested. However, due to their ability to speed healing and promote regeneration of ocular tissue by encouraging re-epithelialization, reducing inflammation and scarring, preventing neovascularization, and improving patient comfort[4], PCAMs may be a strong addition to the ocular burn "gold-standard" of treatment.

Composed of three layers - a single layer of epithelium, a thick basement membrane, and an avascular stroma[4] - PCAMs have a variety of unique, inherent properties which gives them their specialized treatment profile.

The stromal layer is thought to be the mediator of inflammation, reducing the prevalence of inflammatory complexes that can lead to scarring. In addition, specialized fibroblast inhibition provides an anti-scarring effect as well. Furthermore, the tissue is naturally avascular, making it inherently anti- vascular endothelial growth factor (VEGF), preventing growth of neovascular vessels into the cornea; the inhibition of VEGF migration allows the cornea underneath to receive the same antiangiogenic properties as the PCAM. [4, 5] In addition, studies have shown that PCAM promotes expansion of limbal stem cells, even in cases of cellular decompensation.

Clinical uses for PCAM include any condition causing damage to the surface cells or underlying stromal inflammation or scarring. [4, 5] There is a select group of patients in which the PCAM would be contraindicated: patients with glaucoma drainage devices or filtering blebs and/or patients with an allergy to ciprofloxacin or amphotericin B[4, 5], as the PCAMs are stored in a medium which contains both pharmacologic agents.

DAY 1

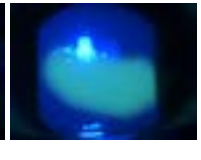
RIGHT EYE

LEFT EYE

DAY 4

RIGHT EYE

LEFT EYE



DAY 14

RIGHT EYE

LEFT EYE

DAY 21

RIGHT EYE

LEFT EYE

CONCLUSION

Our patient continues to display signs of limbal blanching nasally and temporally in both eyes; however, his epithelium has remained in-tact and visual acuity returned to 20/15 OU. We continue to monitor closely.

Key Words: Chemical Burn; Limbal Blanching; Prokera Cryopreserved Amniotic Membrane

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Treatment and Management of Pseudophakic Bullous Keratopathy

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BACKGROUND

Pseudophakic bullous keratopathy(PBK) is irreversible corneal edema due to endothelial cell loss and damage that occurs post cataract extraction, most commonly with anterior chamber IOLs (0.9-5.3%). Corneal edema is noticed 8 months to 7 years after cataract surgery at follow-ups or after awakening with a painful eye secondary to a corneal ulcer. Ulcerative keratitis due to ruptured bullae occurs in 4.7% of patients with PBK.

Corneal pachymetry is important to determine effectiveness of treatment. The current gold standard of treatment is penetrating keratoplasty (PK). Other treatment includes topical hyperosmotic agents, topical beta blockers, amniotic membranes, hydrophilic CLs, anterior stromal puncture, collagen cross linking, or conjunctival flap.

This case examines the use of topical mediations (hyperosmotics and beta blockers) to aid in reducing thickness and improving patient comfort prior to PK evaluation. The patient was monitored with anterior segment photos and Oculus Pentacam® tomography.

CASE

A 58 year old white male presented with a left photophobic, painful, crusty eyelid that was swollen shut upon awakening, (+) yellow-white discharge and mattering of lids. Pain initially 7/10, decreased to 2/10 within a few hours of awakening. 2 days prior, went to ER and was diagnosed with a central corneal ulcer. Patient was being treated with ofloxacin q2hrsand prednisolone acetate q3hrs. No decrease in vision (BCVA NLP).

TABLE 1: Entrance Testing (stable at follow ups)

	OD	OS
VAcc	20/25	NLP
IOP	13mmHg	10mmHg
Pupils	RRL	Fixed
EOMs	FROM	FROM
Corneal Sensitivity		Reduced

TABLE 2: Pertinent Slit Lamp Findings Visit 1 OS Only

Conj	1+ diffuse inj sup > inf
Cornea	1.2x1.2mm epi defect w/NaFl staining, 3-4+ diffuse epi and endo edema, 2-3 microcystic bullae temp, sup nasal pannus
AC	UTT 2' edema
Lens	ACIOL

Pertinent ocular history:

PPV/laser AFx for recurrent RD OD x 2
Choroidal drainage OS
PPV/laser AFx with scleral buckle OS (NLP post surgery)
PPV for macular hole OS
PPV to remove PCIOL, insert ACIOL OS

FIGURE 1: Follow up Day 1 (visit 2) demonstrates smaller epithelial defect while taking topical antibiotics

FIGURE 1a: Small epithelial defect OS with white light

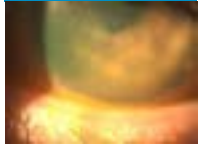


FIGURE 1b: Minimal NaFl staining OS with blue light

FIGURE 2: Follow up Day 2 (visit 3) only taking topical antibiotics

FIGURE 2a: Nearly absent NaFl staining of epithelial defect OS

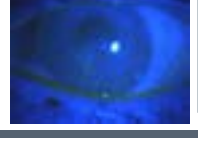
FIGURE 2b: White light view of ACIOL OS

The corneal epithelial defect wasresolved. However, it was imperative to determine the underlying cause of the ruptured bullae for long term treatment and management. The AC IOL was contributing to the edema and the formation of bullae. Therefore, the patient was started on sodium chloride 5% ophthalmic solution QID OS. Pentacam tomography was performed at each follow-up to monitor changes in corneal thickness.

FIGURE 3: Follow up 2 weeks (visit 4) after starting topical sodium chloride 5% ophthalmic solution QID OS

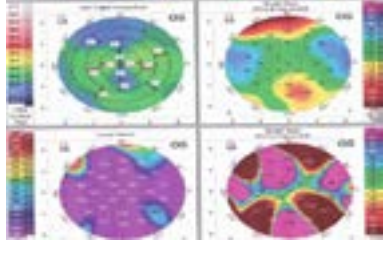
FIGURE 3a: Diffuse edema and Descemet's folds OS

FIGURE 3b: Mild epithelial disruption OS



Pentacam tomography was used because it measures the corneal thickness of the entire cornea, and is repeatable, reproducible, and accurate compared to conventional corneal pachymetry.

FIGURE 4: Initial corneal thickness measurement with Oculus Pentacam® tomography at visit 4 post NaCl gtt QID OS



Patient was feeling slight discomfort with FBS and irritation upon awakening at visit 4. NaCl 5% ophthalmic ung was added qhs OS to use in conjunction with topical NaCl 5% QID OS. Corneal thickness typically increases during sleep, therefore a thicker ointment penetrates better overnight.

FIGURE 5: Follow up at 4 weeks (visit 5) using NaCl 5% QID OS and NaCl 5% ung qhs OS

FIGURE 5a: Small epithelial defect with bullae OS

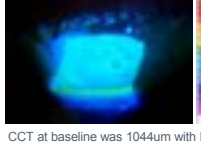
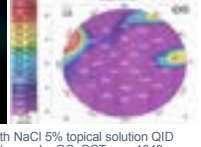


FIGURE 5b: Pentacam tomography with CCT 1049 OS



CCT at baseline was 1044um with NaCl 5% topical solution QID OS. With the addition of NaCl 5% ung qhs OS, CCT was 1049um. This was a very minimal decrease in edema over 2 weeks.

The patient was hesitant about undergoing another surgery, and wished to exhaust all topical options before a PK evaluation. Topical beta blockers are thought to reduce edema due to their mechanism of action in lowering IOP. Therefore, timolol 0.5% BID OS was added to the treatment regimen.

FIGURE 6-8: Follow up visits (6, 7, 8) at 2-3 week intervals while taking NaCl 5% sol'n QID OS, NaCl 5% ung qhs OS, and timolol 0.5% BID OS.

FIGURE 6a: Visit 6 new epithelial defect and increased swelling

FIGURE 6b: Visit 6 pentacam tomography CCT 1265 OS

FIGURE 7: Visit 7 pentacam tomography with CCT 1263 um and corneal irregularity is illustrated.

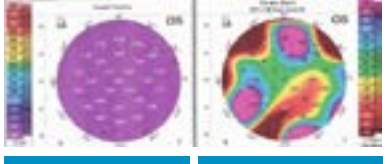
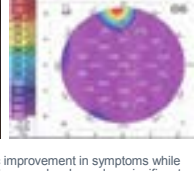


FIGURE 8a: Final corneal appearance prior to referral

FIGURE 8b: Final tomography visit 8 with CCT 1117um



Although the patient had a drastic improvement in symptoms while on timolol 0.5% BID OS, corneal topography showed no significant change in central thickness. Therefore, the patient was referred for a penetrating keratoplasty.

TABLE 3: Summary of Pentacam CCT over 2 month period of follow up visits every 2 weeks

Visit 4	Visit 5	Visit 6	Visit 7	Visit 8
1044	1049	1265	1263	1117

DISCUSSION

PBK occurs from damage to the Na+/K+ endothelial pump, leading to loss of important cells and proteins that regulate endothelial structure. This pump normally functions to control the homeostasis of fluid entering and leaving the cornea, keeping it at its relatively dehydrated state. Once the pump is compromised, hyperosmotic material is able to enter, resulting in an "overhydrated" cornea. Additional damage can occur to the extracellular matrix (ECM). ECM proteoglycans are destroyed, allowing more keratin sulfate to accumulate, resulting in further influx of water, loss of transparency, and a change in the corneal refractive index. Lastly, compromised myofibroblasts become dysfunctional. These cells normally assist in wound healing and restore the damage to the pumps and ECM. Since the corneal endothelium is unable to regenerate new cells, the result is a persistent edematous endothelium that is unable to start the repair process.

The breakdown of the pump occurs due to mechanical or chemical injury, inflammation, infection, or concurrent eye disease. AC IOLs are the most problematic, due to their proximity to the endothelium, resulting in intermittent touch between the IOL and endothelium.

As a first line topical treatment option, hyperosmotic agents are used to draw excess fluid out of the cornea, therefore making patients more comfortable and in most cases, improving VA. Topical beta blockers are also used to decrease fluid due to their mechanism of decreasing aqueous production for glaucoma patients. The theory is that with less fluid entering the eye, the endothelial swelling should also decrease. Lastly, reducing IOP may be beneficial in allowing the endothelium to preserve remaining function.

Treatment failure considerations:

- Corneal edema advanced too far, with not enough endothelial cells to restore the damage
- Timespan that patient had been combating corneal edema was too long
- Poor compliance

CONCLUSION

Although rare and decreasing in prevalence, PBK nonetheless requires careful management due to the long term impact on vision and patient comfort.

A proper diagnosis of PBK is essential for long term treatment and management.

Pentacam tomography is invaluable in measuring corneal thickness over time.

Unconventional treatments for reducing corneal thickness may outweigh the risk of surgery and should be considered.

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Anterior Chiasmal Syndrome Owing to a Pituitary Macroadenoma

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BACKGROUND

The overall prevalence of pituitary adenoma is about 16-17%. Often, the first signs of the condition are related to the patient's visual function and up to 92% report visual blur. Other clinical signs and symptoms include see-saw nystagmus, photophobia, loss of depth perception and dyschromatopsia. Pituitary adenomas can be classified based on their size as microadenoma (less than 10mm) or macroadenoma (greater than or equal to 10mm). They can also be classified as functioning (secrete hormones, commonly prolactin) or non-functioning. The majority of the non-functioning tumors (~96%) are macroadenomas and about 68% of patients will present with visual field defects. Other associated findings are loss of central visual acuity and optic disc pallor.

CASE PRESENTATION

79-year-old African American male presented with blurry vision and progressive vision loss in the left eye for about 6 years. Patient medical and ocular history was unremarkable, though last medical exam was more than 20 years ago.

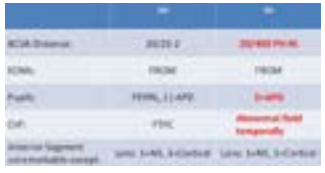


FIGURE 1
Fundus examination was positive for subtle temporal pallor of the left optic nerve.

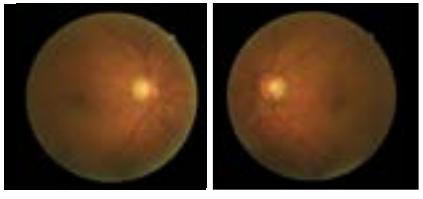


FIGURE 2
Optical Coherence tomography (OCT) of the ganglion cell layer reveals binasal thinning greater in the left eye than the right eye.

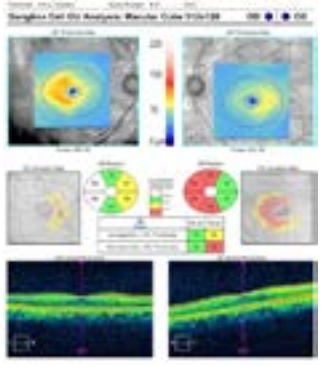


FIGURE 3
Humphrey Visual Field 24-2 shows generalized visual field loss in left eye and complete temporal field loss respecting the vertical midline in right eye.

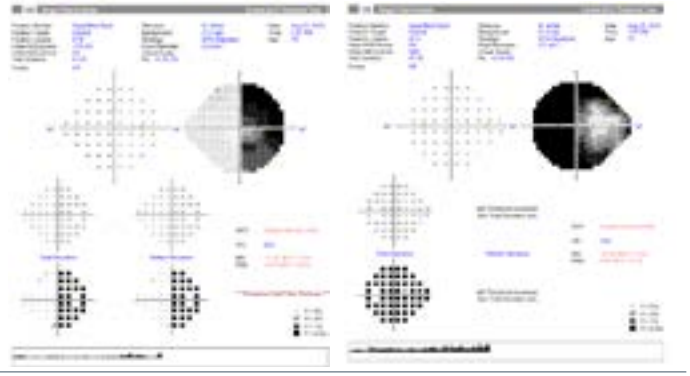
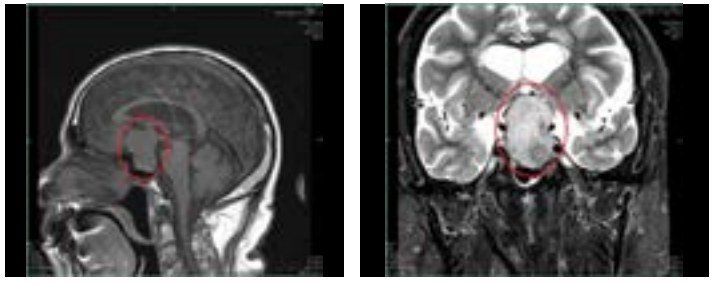


FIGURE 4
MRI with contrast reveals 4.1x3.7x2.7cm enhancing soft tissue mass suggestive of a pituitary macroadenoma with involvement of the optic chiasm (circled in red on coronal (left) and sagittal view (right))



PLAN

Once compressive lesion was confirmed with MRI, patient was referred for neurosurgery consultation and a physical exam with primary care doctor.

TREATMENT

Multidisciplinary approach with main focus to preserve and restore visual and pituitary function. Surgical resection is the preferred primary intervention for symptomatic non-functioning pituitary macroadenomas. The goal of surgery is to remove the lesion and decompress the optical pathways, preserve the adjacent tissues and restore the visual and pituitary function. Usually results in visual improvement within the first few days and improved visual function in 75 to 91% of the patients.

DISCUSSION

Unique case presenting with complete loss of visual field in left eye and temporal field loss in the right eye rather than the classic bitemporal field loss characteristic for pituitary adenoma. The only presenting symptom was progressive unilateral vision loss without any systemic manifestations.

CONCLUSION

Compressive lesion should always be a differential diagnosis with findings of optic atrophy and progressive vision loss. Visual field should be performed in the presence of unexplained vision loss and is often helpful in determining the next step in the management plan.

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MINNESOTA OA

4 ICO PRESENTATIONS

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Atopic Keratoconjunctivitis Mimicking as HZO

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Stacy Hinkemeyer, OD, FAAO, Dipl ABO, ABCMO, Kevy Simmons, OD, MEd-VFL

Introduction

Ocular allergy can take many forms, including: seasonal and perennial allergic conjunctivitis, VKC, AKC, GPC, and contact dermatitis. These clinical entities are often associated with other allergic symptoms such as rhinitis and atopy, but not always. These conditions represent a significant burden in the world population, with 15-20% being affected by an allergic disease and an estimated 40-60% of those experiencing ocular allergy symptoms.[1] This case report focuses on one of these ocular allergy subsets: atopic keratoconjunctivitis (AKC).

AKC is categorized as a chronic inflammatory condition. It presents bilaterally, and involves the eyelids and ocular surface. Conjunctiva is often involved, and cornea can also be affected with potentially sight-threatening sequelae. It is sometimes explained as the ocular counterpart to atopic dermatitis or eczema.[1]

The disease typically affects young adults with incidence peaking between 30-50 years of age, and it continues through the fifth decade.[1] Inflammation is caused by mast cell degranulation causing the release of histamine, other chemokines, and adhesion molecules that initiate the inflammation. In AKC, this process is mediated by IgE, Th2, and Th1. Eosinophils also play an unknown contributing role.[2]

The classic sign of AKC is lid involvement, with eczematous scaly lesions of the eyelids. These lesions are red, elevated, itchy, and may thicken or crack over time. Lid skin may also appear chemotic with fine sandpaper-like texture.[2] Conjunctival involvement presents as papillae or chemosis, largely affecting the inferior fornix. If the disease progresses to involve cornea, there may be SPK, plaques, neovascularization, or trantas dots (often seen in VKC).[1]

Prolonged uncontrolled inflammation of the ocular surface may cause fibrotic scarring, with conjunctival scarring being common.[2] The lens can also be affected by prolonged inflammation, and atopic cataracts may develop. The anterior lens is often the first site affected with a shield-like cataract, however nuclear cataracts and PSC have also been reported.[2]

Case Presentation

A 50 year old Caucasian female presented as a physician-directed visit from an urgent care. At the urgent care they suspected she had shingles, was prescribed an oral antiviral, and was instructed to visit our clinic to ensure the eye was not involved. We saw her later in the afternoon.
She had a small rash that began on the right corner of the right eye 4 weeks prior, noticed intermittently at first. In the past 2-3 weeks, the rash had spread from corner to involve upper and lower lids of both eyes. The rash is very itchy. Negative eye pain, discharge, or photophobia.

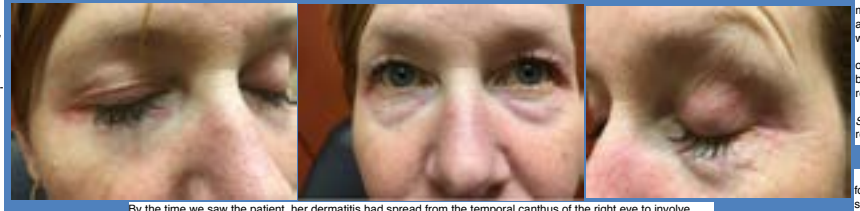
Medical history: Gluten sensitivity

Ocular history: Itchy eyes from seasonal allergic conjunctivitis

Current medications: Alaway 0.025%

Entering visual acuities uncorrected
OD: 20/20-
OS: 20/25-
Pupils
OU: Equal, round, reactive to light, (-) afferent pupillary defect
Extra Ocular motility
OU: Full range of motion without discomfort or diplopia
Confrontation Visual Fields
OU:: Full to finger count
Goldmann Tonometry
OU: 17mmHg
Slit Lamp
OU: Dermatitis
1+ Anterior Blepharitis (upper lids)
1+ Papillary conjunctivitis, pinguecula
Neg NaFl staining, cornea and A/c clear
+Anterior lens pigment, negative iris transillumination defects
Posterior Pole
OU: Unremarkable, 0.2 C/D

Dermatitis



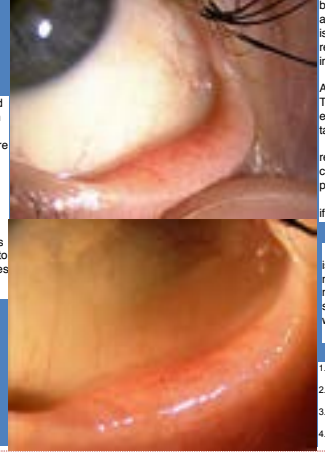
By the time we saw the patient ,her dermatitis had spread from the temporal canthus of the right eye to involve both upper and lower lids of both eyes. This bilateral presentation that also did not respect the dermatome distribution of the trigeminal nerve (involving both upper and lower lids) immediately caused us to rule out HZO as a differential.

Her rash was erythematous with elevated lesions that were beginning to indurate. She reported severe itching as the predominant symptom.

Papillary Conjunctivitis

OD

OS



While the cornea remained uninvolved, a mild papillary conjunctivitis had manifested in both right and left lower lids. Very fine end-vessel dilation and a few petechial hemorrhages were visible from rubbing the eyes.

This papillary reaction is somewhat atypical, with minimal elevation or "bumps" on the conjunctiva. Some areas near these dilated end vessels do appear elevated and can be appreciated in the photographs as focal areas of extra reflectance or "shininess" compared to the adjacent flat conjunctival tissue which does not reflect the light as strongly.

Discussion

It is easy to see why the urgent care physician initially presumed shingles activation. The rash appears maculopapular with vesicles, but does not respect the vertical midline or dermatome distribution. The patient also did not report any feeling of malaise or illness prior to onset as is common with viral prodrome.

With viral etiology removed, allergic response is left as the differential. This patient did report gluten intolerance and an overall sensitivity to certain foods, sometimes developing a mild atopic reaction on the face after consumption. Because of this predisposition, she was always very aware of foreign material coming in contact with her face, and denied any contact with new facial or beauty products.

This made contact dermatitis seem unlikely, especially with a worsening presentation over the course of 4 weeks with no new lifestyle habits present. We stressed the point of being even more cautious and removing any facial moisturizing or makeup from her daily routine until the condition was resolved.

This patient did have a mild case of blepharitis of both upper lids. Colonization with *Staphylococcus Aureus* can sometimes induce a flare-up of AKC as the immune system reacts to the bacterial toxins.[1]

Treatments

Our goal with this patient was twofold: reduce the immediate inflammation and control for long-term inflammation and flare-ups. With AKC being a chronic condition that can have seasonal variation in severity, simply managing the acute phase is insufficient. Avoiding extensive involvement of the ocular surface is essential, as prolonged conjunctival involvement can cause fibrotic lid scarring while corneal involvement can result in neovascularization or permanent opacities.

For reduction of the severe dermatitis reaction, Lotemax® 0.5% ointment was prescribed TID to be applied on the affected areas for seven days. A short course of corticosteroid for 7-8 days is indicated in the treatment of severe allergy.[3] Lotepredrnol etabonate is an ester-based corticosteroid that blocks release of inflammatory mediators. It is is thought to have a better safety profile for complications such as cataract formation and IOP increase than ketone-based corticosteroids such as prednisolone or dexamethasone.[3]

To address the chronic nature of the condition, Alomide® 0.1% at TID dosing in both eyes was initiated. Mast cell stabilizers inhibit the degranulation of mast cells that causes release of inflammatory mediators. They are not intended for immediate relief, as they require a loading period of up to two weeks at TID-QID dosing.[1] Combination antihistamine/mast cell stabilizer medication may be appropriate for seasonal conjunctivitis, but the severity of AKC calls for a more aggressive mast cell stabilizer. Lodoxomide is approximately 2500 stronger than the original mast cell stabilizer, sodium cromoglycate and is indicated in the treatment of AKC and VKC.[3] In addition to its mast cell stabilization, it also reduces eosinophil chemotaxis.[3] This is desirable as eosinophils contribute to the inflammatory response in AKC.

Some immunomodulatory agents have also been shown to be successful in treating AKC, especially in cases that have responded poorly to traditional corticosteroid therapy. Topical Cyclosporine A 0.1% and topical tacrolimus 0.1% have both been shown to be effective in treating AKC.[3] Cyclosporine A acts to reduce eosinophil infiltration while tacrolimus inhibits T-cells, both of which contribute to inflammation in AKC.[3]

Surgical application of amniotic membrane has also shown reduction in symptoms and restoration of ocular surface in cases refractory to corticosteroid, mast cell stabilization, and cyclosporine therapy.[4] In-office dehydrated or cryopreserved amniotic membranes may provide relief for the patient failing on these therapies.

The patient was to return in one week for follow-up to monitor for improvement, sooner if symptoms worsened. The patient has since been lost to follow-up.

Conclusion

Atopic keratoconjunctivitis can be a serious, sight-threatening condition if inflammation is left uncontrolled. Potential sequelae of scarring should always be considered, and long-term maintenance therapy may be needed given the persistent nature of the condition. There are many treatment modalities that have been shown to be effective, and alternative therapies such as immunomodulatory agents or amniotic membrane should be considered in patients with difficult to treat disease.

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Dry Eye Syndrome

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Introduction

The definition of Dry Eye Syndrome (DES), also known as keratoconjunctivitis sicca or keratitis sicca is "a multifactorial disease of the tears and ocular suface charaterizws by a loss of homeostasis of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and neurosensory abnormalities play etiological roles[1]."

Epidemiology

DES is one of the most common ocular diseases, with 10-30% of patients having signs or symptoms of DES[1]. While the number varies based on criteria of diagnosis and population studied, approxiamtely 3.2 million women and 1.05 million men are affected by DES in the United States[2]. DES is more predominate in women with a hormonal imbalance such as during pregnancy or postmenopausal, as well as women on oral contraceptives[2,3,4]. Based on international epidemiological studies, other populations have similar or higher rates than the United States. 26% of patients with DES have an underlying autoimmune condition such as rheumatoid arthritis or systemic lupus erythematosus[2,3].

Etiology

DES is a disease of the tears and ocular surface. DES can be due to problems with tear evaporation or poor tear production[2,5]. Also, it has been shown that inflammation can have a causative role in DES.

Evaporative DES accounts for 86% of all dry eye and is caused by blockage of the meibomian glands. Meibomian gland dysfunction (MGD) causes limited lipid layer, which leads to tears evaporating 4-16x faster. Signs and symptoms of MGD were found in two-thirds of patients with DES. Patients, in particular children, with Rosacea-associated MGD is associated with a more severe disease. MGD can also cause tear film instability, however is usally asymptomatic[2].

Aqueous DES occurs when the lacrimal gland does not produce enough of the aqueous portion of the eyes. This can result in hyperosmolarity and unstable tear film. Sjogren syndrome is a chronic autoimmune disorder characterized by exocrine gland dysfunction and is associated with aqueous DES, in one study, 85% of Sjogren patients reported symptoms of DES[2]

Other causes of DES can include but are not limited to Vitamin A deficiency, Diabetes, and neuropathic DES due to post refractive surgery or contact lens wear. Environment such as dry, warm climates can worsen DES. Many current studies are looking at genetic susceptibility, but little is known as of yet.

Clinical Diagnosis

DES is a clinical diagnosis, where optometrists need to use patient history, slit lamp examination and one or more test such as tear film osmolarity, schirmer's test, phenol red test, or inflammadry. Early detection and treatment is key to prevent corneal ulcers, scarring, and improve the quality of life for patients

History and Symptoms

Patients typically complain of a dry, gritty feeling in the eyes with occasional foreign body sensation. Additional symptoms include itchyness, excess tearing, pain, and redness of the eyes. Photophobia, blurred vision and stringy discharge are also noted.

According to the TFOS DEWS II, an important aspect of DES is symptoms. To help with the different aspects of DES, some clinicians use symtpom questionnaires such as OSDI and DEQ. OSDI contains three sections that help determine frequency of symtpoms, quality of life, and environmental factors.

Slit Lamp Exam

Tear breakup time (TBUT) is a quantitative test for tear film stability and how fast a tear layer evaporates. A flourescein strip is applied and patient takes a big blink and then holds eyes open. A normal TBUT is 15-20 seconds.

Epithelial Staining uses flourescein, lissamine green or rose bengal dye to dye abnormalities of the ocular surface, quality of tears, and severity of dryness. Fluorescein stains degenerated or damaged cells, and will show superfical puntate keratitis and PEE, which the other two stain dead cells[3].

Objective Tests

Schirmer Test is a quantitative measure of the tear production by the lacrimal gland during a 5 minute period. Schirmer I tests basic and reflex tearing because it is performed without topical anaesthetic. Schirmer II test measures only basic tearing with the use of an anaesthetic. Anything below 15mm of wetting is considered abnormal[3].

The Zone Quick (phenol red) test is similar to Schirmer's but only takes 15 seconds. The thread is yellow and will turn red once it touches tears. The thread is placed in the inferior palpebral conjunctiva 1/3 from the lateral canthus. No topical anaesthetic is used. Normal is above 20mm, marginal dry eye is above 10mm, and below 10mm signifies DES[6].

Tear Film Osmolarity measures the osmolarity of tears. An osmolarity of 309-312 mOsm/L or lower is considered normal. It is a quantitative measure of tear production and is very sensitive but lacks specificity. According to TFOS DEWS II, tear osmolarity has the highest correltation to DES, and can be used to classify the severity of DES. Differences between the two eyes also provides insight of tear instability[3,8].

Inflammadry measures Matrix metalloproteinase 9, an inflammatory biomarker that has been shown to be elevated in the tears of patients with DES. InflammaDry showed a 85% sensitivity and 94% specificity of inflammatory DES[6,7,8].

Sjo Test measures 4 traditional biomarkers with 3 propriety biomarkers for early detection of Sjogren's syndrome. It is highly specific and sensitive. This is done by a blood sample and is sent to a diagnostic laboratory[5].

Lactoferrin can be tested as it is one of the major proteins secreted by the lacrimal gland. Its concentration correlates to lacrimal gland activity. However, this test is not commonly done[9].

Initial Visit

A 28 year old Caucasian female presents to clinic for comprehensive eye exam with complaint of dry, irritated, red eyes for the past two weeks. Patient prescribed unknown steroid eye drops in the past that did not help and was told to continue contact lens use for comfort. Vision varies daily.

Ocular History: Contacts and glasses.
Medical History: Amoxicillin allergy

Visual acuity without correction:
Right eye: 20/125
Left eye: 20/125
Visual acuity through Alcon Air Optix -2.25 OU:
Right eye: 20/20
Left eye: 20/25-
Auto Refraction:
Right eye: -1.50-1.00x161
Left eye: -1.75
Cycloplegic Refraction
Right eye: -2.75-1.00 x 161
Left eye: -1.75-1.50 x 088
Confrontational fields: Full to finger count
Pupils: Round, equal, reactive to light, (-)APD
Extra-ocular motilities: Full range of motion
BIO/90: unremarkable
Goldmann Tonometry:
Right eye: 13 mmHg
Left eye: 13 mmHg

Slit Lamp Findings and Photos

Slit Lamp examination showed trace injection and papillary conjunctivitis on palpebral conjunctiva in both eyes. Upon instillation of fluorescein dye, examination showed abnormal tear break up time and 3+ SPK equally on both eyes.

Impression/Plan from initial visit

Myopia: Hold off on Rx for glasses and contact lenses until corneal dryness has improved. Refract once stable.

Dry Eye Syndrome: Discontinue contact lenses. Start Artificial tears q1-2hrs with ointment or gel qhs. Return to clinic in 1 week.

OD: 3+SPK

OS: 3+SPK

Tear Osmolarity

Initial Visit:
Right Eye: 305 mOsm/L
Left Eye: 347 mOsm/L
First Follow Up:
Right Eye: 305 mOsm/L
Left Eye: 298 mOsm/L
Second Follow Up:
Right eye: 296 mOsm/L
Left eye: 288 mOsm/L
Third Follow Up:
Right eye: 277 mOsm/L
Left eye: 287 mOsm/L

First Follow Up

Patient returned 1 week after initial. Patient believes condition has improved and eyes are feeling better. Patient has discontinued contact lens wear since last exam.

Visual acuity with glasses correction:
Right eye: -2.25-0.50x168 20/25
Left eye: -2.25DS 20/20 +2
Slit Lamp:
Right eye: 1+ papillae superior, corneal staining with fluorescein, 2+SPK
Left eye: 1+ papillae superior, corneal staining with fluorescein, 2+SPK
Inflammadry: Positive

Impression/Plan from First Follow Up

Dry Eye Syndrome: Resolving. Continue no contact lens use. Continue Artificial tears and gel qhs.

Second Follow Up

Patient returned for two week follow up. Patient believes condition has improved.

Visual acuity with glasses correction:
Right eye: 20/15
Left eye: 20/15
Slit Lamp:
Right eye: 1+ injection and papillary conjunctivitis, 1+ PEE
Left eye: 1+ injection and papillary conjunctivitis, 1+PEE
Inflammadry: Positive
Zone quick (15 seconds):
Right eye: 25mm of wetting
Left eye: 26mm of wetting

Impression/Plan from Second Follow Up

Dry Eye Syndrome: Resolving. Continue no contact lenses. Start Xiidra bid OU, short term pred forte bid OU for 1 week. Return in 1 month and consider SJO test.

Third Follow Up

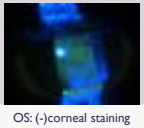
Patient returned for one month follow up. Patient believes condition has improved. Reports Xiidra stings.

Visual acuity with glasses correction:
Right eye: 20/15
Left eye: 20/15
Slit Lamp:
Right eye: trace injection and papillary conjunctivitis, (-)corneal staining, nasal chemosis
Left eye: trace injection and papillary conjunctivitis (-)corneal staining

Impression/Plan from Third Follow Up

Dry Eye Syndrome: Resolving. Continue no contact lenses. Continue Xiidra bid OU. Return in 1 month and perform SJO test. Consider Daily contact lens fitting.

OD: (-)corneal staining



OS: (-)corneal staining

Discussion

Quality of Life

Current research shows that DES has an adverse effect on the quality of life of patients. It can cause pain, irritation, and can affect the ocular and general health of a patient. DES can also affect the visual performance and acuity in affected eyes. Recent studies have shown that DES is associated with depression, anxiety, and psychological stress. Based on one study, mild DES has a similar QOL score similar to psoriasis. Moderate DES has a similar score to moderate angina, and severe DES was similar to class III/IV angina and disabling hip fractures[4]. Therefore, it is important to treat aggressively and early for DES patients.

Treatment

TFOS DEWS II reports on many different treatments for different causes, signs and symptoms of DES. This discussion will look at the three treatments used in this case: artifical tears, Pred Forte, and Xiidra.

Artificial Tears is considered the most common therapy for DES. These are usually considered over the counter, and attempt to replace/supplement the natural tear film. These do not fix the underlying cause. Ocular lubricants are regarded as safe, however, when needed to be taken q1-2 hrs, it is advised to use single use non-preserved artitifical tears. Preservatives can induce toxicity and adverse changes to the ocular surface[10].

Steroids used pre-treatment or at the beginning of the initiation of long term treatment has been shown to provide a more rapid improvement in Schirmer Test, decreased corneal staining and symptoms compared to initiating alone or with use of artificial tears[10].

Xiidra is the newly FDA approved lifitegrast 5% ophalmic solution for treatment of both signs and symptoms of DES. . Lifitegrast is a small integrin antagonist and is thought to block binding between LFA-1 and ICAM-1, resulting in inhibition of T cell migration into target tissues, reduction of cytokine release, and reduction of further T cell recruitment. In current studies, it has shown decreased corneal staining, decreased symptoms, and improved vision-related function. Lifitegrast has appeared safe and well tolerated with no serious ocular adverse events[10].

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BACTERIAL KERATITIS

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INTRODUCTION

Infectious keratitis occurs in approximately 20-50 per 100,000 people in the United States[1]. As a comparison, bacterial keratitis has an incidence of about 11 per 100,000 people in the United States[1]. Bacterial keratitis, which is the most common type of infectious keratitis, is one of the most important causes of corneal opacification due to scarring from infiltrates[1,2]. In turn, corneal opacification is second only to cataracts as the most common cause of legal blindness world-wide[1]. It is typically an acute condition, that if untreated, can rapidly lead to irreversible vision loss[1,2].

Bacterial keratitis is most often seen in contact lens wearers who do not practice proper lens hygiene and/or sleep in their lenses[1]. The incidence of corneal ulcers have increased over the years, correlating to an increasing number of people using soft contact lenses[1]. Other causes include recent eye injury, a weakened immune system, topical steroid use, and pre-existing ocular surface disease[1,2].

When a patient presents with an infectious keratitis, the most popular culprit is bacterial in nature, hence why this type of infection is assumed until proven otherwise[1,2]. The most common causes of bacterial keratitis are the staphylococcus species, *Pseudomonas aeruginosa,* and *Streptococcus pneumoniae*[1,2,3].

Common symptoms of bacterial keratitis are a red painful eye, discharge (often mucopurulent), photophobia, decreased vision, and sudden contact lens intolerance[1,2]. Common signs are 1or more epithelial defects with opacification of the underlying stroma (infiltrate)[1,2]. The epithelial defect is caused by the bacterial infection itself, whereas the infiltrate is caused by white blood cells attacking the pathogen. An anterior chamber reaction with cell and/or flare, eyelid edema, posterior synechiae, conjunctival injection, and increased IOP in severe cases can also be seen[1,2]. A patient with bacterial keratitis will often be a contact lens wearer and present unilaterally[1,2].

When treating bacterial keratitis, one must consider if the patient is a soft contact lens wearer. If so, Pseudomonas should be assumed[1,2]. Pseudomonas is the most common pathogen in soft contact lens wearers[1,2]. It is rapidly progressive, it can have a necrotic infiltrate, purulant discharge and a hypopyon[1,2]. If untreated, the cornea can perforate in as soon as 72 hours[1,2].

Other common causes of infectious keratitis are:

- Fungal; usually after trauma from vegetative matter such as a tree branch. The infiltrate may have feathery borders and satellite lesions[1,2,3].
- Acanthamoeba; very painful keratitis/infiltrate. The pathogen eats away at the corneal nerves. The presentation is much worse subjectively than objectively. Typically seen in soft contact lens wearers with poor lens hygiene, history of being in a swimming pool or a hot tub. Early stages have an epithelial defect that may mimic HSV I. In the later stages (3-8 weeks), the infiltrate becomes ring shaped[1,2,3].
- HSV I - can have eyelid vesicles and/or corneal dendrites. A history of known ocular herpes is common, as well as recurrent unilateral eye disease[1,2,3].
- Staphylococcal hypersensitivity – the infiltrates are located in the peripheral cornea and usually present bilaterally with multiple infiltrates and a clear space between the infiltrate and the limbus. Less pain is noted and the associated conjunctival injection is localized[1,2,3].

Although bacterial keratitis has a relatively good prognosis, inadequate management or late treatment can develop into serious vision threatening complications such as descemetoceles, perforation, endophthalmitis, secondary glaucoma, anterior segment disorganisation, scleral extension, and phtisis bulbi[1,2,3].

INITIAL VISIT EXAMINATION

23 yo female presented with complaint of a red painful left eye associated with tearing and photophobia. Patient is a SCL wearer. Slept in CLs 2 days prior, woke up with red painful eye, now present for 1 day.

Ocular hx: glasses and soft contact lens wearer, corneal ulcer OD secondary to contact lens use
Medical hx: unremarkable
Medications/allergies: none

VAs with correction: 20/15 OD, 20/15 OS
Confrontation visual fields: OD, OS: normal
Extra-ocular motilities: OD, OS: normal

Pupils: OD, OS: round, reactive to light, no APD
Goldmann Tonometry: OD: 16, OS: 16

SLE:
OD: - trace conjunctival injection
- trace conjunctival papillary reaction
- non-staining corneal scar, superior (likely from past ulcer)
- (-) cells or flare in A/C
OS: - 2+ conjunctival injection
- 2+ conjunctival papillary reaction
- (+) staining central corneal ulcer (0.5mm x 0.5mm) with underlying infiltrate
- trace cells in A/C, no flare
Fundus:
OD, OS: normal
Impression:
Bacterial keratitis with central corneal ulcer OS, likely contact lens related
Plan:
Discontinue CL wear
Corneal ulcer scraping obtained for culture
Zymaxid (gatifloxacin) 1 gtt q2h OS
ATs prn for comfort
RTC 1 day

Fungal keratitis with grayish infiltrate consisting of feathery borders.

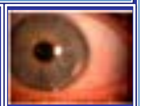
https://www.aao.org/topic-detail/fungal-keratitis--europe

Acanthamoeba keratitis with ring like infiltrate.

https://www.eyeworld.org/article-treating-acanthamoeba

HSV I keratitis with dendritic lesions hyperfluorescent with NaFl.

https://coreem.net/core/herpes-keratitis/



Marginal keratitis due to staphylococcal hypersensitivity.

https://openi.nlm.nih.gov/detailedresult.php?img=PMC3363308_opth-6-747f4&req=4

Discussion

Bacterial keratitis, which is becoming more prevalent with the increase in soft contact lens wear, can rapidly become serious enough to lose vision and in very severe cases lose the globe from serious complications such as endophthalmitis if not diagnosed and treated promptly[1,2,3].

As mentioned previously, a corneal infection is treated as if bacterial in nature until proven otherwise, either by corneal scraping/culture or if topical antibiotics are unsuccessful. A corneal scraping for culture is usually done if the lesion is 3mm in size or larger, if 2 or more satellite lesions are present, if it is central in location, or if unresponsive to the initial treatment[1,2,3].

The typical course of treatment for bacterial keratitis is the following: a cycloplegic (eg: cyclopentolate 1%) can be given for pain stemming from ciliary spasm and to prevent posterior synechiae[1,2,3]. Starting with a broad spectrum topical antibiotic is usually indicated: typically fluoroquinolones – moxifloxacin, gatifloxacin, ciprofloxacin, besifloxacin, levofloxacin. Dosing is qid x 7 days; if larger in size or centrally located, q1h-q2h x 1-2 days, then qid for 5 days. The topical fluoroquinolones can be substituted with topical polymyxin B/trimethoprim; same dosing schedule[1,2,3]. If the ulcer is larger than 2mm in size, centrally located or unresponsive to initial therapy, can start with fortified tobramycin or gentamicin 15mg/mL q1h around the clock, alternating with fortified cefazolin 50mg/mL or vancomycin 25mg/mL (vancomycin should be reserved for resistant organisms) [1,2,3]. A topical steroid can be added qid x 5-7 days once the lesion has re-epithelialized to reduce the development of a scar formation from the infiltrate and to decrease any residual inflammation[1]. Topical steroid use, however, has been found not improve best corrected visual acuity at the 3 month mark in patients with a bacterial corneal ulcer, according to the SCUT trial[4]. Contact lens wear should be discontinued until the ulcer and infiltrate have resolved[1,2,3]. The contact lens that was being used at the onset of the ulcer, as well as the contact lens case and solution should be disposed. The patient should be seen daily until the lesion has re-epithelialized and the infiltrate has reduced in size[1,2,3].

With contact lens usage being a top risk factor in acquiring bacterial keratitis, educating patients on proper contact lens hygiene and the risks associated with contact lens over-wear, sleeping in lenses, and use of lenses during water related activities is crucial.

1 DAY FOLLOW-UP

23 yo female presented for her 1 day bacterial keratitis follow-up OS. The patient is taking medication as directed, reports pain, photophobia and tearing dramatically improved.

VAs with correction:
20/15 OD
20/15 OS
Confrontation visual fields/extra-ocular motilities/pupils:
OD, OS: normal
Goldmann Tonometry:
OD: 16
OS: 16
SLE:
OD: - trace conjunctival injection
- trace conjunctival papillary reaction
- non-staining corneal scar, superior
- (-) cells or flare in A/C
OS: - 1+ conjunctival injection
- 1+ conjunctival papillary reaction
- infiltrate decreased in size, no staining, no epithelial defect
- trace cells in A/C, no flare
Fundus:
OD, OS: normal
Culture results: no growth.
Impression:
Bacterial keratitis OS, improved
Plan:
Continue gatifloxacin 1 gtt q2h for remainder of day, then taper to qid OS.
Start dexamethasone 1gtt qid OS for infiltrate and reduce scarring
ATs prn for comfort
RTC 3 days

3 DAY FOLLOW-UP

Patient returns with no complaints of pain, tearing or photophobia. Followed treatment as directed.

VAs/CVF/Motilities/Pupils/IOPs:
OD, OS: unchanged since last visit
SLE:
OD: non-staining corneal scar
OS: no staining, no epithelial defect, no infiltrate, no cells or flare in the A/C
Impression:
Bacterial keratitis OS resolved
Plan:
Continue dexamethasone and gatifloxacin qid x 1 more day OS, then discontinue
RTC if any recurrence

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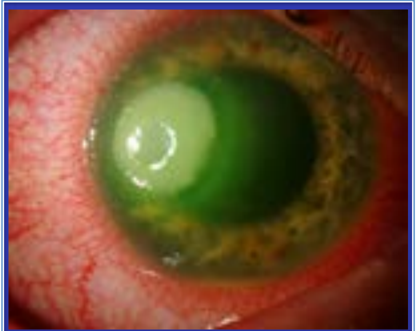


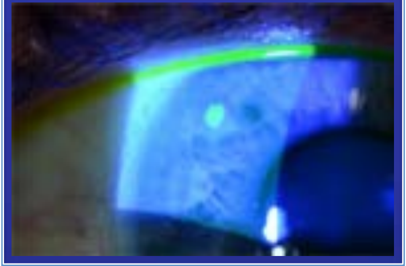
Corneal Ulcer

Anterior segment photograph of a large corneal ulcer with underlying infiltrate and opacification caused by contact lens abuse.

Credit: http://mvretina.com/index.php/section/article/22

Sodium fluorescein evaluation of a corneal ulcer. The hyperfluorescence is attributed to staining of the mucous plug.

https://www.reviewofoptometry.com/ce/is-that-corneal-infiltrate-sterile-or-infectious



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Indications and Uses of Dehydrated Amniotic Membranes: What, When, and How–To.

Amanda Thurmes, BS, ICO, Nicholas Colatrella, OD, FAAO, Dipl AAO, ABO, ABCMO, Stacy Hinkemeyer, OD, FAAO, Dipl ABO, ABCMO, Kevy Simmons, OD, FAAO, Joseph Allen, OD, Nancy Simmons, OD

ABSTRACT

Dehydrated amniotic membrane transplantation is frequently being used to accelerate healing of the ocular surface in numerous conditions. Pterygium excision, corneal ulcers, inflammatory ocular surface disease, and recurrent corneal erosions are common indications. Amniotic membranes have multiple properties that aid in this acceleration including facilitating epithelial cell migration, reinforcing basal cellular adhesion, and anti-inflammatory properties, and help to decrease scarring. Four patients with various ocular surface conditions will be compared to see how dehydrated amniotic membrane transplantation aids in their healing process, side effects they experienced, and current status. Dehydrated amniotic membranes are more manageable and comfortable for the patient. Insertion of dehydrated amniotic membrane and subsequent removal of the bandage soft contact lens is a delicate process, but simple and successful if properly performed and troubleshot when complications arise. Amniotic drops are being investigated to become more easily accessible to the patient. Overall, dehydrated amniotic membrane transplantation is effective, tolerable, and convenient to patients and practitioners.

INTRODUCTION

- **Background**
  - An avascular and acellular tissue
  - Found to be anti-inflammatory, anti-scarring, anti-neovascular, and anti-pain
  - Has regenerative and expedited ocular surface healing properties
  - Patient response variable - not all advantages can be expected in every patient
  - Protects delicate epithelial defects from the mechanical shearing forces of the eyelids
  - Acts as a barrier to inflammatory cells and other substances in the tear film
  - Aids in hydration of the epithelium
  - Certain environmental factors can negatively effect ocular surface healing - patients with several of these may benefit to a greater degree from amniotic membrane transplantation
    - Diabetes and other inflammatory or autoimmune diseases
    - Stress, obesity, atopic diseases
    - Medications such as NSAIDs, aspirin, steroids, and chemotherapy
    - Alcohol use and smoking
    - Previous ocular surgeries or trauma
- **Indications**
  - Dry eye/non-healing epithelial defects
    - Medical necessity comes along after failure of other management strategies
  - Pterygium excision
  - Reconstruction of conjunctiva status-post removal of tumor or pinguecula
  - Limbal stem cell deficiency
  - Corneal ulcer
    - Infectious and sterile/neurotrophic ulcers with corneal thinning and/or perforation
    - Promotes faster healing to avoid corneal transplantation
  - Recurrent corneal erosions (EBMD or trauma-related)
    - Epithelial debridement and diamond burr polishing followed by amniotic membrane transplant with bandage soft contact lens decreased recurrence by 50% compared to bandage soft contact lens only after debridement and polishing
    - Increased MMP-9's found in tears of patients with RCEs
    - Minimize pain, decrease likelihood for infection, and expedite healing in RCE patients
    - Manage with oral tetracyclines, topical steroids, autologous serum, and amniotic membrane transplant to decrease inflammation and optimize healing environment
  - Chemical and thermal burns
  - Stevens-Johnson Syndrome
  - Peripheral ulcerative keratitis
  - Post-infectious keratitis (herpetic, vernal, bacterial)
- **Options for management of ocular surface disease**
  - Cryopreserved
    - Brand: Prokera

    - Allows for greater retention of the membrane's structural, physiological and biochemical properties responsible for its dramatic healing and easier handling intra-operatively
    - Large in size and can be difficult to handle
    - Uncomfortable/painful for patient while in place
  - Dehydrated
    - Brand: AmbioDisk

    - 15 mm sutureless, overlay AM disk
      - Available in 35 microns (Ambio2) or 100 microns (AmbioS)
      - New 9 mm and 12 mm diameter available for Ambio2
      - Insertion and removal more detailed
      - Biggest issue is ejection of the membrane from underneath the BSCL
    - A larger CL can be helpful at retaining the membrane for entire treatment
    - Avoid limbal compression with BSCL
    - Discomfort/pain can also be an issue but less common in dehydrated

CASE REPORTS

- **20 year old CF: Recurrent Corneal Erosions**
  - No relevant medical history
  - Father has history of epithelial basement membrane dystrophy OU
  - Recurrent corneal erosion OD
    - Start Pred Forte and Ciloxan QID OD with bandage soft contact lens
    - Improved - tapered Pred Forte and discontinued Ciloxan QD
    - Debridement and amniotic membrane transplant OD recommended for follow-up
  - Recurrent corneal erosion OS
    - Bandage soft contact lens OD still in place and feels fine
    - Start Pred Forte and Ocuflox QID with bandage soft contact lens OS
  - Debridement and amniotic membrane transplant with AmbioDisk and bandage soft contact lens OS
    - Left office in good condition - continued use of same drops
  - Mild discomfort and lid edema OS
    - Continued treatment regimen with addition of cool compresses
  - Comfort and vision fully improved OS
    - Replaced bandage soft contact lens OU and tapered drops OS
  - Debridement and amniotic membrane transplant with AmbioDisk and bandage soft contact lens OD
    - Start Pred Forte and Ocuflox QID OU OD, continue taper OS
  - Mild discomfort and lid edema OD
    - Continue drop regimen and cool compresses OD
  - Comfort and vision fully improved OD
    - Taper drop regimen OD and replaced bandage soft contact lens OU
    - Educated on importance of full 6-8 week bandage soft contact lens wear to decrease recurrence
    - Begin Muro 128 ointment QHS OU and preservative free artificial tears PRN OU once last set of bandage soft contact lenses removed
- **56 year old CM: Inflammatory/Neurotrophic Dry Eye**
  - History of arthritis and type II diabetes
  - Dryness increased after trabeculectomy surgery in early 2015
  - Failed past treatments:
    - Restasis, doxycycline, Evoxac, autologous serum, punctal plugs, Refresh artificial tears, moisture chamber goggles, and scleral lens fit attempted – issues due to superior bleb OU
  - Amniotic membrane transplant OU end of 2015
    - Greatly improved quality of cornea
    - Still mild discomfort but vision improvement
  - Started on Xiidra BID OU - provided modest improvement for a few weeks
  - Hemoglobin A1c elevated over holidays
    - Dryness seems to be worsening
    - Using preservative free artificial tears 20-30 times a day
    - Xiidra burning eyes for 20 minutes after instillation
    - Wanted to try amniotic membrane transplant again
  - Amniotic membrane transplant performed with AmbioDisk and bandage soft contact lens OS without complication
    - Discontinue Xiidra OS while membrane in place
    - Start Ocuflox QID OS
    - Consider use of Pred Forte QID OS only if experiences irritation due to past issues with blood sugar fluctuations from topical steroid use
    - Felt better within 24 hours of amniotic membrane transplant OS
    - Wearing bandage soft contact lens OU in daytime to help with discomfort
  - Holding off on amniotic membrane transplant OD at this time due to increased comfort with bandage soft contact lens alone
  - Discussed potential need for annual amniotic membrane transplant OU to get him through exacerbation of dryness in winter months
- **55 year old CF: Salzmann's Nodular Dystrophy**
  - Failed treatments:
    - Restasis, autologous serum, and punctal plugs
  - Amniotic membrane transplant with AmbioDisk and bandage soft contact lens OD
    - Started TobraDex QID OD and discontinue Restasis OD while amniotic membrane in place
    - Educated that amniotic membrane transplant would help with long term inflammation but create more discomfort while membrane in place
    - Monovision patient – OD for distance - gave CL to improve distance vision OS while amniotic membrane and bandage soft contact lens in place OD
  - Follow-up amniotic membrane transplant OD - feeling better and corneal appearance improved
    - Using TobraDex QID OD and Restasis BID OS – began taper
    - Removed her own BSCL OD after 24 hours
  - Returned 6 months for dry eye evaluation OU
    - Stable comfort and vision with Restasis BID OU and Systane Ultra artificial tears PRN OU
    - Still has autologous serum but not using it at this time
    - Recommended use of autologous serum QID throughout winter months to help promote ocular surface health
    - Consider second amniotic membrane transplant if condition worsens even with autologous serum use

HOW–TO

- Insertion:
  - Gather supplies:
    - Jewelers forceps, lid speculum, alcohol pads, bandage soft contact lens, dehydrated AM, sponge spear, proparacaine
  - Slightly recline patient in chair
  - Instill proparacaine OU
  - Prepare supplies
    - Clean jewelers forceps and lid speculum with alcohol pad, open BSCL and AM packaging, place two sponge spears and cleaned tools on sanitary cloth

  - Lid speculum insertion

    - Have patient look down, secure speculum under upper lid, then look up, secure speculum under lower lid, then give a target on ceiling for patient to focus on that positions the cornea so you can put the AM in place covering entire cornea
  - Ensure ocular surface is dry to prevent bunching of graft upon insertion and to avoid sliding out from underneath BSCL
  - Grasp amniotic membrane with jeweler's forceps inside packaging
    - Be cautious of static cling inside bag – open it only halfway as to not eject amniotic membrane from bag
  - Remove from packaging and inspect AM for IOP marking
  - Place AM onto ocular surface IOP side down

  - Use sponge spear to position AM centrally on cornea and remove any creases
  - Grab BCL with finger – inspect for defects – place directly on top of AM on cornea
  - Use sponge spear again to reposition BSCL if necessary
  - Lid speculum removal
    - Have patient look up, remove speculum from lower lid, then look down, remove speculum from upper lid
    - Be VERY careful as to not displace BSCL/AM complex as both can dislodge from ocular surface during speculum removal
    - Useful to have an extra pair of hands (fellow doctor, student, technician) able to assist
  - Have patient close eyes and move eyes around
  - Open eyes and examine positioning of BSCL/AM in slit lamp
  - Adjust positioning of AM underneath BSCL with sponge spear if required
- Follow-up & Removal
  - After insertion
    - Begin use of steroid and antibiotic in eye with amniotic membrane in place
    - TobraDex QID
    - Pred Forte QID and broad spectrum antibiotic QID à ofloxacin, ciprofloxacin, vigamox, moxifloxacin, gatifloxacin, etc.
    - Discontinue non-artificial tear drops while AM/BSCL in place
    - Ex: Restasis, Xiidra, and autologous serum
  - Ok to remove bandage soft contact lens after 3-5 days (ideally)
    - Patient ok to remove bandage soft contact lens sooner if bothersome
    - Otherwise have patient return to office for doctor bandage soft contact lens removal and ocular surface evaluation

POTENTIAL RISKS AND COMPLICATIONS

- Corneal abrasions from lid speculum, forceps, or eye rubbing
  - If induced by insertion, patient will likely report increased foreign body sensation and discomfort
  - Not very concerning because AM should heal it
  - Abrasions from removal are more troubling
  - Newly healed epithelium may still be inadequately bound to the basement membrane complex
  - To avoid these complications, ensure most supplies are close at hand and that you have enough room to maneuver the patient for insertion
  - Position the patient on their back for straightforward insertion of lid speculum
  - Directing patients to look away from the contact point of the speculum also decreases the chance of corneal contact
  - Irritation, discomfort, and itching are all possible so educate the patient that eye rubbing is forbidden
  - Can lead to destabilization and ejection of graft
  - Will lessen beneficial properties
- Poor cornea-contact lens relationship
  - Imperative that a contact lens covers entire membrane to hold it in place
  - Selecting the right contact lens is critical to the overall function and retention of AM
  - Too tight a contact lens fit will cause impingement of the limbal stem cell region, which can exacerbate issues with a healing corneal epithelium
  - Fit too loose and the lens can slide around, leading to potential loss/ejection of AM
- Patient intolerance
  - A common yet highly patient-dependent variable
  - Important to set expectations prior to insertion
  - Common issues surrounding intolerance
  - Pain or discomfort
  - Excessive inflammation of the lids or conjunctival surface prior to insertion can lead to issues with the fit and movement of the BSCL
  - Poor vision affecting lifestyle
  - Ex: Monovision Patient

CONCLUSIONS & FUTURE RESEARCH

- Amniotic Membrane Extract Eye Drops
  - Currently in clinical trials for severe ocular surface diseases such as chemical and thermal injuries, Stevens-Johnson Syndrome, Band Keratopathy, Corneal dystrophies, post-PRK, and post-corneal surgeries
  - Evaluating how corneal defect size changes over a span of 12 months using the drops via ocular surface examination
  - Evaluating any abnormal eye discharge on a weekly basis via questionnaire
  - Evaluating any ocular pain or discomfort on a daily basis via questionnaire
- Contact lens – welded sutureless amniotic membrane
  - Ease of inserting a soft CL

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SOCIETY FOR NEUROSCIENCE

1 ICO PRESENTATION

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021.16SA

Charles Bell: Controversial Scientist

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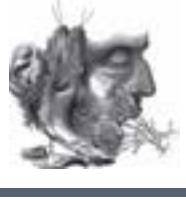
INTRODUCTION

Sir Charles Bell (1774-1842) was Scottish anatomist/surgeon that came from a family of doctors.[1] He is most famous for several eponymous terms. Idiopathic facial paralysis is commonly known as Bell palsy. Although, he was by no means the first to describe this problem. That honor appears to go to Cornelis Stalpart van der Wiel in 1683.[2] Bell was truly the first to correctly differentiate peripheral from central facial paralysis.[3] He was also the first to describe the upward rolling the eyes when the eyelids close, which is known as Bell phenomenon. In addition, he described the external respiratory nerve (of Bell), now known as the long thoracic nerve, which supplies the serratus anterior muscle.

Bell appears to have been a dichotomous figure. On the one hand he was known around London to be genial and unaffected,[4] a sensitive artist, fastidious in his dress,[5] and a devout Christian.[6] In 1802 he published a book, The *Anatomy of the Brain* that has some of the most beautiful neuroanatomical renderings of the time.[7] On the other hand, Bell was ambitious and not afraid of controversy. His friend, Francis Jeffrey wrote to him: "… a little too much ambition … and … a small degree of misanthropy, particularly towards persons of your own profession."[8] He was famously involved in at least three very public arguments related to neuroscientific discoveries.

In this drawing by Bell, the large nerve in the middle of the page (Bell's Fig. 1) is the trigeminal nerve showing both the ganglion (B) and the motor root passing anterior to the ganglion (C). The smaller figure in the top right (Bell's Fig 2) is a spinal ganglion arranged to show its similarity to the trigeminal ganglion. The top left figure (Bell's Fig 3) is a sympathetic ganglion and is meant to show the difference between the ganglia of "respiratory system" (of which what we now call the sympathetic system was a part) from those of the "symmetrical system" (of which the trigeminal and spinal nerves were a part).



In this drawing also by Bell, A is the facial nerve, shown emerging just anterior to the ear. Its buccal branch is cut and folded forward (B). C is the buccal nerve (a branch of the mandibular division of the trigeminal nerve) showing the complex and interwoven nature of the nerves of face.

ALEXANDER MONRO (SECUNDUS) 1733-1817

The first disagreement involved the interventricular foramen (of Monro), a passage that links the lateral ventricles of the brain with the third ventricle.[9] Alexander Monro *secundus* first described this communication in 1764[10] and gave a fuller account in his 1783 text: Observations on the Structure and Functions of the Nervous System.[11] Here he was honest in pointing out that the presence of a communication between the ventricles was well known by others preceding him (even Galen). Monro then went on to claim that he described it in more detail than anyone before him and that prior descriptions had no value.[12] This appears to have given rise to challenges from his contemporaries, especially those in London. In response, Monro had eminent physicians write letters that would leave no doubt that he well deserved the acknowledgement of an eponym,[13] and he wrote a second article in 1797 that substantiated and defended his anatomical descriptions of these communications.[14] The first written critique of Monro was in an appendix in Charles Bell's 1802 book.[7] It was more of a personal attack on Monro for presuming to describe something that was already well known than an attempt to show that he was mistaken, although he actually was. Monro described a direct communication between the lateral ventricles and a separate foramen opening into the third ventricle. Actually the lateral ventricles each separately open into the third ventricle with no direct connection. Even though he was vitriolic, Bell was right.

FRANÇOIS MAGENDIE (1783-1855)

Another controversy involved the French physiologist, François Magendie. In 1811, in a self-sponsored pamphlet distributed only to his friends and colleagues, Bell stated that he found (with the help of his brother-in-law and assistant, John Shaw) that touching or cutting the ventral spinal nerve roots of an unconscious animal caused convulsions, while the dorsal roots were "insensible", i.e., not sensory in our understanding of the term but merely that they did not produce any observable reaction.[15] His hypothesis was that the brain consisted of a "grand division". The cerebrum was for "impressions" and motions and was connected to the spinal cord by ventral roots. He called this the "symmetrical system". The cerebellum, connected to the spinal cord by dorsal roots, was for "governing the operation of the viscera", what he called "respiration" and, thus the "respiratory system". Therefore, Bell had actually suggested that sensation and ordinary motion were both conveyed by the ventral roots. The dorsal roots were then involved in "respiratory" functions. In 1822, Magendie established that the ventral roots are motor and that the dorsal roots are actually sensory in function.[16] He used visvisection on awake animals in order to determine this and may have based his experiments on Bell's research on the nerves of the face that were demonstrated by Shaw when he visited Paris. Later in 1822, after reading a copy of Bell's *New Anatomy of the Brain* obtained from Shaw, Magendie publically acknowledged Bell as the first person to conduct nerve root experiments but maintained that Bell had not realized the distinct roles of the ventral roots as motor and dorsal roots as sensory, the discovery of which remained rightly his alone.[17] Acrimonious debates about priority followed, in which Bell did not behave admirably.[18-22] Meanwhile, Bell had reprinted his findings in book form with subtle changes that made it sound like he had also discovered the sensory nature of the dorsal roots in 1811. [20,23] The conflict, promulgated mostly by Bell, lasted until Bell's death (and beyond) and even had nationalistic overtones. Bell, and also British politicians, rebuked the French vivisection methods as crude and cruel. Finally, it was established that the term Bell-Magendie law be used, although Johannes Peter Müller (1801-1858) was the first to show this phenomenon with absolute reproducibility in frogs in 1831.[24]

HERBERT MAYO (1796-1852)

Bell was also involved in a controversy with one of his former students, Herbert Mayo that was entwined with the dispute with Magendie.[25] In 1821, Bell stated that the fifth nerve was the "spinal nerve of the head" in that it had both sensory and motor functions. At this time the seventh cranial nerve was divided into a portio dura (what we now call the facial nerve) and the portio mollis (what we now call the vestibulocochlear nerve). According to Bell, the portio dura of the seventh nerve belonged to the "respiratory" nerves since its section caused cessation of motions of the lips, nostrils, and face generally. [26] He felt that without the portio dura, the parts of the face could not coordinate with the lungs or produce expression, which he considered to be mostly involuntary. In 1822, Mayo rejected Bell's system and unambiguously defined the separate motor and sensory functions of the various branches of these nerves.[27] In 1823, Bell accurately described these nerves with no reference to Mayo and had used these as examples in his argument with Magendie.[28] Subsequently, Bell left it to his brothers-in-law, John and later Alexander Shaw, to go on a decades-long campaign to slur Mayo, not only on a scientific basis but also on a personal level, claiming Bell's priority of this discovery before 1822.[29]

CONCLUSION

So, while Bell seemed nice in polite company, he had a definite mean streak when it came to other scientists. It might be easy to believe that Bell's friend, Francis Jeffrey, understated the "small degree of misanthropy" Bell had toward some of his colleagues.

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