ILLINOIS COLLEGE OF OPTOMETRY

2024 RESEARCH PRESENTATIONS

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Optic Neuritis as First Sign of Late Onset Multiple Sclerosis

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INTRODUCTION

A 67-year-old Black male with sudden, unilateral, painless vision loss undergoes comprehensive workup for underlying systemic etiology. Multiple sclerosis (MS) should be considered and ruled out in patients presenting with optic neuritis, regardless of demographics.

CASE PRESENTATION

A 67-year-old Black male presented with non-specific complaints of decreased vision OD which began upon waking 2 weeks earlier. The patient's ocular and medical histories were unremarkable. Entering acuities were count fingers at 3 feet in the right eye and 20/20 in the left.

TABLE 1
Clinical Findings at Initial Visit

Clinical Findings	OD	OS
BCVA	CF @ 3 ft	20/20
Pupils	(+) APD	Round, reactive
CVF	FTFC	FTFC
EOM	FROM, (-) pain	FROM (-) pain
GAT IOP @ 4:33PM	11 mmHg	11 mmHg
Anterior Segment	Unremarkable	Unremarkable
DFE	Unremarkable	Unremarkable

FIGURE 1
ONH and RNFL Analysis from initial visit

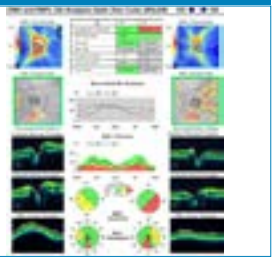
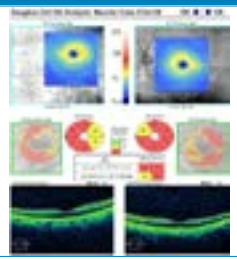


FIGURE 2
Ganglion Cell Analysis from initial visit



Serology:
CBC with differential, ESR, CRP, ACE, liver function, AQP4 IgG, MOG IgG, FTA-ABS
- All findings normal

Radiology:
- Chest x-ray – normal
- MRI of brain and orbits, with and without contrast
  - o Ill-defined, patchy T2 signal hyperintensity in periventricular white matter of both cerebral hemispheres and along lateral margin of anterior right temporal horn with some faint enhancement into the posterior areas
  - o Some areas of hyperintensity visible pre-gadolinium remained hyperintense post-gadolinium infusion; others appeared isointense
  - o Faint area of hyperintensity along right optic nerve adjacent to globe

FIGURE 3
MRI of Brain, Axial FLAIR – hyperintense white matter lesion

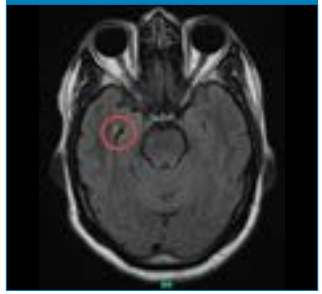
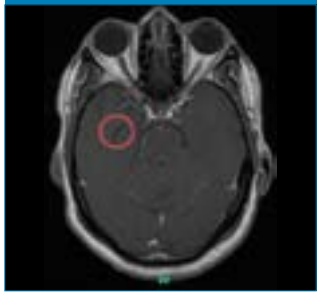


FIGURE 4
MRI of Brain, Axial T1 Post-Gadolinium Infusion – isointensity in area of hyperintensity in Figure 3



TREATMENT/ MANAGEMENT

Following the initial presentation, comprehensive serology was ordered. Due to the patient's demographics, aquaporin-4 (AQP4) and myelin oligodendrocyte glycoprotein (MOG) antibodies were included in the bloodwork. MRI of the brain and orbits with and without contrast was obtained and showed multiple periventricular T2 and FLAIR lesions, one of which showed enhancement with gadolinium. Consultation with neurology confirmed the diagnosis of late-onset multiple sclerosis and the patient was started on Vitamin D supplementation. The patient is to start further disease modifying therapy later this year. Follow-up neuro-oph exam at 2 months showed improvement of visual acuity to 20/60 in the right eye.

FIGURE 5
ONH and RNFL Analysis from 2-month follow-up

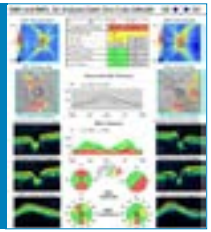
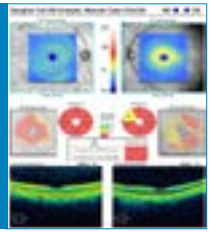


FIGURE 6
Ganglion Cell Analysis from 2-month follow-up



DISCUSSION

Optic neuritis (ON) is an inflammation of the optic nerve commonly associated with multiple sclerosis (MS). Common findings of unilateral ON are reduced vision, pain on eye movement, afferent pupillary defect, dyschromatopsia, and decreased contrast sensitivity. OCT can show increased RNFL thickness in acute ON; although global GCL thinning is associated with MS.

A single MRI study can be used to satisfy not only the separated in space criteria for the diagnosis of MS, but also the separated in time. White matter lesions at different stages are visible without contrast; however, gadolinium highlights those lesions that are active.
The classic demographic of a patient newly diagnosed with MS is a Caucasian female between the ages of 30-50. Recent studies are changing the face of the typical patient with MS, finding that there is a similar prevalence and clinical presentation between black and white patients; however, ON is less common in patients with late-onset MS.

CONCLUSION

ON secondary to demyelinating disease should be considered in a patient with sudden, unilateral vision loss, even if they do not fit the classic profile of a young, Caucasian female, especially since recent studies are showing that MS affects a more diverse group of people than previously thought. Late-onset MS-related optic neuritis should be considered in older patients with acute monocular vision loss.

References: Available upon request

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When A Malingerer is Not a Malingerer- A Case of Early Onset Leber Hereditary Optic Neuropathy

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Chicago, Illinois

INTRODUCTION

Leber Hereditary Optic Neuropathy (LHON) is a rare disease caused by a mitochondrial disorder. It is more common in males with a prevalence of 1 in 45,000 in a European population. The average age of onset is 15 to 35 years. Diagnosis is important to ensure accommodations in the educational setting for younger patients.

CASE REPORT

A 9-year-old black male presented with a complaint of gradually increasing blurry vision at all distances. There was a history of glasses wear for near point activities for 6 months prior with the glasses currently being lost. The child did feel like his vision was better when wearing the glasses in the past. See Table 1 for Initial Exam Presentation. Entering visual acuity was OD 20/250, OS 20/300 with minimal refractive error. The child was unable to see the near targets in order to perform accommodative testing, and no strabismus was present. The child was best corrected to 20/150 OD, 20/200 OS with a small amount of astigmatic correction and what appeared to be eccentric viewing. Color vision testing was normal. Dilated fundus exam was unremarkable OU, however there was questionable optic nerve pallor and yellowish macular deposits. See Figure 1 and 2. Even though the parent felt the child was malingering, they were referred for a visual evoked potential test (VEP). Flash VEP was normal but the pattern VEP was not. See Figures 3, 4, &5. ERG testing appeared normal with both scoptopic and photoptic testing. Genetic testing revealed LHON due to a variant of MT-ND4 m.11778G>A. See Figures 6 & 7.

Low Vision Rehabilitation followed, and details are in Table 2. The patient responded well to eccentric viewing and the parent was encouraged by the child's ability to see better at all distances. See Figures 8 & 9. Additionally, a detailed report was provided so that the child would qualify for an Individual Education Plan at school with vision services and accommodations. Time was taken to counsel the child and mother on the condition, impact on visual abilities and what resources are available. The vision loss was simulated for the Mother so that she could further understand how her child sees and support him. Referral for mental health resources and support groups was completed.

Table 1: Initial Exam Findings

Tests	Findings
Distance Visual Acuity	OD 20/250, OS 20/300 with Eccentric Viewing
Near Visual Acuity	OU 20/250
Pupils, CVF, EOM	All normal, no APD
Dist/Near Cover Test	Ortho distance and near
Stereoacuity	Negative Forms, Negative Lang
NPC and Vergences	NPC reduced, vergences normal
Manifest Refraction and Best Corrected VA	OD -0.25-0.75X180 20/150 OS -0.50-0.75X180 20/200
Cycloplegic Retinoscopy	OD +0.75-0.50X180 OS PI -0.50X180
Dilation	See optic nerve photos

Table 2: Vision Rehabilitation

Tests	Findings
Additional History	Uses enlarged font on computer distortion/missing central vision at all distances Glare sensitivity indoors and outdoors Slow reader, uses relative distance magnification and experiences visual fatigue Likes TikTok's and basketball Mobility is ok, but doesn't go anywhere alone No special services or assistance at school
Distance Visual Acuity with coached Eccentric Viewing	OD 20/200 OS 20/200
Near Visual Acuity	OU .25/4M (20/200 at 25 centimeters)
Mars Contrast Sensitivity	Moderate to Severe loss 1.24 log CS OD, 1.04 log CS OS, 1.17 log CS OU
Accommodation	Reduced to 7 D OD, OS, OU
HRR Color Vision Test	Normal
Equivalent power at Near	+16 to +20 diopters needed
Telescopic magnification	5x needed
Devices dispensed	+20 Handheld magnifier with LED- VA20/30 Polarized Gray fit over glare shields 6x handheld telescopes- VA 20/30 Portable digital magnifier- VA 20/20
School Recommendations	Individual Education Plan to include: Teacher of the Visually Impaired, Orientation and Mobility, Assistive Technology, front row seating, testing accommodation, safety precautions in PE
Resources and Referrals	In person and online mental health/counseling services Local and national organizations that serve the community with vision impairment or blindness

* Provided devices with grant funding by Horizons Therapeutics through Illinois Society for the Prevention of Blindness. https://eyehealthillinois.org/about-isph/

Figure 1: Right Eye

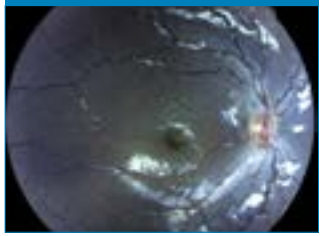

Figure 2: Left Eye

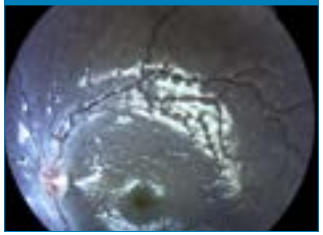

Figure 3: Photopic ERG

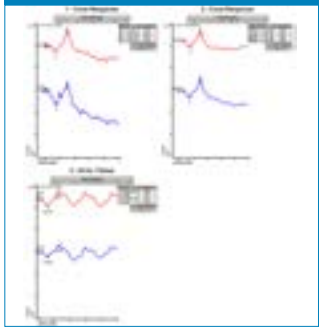

Figure 4: Scotopic ERG

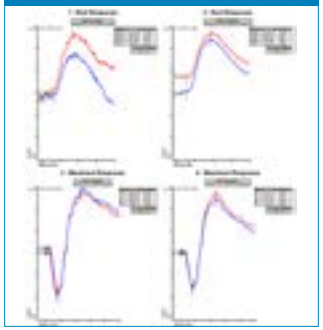

Figure 5: Pattern VEP OU

Figure 6: Genetic Tests Results

Figure 7: Genetic Tests Results Conclusion Page

Figure 8: Photo of Child Using Devices

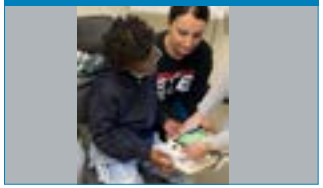

Figure 9: Photo of Devices

CONCLUSION

LHON is a rare condition for this child's age and ethnicity, yet the results are important for his continued function and success in both school and life. While many children may malinger during an exam, it is important to listen to the child and observe their visual behavior to determine when further testing is needed. Beyond direct observation, electrodiagnostic and genetic testing are available diagnostic tools that can be accessed to determine the diagnosis of LHON.

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Multimodal Imaging Techniques of Foveal Hypoplasia in Ocular Albinism

Mara Bedell, OD • Raman Bhakhri, OD, FAAO
Illinois College of Optometry; Chicago, IL

INTRODUCTION

A 32-year-old patient presented with a questionable diagnosis of ocular albinism. Multimodal imaging, including OCT-A, revealed foveal hypoplasia and an absent foveal avascular zone, findings consistent with ocular albinism.

CASE HISTORY

32-year-old white male
CC: light sensitivity OU; referred from outside provider who suspected ocular albinism; denies blurry vision at distance or near with current glasses
POH: unremarkable
PMH: unremarkable
Medications: none

CLINICAL FINDINGS

Entering VAs with glasses: OD 20/20-1, OS 20/20-2
DFE: blonde fundus OU, otherwise unremarkable
Other: light skin complexion, blue iris color
OCT Macula: OD: foveal hypoplasia, minimal foveal contour, no macular edema, central ILM-RPE thickness 309um; OS: foveal hypoplasia, minimal foveal contour, no macular edema, central ILM-RPE thickness 312um.
OCT-A: No foveal avascular zone in superficial capillary plexus OU, reduced foveal avascular zone in deep capillary plexus OU
Optos Widefield: C/D ratio 0.15/0.15 OD,OS; blonde fundus OU but otherwise unremarkable
Fundus Autofluorescence: unremarkable, no apparent pathology OU
Genetic testing was performed

DISCUSSION

Albinism is a rare heterogenous genetic condition characterized by mutations in enzymes responsible for melanin production, leading to absence of melanin in the skin, hair, and eyes of affected individuals. Ocular albinism is an X-linked autosomal recessive variant in which hypopigmentation is limited to ocular structures. Ocular manifestations in individuals with ocular albinism include possible iris transillumination defects, foveal hypoplasia, nystagmus, and fundus hypopigmentation. By definition, foveal hypoplasia involves the presence of inner retinal layers at the level of the normally avascular fovea.

Recent advancements in imaging techniques, such as OCT-A, allow for detection of this finding. Specifically, OCT-A analysis of the superficial capillary plexus and the deep capillary plexus reveals a decreased and smaller foveal avascular zone which correlates to the increased amounts of retinal vasculature in individuals with foveal hypoplasia secondary to ocular albinism.

IMAGE 1
HD 5-Line Raster Macula OCT of OS and OD; foveal hypoplasia, minimal foveal contour, no macular edema

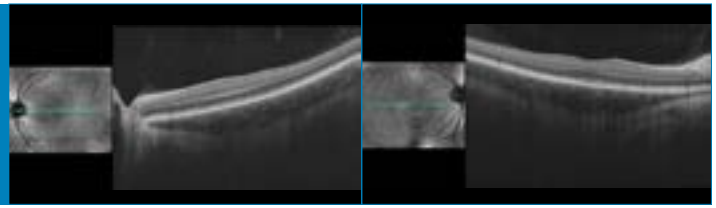


IMAGE 2
Optos wide field fundus images OD and OS; blonde fundus

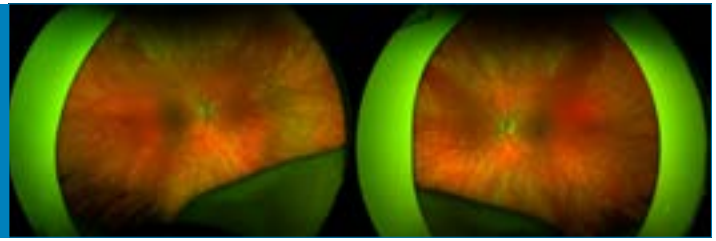


IMAGE 3
OCT Macula: OD: foveal hypoplasia, minimal foveal contour, no macular edema, central ILM-RPE thickness 309um; OS: foveal hypoplasia, minimal foveal contour, no macular edema, central ILM-RPE thickness 312um

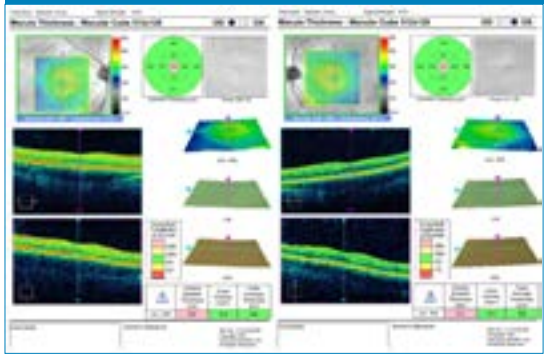
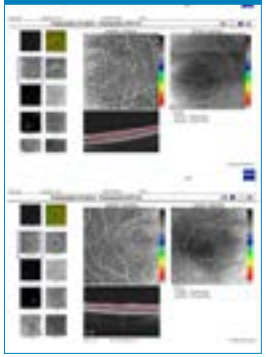


IMAGE 4
OCT-A: No foveal avascular zone in superficial capillary plexus OU, reduced foveal avascular zone in deep capillary plexus OU



TREATMENT/ MANAGEMENT

Although there is no cure for the condition, it is stable with patients maintaining relatively good visual acuities. The patient was educated on his findings and counseled on the etiology of ocular albinism and its genetic pattern. Dark tinted lenses or transition lenses can aid in reducing glare, making patients more comfortable in sunlight if needed. Genetic testing and counseling can be very helpful for families and those patients of child-bearing age who are considering having children.

CONCLUSION

Multimodal imaging techniques including OCT and OCT-Angiography are beneficial and practical when trying to clinically identify foveal hypoplasia in ocular albinism. Definitive diagnoses can be made through simple and direct visualization of the microvasculature of the retina.

Bibliography

Available upon request

CONTACT

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Waardenburg Syndrome and Papilledema, a Rare Association

Raman Bhakhri, OD, FAAO, Chicago, IL
Stephen Magill, MD, PhD, Chicago, IL
Leonard Messner, OD, FAAO, Chicago, IL
Xiao (Shawn) Yu, OD, FAAO, Los Angeles, CA

PURPOSE

Waardenburg syndrome (WS) is a rare autosomal dominant condition that can be classified into 4 subtypes with types 1 and 2 being the most common. WS is secondary to mutations in the PAX3 gene which results in deafness and pigment loss of the skin and hair. Ocular features can include a lateral displacement of the canthi, iris heterochromia, and choroidal pigmentary changes. Although rare, research has also shown that these patients are at higher risk of neural tube defects including spina bifida which may lead to further neurological and neuro-ophthalmological complications. This case details a rare presentation of WS with secondary spina bifida (SB) that resulted in hydrocephalus and subsequent papilledema.

CASE REPORT

A 23-year-old Hispanic female presented for a new comprehensive eye exam. Her medical history was positive for WS and SB resulting in hydrocephalus that was treated with a ventriculoperitoneal (VP) shunt as an infant. Her mother also had WS with the rest of her family and ocular history being unremarkable. Best corrected visual acuity was 20/25 OD/OS. External examination showed graying hair and lateral canthus displacement. Entrance testing and IOPs were within normal limits. Slit lamp exam revealed iris heterochromia OS >OD. Fundus examination revealed elevated and non-distinct optic discs with 0.2/0.2 cup to disc ratio OD/OS. Venous tortuosity was also seen OD/OS. SD-OCT imaging OD/OS was consistent with elevated optic nerves, deflected RPE/bruchs complexes, and RNFL thickening. Papilledema was suspected based on the patient's history and exam. Immediate referral to the patient's neurosurgeon revealed elevated intracranial pressure (ICP) secondary to VP shunt blockage. The shunt was surgically revised resulting in decreased ICP. Follow up revealed a reduction in RNFL thickening with an observable reduction in papilledema with fundus imaging. The patient continues to be followed at this time.

FIGURE 1
A 23yr old Hispanic female with typical Waardenburg syndrome type 1 findings including telecanthus (A) and hair hypopigmentation (B).

FIGURE 2
Iris photos of the patient demonstrating incomplete iris heterochromia of the right eye (A) and complete iris heterochromia of the left eye (B)

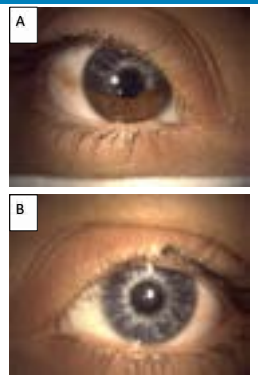


FIGURE 3
Initial optic nerve head photos depicting disc edema greater in the left eye (A) than the right eye (B). Tortuous retinal vessels are also noted.

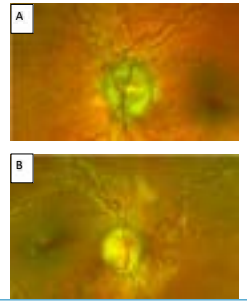


FIGURE 4
Repeat optic nerve head photos depicting resolution of the papilledema in the left eye (A) and right eye (B) when compared to Figure 4.

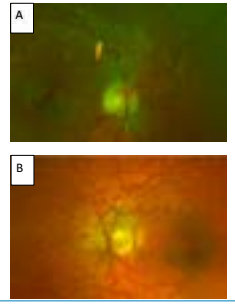


FIGURE 5
Initial optic nerve head optical coherence tomography, showing retinal nerve fiber layer thickening greater in the left eye (172um) than the right eye (128um), indicative of papilledema.

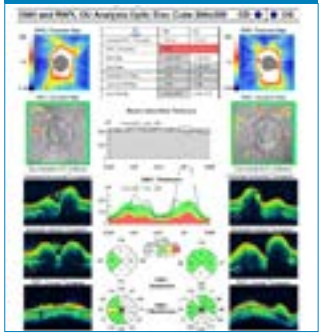
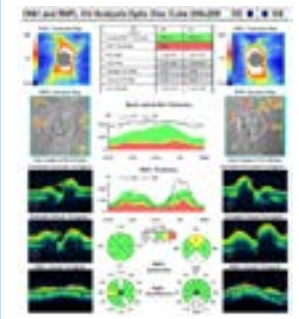


FIGURE 6
Repeat optic nerve head optical coherence tomography after shunt revision showing resolution of the retinal nerve fiber layer thickening. The left eye retinal nerve fiber layer thickness had decreased to 109um while the right eye had decreased to 106um.



CONCLUSION

Although the exact frequency of WS and SB occurring together has yet to be established, research has determined the underlying pathophysiology to be PAX 3 mutations. These mutations result in WS but can at times can also lead to coinciding neural crest defects and therefore neural tube defects such as SB. Ophthalmic findings are known to occur at high frequency in patients with SB and can include strabismus, papilledema, and optic atrophy. A recent retrospective study revealed that 20% of patients with SB had an episode of papilledema with 10% developing optic atrophy over time. This underscores the need of eye physicians to monitor their patients, with WS and secondary SB, for complications such as papilledema as they might be ultimately involved in their diagnosis and management.

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Epi-Multiple Evanescent White Dot Syndrome (EpiMEWDS) Secondary to an Idiopathic Choroidal Neovascular Membrane

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Shaun Ittiara, MD-Chicago, Illinois

PURPOSE

Multiple evanescent white dot syndrome, MEWDS, a white dot syndrome, consists of transient white dots in the outer retina and the retinal pigment epithelium (RPE). The exact pathogenesis is unknown but thought to be due to a viral-like infection with an immune-mediated mechanism. Recent literature poses a secondary or EpiMEWDS that is thought to occur secondary to an underlying condition that disrupts the outer retina, such as a choroidal neovascular membrane, CNVM. This rare case details the diagnosis and treatment of a patient with EpiMEWDS secondary to an idiopathic CNVM.

CASE REPORT

A 25-year-old male presented with complaints of gradual vision loss and central scotoma OD which began 3 week earlier. Ocular and medical history were unremarkable. Corrected visual acuities were 20/50 OD and 20/20 OS. Anterior segment examination was unremarkable. Dilated exam revealed subfoveal thickening with subretinal hemorrhage OD and a normal macula OS (Figure 1). Optical coherence tomography (OCT) OD showed a CNVM with subretinal fluid and adjacent disruption of the outer retinal layers (Figure 2). Fundus auto-fluorescence (FAF) photos revealed hyper-auto fluorescent dots, corresponding to the outer retinal disruption, indicating possible MEWDS (Figure 2). He was referred to a retinal specialist and received an injection of Avastin. At the 5 week follow up, his acuity had improved to 20/25 with reduction of the subretinal thickening, subretinal fluid, and hemorrhaging seen on OCT (Figure 4). FAF photos showed resolution of the hyper-auto fluorescent dots (Figure 5). With negative lab results for infectious and inflammatory conditions, no history of recent illness or vaccination, and unremarkable ocular history, he was diagnosed with EpiMEWDS secondary to an idiopathic CNVM. He continues to be followed by the retina specialist.

FIGURE 1
Fundus photo revealing intra retinal hemorrhaging and sub retinal fluid indicative of a choroidal neovascular membrane (CNVM).

FIGURE 2
OCT showing intra and subretinal fluid secondary to an idiopathic CNVM.

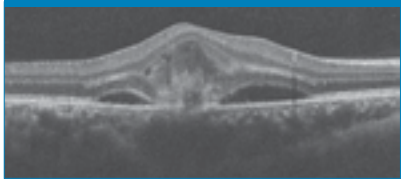


FIGURE 3
Fundus auto fluorescence showing hyper auto fluorescent spots throughout the posterior pole indicative of an EpiMEWDS phenomenon in the setting of a CNVM.

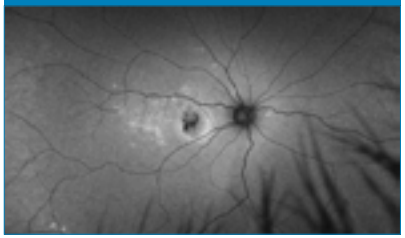


FIGURE 4
Repeat OCT after the initial anti-veg injection showing reduction of the CNVM and subretinal fluid.

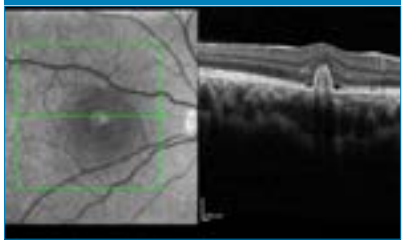
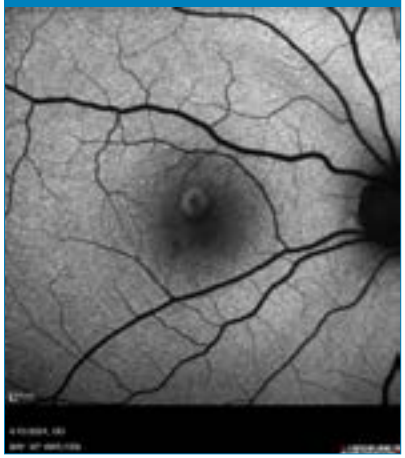


FIGURE 5
Repeat FAF after the first anti-veg injection showing resolution of the previous hyper auto fluorescent spots indicative of EpiMEWDS.



CONCLUSION

This rare case corresponds to recent literature findings of a condition termed EpiMEWDS. Initially, damage to the tunica Ruyschiana consisting of Bruch's membrane, the choriocapillaris, and RPE, from inflammatory and/or idiopathic conditions (as in this case) occurs. This causes the outer retina and ellipsoid zone to lose immune privilege. Further transient outer retinal inflammatory changes follow, leading to an interaction of the immune system with retinal antigens. These complexes are then hypothesized to induce MEWDS as an epiphenomenon. Fortunately, EpiMEWDS follows its own path of progression and resolves without affecting the course of the associated or causative condition. Unfortunately, the literature also suggests that EpiMEWDS may pose a greater risk for recurrent disease and fellow eye involvement suggesting a possible systemic factor. More research is needed to confirm this. Both MEWDS and EpiMEWDS are characterized by the appearance of white dots in the outer retina and RPE and are self-limiting. EpiMEWDS differs in that it is triggered by a retinal pathology. Clinicians should be aware of this epiphenomenon and ensure the causative agent be properly treated. Careful attention to the fellow eye and frequent monitoring of the affected eye are suggested as the literature does suggest reoccurrence and bilateral involvement. Further research is needed to understand the exact pathophysiology as well as long-term consequences.

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The Role of Multimodal Imaging in the Diagnosis of Circumscribed Choroidal Hemangiomas

Maya Weis, BA-Chicago, Illinois; Raman Bhakhri, OD, FAAO-Chicago, Illinois

PURPOSE

Circumscribed choroidal hemangioma (CCH) is a rare benign vascular hamartoma of the choroid. It traditionally presents as an orange red lesion at or near the posterior pole. Although benign, it can progress and lead to sequalae such as subretinal fluid (SRF), serous retinal detachment, and retinoschisis. The presence of these complications at the macula could then lead to visual impairment. Major differentials include amelanotic choroidal melanoma and choroidal metastasis, thus making an accurate diagnosis essential. With the utilization of multimodal imaging such as ultrasonography, fundus autofluorescence (FAF), and optical coherence tomography (OCT), clinicians can arrive at the correct diagnosis promptly and confidently. This case details a patient who was ultimately diagnosed with a CCH based on the results of varying multimodal imaging modalities.

CASE REPORT

A 59-year-old Hispanic male presented for an ocular health examination for reduced vision OD that started about a year prior. Best corrected visual acuity was 20/25 OD and 20/20 OS. External examination, entrance testing, and slit lamp examination findings were unremarkable. IOPs were 17 mmHg OD/OS with Goldmann applanation tonometry. Dilated fundus examination revealed optic discs with 0.2/0.2 cup to disc ratio OD/OS. A 5DD by 3DD, orange yellow, and elevated mass was noted along the superior arcades OD. FAF revealed hyper-auto fluorescence encircling the optic nerve, macula, and the elevated mass. The mass itself showed hypo-auto fluorescence with plaque-like hyper-auto fluorescence around the borders. OCT depicted mild photoreceptor loss from the fovea to the choroidal mass but no obvious SRF or serous detachment. A/B-scan revealed a dome-shaped mass with high internal reflectivity. Based on the examination findings the patient was suspected of having a CCH. Consultation with ocular/retina oncology confirmed the diagnosis. No treatment was initiated based on the lack of SRF at the macula. The patient continues to be followed every 3 months with the last exam showing stable findings.

FIGURE 1
Optos photo showing a large elevated circumscribed orange lesion with subtle subretinal fluid superior to the fovea.

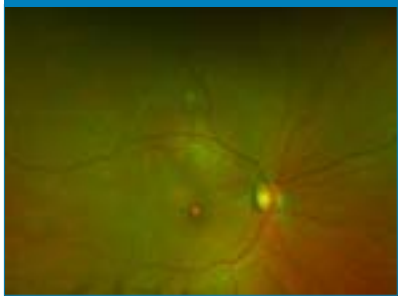


FIGURE 2
Fundus autofluorescence shows hypo-auto fluorescence of the hemangioma with plaque-like hyper-auto fluorescence around the borders. Hyper auto fluorescence is also seen extending into macular and mid-periphery.

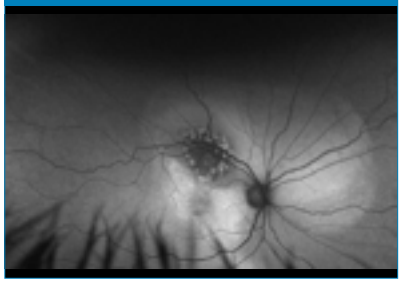


FIGURE 3
A/B-scan revealing a dome-shaped echo dense mass with high internal reflectivity.

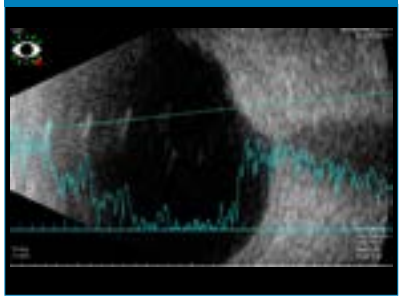


FIGURE 4
OCT showing elevation of the choroidal hemangioma with lack of obvious subretinal fluid

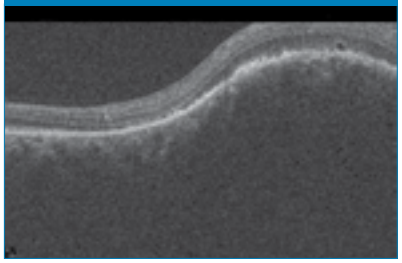
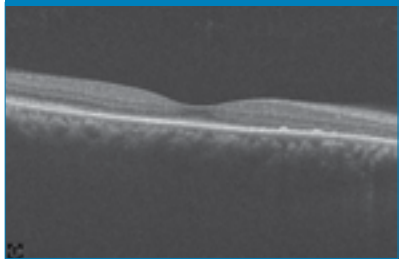


FIGURE 5
Macular OCT showing ellipsoid zone and RPE disruption more so nasal to the fovea



CONCLUSION

While benign in nature, CCHs can be difficult to discern from more sinister choroidal tumors leading to potential misdiagnosis and unnecessary and aggressive treatment. Utilizing various multimodal imaging modalities, such as OCT, FAF, and A/B scan, clinicians can arrive at a more confident and quick diagnosis leading to appropriate treatment and management. Although no intervention was needed in this case, the potential for visual impairment does exist thus regular monitoring with repeat multimodal imaging is vital. Progression and early detection of complications by multimodal imaging, especially SRF at or near the fovea, may necessitate treatment with first-line therapy being photodynamic therapy.

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World Council of Optometry Launches A New Competency Framework For Optometry School Graduates Globally

Sandra S. Block, OD, DOS (*hc*), MEd, MPH [1,2]

[1] Illinois College of Optometry [2] World Council of Optometry

Background

The World Health Organization (WHO) fostered the development of the Eye Care Competency Framework(ECCF) (2022) in a effort to outline the compentencies required to address current challenges in the current eyecare workforce.

With the magnitude of preventable visual impairment growing and limitations in the number of eyecare providers serving populations around the world, WHO brought together representatives from manyprofessions involved in eyecre to define what was needed to address human resource development.

The ECCF provides guidance on standards for the competencies for the eyecare workforce. Optometry was one of the professional groups involved in its development.

WCO understood that WHO and International Labor Organization identified optometry at an advanced levelfunctioning as a primary care provider.

Previsouly, the World Council of Optometry (WCO) created a 4 level model to describe varying levels of how optometry is practiced around the globe from simply offering optical services to providing complex diagnostic and therapuetic care. WCO determined that it needed to provide guidance for curriculum content to ensure that the graduates fit the current needs and definition of optometry as a primary eye care provider.

Methods

In an effort to ascertain the value of the WCO representatives developed the framework to offer guidance on what was required for current and future optometric graduates.

The goal was to provide the tools to know how to achieve what is now the current definition of an optometrist as follows:

> **"to be able assess ocular health and visual function by measuring visual acuity and refractive error, and test the function of visual pathways, visual fields, eye movements, intraocular pressure, perform other tests using special eye test equipment; and detect, diagnose and manage eye disease and prescribe medications for the treatment of eye disease".**

This definition forced the shift away from the levels of defining optometry. WCO looked at the ECCF to ensure the final framework would describe the education needed so that a graduate would have mastered the appropriate knowledge and skills.

Results

The WCO competency framework is divided into five domains: refractive error; visual function; ocular health, public health, professional practice (ehtics, communication). Within each domain the framework lists competencieis, curricular elements, and performance criteria and ties those with the competencies defined within the WHO ECCF.

WHO Eye care Competency Framework

WCO Competency Framework for Optometry

5 Essential Domains

Discussion

- Recognizing the **diverse landscape** of optometric education and practice across the globe, WCO identified the pressing need for a **unified global standard for outcomes of optometric education**.
- The **WCO Competency Framework for Optometry** addresses this need by providing a comprehensive set of competency statements, coupled with the core curriculum elements supporting their development through tertiary-level optometry programs.
- The framework defines optometry in terms of the minimum **essential competencies** required to engage effectively in the international eye care agenda.
- It is divided into **five competency domains**, which outline the competencies expected of optometry graduates.
- These competencies are aligned with those describing optometry in the World Health Organization's **Eye Care Competency Framework (ECCF)**.
- The **WCO Competency Framework for Optometry** demonstrates to health care policy makers a clear statement of the skills optometrist can bring to health systems in support of better delivery of care and improved health outcomes

- Over **1 billion people** worldwide suffer from preventable vision impairment. The need for qualified optometrists has never been greater.
- The **WCO Competency Framework for Optometry** ensures optometrists are equipped with the necessary skills, knowledge and abilities to fully participate in addressing this global burden.
- By informing policymakers and guiding curriculum development, it **facilitates the recognition of optometry** as a vital component of integrated, people-centered eye care
- Adaptable to each country's needs, this framework will help **shape the future of optometry education and practice** by guiding curriculum development, informing policymakers, and making it easier to recognize the impact of the profession in the international agenda for eye care.
- This framework demonstrates to people who are looking at their health system, what skills optometrists have and can bring to **better delivery of care**.
- The competencies described in the framework provide optometry the opportunity to participate in **multiple roles within health systems**, and to work with others in the delivery of care.

Conclusions

The release of the WCO Curriculuar framework guides optometry programs globally to help understand what level of knowledge and skills are expected. The focus was on bringing the abilities of graduates at schools and colleges of optometry to a minimum level globally so as to offer quality eye care at a level that is needed to provide primary eyecare. In addition, the hopes are that it will highlight the importance of lifelong learning for those who do not yet have that level of competency or for those needing to maintain their knowledge as we learn more to provide the best care to our patients.

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WORLD COUNCIL OF OPTOMETRY

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Validation of a New Threshold Perimeter for 10-2 Visual Fields

Brittney Brady, OD; Anne Rozwat,OD; Ashley Speilburg, OD; Patricia Salazar, OD; Daniel Roberts, OD, PhD; Michael Chaglasion, OD - Chicago, IL

INTRODUCTION

A compact, binocular, threshold perimeter, TEMPO, can be performed in ambient light and offers 39% faster test time. TEMPO has been found to produce repeatable results comparable to the Humphrey Field Analyzer (HFA) for 24-2 testing patterns. This study measured concordance between the TEMPO and HFA for staging glaucomatous central visual field (VF) defects identified with 10-2 testing patterns.

METHODS

A prospective, single center study was conducted at the Illinois Eye Institute in Chicago, Illinois. Central 10-2 testing was performed on 65 eyes from 36 glaucoma patients (age range 50-86yrs) using both the TEMPO/IMOvifa (Topcon Healthcare/CREWT Medical Systems, Tokyo, Japan) AIZE-Rapid program and the HFA (Carl Zeis Meditec, Dublin, California) SITA-Fast algorithm. Testing order was randomized by subject number. Three graders independently staged the 10-2 VFs and consensus was identified. Staging followed the cluster criterion (3 contiguous points (5%, 5% and 1% or 5%, 2%, and 2%) within a hemifield on either total or pattern deviation plot) which has been reported with 95% specificity. Defects are grouped into 6 categories: 1) arcuate, 2) partial arcuate, 3) nasal, 4) diffuse, 5) other, 6) no defect (Table 1).

Inclusion Criteria:

- BCVA of 20/40 or better in each eye
- A diagnosis of glaucoma in one or both eyes
- Refractive error within -8.00 to +3.00 diopter sphere or cylinder up to 2 diopters
- No history of significant non-glaucomatous ocular disease.

TABLE 1:10-2 VF staging for TEMPO vs. HFA

	HFA Stage Number of subjects (% of total subjects)						
TEMPO Stage	**Arcuate**	**Partial Arcuate**	**Nasal**	**Diffuse**	**Other**	**No Defect**	**Total**
Arcuate	6 (16.7)	0	0	0	0	0	6 (16.7)
Partial Arcuate	3 (8.3)	3 (8.3)	1 (2.8)	0	0	0	7 (19.4)
Nasal	0	0	2 (5.6)	0	0	0	2 (5.6)
Diffuse	0	0	0	2 (5.6)	1 (2.8)	0	3 (8.3)
Other	0	0	0	0	1 (2.8)	0	1 (2.8)
No Defect	1 (2.8)	3 (8.3)	2 (5.6)	0	3 (8.3)	8 (2.2)	17 (47.2)
Total	10 (27.8)	6 (16.7)	5 (13.9)	2 (5.6)	5 (13.9)	8 (22.2)	36 (100)

Kappa=0.51 (95% CI = 0.33 to 0.70)

FIGURE 1: Patient performing binocular TEMPO VF

RESULTS

The right eye was used for statistical analysis, but when right eye data was unavailable, left eye data was used. TEMPO showed moderate agreement to 10-2 HFA staging with a kappa=0.51 (95% CI 0.33-0.70). A notable difference found was the classification of 9 subjects with classified "no defect present" per the TEMPO 10-2 VF but showing some type of defect present per the HFA 10-2 VF test (P=0.003).

CONCLUSION

In this subject sample, the TEMPO perimeter showed moderate agreement to the HFA for staging glaucomatous defects identified with 10-2 testing patterns. This data also suggested that the HFA may have greater sensitivity for identifying mild central defects. Although larger studies are needed to further explore and validate the results, these findings are valuable since TEMPO performance for 10-2 testing has not previously been investigated.

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Unique Pathological Myopic Complications: Dome-Shaped Maculopathy and Heavy Eye Syndrome

Brittney Brady, OD, FAAO; Raman Bhakhri, OD, FAAO; Wateen Alami, OD; Leonard Messner, OD, FAAO
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BACKGROUND

Dome-shaped maculopathy (DSM) results from scleral deformation in the presence of increased axial length and occurs in up to 12% of high myopes. The main diagnostic feature is a convex protrusion of the macula within an area of posterior staphyloma on OCT. Secondary serous macular detachment resulting in metamorphopsia is the main cause of decreased vision. Heavy Eye Syndrome (HES), another complication of axial myopia, results in esotropia, limited abduction, and diplopia secondary to inferior displacement of the lateral rectus (LR) muscle. This case highlights the importance of considering these rare complications in the evaluation of highly myopic patients who present with decreased vision and/or subjective visual changes.

CASE DETAILS

56yo AAF
CC: diplopia worse in left gaze and a gradual onset left inward eye-turn over the last 5 months
POH: refractive amblyopia OS
PMH: HTN, high cholesterol, borderline Type 2 Diabetes, hospitalized 1 month prior for TIA

OD	Pertinent Exam Findings	OS
20/20-1	Visual Acuity cc	CF (PHNI)
PERRL (-) APD	Pupils	PERRL (-) APD
FTFC	CVF	FTFC
FROM	EOM (Figure 1)	Limited abduction
–1.00-0.75x096	Dry Auto-Refraction	–26.75-2.50x079
WNL	Slit Lamp Exam	WNL
WNL	Dilated Fundus Exam	Large posterior staphyloma, myopic disc tilt, well-demarcated ~1.5DD subretinal elevation inferior to the macula
WNL	OCT (Figure 3)	Dome-shaped elevation within fovea (-) SRF
Not obtained	B-scan (Figure 4)	Increased axial length, posterior staphyloma, echodense focal elevation within macula

FIGURE 1
Constant left esotropia, image captured in partial inferior-left gaze

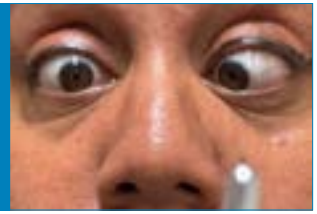


FIGURE 2
A) Unremarkable posterior segment photo OD.
B) Posterior segment photo OS revealing a large posterior staphyloma, vitreous floaters, myopic disc tilt, and a well-demarcated ~1.5DD subretinal elevation inferior to the macula

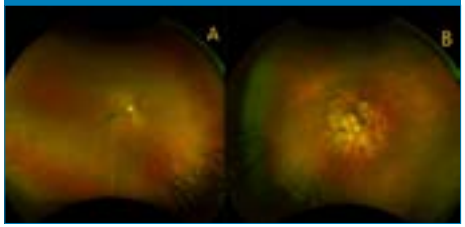


FIGURE 3
A) Macula OCT OD Unremarkable with normal foveal contour.
B) Macula OCT OS revealing a dome shaped elevation of the fovea with absence of fluid

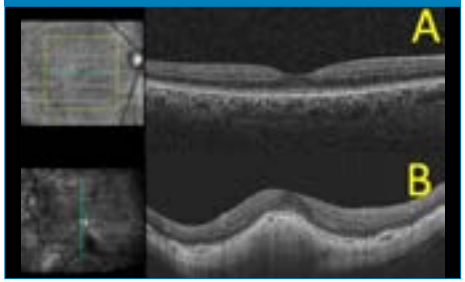


FIGURE 4
B-scan OS showing an increased axial length, posterior staphyloma and an echodense focal **elevation within the macula**

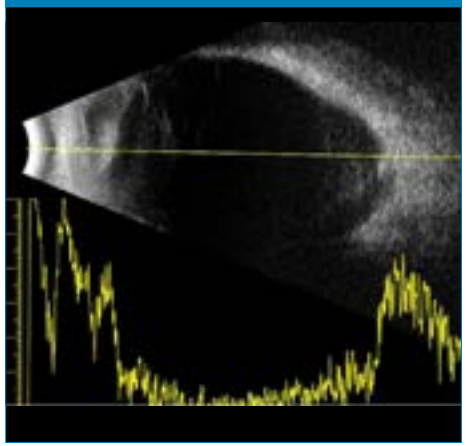
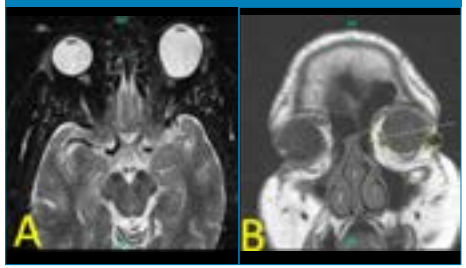


FIGURE 5
A) Axial T2 weighted image showing increased axial length OS
B) Coronal T1 weighted image revealing an inferior displacement of the left lateral rectus muscle consistent with Heavy Eye Syndrome



Imaging (MRI of brain and orbits, with and without contrast) ruled out an acute intracranial process and confirmed a 3.1mm increased axial length OS compared to OD with inferior displacement of the left LR muscle (Figure 5). The patient was diagnosed with DSM and HES secondary to pathological myopia OS. She was fit with Fresnel prism to manage her diplopia with good response while the DSM continues to be monitored.

SUMMARY

Pathological myopia can result in reduced vision secondary to well-known ocular complications including macular atrophy, macularschisis, macular holes, choroidal neovascular membrane, and retinal detachment. While DSM and HES are rarely encountered in the examination of myopic patients, clinicians must be aware of their potential due to the risk of visual complications. Early detection, diagnosis, and treatment are paramount in the hopes of achieving optimal patient outcomes.

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A Retinal Arterial Macroaneurysm at the Optic Nerve Head

Rachel E. Breliant, OD • Molly Johnson, OD, FAAO
Jesse Brown VA Chicago, Illinois

BACKGROUND

In this report we present a novel case of retinal arterial macroaneurysm (RAM) at the optic nerve head. RAM's occur at the ONH in as little as 8% of cases and few similar cases are reported in the literature.

- A 74 yo African American male presents to the Eye Clinic with a chief complaint of floaters OS x1.5m
- POH: Open angle glaucoma suspect OD>OS due to cupping OU, mild cataracts OU, hyperopia with presbyopia OU. Denies ocular trauma or surgery
- PMH: HTN, CKD, hyperlipidemia, pre-diabetes, OSA (on CPAP), dysphagia, GERD, atrial flutter s/p ablation 07/22, hypergammaglobulinemia
- Meds: amlodipine, carvedilol, lisinopril, omeprazole

RESULTS

- **Initial examination:**
  - CC VA: 20/30 PH 20/25 OD, 20/25 OS
  - Pupils/EOMs/CVF: WNL
  - Ant seg: WNL
  - IOPs: 19 OD/19 OS
  - Lens: OD: 2+ NS OS: 1+ NS, peripheral ACC
  - SD-OCT RNFL:
    - OD: Borderline thin sup, thinning inferior/ temporal
    - OS: Elevated at vascular outpouching
- **F/u examination:**
  - Stable vision/entrance testing
  - DFE:
  - OS: essentially resolved pre-papillary sub-ILM hemorrhaging c adjacent subretinal heme & mild surrounding IRF

Figure 1 - Fundus photo OD

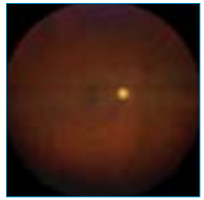
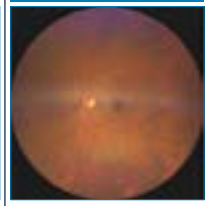


Figure 2 - Fundus photo OS

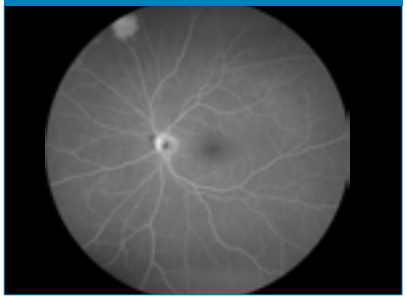


Pulsatile outpouching of vasculature within cup with trace pre-papillary sub-ILM heme; trace peripapillary thickening 10-2 o'clock

Figure 3- HVF 24-2 OD

Figure 4 - HVF 24-2 OS

Figure 5 - FA OS



OS: Grossly normal vascular filling time, peripapillary subretinal heme, progressive staining of nasal disc, area of dilated ONH vessel remains mostly hypofluorescent throughout angiogram 2/2 overlying heme

Figure 6 - OCT-A OS
OS: On the left is an image of the superficial vasculature with a superficial vascular outpouching. On the right is the choriocapillaris with no CNVM.

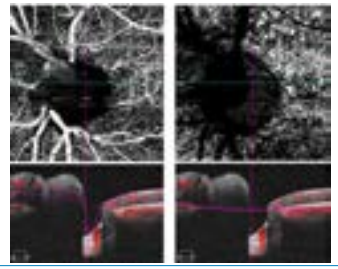
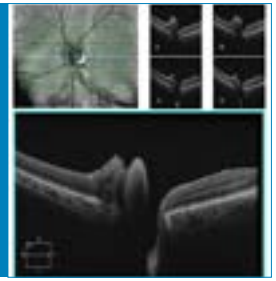


Figure 7 - SD-OCT Disc Raster OS
OS: bullous lesion nasal within optic nerve head suggestive of retinal artery macroaneurysm



- Started on treatment with latanoprost QHS OU for open-angle glaucoma
  - Gonio: CB 360 c 1-2+ TM pigment OD, OS
- Retina Consultation: recommended observation unless VA becomes affected

DISCUSSION

Retinal arterial macroaneurysms have a predilection for middle-aged females with systemic hypertension and atherosclerotic vascular disease. Although RAMs are well reported, there are few published cases occurring at the optic disc. Literature reports only 8% of RAMs occur at the optic disc.

Upon initial examination, our leading differential also included a peripapillary choroidal neovascular membrane. Although the clinical appearance of a RAM is evident on fundus examination, confirmation of the diagnosis is made through FA. In cases like ours, this may be complicated by obscuration of the macroaneurysm by overlying hemorrhage. OCT-A and SD-OCT did not reveal a CNVM. No space occupying lesion was evident on MRI.

In most cases of uncomplicated RAMs, no treatment is necessary, and spontaneous involution is observed over time. However, in cases where retinal hemorrhage, vitreous hemorrhage, or edema arise, treatment options may include anti-VEGF, focal laser photocoagulation, and pars plana vitrectomy. Management of systemic health conditions such as hypertension and atherosclerosis will minimize risk factors for RAMs. Close follow up with DFE is recommended to monitor for complications. We will follow-up with this patient bimonthly to monitor resolution with DFE and continue serial fundus photography.

CONCLUSION

A RAM occurring at the ONH is an atypical presentation and few cases are reported in the literature. It is important to perform appropriate diagnostic testing to rule out all other pathologies in patients with a suspected RAM. Once the diagnosis is made, it is paramount to ensure the maintenance of systemic health with a PCP. These patients should be acutely monitored for complications to mitigate loss of vision.

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Available upon request

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The EYS Have It: An Atypical Presentation of Retinitis Pigmentosa

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INTRODUCTION

A 35-year-old Asian female presents with findings of chorioretinal atrophy OD>OS on DFE. Genetic testing confirms the presence of the EYS gene. This gene is found predominantly in Asian patients with retinitis pigmentosa.

CASE HISTORY

- 45-year-old Asian female
- CC: blurry vision at near without correction; denies nyctalopia, field loss awareness
- POH: dry eyes otherwise unremarkable
- PMH: history of unknown gastric condition
- Medications: tenofovir and famotidine

CLINICAL FINDINGS

TABLE 1
Clinical findings on examination

BCVA	20/20 OD, OS
EOMs	FROM OD, OS
Pupils	PERRL (-)APD
CVF	FTFC OD, OS
Anterior Segment	PEE OD, OS MGD OD, OS Otherwise unremarkable
Posterior Segment	Chorioretinal atrophy OD>OS with pigment OD Otherwise unremarkable

DIAGNOSTIC TESTING

OPTOS:

FIGURE 1A
Optos fundus imaging shows an image of the right eye with question of chorioretinal atrophy temporal to the macula and some spiculing.

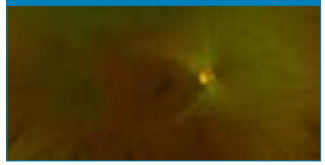


FIGURE 1B
Optos fundus imaging shows an image of the left eye with question of chorioretinal atrophy temporal to the macula without spiculing.

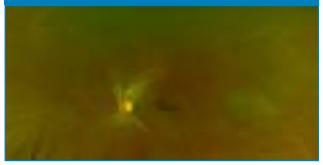


FIGURE 2A
Optos fundus auto-fluorescence imaging shows an image of the right eye with temporal hypoautofluorescence surrounded by areas of hyperautofluorescence. The inferior arcades also show areas of hyperautofluorescence.

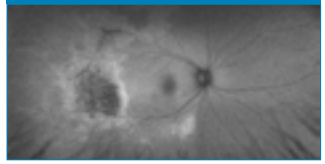
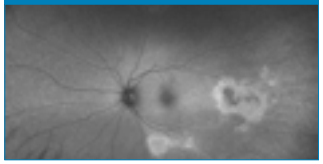
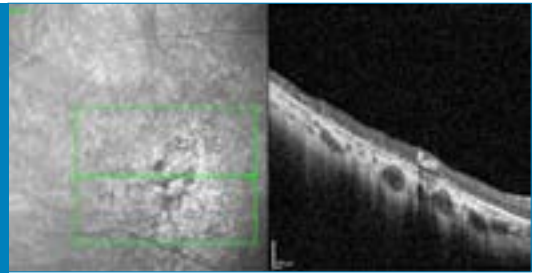


FIGURE 2B
Optos fundus auto-fluorescence imaging shows an image of the left eye with temporal hypoautofluorescence surrounded by areas of hyperautofluorescence. The inferior arcades also show areas of hyperautofluorescence.



OCT: retinal OCT shows outer retinal degeneration temporal to macula OU

FIGURE 3
OCT shows a cross section of the right eye temporal to the macula. This is showing areas of retinal atrophy.



Genetic Testing:
- Heterozygous for EYS c.8107G>T, p.(Glu2703*), which is pathogenic
- Heterozygous for EYS c.6416G>A, p.(Cys2139Tyr), which is pathogenic

DIFFERENTIAL DIAGNOSES

- Atypical Retinitis Pigmentosa
- Cone Rod Dystrophy
- Syphilis
- Other inherited retinal diseases
- Other infectious/immunologic conditions

DISCUSSION

RPE hyperplasia may be found as an incidental finding. When presenting with a "spicule" appearance, a few differentials such as RP or syphilis come to mind. In this case, the location of the spiculing seemed atypical of RP. The patient denied any prior inflammatory or infectious conditions. Multiple imaging studies gave more data to aid in a proper diagnosis. With FAF, there was significantly more hyperautofluorescence associated with chorioretinal atrophy than what was observed on funduscopic examination. Due to the binocularity of the autofluorescence in imaging and relatively symmetrical appearance, an inherited retinal condition was a top differential. A buccal swab test was collected and submitted to the lab with orders for an inherited retinal disease panel. Results showed that the patient was positive for 2 mutations with the EYS gene which correlates to an autosomal recessive version of RP.

TREATMENT AND MANAGEMENT

This RP case is unique as the phenotypic expression is atypical thus necessitating the need to rule out other potential causes. There is currently no genetic therapy or other approved treatment for this EYS variant of RP. Some research has stated that individuals with the EYS gene may have a type of RP that progresses more quickly but this is inconclusive. Our patient is currently asymptomatic for RP and denies nyctalopia. Management includes thorough education to both the patient and family in regards to the condition and its inheritance pattern. The patient and the patient's children should be monitored annually with DFE and FAF imaging for progression and early diagnosis respectively. Any functional visual limitations that may result should be managed with low vision rehabilitation.

CONCLUSION

In cases where binocular and symmetrical areas of autofluorescence are noted on imaging, an inherited retinal condition should be considered amongst the differentials. Amongst Asian patients with bone spiculing and autofluorescence in the posterior pole, the presence of an EYS gene is possible due to its predominance in East-Asian patients.

References:
(not on poster, available upon request)

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Retinopathy of Prematurity Among Twins: A Case Comparison of Early Treatment in Infancy v. Spontaneous Regression and Reactivation in Childhood

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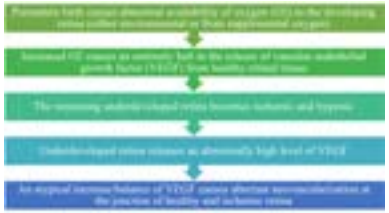
INTRODUCTION

In twin patients with histories of retinopathy of prematurity (ROP), one received treatment in infancy while the other experienced spontaneous regression. The untreated twin's condition reactivated at age 9, now requiring close observation and potential intervention. Late-onset reactivation occurs in only 3.6% of cases.

ROP is a leading cause of blindness in premature infants worldwide. In 92-96% of cases, ROP spontaneously regresses. In rare instances, however, ROP may reactivate, which is the recurrence of acute disease. Even more rarely, reactivation can occur after several years of stable, regressed ROP.

BACKGROUND INFORMATION

Retinopathy of prematurity is a condition characterized by abnormal retinal blood vessel development due to incomplete vascularization from premature birth. A brief review of the pathophysiology of ROP is outlined below:



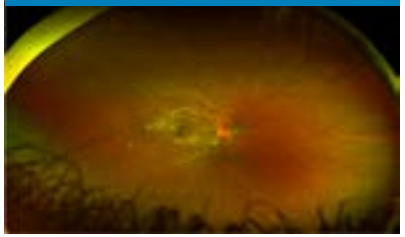
Because the retina develops from the optic nerve toward the periphery, ROP is categorized by zones of involvement, indicating differing levels of disease severity. More severe forms of ROP are indicated with more central involvement. See Figure 3 for a classification of retinal zones. See Figure 4 for a classification of ROP stages.

Significant risk factors for ROP:
- Low gestational age (<30-32 weeks)
- Low birth weight (<3 lbs 5 oz)
- Supplemental oxygen use at birth

Plus vs Preplus disease
- Plus: Significant vascular dilation and tortuosity
- Preplus: Vascular dilation and/or tortuosity less than Plus disease

Figure 4: Retinopathy of Prematurity Staging

Figure 1: Patient 1 Fundus Photo – OD
Tortuous vessels indicative of Plus disease



CASE HISTORY

Patient #1: 9-year-old Black female
- **CC:** Presents for comprehensive eye exam, mild irritation OS
- **POH:** ROP (resolved without treatment)
- **PMH:** Premature (24 weeks, ~1 lb 5 oz) via emergency c-section (1st born), PDA (s/p surgery), Asthma
- **Meds:** Flovent

Patient #2: 9-year-old Black male
- **CC:** Presents for comprehensive eye exam
- **POH:** ROP (treated at ~2 months), IRET
- **PMH:** Premature (24 weeks, ~1 lb 5 oz) via emergency c-section (2nd born), Hydrocephalus, PDA (s/p surgery), Seizures
- **Meds:** Sympazan

Table 1: Patient 1 Exam Findings

Patient #1	OD	OS
BCVA	20/20	20/20
ONH	Flat, sharp, good color	Flat, sharp, good color
Macula	Flat, intact	Flat, intact
Vessels	Tortuous 360 (Plus disease)	Tortuous 360 (Plus disease), Avascular zone III
Periphery	Temporal demarcation line, lattice degeneration inferior	Temporal demarcation line with vascular frond protruding into vitreous, 4/6 hole vs vascular frond inferiorly, lattice degeneration inferiorly
Referral	Pediatric ophthalmology for further evaluation / treatment	

Figure 2: Patient 1 Fundus Photo – OS
Tortuous vessels indicative of Plus disease, temporal demarcation line with avascular Zone 3, and vascular frond temporally; ROP zones are illustrated overlaying the fundus

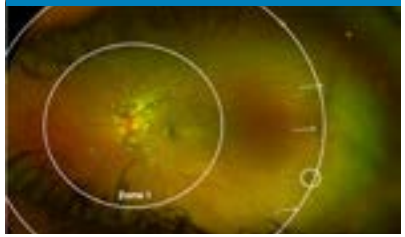


Figure 3:
Retinopathy of Prematurity Zones

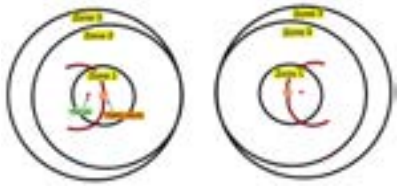


Table 2: Patient 2 Exam Findings

Patient #2	OD	OS
BCVA	20/100 (Cardiff Cards)	20/100 (Cardiff Cards)
ONH	Mild temporal ONH pallor	Mild temporal ONH pallor
Macula	Flat, intact	Flat, intact
Vessels	Mild tortuosity	Mild tortuosity
Periphery	WNL to extent viewed, limited views due to patient's developmental delays and poor cooperation	
F/u	3 months for Rx and VA check, Referral to pediatric ophthalmology for examination under anesthesia for more extensive peripheral views	
Note	Unable to obtain photos due to patient's poor cooperation and mobility due to his developmental delays	

DIAGNOSIS DISCUSSION

At 2 months of age, Patient #1 was diagnosed with retinopathy of prematurity (ROP), which spontaneously regressed without treatment. However, a recent dilated examination revealed tortuous blood vessels in both eyes consistent with Plus disease, a demarcation line in both eyes, and new extraretinal blood vessels in the left eye, not noted at previous visits. These findings are indicative of reactivation of ROP, a phenomenon observed in 3.6% of regressed cases. Familial exudative vitreoretinopathy was ruled out due to the patient's history of premature birth. Incontinentia pigmenti and Coats' Disease were considered less likely due to their typically unilateral presentation. Hypertensive retinopathy was ruled out because of the patient's age and lack of a hypertension history. Retinoschisis was also ruled out due to the presence of an avascular zone peripheral to the demarcation line. As a result, Patient #1 was diagnosed with late reactivation of ROP, based on her ocular history, birth history, and retinal findings.

TREATMENT & MANAGEMENT

Laser photocoagulation and anti-VEGF injections are commonly used to promote regression of ROP. Laser treatment ablates the hypoxic, avascular retina to reduce VEGF levels, while anti-VEGF injections rapidly block VEGF and are typically preferred in aggressive cases. Oral propanolol is a newer prophylactic option being studied for its potential to slow disease progression. Retinal detachment surgery is performed on patients with Stage 4 or 5 ROP. Currently, there is no standard guideline for the management of reactivated ROP.

Pediatric ophthalmology was consulted regarding Patient #1's case, and further evaluation with fluorescein angiography (FA) was recommended within two months. Initially, the urgency of laser treatment was advised due to the reactivation of Stage 3 ROP, which increases the risk of retinal detachment. However, further discussion with pediatric ophthalmologists revealed a potential association between laser treatment and subsequent retinal detachment. Therefore, unless leakage is noted on FA, close observation is preferred.

Patient #2 will return for a prescription and vision check. The patient was referred for a dilated fundus examination under anesthesia with pediatric ophthalmology to obtain more extensive views of the peripheral retina.

CONCLUSION

Twins, despite sharing similar genetics and neonatal history, can exhibit different presentations, severity, and progression of retinopathy of prematurity. Furthermore, a patient with a history of ROP – whether previously treated or spontaneously regressed – may experience reactivation of acute ROP. Therefore, it is especially crucial to conduct thorough dilated exams annually to monitor all patients with a history of ROP. In addition, establishing a standardized treatment protocol could improve the management of reactivated ROP.

Bibliography: Available upon request

CONTACT

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The Presentation of Purtscher's-like Retinopathy in Acute Pancreatitis

Samantha Dodda, OD, FAAO - Chicago, Illinois

ABSTRACT

Though rare, acute pancreatitis can present with ophthalmic manifestations such as central scotomas, secondary to retinal cotton wool spots and hemorrhages, or Purtscher's-like retinopathy.

CASE REPORT

A 33 year old Caucasian female complains of reduced vision bilaterally. Onset was 2 weeks ago, amongst other systemic complaints, and she was admitted to the hospital for acute, alcohol-induced pancreatitis and pneumonia. She has had no visual relief, has no current glasses prescription, and no significant ocular history. Patient has hypertension, 129/82 today.

Patient's distance vision was 20/200 vision OD/OS, with NPHI. Near vision was 20/50 OD/OS. Amsler grid revealed a central scotoma in OD and OS, and all entrance and slit lamp testing within normal limits, IOP was 13mmHg OD/10mmHg OS. DFE revealed distinct margins of the optic nerve OD/OS, C/D ratios of 0.25 and 0.30 OD/OS, no pallor or edema. Posterior pole evaluation revealed scattered cotton wool spots and hemorrhages within the arcades and surrounding the disc. The peripheral retina presented with no defects.

DIFFERENTIAL DIAGNOSES

Acute Hypertenisve Retinopathy, Central/Branch Retinal Vein Occlusion, Ocular Ischemic Syndrome, Diabetic retinopathy, Papilledema, or True Purtscher Retinopathy.

FIGURE 1
Optic Nerve Head OCT shows no diffuse elevation or edema that would lead to diagnosis of papilledema.

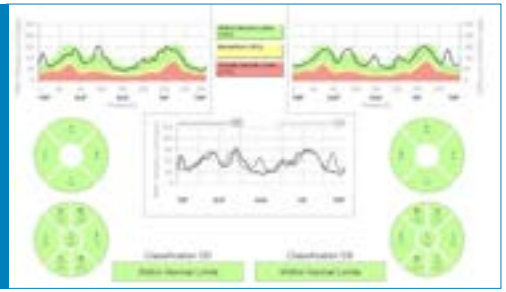


FIGURE 2
No cystoid macular edema was present. Retinal thickening was observed by cotton wool spots as well as hemorrhaging. Purtscher's retinopathy may lead to a variable degree of outer retinal atrophy as well as photoreceptor disruption .

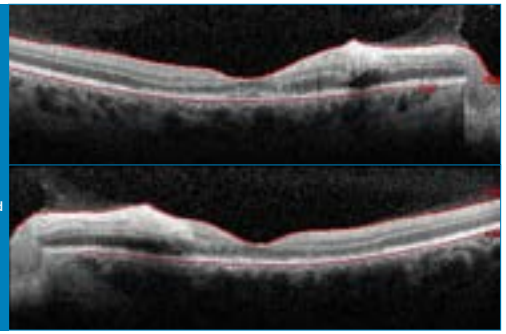
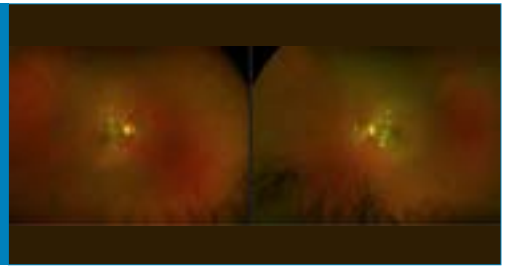


FIGURE 3
Most cotton wool spots and hemorrhages are located within the posterior pole. The peripheral retina is usually spared from involvement.



DIAGNOSIS AND DISCUSSION

Usually associated with traumatic chest compression or injury, Purtscher's-like Retinopathy can present in chronic renal failure, acute pancreatitis, pancreatic carcinoma, amniotic fluid embolization, lymphomas, and connective tissue diseases. In active pancreatic damage, the release of proteolytic enzymes cause activation of the complement cascade and the formation of leukocyte, platelet, and fibrin aggregation, forming retinal arteriolar occlusions, leading to the presentation of cotton wool spots and hemorrhages.

TREATMENT AND MANAGEMENT

Management includes a complete history and exploration of underlying causes via basic metabolic panel, amylase, lipase, complete blood count, blood pressure measurement, and rheumatologic evaluation. Consider fluorescein angiography, which will show nonperfusion in regions of retinal whitening. Treatment of the underlying condition is key to prevent further damage. Repeat DFE every 2-4 weeks to monitor. In 50% of cases, visual acuity returns to baseline after the underlying cause is managed.

CONCLUSION

Providers in internal, emergency, and ophthalmic medicine should be aware of the visual and retinal presentation of acute pancreatitis. With a comprehensive team of physicians, an at risk patient can be co-managed appropriately and given the care that they need to prevent escalation of pancreatitis and subsequently, vision loss.

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Discovery of Carotid Artery Occlusive Disease Resulting in Carotid Artery Revascularization

Demetra Danos OD • Mary Wittendorf OD, FAAO • Christopher Bugajski OD, FAAO • Robert Binkley OD, FAAO

Jackie Walorski VA Clinic, Mishawaka, Indiana

INTRODUCTION

This case features a patient who presented for a comprehensive exam with an incidental finding of carotid artery occlusive disease, with subsequent imaging indicating near occlusion resulting in a left Transcarotid Artery Revascularization (TCAR).

CASE SUMMARY

Case History:

- 82 yo Caucasian male
- **CC**: Blurry vision OU
- **Ocular Hx**: Pseudophakia OU, Presbyopia OU
- **Med Hx**: HTN, hyperlipidemia, transient ischemic attack, coronary arteriosclerosis stent
- **Meds**: Carvedilol, clopidogrel bisulfate, lisinopril-hydrochlorothiazide

Clinical Findings:
See Table 1.

Laboratory/Ancillary Testing:
See Table 2.

Exam Findings	OD	OS
VA	20/25	20/40
Optic Nerve	0.35r	0.35r
Macula	(-) hemes	(-) hemes
Vessels	A/V crossing changes, tortuosity	A/V crossing changes, tortuosity, dilated, (-) emboli, (-) NVE
Posterior Pole	Clear	Rare scattered blot hemes
Periphery	Clear	Significant mid-peripheral blot hemes

Table 1: Clinical Findings

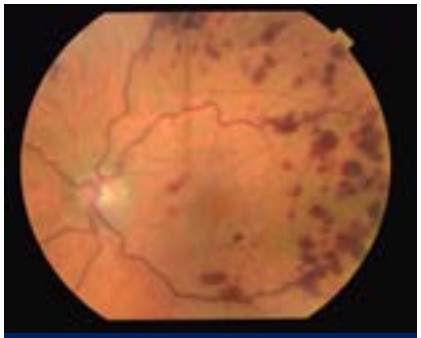

Figure 1: Fundus Photo OS; Rare scattered blot hemes, dilated tortuous vessels

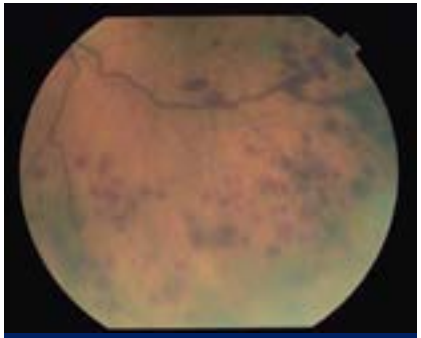

Figure 2: Fundus Photo OS; Scattered mid-peripheral blot hemes

Testing/Imaging	Results
SD-OCT	OD: ERM (-) IRF/SRF/CNVM; OS: shallow foveal contour (-) IRF/SRF/CNVM
Carotid Doppler	Left ICA: near occlusion stenosis
CTA Head	Chronic microvascular ischemic changes, vascular calcifications
Surgical Intervention	Left TCAR

Table 2: Laboratory/Ancillary Testing

TREATMENT & MANAGEMENT

The patient had an extensive work up including a Carotid Doppler ultrasound, CTA of the head, and CTA of the neck. Treatment of OIS involves the treatment of the systemic causes and ocular ischemic findings. This patient's Carotid Doppler found near occlusion of the left ICA, resulting in a left TCAR. The surgery results were successful. In order to manage an OIS patient, a multidisciplinary approach is necessary. The vascular surgeon is monitoring if further vascular surgery is needed every 6 months, including a yearly Carotid Doppler. Cardiology and primary care manage his cardiovascular disease. The patient was directed to retinal specialist management due to the risk of neovascularization including NVG, NVD, NVE, NVI, and macular edema.

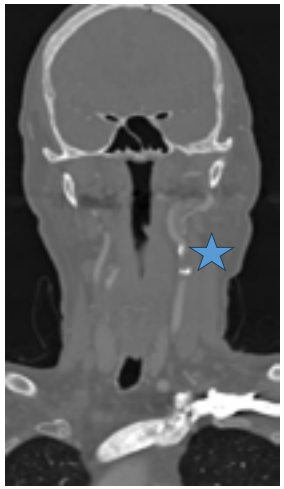

Figure 3: CTA of Neck 90% occlusion of left internal carotid artery (ICA) (blue star)

DISCUSSION

Ocular Ischemic Syndrome is a vaso-occlusive ocular condition leading to ocular hypoperfusion due to the stenosis or obstruction of the carotid arteries. This condition is commonly found in patients who are males over the age of 65, with hypertension, diabetes, or atherosclerosis causing abnormalities of the arteries. Although this condition is rare, about 7.5 per million cases of OIS are discovered each year. The most common posterior clinical findings are narrowed arteries, dilated veins, retinal ischemia, and mid-peripheral retinal hemes. Majority of OIS cases have an obstruction of 90% of the ICA or common carotid artery on the same side. There is a complete obstruction of the artery in 50% of cases. It is crucial to diagnose this condition early and order the proper lab work due to its associated systemic vascular findings and mortality rate of 40% within 5 years.

CONCLUSION

Ocular findings of OIS can serve as a prelude of severe cardiovascular disease leading to detrimental systemic effects. Patient education of these comorbidities and their proper management is crucial for the survival of the patient. The presentation of OIS requires thorough ancillary testing, imaging and co-management between various medical specialties to provide optimal care to these patients.

References

Available upon request.

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Student Perception of Patient Encounters and Performance Skills Preparation

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INTRODUCTION

Student performance on national board examinations may be considered a litmus test for the success of their didactic and clinical education. In the 2024-25 exam cycle, the National Board of Examiners in Optometry is shifting away from the Clinical Skills Exam to a new exam rooted more in real patient encounters: the Patient Encounters and Performance Skills (PEPS) Examination. While this is a common way of evaluating different medical subspecialties, this is uncharted territory for optometry students and educators trying to prepare them. Similar to the way lab practical assessments are utilized to evaluate the level of student preparedness for clinic, PEPS simulation training is being used to prepare our students for this section of NBEO. This low- stakes method will help us develop appropriate learning plans, identify gaps in knowledge or the curriculum, and ensure that the students are properly prepared to pass their board examinations. The purpose of this study was to determine the benefit of PEPS simulation training and perception of students regarding PEPS.

METHODS

PEPS simulation training was developed at the Illinois College of Optometry to better prepare students for the new Part III NBEO. The simulated patient encounters were modeled after the Part III PEPS Restructure Blueprint & Model. Students encountered cases drawn from the nine clinical presentation categories. Faculty acted as both the patient and the proctor, using grading rubrics to assess the four competency domains. After the PEPS simulation training a questionnaire was administered to students. It consisted of 9 questions to assess students' understanding of the PEPS exam and evaluate their confidence in the components of the exam.

RESULTS

A total of 87 students finished the survey (43 second year, 44 third year). The majority (54%) reported that they were "not at all familiar" with PEPS prior to their simulation experience. After the simulations the majority (73%) felt "moderately or extremely familiar". Students were asked about their level of confidence with Case History, Test Selection, Analyzing Data, Diagnosis and Management and Patient Education with the cases they were presented during the PEPS simulation. Students felt the most confident (94.2%) in taking Case History. Students felt the least confident (46%) with Test Selection *(Figure 1)*.

The Patient Encounter portion of the exam evaluates four main areas of competency. The order in which students felt most to least confident was Communication, Clinical Assessment and Interpretation, Patient Education, Management and Documentation *(Figure 2)*. Similarly, the students ranked their confidence with the nine clinical presentation categories. The order which they felt most to least confident was Refraction, Glaucoma, Binocular Vision, Contact Lenses, Anterior Segment Disease, Posterior Segment Disease, Systemic Disease, Pediatrics and Neuro-Ophthalmic Disease *(Figure 3)*.

FIGURE 1
Overall, in relation to the case(s) you had in your fall and winter second-year lab PEPS simulation experiences or winter and spring third-year PEPS simulation experience, how confident did you feel about the following aspects?

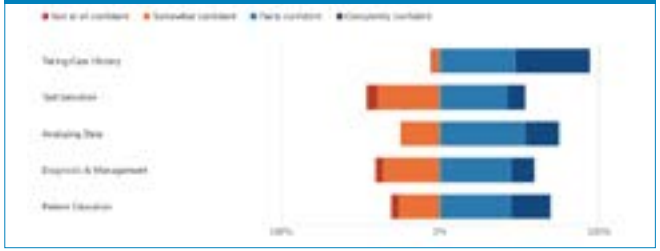


FIGURE 2
The PEPS exam evaluates 4 main areas of competency (outside of the Skills station). Rank these areas from 1-4 in the order that you feel most (1) to least (4) confident in at the time of this survey.

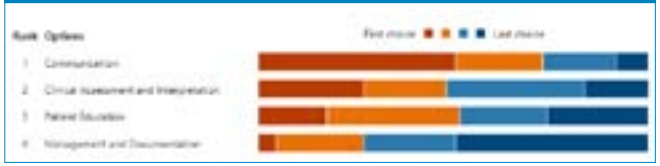
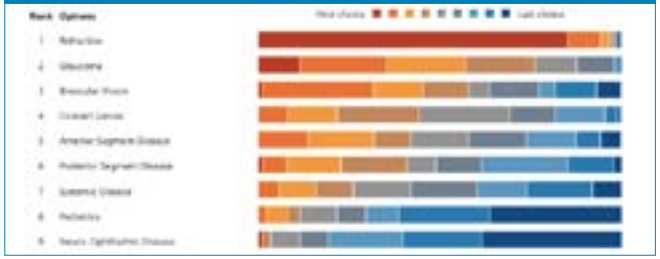


FIGURE 3
During the PEPS exam, candidates are presented with one case from each of the nine clinical categories below. Rank these areas from 1-9 in the order that you feel most (1) to least (9) confident in at the time of this survey.



CONCLUSION

The survey results highlight the areas of clinical competency that may need more emphasis to develop confidence and achieve proficiency for optometry students PEPS examination. The published weighting of the PEPS clinical presentation categories and the student's confidence assessment of their clinical knowledge in these categories will help focus preparation efforts for NBEO PEPS.

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Bowtie Optic Atrophy Secondary to Traumatic Brain Injury from Motor Vehicle Accident

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INTRODUCTION

A patient with brain injury following a motor vehicle accident presented with retrograde neuronal damage to both optic nerves. The patient's left homonymous hemianopia correlated with right ganglion cell layer (GCL) thinning in both eyes. Characteristic presentation on Ocular Coherence Tomography (OCT) of the nerve shows bow tie atrophy OS.

CASE PRESENTATION

A 20-year-old male patient presented for evaluation of blurry vision at distance and near in both eyes after a motor vehicle accident that happened three months prior. His mother expressed that the patient was a normal healthy 20-year-old who had never worn glasses before the accident. The patient presented with visible mobility problems, cognitive impairment, and left-sided weakness.

Patient Ocular History: unremarkable
Patient Medical History: traumatic brain injury from a motor vehicle accident that occurred 3 months ago
Visual Acuity: 20/200 PH NI OD/OS
Visual Acuity at 2 month follow-up: 20/20 OD/OS
Confrontational Visual Fields: constricted superior nasal and inferior nasal OD, constricted superior temporal and inferior temporal OS
Pupils: 3+ APD OS
Anterior Segment: unremarkable
Dilated Fundus Exam: temporal pallor OD, temporal and nasal pallor OS
Vision Function: deficits in color vision, accommodation, convergence and oculomotor system
Diagnosis: Left Homonymous Hemianopsia secondary to presumed traumatic injury of right optic tract

IMAGE 1
GCL complex homonymous pattern

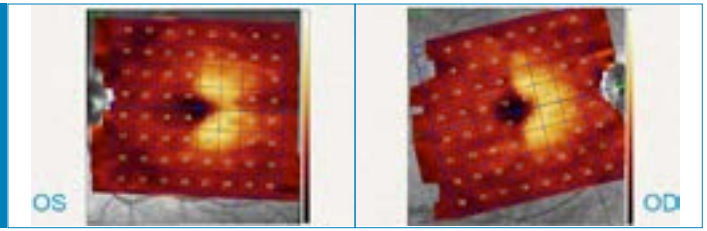

IMAGE 2
Kinetic VF Left Homonymous hemianopsia

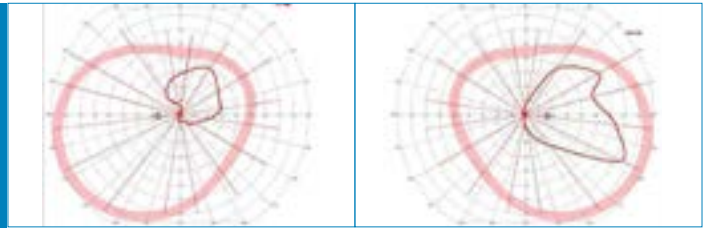

IMAGE 3
MRI showing enhancement of left optic tract, likely post traumatic white matter disease.

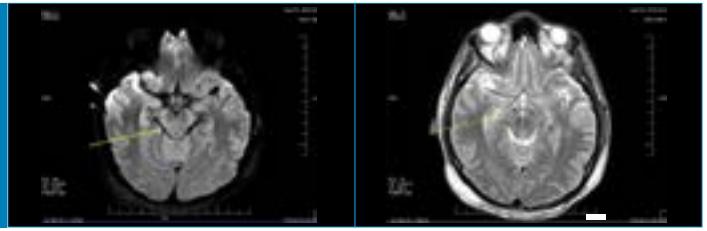

IMAGE 4
ONH OCT Bow tie pattern

DISCUSSION

Motor vehicle accidents are a common cause of traumatic brain injury (TBI). Homonymous hemianopsia visual field points to a contralateral lesion of the brain. When there is an APD in the eye with the temporal hemifield defect, a lesion of the contralateral optic tract should be ruled out. The optic nerve ipsilateral to the lesion will have temporal pallor only. The optic nerve contralateral to the lesion will have bow-tie atrophy due to the decussating fibers. The nasal fibers of the retina decussate resulting in nasal pallor of the nerve. The papillomacular bundle also decussates at the chiasm, but inserts temporally in the nerve, resulting in temporal pallor. The RAPD in these patients does not seem to be caused by the number of decussating fibers, it is associated with the difference between the sensitivity levels of the two functioning hemiretinas. MRI is usefull to identify correlating retro chiasmal pathology. In addition to the visual field loss, patients with TBI often have deficits in accommodation and oculomotor abilities, resulting in diplopia and poor reading ability.

CONCLUSION

This case illustrates the relationship between structure and function of the retina and optic nerve. Retrograde damage to the nerve fibers from a traumatic brain injury to the optic tract is clearly seen as thinning of the Ganglion Cell Layer (GCL). The visual field shows functional loss of the left homonymous hemifield. The visual field loss will likely be permanent. Any recovery expected to happen will likely happen within six months after the injury, recovery afterward is unlikely. Vision Rehabilitation and vision therapy can help with reduced visual function and visual field loss.

REFERENCES

Available upon request.

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Restoring Corneal Sensitivity: Oxervate Treatment for Herpes Associated Neurotrophic Keratitis

Greta Gregg, OD, FAAO; Navjit K. Sanghera, OD, FAAO
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BACKGROUND

Neurotrophic keratitis is a degenerative cornea disease caused by damage to the trigeminal nerve. This damage impairs corneal sensation, leading to decreased corneal sensitivity and healing. The treatment aims to support corneal healing and prevent persistent epithelial breakdown, which can lead to corneal ulceration and perforation. Oxervate (cenegermin-bkbj) is the first ophthalmic solution approved for treating neurotrophic keratitis. Patients have shown complete corneal healing after approximately 8 weeks of treatment. This case study investigates the use of Oxervate to promote corneal healing in a patient diagnosed with neurotrophic keratitis. The patient had limited corneal sensitivity and healing improvement with previous ocular therapy.

CASE INFORMATION

A 57-year-old Hispanic male presented for a comprehensive eye exam with progressive, painless, bilateral blurry vision (OD=OS). No additional complaints were reported. The patient's previous ocular history included cataract surgery with PCIOL OU, retinal PRP for proliferative diabetic retinopathy OU, and a resolved corneal abrasion OS. Best corrected visual acuity was 20/125 PHNI OD and 20/70 PH 20/60 OS. The patient reported long-term reduced vision OD following cataract surgery. Pupils were reactive to light, without RAPD OD, OS. Confrontation visual fields were constricted OD; full-to-finger-count OS, with full extraocular movements OU.

Slit lamp biomicroscopy revealed 1+ diffuse superficial punctate keratitis (SPK) denser inferiorly OD, and OS showed 2+ stromal haze with central scarring, a pseudo-dendritic lesion with positive NaFl staining, and inferior circumlinear epithelial heaping **(see Image 1a)**. Corneal sensitivity was reduced OS. The patient was diagnosed with neurotrophic keratitis secondary to herpes zoster OS.

IMAGE 1
(Top row) Weekly corneal appearance OS with standard treatment of neurotrophic keratitis associated with herpes without Oxervate. (Bottom row) Addition of topical Oxervate with notable improvement in corneal healing, stromal haze, and subjective corneal sensation.

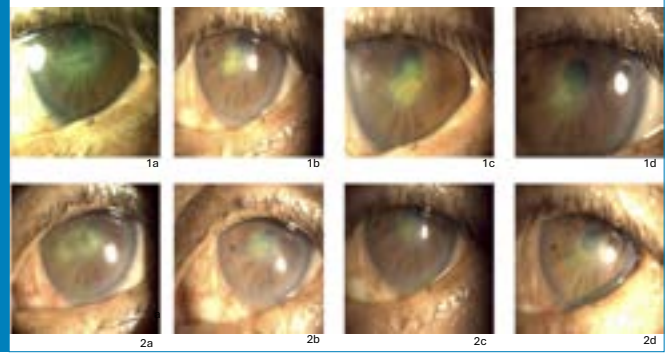

TABLE 1
Clinical Examination OS

Follow-Up after Initial Presentation	BCVA (sc)	Clinical Presentation OS	Treatment	
3 days	20/150 (PHNI)	3+ stromal haze, central pseudo dendrite **(Image 1a)**	• acyclovir 800mg PO 5x/day	• erythromycin ung QHS
2 week	20/100 20/70 (PH)	2+ stromal haze, resolving excavated pseudodendrite **(Image 1b)**	• acyclovir 800mg PO 5x/day	• erythromycin ung QHS
3 week	20/100 20/50 (PH)	1+ stromal haze, resolving excavated pseudodendrite, circumlinear epi heaping, 2+ A/C cells **(Image 1c)**	• acyclovir 800mg PO 5x/day • pred acetate 1% QID • PFAT Q2H • BCL inserted in office	• erythromycin ung QHS • olytrim QID • Vitamin C 100mg PO
4 week	20/100 20/60 (PH)	1+ stromal haze, resolving epithelial defect with minimal epithelial heaping, 0.5+ A/C cells **(Image 1d)**	• acyclovir 800mg PO 5x/day • pred acetate 1% QID • PFAT Q2H • BCL inserted in office	• erythromycin ung QHS • Polytrim QID • Vitamin C 100mg PO
5 week – Oxervate Initiated	20/80 20/70 (PH)	1+ stromal haze, resolving epithelial defect with minimal epithelial heaping, rare A/C cell, (-) corneal sensation **(Image 2a)**	• acyclovir 800mg PO 5x/day • Taper pred acetate 1% BID • PFAT Q2H • BCL inserted in office	• erythromycin ung QHS • Polytrim QID • Vitamin C 100mg PO
6 week	20/70 20/50 (PH)	1+ stromal haze, persistent epithelial defect **(Image 2b)**	• acyclovir 800mg PO 5x/day • PFAT Q2H • Oxervate 6x/day	• erythromycin ung QHS • Vitamin C 100mg PO
13 week	20/100 20/50 (PH)	Trc stromal haze, resolving persistent epithelial defect with minimal overlying stain **(Image 2c)**	• Oxervate 6x/day • Polytrim QID • Vitamin C 100mg PO	• BCL inserted • PFAT Q2H
15 week	20/70 20/60 (PH)	Trc stromal haze, minimal epithelial staining, (+) corneal sensation **(Image 2d)**	• Oxervate 6x/day • Polytrim QID • Vitamin C 100mg PO	• BCL inserted • PFAT Q2H

Initial treatment included acyclovir 800 mg PO 5x/day and erythromycin ointment QHS OS. Over multiple follow-up exams **(see Table 1)**, the treatment regimen expanded to include prednisolone acetate 1% QID OS, a therapeutic contact lens OS, Polytrim QID OS, preservative-free artificial tears PRN OU, Vitamin C 1000 mg PO daily, and doxycycline 50 mg PO BID. The patient was approved for Oxervate (cenegermin-bkbj) and started on Oxervate 6x/day OS. Significant corneal healing and improved sensation were observed after 8 weeks of Oxervate therapy **(see Image 1)**.

DISCUSSION

Early detection and intervention of neurotrophic keratitis are critical to prevent severe complications such as corneal ulceration and perforation, both of which can severely impair visual function and quality of life. Eye care providers must stay vigilant in identifying this condition and adopt new medical advancements in the management. Incorporating routine assessments for neurotrophic keratitis, along with innovative therapies like Oxervate (cenegermin-bkbj), can optimize patient outcomes. The use of Oxervate in this case led to significant corneal healing and improved sensation, highlighting its effectiveness in preserving vision and enhancing ocular health.

REFERENCES

Available Upon Request

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Meibomian Gland Disease in Scleral Lens Wearers with Midday Fogging

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INTRODUCTION

- Midday fogging or onset of blur during lens wear is a common problem reported by patients who wear scleral lenses (SL).
- Multiple factors likely contribute to subjective reports of midday fogging with SL wear.
- Midday fogging may be caused by particulate matter in the post-lens fluid reservoir or from deposits on the anterior surface of the lens.
- This study evaluated the role that meibomian gland disease (MGD) may play in habitual SL wearers with and without midday fogging.

METHODS

- Habitual SL wearers with > 6 months of wear were recruited at 5 clinical sites. The study was approved by the Ohio State University IRB.
- REDCap (Research Electronic Data Capture) was used for data capture and collected information on demographics, indication for SL wear, anterior segment findings, and self-reported presence or absence of midday fogging with SL wear.
- Comparisons were made between the eyes of those who reported subjective midday fogging and those who did not experience midday fogging.
- Descriptive statistics are reported.

RESULTS

- Forty-nine SL wearers (31 female) were enrolled
- The mean (standard deviation) age was 49.3(14.9) years
- Twenty-eight (57%) SL wearers reported midday fogging (16 female)
- Indications for scleral lens wear:
  - o Corneal irregularity (55%; 27/49)
  - o Ocular surface disease (39%; 19/49)
  - o Refractive error (6%; 3/49)

FIGURE 1
Scleral Lens Wearers With Midday Fogging, n=48

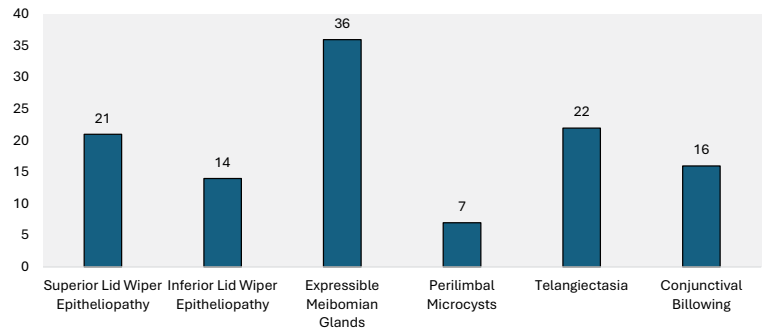
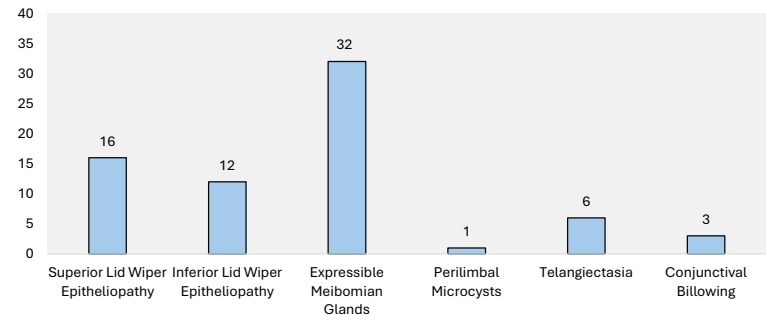


FIGURE 2
Scleral Lens Wearers Without Midday Fogging, n=37



Scleral Lens Wearers with Midday Fogging
- Corneal irregularity: 48% (13/27)
- Ocular surface disease: 74% (14/19)
- Meibomian Gland Expression:
  - Clear secretions: 63% (30/48)
  - Turbid secretions: 13% (6/48)

Scleral Lens Wearers without Midday Fogging
- Corneal irregularity: 52% (14/27)
- Ocular surface disease: 26% (5/19)
- Meibomian Gland Expression
  - Clear secretions: 59% (22/37)
  - Turbid secretions: 22% (8/37)

- Of all additional anterior segment findings noted in SL wearers, only the presence of telangiectasia was found to have a statistically significantly association with the presence of midday fogging.

CONCLUSION

- Over half of the subjects in this study reported midday fogging but there was minimal difference in lid wiper epitheliopathy between cohorts.
- However, SL wearers who reported midday fogging had more perilimbal microcysts, telangiectasia, and conjunctival billowing compared to those who did not experience fogging.
- SL wearers who did not experience midday fogging had a slightly higher rate of expressible meibomian glands compared to those who reported fogging.
- Aggressive management of meibomian gland disease may mitigate reports of midday fogging regardless of indication for SL wear.

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Cardiovascular Risk Factors in Adult Population at Urban Eye Clinic

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Chicago, Illinois

BACKGROUND

Patients' cholesterol and glucose levels are not well known nor easily accessible to most optometrists in routine practice. Elevated non-HDL cholesterol levels 130 mg/dL or above are defined as at-risk for development of atherosclerotic cardiovascular disease (ASCVD) by the American Heart Association. 10-year risk of having an ASCVD event (i.e., heart attack, stroke, cardiac death) is standardly estimated using Pooled Cohort Equations (PCE). As part of an ongoing artificial intelligence (AI) fundus imaging study focusing on cardiovascular disease, we acquired point-of-care finger prick micro-pipette blood samples to obtain a basic lipid panel and glucose level. We report on these findings and the associated ASCVD risk, based on consensus guidelines.

METHODS

341 subjects between the ages of 40-75 years-old were recruited at an urban eye clinic to participate in an AI fundus imaging study. Exclusions included current use of cholesterol-lowering medications, known ASCVD, and significant ocular disease that would mask fundus vascular details on photography. As part of the study, HDL, total cholesterol, and non-fasting glucose were measured via a point-of-care instrument. In addition, three consecutive, automated brachial artery blood pressure readings were taken along with a short medical history.

RESULTS

195 female and 146 male subjects were enrolled with an average age of 53.2 years old. The race and ethnicity breakdown of the subjects was: 214 were non-Hispanic Black, 35 were Hispanic White, 72 were non-Hispanic White, one subject identified as American Indian, and the remaining subjects (18) were of various Asian racial backgrounds. 48.7% of the subjects (n=166) had high blood pressure readings (average of the three readings ≥130/80 mm Hg) despite 103 participants currently on blood pressure medication(s). Non-HDL cholesterol levels were elevated (≥130 mg/dL) in 37.2% (n=127) of the subjects with 14.4% (n=49) having high levels (≥160 mg/dL).

Table 1: Participant ASCVD risk factors

Age	Total participants	Avg of 3 readings ≥ 130/80 mmHg	Elevated non-HDL cholesterol levels (130 – 159 mg/dL)	Highly elevated non-HDL cholesterol levels (≥160 mg/dL)
40-49 years old	137	61	53	21
50-59 years old	116	62	46	19
60-69 years old	81	41	28	9
70-75 years old	7	2	0	0
	341	166(48.7%)	127(37.2%)	49 (14.4%)

Table 2: ASCVD risk-enhancing factors

Family history of premature ASCVD	Metabolic syndrome
History of premature menopause and/or history of pregnancy-related preeclampsia	Chronic kidney disease, not treated with dialysis or kidney transplantation
High risk race/ethnicity	Persistent hypertriglyceridemia and/or hypercholesterolemia
Elevated biomarkers: CRP, Lp(a), apoB	Low ankle-brachial index ratio
Chronic inflammatory conditions (e.g. autoimmune diseases)	

Table 3: Pooled cohort equations 10-year ASCVD risk calculation

Participant 10-year ASCVD risk category	Low risk (<5%)	Borderline risk (5 - 7.4%)	Intermediate risk (7.5 - <20%)	High Risk (≥ 20%)
40-49 years old	110	18	8	1
50-59 years old	52	17	42	5
60-69 years old	19	16	42	13
70-75 years old	0	0	5	2
	50.4%	15.0%	28.4%	6.2%

Per the PCE calculation of ASCVD risk, 28.4% (n=97) of the subjects were at intermediate risk (7.5-19.9%) and 6.2% (n=21) were at high risk (≥20%) for having an ASCVD event within 10 years. Random non-fasting glucose levels were abnormal (≥140 mg/dL) in 6.7% of the subjects (n=23) without known diabetes.

CONCLUSION

Despite the absence of ophthalmic complications from cardiovascular systemic disease, most subjects in this AI imaging study were found to have abnormal risk factors for development of a future ASCVD event. Also, over a third of the subjects were above the guideline 10-year ASCVD risk threshold-for-benefit from preventive therapy (e.g., statin). Improved access to screening tools and/or ability to identify ophthalmic vascular biomarkers of cardiovascular disease is important given the correlation between dyslipidemia, high blood pressure, and /or hyperglycemia and development of cardiovascular and cerebrovascular events.

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https://tools.acc.org/ldl/ascvd_risk_estimator/#!/calulate/estimator/

FINANCIAL SUPPORT

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Bilateral Cystoid Macular Edema in Presumed Usher Syndrome Type 3: Treatment and Management Considerations

Edem Jongue, OD, MPH; Raman Bhakhri, OD, FAAO; Tracy Matchinski, OD, FAAO
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CASE SUMMARY

30-year-old pregnant female presents with unknown etiology of hearing impairment and reduced vision. Examination suggests Usher Syndrome Type 3 with bilateral CME. CME should be screened for in all patients with Usher Syndrome.

CASE HISTORY

- 30-year-old Female (Adopted at birth)
- CC: Decreased vision for the past 4 months
- POH: Retinitis Pigmentosa OU x 05.2024, Bilateral Cystoid Macular Edema OU x 05.2024, (+) nyctalopia, Compound Myopic Astigmatism OU,
- PMH: (+) hearing impaired, (+) balance problems, (+) pregnant
- Medications: Not taking any medications currently
- Other salient information: Patient has 3 sons; 1 is hearing impaired. Does not have any information about biological parents

PERTINENT FINDINGS

- **Clinical (ocular and/or systemic findings)**
- BCDVA OD 20/80, 20/25 OS
- **Physical**
- Hearing impairment diagnosed in childhood/adolescence, mild balance issues
- **SLE**
- Unremarkable
- **Kinetic VF using III4e and V4e stimuli**
- Midperipheral deficits in superior nasal quadrant OD, Midperipheral deficits in superior nasal and inferior nasal quadrants OS
- **Optos Widefield**
- Disc pallor OU with Midperipheral atrophy/bony spicules, and vessel attenuation OU; FAF reveals midperipheral atrophy and Robson-Holder ring OU
- **Cirrus OCT Retina**
- CME OD>OS with loss of underlying EZ
- **Referral: Low Vision and inherited retinal disease genetic testing (results pending)**

DIFFERENTIAL DIAGNOSIS

- Leading Differential Diagnosis Type 3 Usher Syndrome
- Others: Type 1 Usher Syndrome, Type 2 Usher Syndrome, Retinitis Pigmentosa (RP) non-syndromic

DIAGNOSIS DISCUSSION

Based on the patient's retinal presentation (RP phenotype), and systemic history of hearing loss presenting at childhood with accompanying balance issues, the patient most likely has Usher Syndrome Type 3, the rarest subtype of Usher Syndrome. Type 1 is the most severe subtype. It is characterized by profound congenital hearing loss, RP, an absent vestibular function. Usher Syndrome Type 2 presents with moderate-to-severe congenital hearing loss but normal vestibular function. Genetic testing, which is pending, will help confirm this presumed diagnosis. CME in the first two subtypes is well documented as they are the most common types. However, the possibility of CME in type 3 also exists, as evidenced by this case, and therefore OCT imaging is paramount in detecting this complication.

FIGURE 1
Fundus Photo of arteriolar attenuation and bone spicules in the midperiphery (OD)

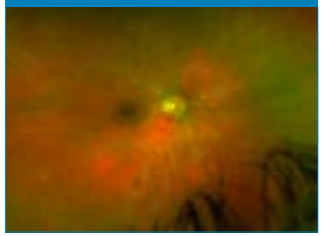


FIGURE 2
Fundus Photo of arteriolar attenuation and bone spicules in the midperiphery (OS)

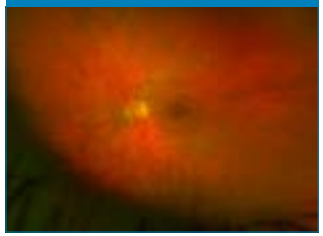


FIGURE 3
SD-OCT of the macula showing cystoid macular edema with concurrent subfoveal and parafoveal disruption of the ellipsoid zone (OD)

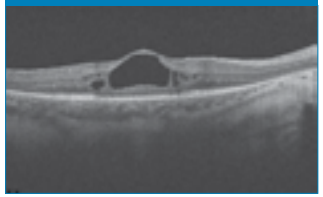


FIGURE 4
SD-OCT of the macula showing cystoid macular edema with concurrent parafoveal disruption of the ellipsoid zone (OS)

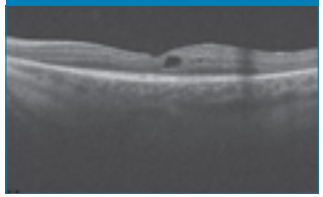


FIGURE 5
Fundus Autofluorescence (FAF) showing hyperautofluorescent paramacular ring indicative of RPE dysfunction (OD)

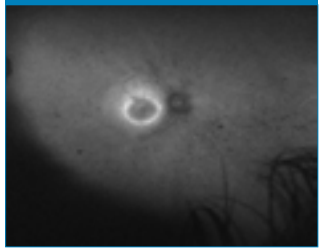
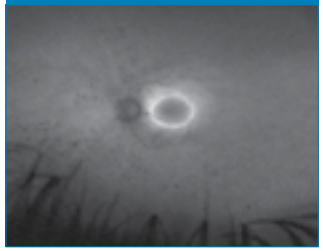


FIGURE 6
Fundus Autofluorescence (FAF) showing hyperautofluorescent paramacular ring indicative of RPE dysfunction (OS)



TREATMENT/ MANAGEMENT DISCUSSION

Theories as to why CME occurs include breakdown of the blood-retinal barrier, dysfunction of the retinal pigment epithelium pumping mechanism, Müller cell dysfunction, disruption of the retinal architecture by defects in cell-to-cell adhesion, antiretinal antibodies, and vitreous traction. The literature has shown that oral acetazolamide should be the first-line treatment and that topical dorzolamide is an appropriate alternative in patients intolerant to adverse effects of oral acetazolamide. However, as the patient was pregnant, she decided to forego any oral or topical treatment until after her pregnancy. Although CME has been shown to improve with treatment, functional improvements vary as the underlying photoreceptors need to be intact for any subjective improvement in acuity. As the EZ line in both eyes was already damaged it is presumed that visual improvement would have been guarded at best for her.

CONCLUSION

OCT should be performed on all patients with confirmed or suspected Usher Syndrome to assess for the presence of possible CME. Consideration should then be given to possible treatment with topical and oral agents. Clinicians should be cognizant of any systemic contraindications or cautions and make informed decisions in conjunction with such patients.

References: Available upon request

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Radiation Induced Optic Neuropathy

Isabel Kazour, OD • Jesse Brown VA Chicago, Illinois

BACKGROUND

Radiation-induced optic neuropathy (RION) is a devastating side effect of radiation therapy and can lead to irreversible vision loss. This case report explores the link between conventional radiation therapy and progressive optic neuropathy. Our patient was a 74 YO male who was seen for a follow up for acute "totally gray" vision OS, stable to four months prior.

OCULAR HISTORY
- Retinoschisis OU
- T2DM s DR OU
- NAION OS 8 years ago with a stable inferior altitudinal defect
  - o Pituitary macroadenoma encasing ICA BCVA 20/25

MEDICAL HISTORY
- Pituitary Macroadenoma s/p resection x8 years ago, HTN, T2DM, CKD, Bladder cancer s/p radical cystoprostatectomy s mets, ED
- Nasopharyngeal cancer stage II s/p CRT x 14 months prior
  - o Chemotherapy: Carboplatin
  - o Radiation
  - o Regions: nasopharynx, left retropharyngeal lymph node, pituitary adenoma
  - o Dose: 70 Gy

RESULTS

VA OD: 20/25 OS: CF; PHNI (20/25 one year prior)
Pupils: OD + D/C, OS 3+ APD
Anterior Segment
- Tr iris atrophy OU, IOP 20/20 GAT
- 2+ NS c ACC OU

Posterior Segment
- OS 0.20, temporal pallor, q/o inferior sectoral edematous disc

Labs
- ESR 31, CRP 0.4, A1C 7.0%, Iron 66, low lymphocyte otherwise NL CBC, NL vitamin D

DIFFERENTIAL DIAGNOSES
- Unilateral, Progressive Radiation Optic Neuropathy, Pituitary macroadenoma growth, Giant Cell Arteritis, Non-Arteritic ischemic optic neuropathy, Optic Neuritis

FIGURE 1
Non-contrast sagittal T1, Post-contrast coronal T1

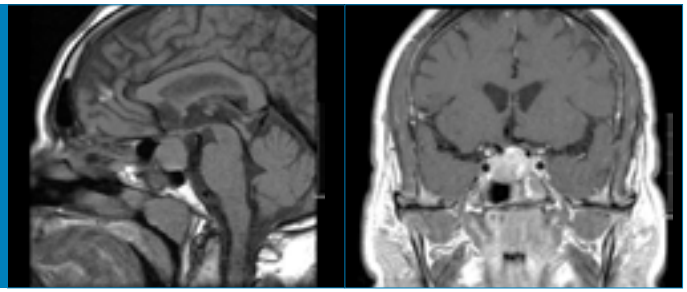


FIGURE 2
ONH Photos

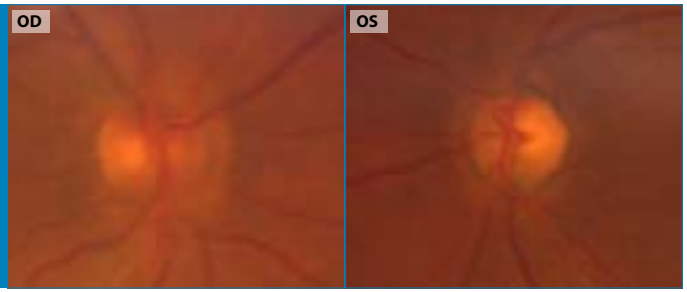


FIGURE 3
OCT RNFL

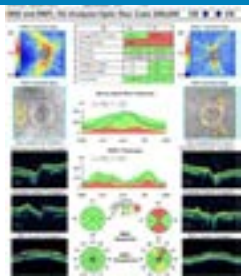
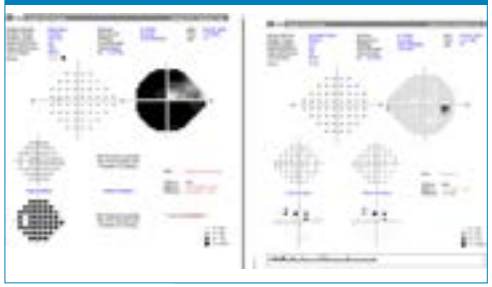


FIGURE 4
HVF 24-2



DISCUSSION

Given the suspicion of optic neuritis, neuro-ophthalmology initiated a four week course of oral prednisone, however this did not improve VA or disc appearance. Other differentials, such as growth of pituitary macroadenoma, NAION and giant cell arteritis were ruled out with MRI, CBC, ESR, CRP and A1C results. Given the acute and extreme drop in acuity, the wound healing and tissue repair Fellow pursued hyperbaric oxygen therapy (HBO). HBO is thought to alleviate RION by delivering concentrated oxygen to necrosed tissue to halt ischemia, initiate angiogenesis and activate fibroblasts. There have been no prominent prospective studies comparing treatments for RION.

RION is a diagnosis of exclusion. RION typically presents in patients who have received radiation for head or neck tumors with doses exceeding 50 Gy; our patient received 70 Gy. RION causes acute, monocular, painless loss of vision and manifests between three months to eight years following treatment. In our case, left eye visual acuity reduction appeared 10 months following radiation. Our patient had concurrent systemic chemotherapy which is associated with an increased risk of developing RION. RION is one of the most common side effects of radiation for nasopharyngeal carcinomas given its proximity to the optic nerve tract.

CONCLUSION

RION is clinically marked by a painless, irreversible, monocular loss of vision within three months to eight years of radiation therapy. Key factors to consider when diagnosing RION include type of carcinoma (nasopharyngeal), location target (pituitary), and radiation dosage (>50 Gy). Other causes of optic neuropathy should be ruled out before diagnosing RION. Further research is needed to investigate treatment options and determine if pre-existing optic nerve atrophy increases likelihood of developing RION.

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Scleral Lens Success in Pediatric Exposure Keratopathy Post-CN VII Palsy

Diana Masolak, OD[1]; Marin Nagelberg, OD[2]; Lindsay Sicks, OD, FAAO, FIACLE, FSLS[1]

1. Illinois Eye Institute - Chicago, IL • 2. Philadelphia Eye Associates – Philadelphia, PA

BACKGROUND

A 9-year-old patient with lagophthalmos of the right eyelid and exposure keratopathy (EK) after right cranial nerve VII palsy following brain tumor resection. She was fit with a therapeutic scleral lens for ocular surface protection.

EK results in corneal desiccation secondary to chronic incomplete lid closure due to an anatomical or functional deficit of the eyelid[1]. Cranial nerve VII palsy is a neurologic etiology for loss of orbicularis function and results in the inability to close the upper eyelid[2,3]. In pediatric patients, new facial nerve palsy incidence can be up to 20% after posterior fossa brain tumor surgery[4].

CASE DESCRIPTION

- 9-year-old Hispanic female
- **CC**: redness, tearing, and clear mucus discharge OD x last two years
- **POH**: s/p right CNVII palsy secondary to benign occipital lobe brain tumor resection two years prior, s/p implantation of gold plate in RUL, s/p unspecified laser procedure for removal of corneal scarring OD
- **Medications**: Lubricating ointment TID OD
- Taping OD eyelid at night with minimal improvement of symptoms
- Wearing polycarbonate glasses full-time

FIGURE 1
Slit lamp examination of the cornea OD: 2mm central subepithelial scar, copious white mucus of the tear film, and 4+ diffuse PEE.

PERTINENT FINDINGS

- BCVA 20/100 OD and 20/20 OS with current SRx
- Lagophthalmos of the right upper eyelid with positive Korb-Blackie
- Corneal sensitivity (Cochet Bonnet): No sensation OD, normal sensation OS

FIGURE 2
Initial scleral lens fit OD, vaulting the 2mm central subepithelial scar.

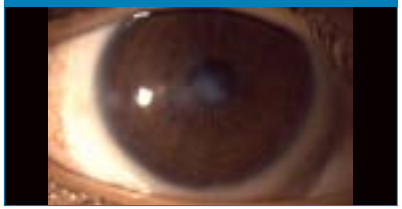
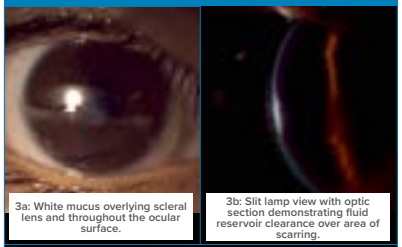


FIGURE 3
Final scleral lens after 8 hours of wear adequately vaulting area of subepithelial scarring secondary to exposure keratopathy.



3a: White mucus overlying scleral lens and throughout the ocular surface.

3b: Slit lamp view with optic section demonstrating fluid reservoir clearance over area of scarring.

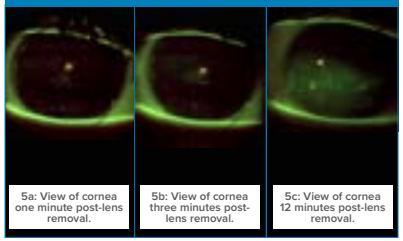
3c: AS-OCT of final lens design OD showing 198 µm of clearance over area of scarring after 8 hours of wear.

RESULTS

A scleral lens was fit diagnostically, ordered and dispensed with an adequate fit. Preservative-free artificial tears were used throughout the day to clear any mucus discharge. Artificial tear ointment was used at bedtime. Lid taping was discontinued. Glasses were continued for full-time wear. Following 14 weeks of wear at 14 hours per day, the patient's mother reported decreased mucus discharge throughout the day and resolution of redness. Slit lamp examination OD revealed complete improvement in corneal staining. Best-corrected visual acuity with the lens was 20/100 OD, limited by central scarring.

FIGURE 4
Non-wetting is a common challenge in scleral lens wear for patients with EK.

FIGURE 5
Protective effect of the scleral lens on the patient's ocular surface. Immediately following lens removal, there is no evidence of corneal staining. However, within minutes, corneal desiccation begins to manifest and progressively worsen due to incomplete blink.



5a: View of cornea one minute post-lens removal.

5b: View of cornea three minutes post-lens removal.

5c: View of cornea 12 minutes post-lens removal.

TABLE 1
Final lens parameters OD

	Lens	Power	Sag	Diameter	Material
Blanchard	Onefit MED	-2.50 DS	4250	15.6	Optimum Infinite + Hydra-PEG

DISCUSSION

- Patients with lagophthalmos and incomplete blink may experience challenges with scleral lenses, including inadequate surface wetting (Figure 4) and increased mucus production (Figure 3a) resulting from ocular surface dryness and inflammation. To address these issues, we recommended rinsing the eye with saline solution, as well as using a cotton-tipped applicator to gently clean the lens surface while the lens is being worn.
- The patient's mother reported a notable reduction in mucus production throughout the day when using a pH-buffered saline filling solution, compared to a non-buffered option. Given that individual responses to filling solutions may vary, it can be helpful for patients with ocular surface disease to trial different options.
- Should the patient's corneal scar worsen due to overnight corneal desiccation, overnight scleral lens wear can be considered. In such cases, a second lens can be prescribed specifically for overnight use, while the daily wear lens undergoes disinfection.
- In patients with reduced vision in one eye, polycarbonate spectacles for wear over the top of contact lenses is necessary for protection.

CONCLUSION

Exposure keratopathy, particularly in the presence of a neurotrophic cornea, requires continuous protection of the ocular surface. Daily wear of scleral lenses protects the ocular surface while retaining visual function. It negates the need for additional invasive procedures to prevent scarring and loss of vision. In this case, a scleral lens provided comfort, ocular surface protection, and improvement in corneal health. The pediatric patient has demonstrated four months of successful wear thus far. There were no challenges encountered with lens fitting, handling, or care attributable to the patient's age.

REFERENCES: Available upon request

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Current Trends in the Management of Angle Closure Suspects at an Urban Academic Medical Center

Mallory McLaughlin, OD, FAAO • Daniel Peterson, OD
Chicago, Illinois

INTRODUCTION

The goal of this study was to evaluate trends in clinical management of primary angle closure suspects (PACS) at one urban academic medical center.

METHODS

Fifty-one patients that met inclusion and exclusion criteria were randomly selected. Their medical records were evaluated.

Inclusion criteria:
- Exam at the Illinois Eye Institute in 2023
- Diagnosis of PACS
- At least 180 degrees of irido-trabecular contact on gonioscopy

Exclusion criteria:
- Diagnosed with glaucoma
- Received eye care elsewhere during the study period
- Historic intraocular pressure measurements ≥ 23 mmHg
- Gonioscopy revealed peripheral anterior synechiae

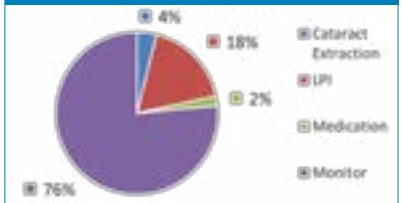
If both eyes of one patient met the criteria, only the eye with the narrower gonioscopy was included.

RESULTS

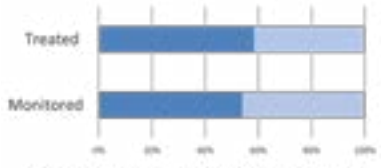
Demographics:

- Gender: Mostly female (70.6%)
- Race: Mostly African American (51%)
- Mean age: 66.1 ± 10.9 years
- Mean IOP: 15.8 ± 2.9 mmHg

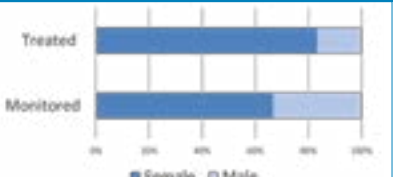
Patient Management



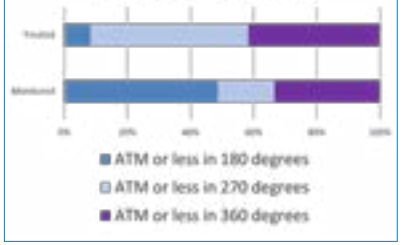
Age Analysis (p=0.75)



Gender Analysis (p=0.47)



Gonioscopy Analysis (p=0.02)



Follow-up schedule:

Of the patients who were monitored without treatment, the average prescribed follow-up duration was 8.7 +/- 4.3 months.

CONCLUSIONS

1. Monitoring without treatment was the most common management recommendation, followed by LPI.
2. Treatment was not found to be dependent on gender or age but did depend on gonioscopy results.
3. The results of this study are particularly interesting considering the ZAP and ANA-LIS studies.

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Exacerbation of retinal histoplasmosis pathology after beginning chemotherapy

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PURPOSE

Histoplasmosis is a fungal lung infection caused by inhalation of Histoplasma capsulatum spores. The typical triad of ocular findings that make up presumed ocular histoplasmosis are punched-out chorioretinal scars, peripapillary atrophy, and choroidal neovascularization. Vision is affected when scarring includes the macula. Anti-VEGF treatment may be utilized if the condition progresses. Reactivation of ocular histoplasmosis findings has been noted after fungal infections and in immunocompromised patients. This case illustrates reactivation of retinal pathology after beginning chemotherapy for cancer treatment.

CASE REPORT

A 75 year old female had been followed since 1991 for bilateral nonspecific peripapillary, retinal, and macular pigmentary changes that were not affecting acuity. In 2006 she experienced significant reduction in vision OD with subsequently noted macular scar in that eye (Figures 1a, 2a), and vast increase in peripapillary changes OS with macular sparing (Figures 1b, 2b). Based on this more typical appearance, a diagnosis of POHS was made. Retinal findings remained unchanged and vision remained stable at CF OD and ~20/25 OS until a visit in April 2023 when she reported dimmer vision over the previous 6-8 weeks, with OS 20/60. The patient had been going through IV chemotherapy treatment for thyroid cancer over the past six months. Fundus exam revealed additional pigmentation and scarring in both eyes (Figures 3a, 3b) compared to recent years. The patient was not feeling well and it was decided not to order additional tests or refer for treatment or retinal consult at that time; she passed away two weeks later.

CONCLUSION

Formation of new lesions and enlargement of existing lesions have been documented in patients with reactivated histoplasmosis. Genetic predisposition, comorbid fungal infection, and immunologic compromise are presumptive etiologies for reactivation. In this patient, both the cancer and its treatment may have increased the likelihood of her recurrent infection and progressive retinal pathology.

FIGURE 1A
Macular scarring OD at time of acute vision loss.

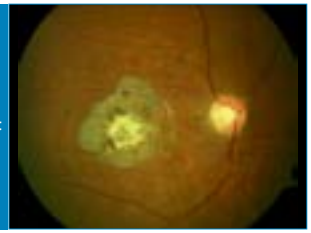


FIGURE 1B
Peripapillary atrophy OS at time of concurrent acute scarring OD.

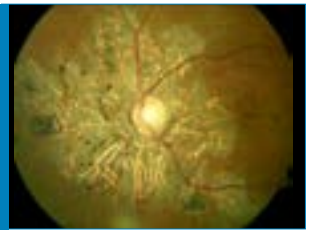


FIGURE 2A
OCT OD noting significant subretinal fibrosis.

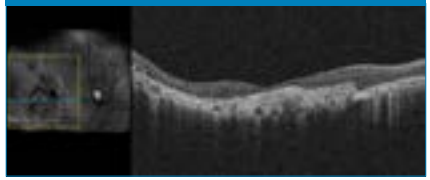


FIGURE 2B
OCT OS noting lesser macular involvement.

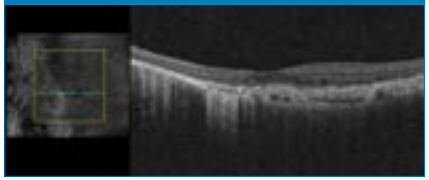


FIGURE 3A
Evidence of increased pigment and breadth of macular scarring.

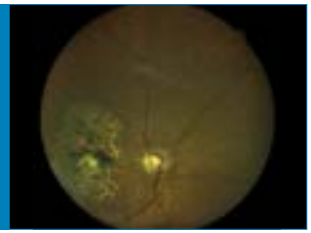
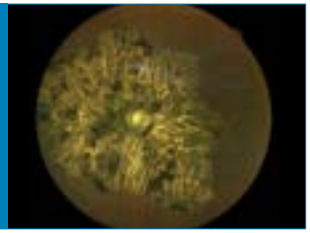


FIGURE 3B
Evidence of increased peripapillary changes which now encompass macula.



DISCUSSION

Histoplasmosis, and presumed ocular histoplasmosis (POHS), has been most commonly noted in the midwestern US, primarily the Ohio and Mississippi River valleys, but due to under-recognition it is thought to be more largely widespread.[1] Primary systemic infection may be relatively asymptomatic with minimal impact on health or function. Pulmonary symptoms may be acute or chronic, and the initial T-lymphocytic macrophage response controls, but does not fully eradicate, the organism. This allows for reactivation when re-exposed or when immunosuppressed.

The retinal findings in POHS can have the same progression and exacerbation, presenting with new and/or enlarging scars which may lead to choroidal neovascularization (CNV) and vision loss. Speculation regarding immunocompromised individuals, genetic inability to fight fungal infections[2], impact of systemic immunomodulatory therapy[3], and smoking[4] may all be factors in reactivated ocular disease. In the case presented here, the combination of a cancer diagnosis and its chemotherapy treatment contributed to a reduced immune status and reactivation. Whether this was the second reactivation, given the 2006 acute retinal changes, is unknown.

Had this patient's systemic health been favorable, additional testing for presence of choroidal neovascularization (OCT or FA) would have been scheduled. Extrafoveal CNV may have been treated with laser photocoagulation, although intravitreal anti-VEGF therapy is currently preferred for best visual outcome[5]. Active CNV is the only aspect of POHS that requires treatment, and visual improvement would not be expected if loss was due to any other retinal etiology. Patients with a diagnosis of POHS should be apprised of the potential for progression, and be aware that subjective changes should be assessed as noted.

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Left Atrial Myxoma Discovered in Patient with Monocular and Bilateral Recurrent Episodes of Transient Loss of Vision

Lauren W. Ng, OD • Michelle M. Marciniak, OD, FAAO
Jesse Brown VAMC, Chicago

BACKGROUND

- 68-year-old African American male
- CC: recurrent monocular (OD and OS) and bilateral transient loss of vision (TLOV) lasting 20-30 sec, involving central vision, onset 4 months ago
- POH: surgical repair traumatic orbital fracture (1992), cataracts OU, choroidal rupture/CR scarring OS
- PMH: CKD, HTN, HL, ED, OSA, iron deficiency anemia, PTSD, CAD, migraines, polysubstance abuse, prostate cancer, MGUS
- Meds: losartan, amlodipine, atorvastatin, fluticasone, metoprolol, multivitamin capsule, tadalafil, aspirin

RESULTS

	Right	Left
BCVA	20/20	20/20
Pupils	+ direct and consensual, no APD	+ direct and consensual, no APD
EOM	Full	Full
CVF	FTFC	FTFC
SLE	WNL	WNL
Lens	1+ NS	1+ NS
C/D ratio	0.5/0.5, no pallor or edema	0.35/0.35, no pallor or edema
Macula	Flat and intact	Flat and intact
Vessels	WNL, no heme/emboli/ischemia	WNL, no heme/emboli/ischemia
Vitreous	WNL	WNL
Periphery	WNL	Chorioretinal scarring at 9:00

- **Ancillary Testing**
  - Vitals: 73 bpm; 152/89 mmHg
  - Ishihara CV: normal OD, OS

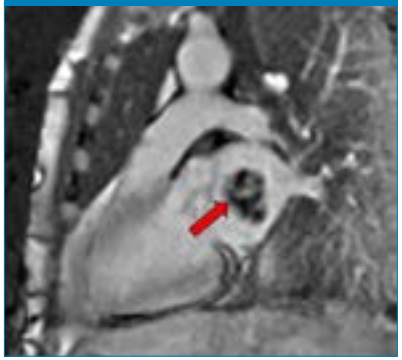
- **Differential Diagnosis**
  - Thromboembolic occlusion
  - Retinal migraine
  - Systemic hypotension
  - Retinal vein occlusion
  - Giant cell arteritis
  - Retinal vasospasm
  - Patent foramen ovale
  - Optic nerve edema
  - Ocular ischemic syndrome
  - Retinal detachment
  - Dry eye disease

- **Lab Tests**

Test	Norm	Result
RPR	Non-reactive	Non-reactive
CRP	<=1.0 mg/dL	0.597 mg/dL
WBC	4.0 – 11.0 K/uL	9.29 K/uL
RBC	4.2 – 5.7 M/uL	**3.38 M/uL L**
Hemoglobin	13 – 17 g/dL	**10.7 g/dL L**
Hematocrit	40 – 51 %	**32.4% L**
MCV	82.0 – 99.0 fL	95.9 fL
Platelet Count	130 – 400 K/uL	311 K/uL
SPEP (gamma globulin)	0.50 – 1.25 g/dL	**1.65 g/dL H**

- **Additional Testing**
  - ER Neurology consult
  - Carotid Duplex: R ICA 50-69% stenosis; L ICA normal
  - TTE and TEE: 3x3cm mass attached to L atrial septum
  - CT head and MRI brain/orbits: normal
  - Cardiology referral
  - Cardiac MRI: large L atrial mass likely myxoma
  - CT abdomen: 3.5cm L atrial soft tissue density

FIGURE 1
Chest MRI w/o contrast, lateral view (left). Red arrow indicates left atrial myxoma



DISCUSSION

Our patient's presentation was unusual in laterality and symptomology. Carotid stenosis can cause monocular but not bilateral simultaneous TLOV. Given the pattern of vision loss and work up, the left atrial myxoma was the likely source of multiple emboli, causing recurrent TLOV. Primary cardiac tumors are very rare. The majority of primary cardiac tumors in adults are myxomas. They are more common in women than men (3:1) and can occur at any age. Myxomas are benign neoplasms composed of scattered cells located within a multipotent mucopolysaccharide stroma that can differentiate and release VEGF, resulting in angiogenesis and growth. Left atrial tumors have a distinctive TEE appearance as seen in our patient. It is not uncommon for left atrial myxomas with villous or friable surfaces to release emboli into the systemic circulation.

FIGURE 2
Cardiac MRI w/ contrast, axial view. Red arrow indicates left atrial myxoma

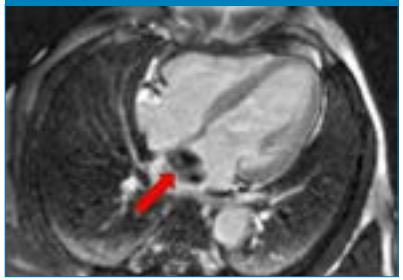
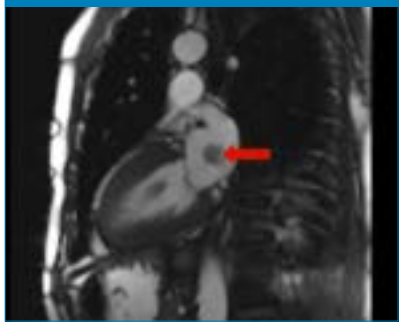


FIGURE 3
Cardiac MRI w/ contrast, lateral view (left). Red arrow indicates left atrial myxoma



CONCLUSION

The patient was diagnosed with a left atrial myxoma and referred to cardiology. Due to his monocular and bilateral recurrent episodes of TLOV, as well as the size of the lesion, sternotomy and open-heart surgery was performed for excision of the left atrial myxoma. The mass was successfully removed, as confirmed by absence of lesion on repeat CT of the head, chest, and abdomen post-surgery. Pathology confirmed the myxoma diagnosis. The patient was placed on a statin and baby aspirin. He was evaluated one month later for any additional ocular sequelae and reported resolution of his TLOV.

In patients with TLOV, a thorough workup is paramount. Left atrial myxomas may result in ocular complications as well as cardiovascular and pulmonary sequelae including heart failure and pulmonary hypertension. A thorough and careful case history, review of systems, ocular exam, and lab workup are essential in elucidating the cause of TLOV.

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- Additional on request

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Therapeutic Use of Scleral Lenses for Chronic Filamentary Keratitis Secondary to Systemic Lupus Erythematosus

Josh Normandeau, OD[1], Marin Nagelberg, OD[2], Lindsay Sicks, OD, FAAO, FIACLE, FSLS[1]

1. Illinois College of Optometry/Illinois Eye Institute - Chicago, IL; 2. Philadelphia Eye Associates – Philadelphia, PA

BACKGROUND

Filamentary keratitis (FK) is a corneal disorder characterized by filaments on the corneal surface.[1] If FK is recalcitrant to topical therapies, scleral lenses (SLs) can provide therapeutic improvement with good comfort. [1,2] This case involves a patient with chronic FK secondary to systemic lupus erythematosus (SLE) who was fit in SLs with continued topical therapy. Improvement in signs and symptoms were noted, along with quality-of-life improvement.

CASE DESCRIPTION

CASE HISTORY

- A 64-year-old African American female presented in January 2024 with complaints of eye pain and irritation OU (Figure 1).
- Ocular history: keratoconjunctivitis sicca and episcleritis, with recalcitrant FK s/p debridement, topical steroid use, and oral doxycycline use.
- Medical history: systemic lupus erythematosus (SLE), Type II diabetes, anemia, and heart disease.
- Medications: lifitegrast BID OU, PFATs QID OU, warm compress QHS.
- The patient was fit in SLs between March and June 2024. Final lens parameters are noted in Table 1.

CLINICAL EXAM

- July: Average wear time with SLs was 4 hours/day, 4 days/week, limited by handling difficulty and associated eye irritation. She cleaned with Boston Simplus (Bausch + Lomb) and used preservative-free 0.9% NaCl inhalation saline (Addipak) to fill the lenses. Application and removal was reviewed.
- August: The patient still had difficulty with application, limiting her wear time. Thus, there was a recurrence of filaments OS (Figure 2).
- September: Improved symptoms and more regular wear (6 hours/day, 7 days/week) due to increased confidence with SL handling. The discomfort was minimal, lasting only a few seconds, once per week.

MOST RECENT FINDINGS

- Entering VAcc: 20/20 OD, 20/25 OS wearing habitual SLs (Table 1).
- Slit lamp and AS-OCT: adequate central and transition zone clearance (400 µm OD, 270 µm OS) with mild impingement of the inferior edges OU.
- Slit lamp examination of the cornea (Table 2): decreased filaments and staining due to increased SL wear time (Figure 3 and 4).
- Given the excellent SL fit and improved symptoms, the patient continued with SL wear.

TABLE 1
Final scleral lens design OD and OS.

	Brand	BC	OAD	Sag	SLZ	Power	Material	O/R	BCVA
OD	SynergEyes VS	8.4	16.0	3400	46-48	+4.75	Menicon Z	plano	20/20
OS	SynergEyes VS	8.4	16.0	3300	48	+3.75	Menicon Z	+0.50DS	20/20

TABLE 2
Slit lamp examination of cornea at follow-up visits.

	January 2024 (pre-fit)	July 2024 (infrequent wear)	August 2024 (1 month intermittent wear)	September 2024 (1 month consistent wear)
Lids/lashes	1+ MGD	1+ MGD	1+ MGD	1+ MGD
Conjunctiva	Trace bulbar injection OD; 1+ diffuse injection	Trace bulbar injection	Trace bulbar injection OS>OD	White and quiet
Cornea	Web-like filamentary network, inf > sup OD; 4+ diffuse coarse filaments centrally OS	2+ diffuse punctate staining OU; inferior filament OS	1+ punctate staining OD; multiple filaments with 2+ punctate staining OS	Scattered punctate staining with 1 inferior filament OD; 2+ inferior punctate staining OS
Lens	1+ NSC, tr ACC	1+ NSC, tr ACC	1+ NSC, tr ACC	1+ NSC, tr ACC

FIGURE 1
January visit showing extensive filaments OU.

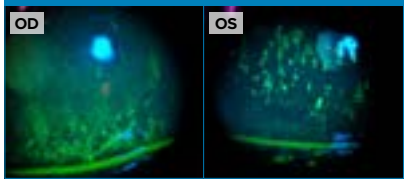


FIGURE 2
August visit: multiple filaments stained with sodium fluorescein OS.

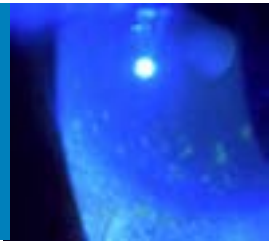


FIGURE 3
September visit: scattered punctate staining with single inferior filament while wearing final lens OD.

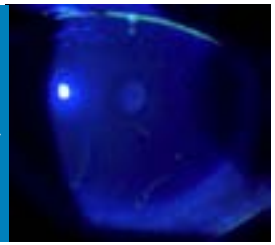
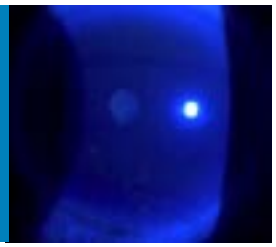


FIGURE 4
September visit: 2+ inferior punctate staining (no filaments) while wearing final lens OS.



DISCUSSION

Filamentary keratitis (FK) is a chronic corneal condition that presents with symptoms of eye pain, irritation, and foreign body sensation. It is associated with ocular and systemic conditions including dry eye disease, recurrent corneal erosion, ocular infection, superior limbic keratoconjunctivitis, trauma, keratoconus, brainstem lesions, exposure keratopathy and autoimmune disorders.[1,3] The chronicity of FK affects patients' activities of daily living.[1,3]

The pathogenesis of FK is not well understood.[1] Corneal basement membrane damage and mechanical eyelid forces result in raised overlying epithelium, which attracts mucus and degenerated epithelial cells.[1] Eyelid shearing force leads to filament formation, causing eye pain, foreign body sensation, photophobia, and tearing.[3] This cycle of inflammation, mucus deposition, and filament formation leads to an uncomfortable ocular surface.[1] In FK concurrent with a comorbid autoimmune condition, filaments are most likely to appear in the inferior peripheral cornea.[1] A thorough slit lamp examination with vital dye confirms the diagnosis.

MANAGEMENT

- Scleral lenses create a tear reservoir which can allow for filament resolution as soon as 24-48 hours after use in addition to increased comfort and clearer vision.[1,2] Consistent lens wear in FK can result in improved comfort, reduced filament formation, fewer symptoms and improved quality of life.
- Review of proper application and removal techniques was completed and repeated to increase the patient's confidence.
- More viscous SL fill solution was recommended to reduce spillage.
- A hydrogen peroxide-based care system was recommended to prevent deposits.
- Options for FK management include copious lubrication, topical steroids, mucolytic agents, bandage contact lenses, and debridement.[1]
- Mucolytic agents, such as n-acetylcysteine, are an option in refractory cases where other treatments do not result in sustained relief.[4]
- Topical compounded acetylcysteine and additional rounds of topical steroids were declined by the patient.
- Preliminary research has shown that oral guaifenesin 600mg twice per day for 4 weeks demonstrates modest reduction in filaments and symptoms in patients with FK.[5] The patient started a course of oral guaifenesin at their last visit.

CONCLUSION

- Identifying the underlying cause of FK is beneficial in management.
- For recurrent FK cases, mucolytic topical agents and scleral lenses have been shown to relieve symptoms.
- Each FK patient can present with variable symptoms and levels of discomfort. It is important to be patient and individualize therapy for maximum visual comfort and improved quality of life.

REFERENCES: Available upon request

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Comparison of the Performance of a New Pediatric Dry Eye Questionnaire to the Ocular Surface Disease Index (OSDI) in Children Aged 5 to 18 Years

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PURPOSE

Several questionnaires have been developed to evaluate dry eye symptoms; however none of them are designed for measurement in children. We have developed a pediatric dry eye questionnaire (PedDEQ) to measure dry eye symptoms in children. The purpose of this study was to compare the performance of PedDEQ to the Ocular Surface Disease Index (OSDI) in children aged 5 to 18 years. In addition, the cut off value of PedDEQ was determined to differentiate dry eye symptoms in children.

METHODS

A total of 59 children (5 to 18 years) presenting at the Illinois Eye Institute were recruited into the study. Children were surveyed on dry eye symptoms using both the pediatric dry eye questionnaire (PedDEQ) and modified Ocular Surface Disease Index (OSDI) in a randomized order. PedDEQ was developed and consisted of a total of 10 questions (Figure 1). The PedDEQ score was calculated using the following formula: total score x 25 / total number of questions answered with minimum score of 0 and maximum score of 100. OSDI was modified to test in children: the second question (Eyes that feel gritty) was edited to "eyes that feel something inside"; the seventh question (Driving at night) was removed based on life experience of our study population; the eighth question ("Working with a computer or bank machine (ATM)") was modified to "using a computer, iPad or tablet". Both modified OSDI and PedDEQ were read to the children by one of the authors. The examiner was allowed to repeat questions if the child did not understand the question. To determine relationships between OSDI and PedDEQ performance, Spearman Rank Correlation was performed. A receiver operating characteristic (ROC) curve was generated to determine the sensitivity and specificity of the PedDEQ questionnaire to differentiate dry eye symptoms defined by OSDI (≥13) in children.

TABLE 1
Demographic Characteristics of Participant (n= 59)

Age (mean ± SD)	11.7±2.6 years
Sex	49.2% Males 50.8% Females
Race/ Ethnicity	0% Non-Hispanic White 43.9% Asian 33.3% Black 21.1% Hispanic 1.8% Multiracial
Screen Time (hours/day)	5.20 ± 3.08 (reported by parent)
Outdoor time (hours/day)	1.85 ± 1.74 (reported by parent)

TABLE 2
Pediatric Dry Eye Questionnaire

Please answer the following questions based on the past week, including today.

	All the time	Most of the time	Half of the time	Some of the time	None of the time
1. How often do you rub your eyes?	4	3	2	1	0
2. How often do your eyes feel painful?	4	3	2	1	0
3. How often do your eyes feel tired?	4	3	2	1	0
4. How often do you feel like there is something in your eye (like sand or dust)?	4	3	2	1	0
5. How often are your eyes uncomfortable at nighttime?	4	3	2	1	0
6. When you are reading or doing close work (like using phone, iPad, book or computer), how often do your eyes feel uncomfortable?	4	3	2	1	0
7. When it's really bright, like when you're in the sun, how often do your eyes feel uncomfortable?	4	3	2	1	0
8. How often do you blink or close your eyes on purpose to make your eyes feel better?	4	3	2	1	0
9. How often do you have to blink on purpose in order to see better?	4	3	2	1	0
10. When you're not crying, how often do your eyes feel watery or teary?	4	3	2	1	0

Total score: _____ = 4 x (_____) + 3 x (_____) +2 x (_____) +1 x (_____)

Calculated Score: _____ = total score x 25 / total number of questions answered

TABLE 3
Modified Ocular Surface Disease Index

Ask your patient the following 15 questions, and circle the number in the box that best represents each answer. Then, fill in boxes A, B, C, D, and E according to the instructions beside each.

A. Last week, did you feel any of the following?

	All the time	Most of the time	Half of the time	Some of the time	None of the time
1. Does light seem bright to you?	4	3	2	1	0
2. Eyes feel gritty (feel something inside of your eye)?	4	3	2	1	0
3. Painful or sore eyes?	4	3	2	1	0
4. Blurred vision	4	3	2	1	0
5. Poor vision	4	3	2	1	0

A. Subtotal score for answers 1-5 _____

B. In the last week, have problems with your eyes made any of the following activities difficult to do?

	All the time	Most of the time	Half of the time	Some of the time	None of the time	
6. Reading	4	3	2	1	0	N/A
7.						
8. Using a computer, tablet, iPad, or cellphone?	4	3	2	1	0	N/A
9. Watching TV?	4	3	2	1	0	N/A

B. Subtotal score for answers 6-9 _____

In the last week, have your eyes felt uncomfortable in any of the following situations?

	All the time	Most of the time	Half of the time	Some of the time	None of the time	
10. Windy conditions?	4	3	2	1	0	N/A
11. Places or areas that are dry?	4	3	2	1	0	N/A
12.Areas that are air conditioned?	4	3	2	1	0	N/A

C. Subtotal score for answers 10-12 _____

D. Total score for sections A, B, C _____

E. Total number of questions answered (do not include questions answer N/A) _____

FIGURE 1
Area under the curve of the ROC for PedDEQ: 0.88 (95% CI: 0.79 – 0.98) with statistical significance (P< 0.0001). A PedDEQ threshold of 19 yielded maximum sensitivity (91.7%) and specificity (74.3%) to differentiate dry eye symptoms defined by OSDI.

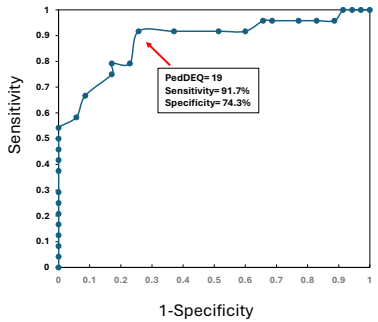
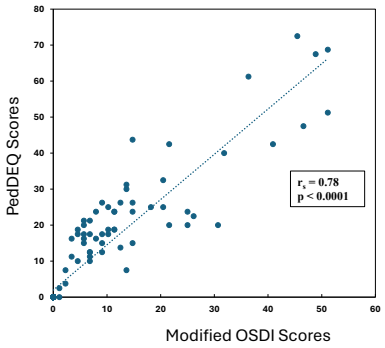


FIGURE 2
Correlation Between PedDEQ and Modified OSDI Scores



RESULTS

- Among 59 children recruited into the study, 29 (49%) were males and 30 (51%) were females (mean age = 11.6 years, ranged from 5.0 to 17.9), Table 1.
- Mean (±SD) OSDI score was 15.4 ±13.3, ranging from a score of 0 to 51. The mean PedDEQ score was 24.1±15.8, ranging from a score of 0 to 73.
- The area under the curve of the ROC for PedDEQ was 0.88 (95% CI: 0.79 – 0.98) with statistical significance (P< 0.0001). A PedDEQ threshold of 19 yielded maximum sensitivity (91.7%) and specificity (74.3%) to differentiate dry eye symptoms defined by OSDI.
- Statistically significantly positive correlation was found between OSDI and PedDEQ ($r_s = 0.78$, $p < 0.0001$).

CONCLUSIONS

- The pediatric dry eye questionnaire was comparable to the modified OSDI questionnaire in discriminating symptoms of dry eye in children. The pediatric dry eye questionnaire is a valid measurement of dry eye symptoms in children aged 5 to 18 years.
- A cut off value of 19 has excellent sensitivity and specificity to differentiate dry eye symptoms in children aged 5 to 18 Years.

Key Words: dry eye, symptom survey, ocular surface disease index, children

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1. Parikh M, Sicks LA, Pang Y. Body mass index, diet, and outdoor activity linked with meibomian gland abnormalities in children. Optom Vis Sci. 2024 Jul 16.

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Myopia Prevalence of Children aged 3 to 18 years in a Primary Eye Clinic over 10 years

[1]Drake Ren, [1]Leo Ren, [2]Yi Pang, Ph.D., OD

1: Whitney M. Young Magnet High School; 2: Illinois College of Optometry

PURPOSE

To assess changes in myopia prevalence of children aged 3 to 18 years in an urban primary eye clinic over a 10-year period, from 2014 to 2023. In addition, prevalence of myopia before, during, and after COVID-19 pandemic was studied to determine the impact of COVID-19 on myopia.

METHODS

Medical records of children seen in a primary eye clinic in Chicago, Illinois Eye Institute, from 2014 to 2023 were reviewed. Children aged 3 to 18 years with retinoscopy or manifest refraction were qualified for the study, resulting in a total of 115,952 clinical encounters.

Refractive Error Groups

- **Myopia:** Spherical equivalent (SE) ≤ -0.50 D in the right eye.
- **Emmetropia:** SE between +0.75 D and -0.50 D in the right eye.
- **Hyperopia:** SE ≥+0.75 D in the right eye.

Chi-square analysis was performed to determine the impact of COVID-19 pandemic on myopia prevalence before (year of 2018 and 2019), during (year of 2020 and 2021), and after (year of 2022 and 2023) COVID-19. Odd ratio of myopia was calculated. P < 0.05 was considered statistically significant.

FIGURE 1
The prevalence of Myopia from 2014 to 2023

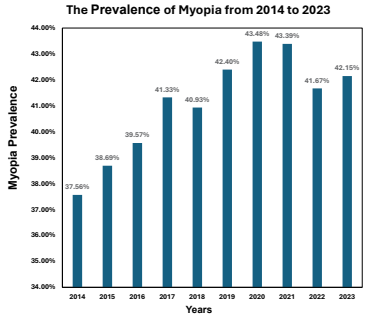

FIGURE 2
Prevalence of Myopia before, during, and after COVID

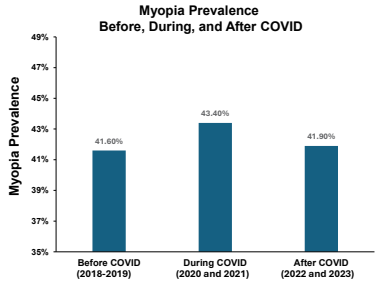

TABLE 1
Prevalence of Myopia, Emmetropia, and Hyperopia in Children aged 3 to < 18 years from 2014 to 2023 (n=115,952)

Years	Myopia % (n)	Emmetropia % (n)	Hyperopia % (n)
2014	37.6% (3,430)	43.6% (3,982)	18.8% (1,719)
2015	38.7% (5,536)	44.5% (6,371)	16.8% (2,401)
2016	39.6% (5,993)	43.7% (6,625)	16.7% (2,529)
2017	41.3% (6,522)	42.5% (6,708)	16.2% (2,552)
2018	40.9% (6,129)	43.6% (6,529)	15.5% (2,315)
2019	42.4% (5,727)	42.2% (5,702)	15.4% (2,079)
2020	43.5% (2,916)	41.4% (2,779)	15.1% (1,012)
2021	43.4% (3,689)	44.6% (3,796)	12.0% (1,017)
2022	41.7% (3,528)	45.1% (3,814)	13.3% (1,124)
2023	42.1% (3,945)	43.9% (4,105)	14.0% (1,310)

RESULTS

- The prevalence of myopia, emmetropia, and hyperopia was 37.6% (n=3,430), 43.6% (n=3,982), and 18.8% (n=1,719) respectively in 2014. In 2023 it changed to 42.1% (n=3,945), 43.9% (n=4,105), and 14.0% (n=1,310).
- Prevalence of myopia was 41.6% before COVID-19, increased to 43.4% during COVID-19, then decreased to 41.9% after COVID-19 with statistically significant difference (X2(2) = 1016.1, P <0.0001).
- Myopia odds ratio was 1.83 during COVID-19 compared to before COVID and odds ratio was 1.80 during COVID-19 compared to after COVID.

CONCLUSION

- Our study found that prevalence of myopia in children aged 3 to 18 years increased from 37.6% to 42.1% from 2014 to 2023.
- There was a statistically significant association between the prevalence of myopia and COVID-19 pandemic. Prevalence of myopia in children aged 3 to 18 years increased significantly during COVID-19 and reduced to the level before COVID-19.
- Children aged 3 to 18 years had 1.83 times higher risk to have myopia during COVID-19 than before COVID-19, and 1.80 times higher risk during COVID-19 than after COVID-19 pandemic.

Keywords: Myopia, COVID, COVID-19, hyperopia, emmetropia, children

REFERENCE

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A Comparison of Image Quality for Transportable Slit Scan vs. Handheld Xenon Flash Fundus Imaging in Community-Based Eye Screening

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Illinois College of Optometry; Chicago, IL

INTRODUCTION

Fundus imaging technology aids eye care professionals in the screening, diagnosis, and management of eye diseases. Traditionally, handheld retinal cameras were designed to require trained ophthalmic photographers or technicians to operate and therefore led to significant variability in image quality based on the operator's experience level. Most retinal cameras use a white light xenon flash to illuminate the retina with a brief, intense burst of light, which necessitates a minimum pupil size of 3-4 mm.

This study will evaluate and compare the image quality of two portable non-mydriatic fundus cameras: a traditional handheld fundus camera using xenon flash and a transportable camera utilizing slit-scan fundus imaging. Slit scan technology employs a rolling shutter mechanism for high-quality images by using a narrow slit of light to sequentially scan the retina and combine multiple sections into a single composite image. This system performs fully automated alignment and image capture, effective even in pupils as small as 2 mm and through significant ocular opacities, such as dense cataracts. The study seeks to evaluate whether slit-scan technology offers better image quality for detecting and diagnosing ocular diseases compared to traditional handheld imaging, particularly in the context of vision screenings or service trips.

METHODS

A total of 284 participants aged 18 and over attending the Eyes of Hope vision screening event in Chicago consented to and participated in the study. The study was approved by ICO IRB. Retinal imaging without pupil dilation was performed using two camera devices. Each participant had images taken with the handheld Topcon Signal camera using xenon flash (CamA) and the Topcon NW500 using slit-scan technology (CamB). Images were independently graded by two masked qualified eye care professionals (Doctor 1 and Doctor 2) using a Topcon five-point image quality scale (Figure 1) while analyzing the image quality factors (Figure 2). Image quality was compared using the Wilcoxon signed-rank test for paired data.

FIGURE 1
Wilcoxon test Doctor1 CamA vs CamB

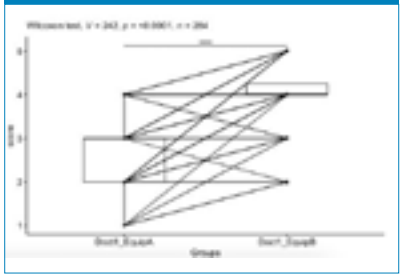


FIGURE 2
Wilcoxon test Doctor2 CamA vs CamB

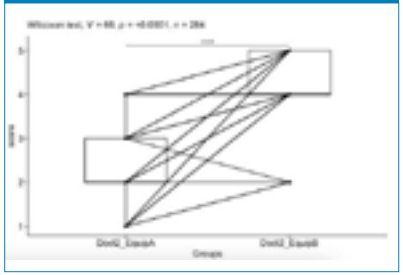
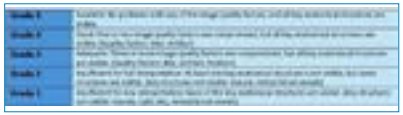


TABLE 1
Five point image quality score



RESULTS

For Doctor 1, the median score for Camera A (CamA) was 3, while Camera B (CamB) had a median score of 4. The difference in median scores for detecting disease between the two cameras was statistically significant (P<0.0001), with an association of 0.865 between ranks (Figure 1). For Doctor 2, CamA received a median score of 2, and CamB scored 4. Again, the median scores differed significantly (P<0.0001), with a 0.858 association between ranks (Figure 2). The paired T-test revealed that the mean score for CamA was 2.47 (95% confidence interval -1.75), compared to CamB's mean of 4.02 (95% confidence interval -1.529), indicating a statistically significant difference between the two cameras (P<0.0001).

FIGURE 3
Median Values of CamA vs CamB

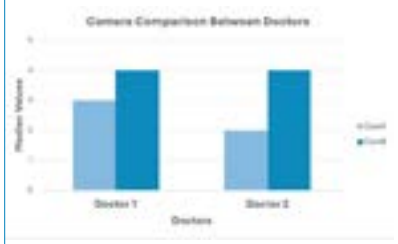
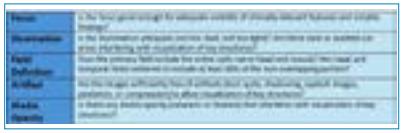


TABLE 2
Image Quality Factors



Overall, both doctors demonstrated a consistent trend where CamB outperformed CamA in median scores for disease detection. Doctor 1's results showed a clear preference for CamB, while Doctor 2's findings echoed this, with significant statistical support for the differences observed (Figure 3). These results highlight the reliability of CamB in diagnosing disease compared to CamA, emphasizing its potential utility in clinical practice, vision screenings, and vision service trips.

CONCLUSION

The average image quality was higher when using the Topcon NW500 with slit-scan technology compared to the Signal handheld retinal fundus camera using xenon flash. Superior image quality is crucial for optimal clinical and AI interpretation of fundus images. The Topcon NW500's slit-scan technology offers auto capture, improved robotic performance and enhanced image quality, which is critical for vision screening events. This study demonstrates that slit-scan fundus imaging provides superior image quality for fundus examinations without dilation.

As the prevalence of eye diseases increases with the aging population, there is a growing need for advanced fundus imaging technology that can consistently capture high-quality images without dilation. Improved image capture quality increases access to care for vulnerable populations that do not have access to eye care, facilitating early detection of retinal pathology and timely interventions that enhance patients' quality of life.

ACKNOWLEDGMENTS
Thank you to Jackson Ernst for their assistance in statistical analysis. Approved by the Illinois College of Optometry IRB, protocol # 22030.

References (Available Upon Request)

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Paracentral Acute Middle Maculopathy and Neovascular Glaucoma in the Setting of Central Retinal Artery Occlusion

Megan Piraino, OD[1]; Pathik P. Amin OD, FAAO[2]

[1]Illinois College of Optometry; [2]Department of Ophthalmology, University of Illinois Chicago

INTRODUCTION

A central retinal artery occlusion (CRAO) is an acute obstruction of the central retinal artery that leads to reduced ocular perfusion and is an ocular emergency. CRAO is a typically a thromboembolic episode that can lead to irreversible vision loss and can be difficult to identify based on the pale retinal appearance. This case demonstrates that recognizing paracentral acute middle maculopathy (PAMM) is essential for identifying impending central retinal artery occlusion (CRAO) as PAMM can precede a CRAO. Neovascularization of the angle (NVA) and the iris (NVI) are critical clinical signs that indicate decreased perfusion to the eye due to thromboembolic episodes associated with coronary artery disease (CAD). These findings should lead practitioners to refer for a comprehensive stroke work up and neuroimaging to manage systemic and ocular health.

CASE PRESENTATION/ CASE HISTORY

A 66-year-old African American female presented for a glaucoma follow-up complaining of new onset blurry vision OD. The patient's ocular history was significant for angle-recession glaucoma OU, a complicated cataract surgery with an ACIOL OS, previous RVO OS with multiple anti-VEGF injections plus focal laser treatment for cystoid macular edema, Kahook Dual Blade goniotomy OS and gonioscopy-assisted transluminal trabeculectomy OS. The patient was on max medical glaucoma therapy consisting of Rocklatan QHS OU, Cosopt BID OU, and brimonidine BID OU.

TABLE 1
Anterior Segment Evaluation & Pertinent Clinical Findings at initial visit.

TABLE 2
Fundus Exam evaluation at initial visit

FIGURE 1
Optos displaying subtle retinal whitening along superior temporal arcades and temporal macula at initial visit.

FIGURE 2
OCT displaying focal hyperreflective band within the inner nuclear layer at initial visit

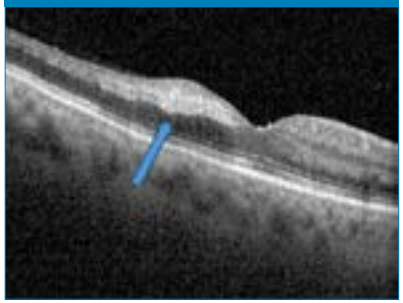

FIGURE 3
OCT displaying inner retinal thinning at 4 week follow-up that correlates with the initial area of INL infarct.

FIGURE 4
Proposed classifications of PAMM referenced from JAMA Ophthalmol. 2013;131(10):1275-1287. doi:10.1001/jamaophthalmol.2013.4056

DIAGNOSIS AND DISCUSSION

The patient was diagnosed with neovascular glaucoma OD along with paracentral acute middle maculopathy with a differential diagnosis including an evolving CRAO vs ocular ischemic syndrome. The patient received an Avastin injection OD and was immediately referred to the ED for a stroke work up. CT angiography of the head and neck revealed complete occlusion of the bilateral common carotids and a mobile thrombus in the right carotid artery. A repeat carotid duplex confirmed the resolution of the mobile carotid thrombus following heparin in the neuro-ICU. The evaluation to rule out giant cell arteritis showed an elevated ESR but a normal CRP, resulting in a negative diagnosis.

Historically, acute macular neuroretinopathy (AMN) has been divided into two types. Type 1, known as PAMM, is characterized by hyperreflective bands in the outer plexiform layer (OPL) and inner nuclear layer (INL), which lead to thinning of the INL. Type 2, on the other hand, features hyperreflective bands in the OPL and outer nuclear layer (ONL), resulting in thinning of the ONL. Recent research suggests that PAMM should be considered a clinical sign rather than a subtype of AMN. This shift in perspective is due to its association as a precursor to many ischemic-vascular conditions including central retinal artery occlusions, central retinal vein occlusions, diabetic retinopathy, sickle cell retinopathy, and Purtscher retinopathy. The clinical features of PAMM, such as parafoveal white lesions in the OPL/INL and hyperreflective bands in the INL, result from ischemia affecting the intermediate and deep capillary plexus. Reduced blood flow to this plexus can be assessed

CONCLUSION

This case's unique presentation of NVA/NVI and PAMM in the setting of central retinal artery occlusion with resolution of an intravascular carotid thrombus reinforces the clinical importance of emergent diagnostic workup to prevent a cerebrovascular accident. A stroke work-up with neuroimaging as well as carotid doppler imaging is essential to identify the thromboembolic source. In some patients with high cardiovascular risk factors anti- platelet therapy may be recommended even if neuroimaging and stroke work up appear normal.

Bibliography
Available upon request.

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A Unilateral Altitudinal Visual Field Defect as the Presenting Sign of a Pituitary Macroadenoma

Megan Piraino, OD; Wendy Stone, OD, FAAO; Leonard Messner, OD, FAAO

Illinois College of Optometry, Chicago IL

INTRODUCTION

A patient with uncontrolled hypertension presents with an inferior altitudinal visual field defect and unilateral optic nerve head pallor. Atypical presentation with no history of acute infarction warrants MRI imaging, revealing a pituitary macroadenoma.

CASE HISTORY

- 48-year-old African American male
- CC: Blurry vision when reading near print, started a few months ago. OD=OS
- POH: hypertensive retinopathy OD stage 3; OS stage 1, chronic allergic conjunctivitis
- PMH: Hypertension
- Medications: Amlodipine Besylate

PERTINENT FINDINGS

- **Clinical**
  - o scVA OD 20/20 -3 OS: 20/25-2
  - o CVF abnormal field inferiorly OS
  - o DFE optic nerve head temporal pallor OS
- **Humphrey Visual Field (HVF) (Figure 1 &2)**
  - o OD Normal
  - o OS Inferior altitudinal defect respecting the horizontal midline
- **Spectralis OCT (Figure 3&4)**
  - o OD Normal
  - o OS superior temporal nerve fiber layer (NFL), ganglion cell layer (GCL) and minimum rim width (MRW) thinning
- **MRI Brain/orbit W/O contrast: (Figure 5 & 6)**
  - o 1.4 x 1.6 x 2.6 cm isointense mass filling the sella/suprasellar cistern, impinging on the prechiasmal segment of the optic nerve. The findings were consistent with a pituitary macroadenoma.
- **Referral**
  - o Neurosurgery

DIFFERENTIAL DIAGNOSIS

- Non-arteritic anterior ischemic optic neuropathy (NAION)
- Compressive optic neuropathy
- Traumatic optic neuropathy
- Optic Neuritis

FIGURE 1
Humphery Visual field displaying no defects

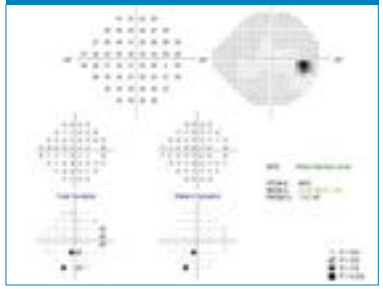


FIGURE 2
Humphrey visual field displaying inferior altitudinal defect of the left eye

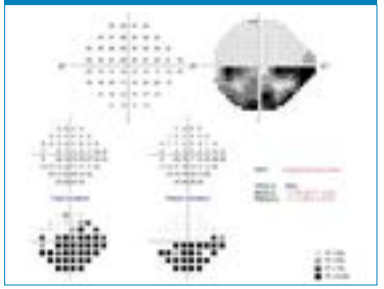


FIGURE 3
Spectralis OCT displaying no RNFL thinning

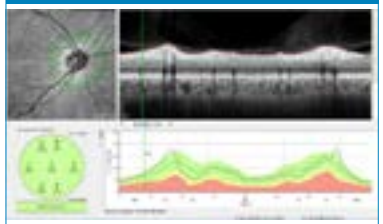


FIGURE 4
Spectralis OCT displaying superior temporal RNFL thinning

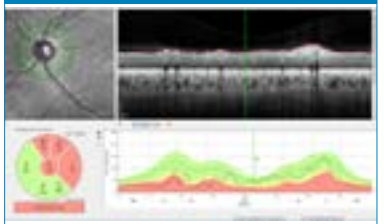


FIGURE 5
Sagittal and Coronal MRI with contrast displaying pituitary macroadenoma

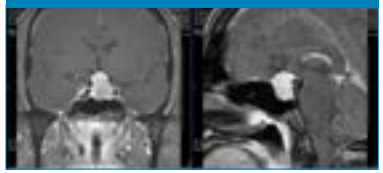
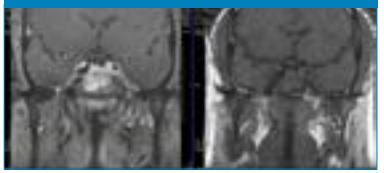


FIGURE 6
Coronal MRI status post-op transsphenoidal tumor resection



DIAGNOSIS DISCUSSION

The classic presentation of unilateral optic nerve head pallor combined with an inferior altitudinal visual field defect initially suggested a diagnosis NAION. This diagnosis was considered given the patient's history of uncontrolled hypertension. Imaging of the brain and orbits was ordered owing to the absence of acute disc infarction along with a normal-sized optic cup. MRI revealed a large, isointense sellar mass consistent with a pituitary macroadenoma, impinging upon the prechiasmal segment of the left optic nerve. The patient was scheduled for surgical resection.

TREATMENT/ MANAGEMENT DISCUSSION

Transsphenoidal tumor resection was performed by neurosurgery with pathology confirming the diagnosis of a pituitary macroadenoma. MRI revealed successful tumor removal. (Figure 6) Post-operatively, the patient has stable vision with a persistent inferior altitudinal defect in the left eye. We postulate that the tumor compressed the left optic nerve against the roof of the optic canal at its exit resulting in an inferior altitudinal visual field defect.

CONCLUSION

Although altitudinal visual field loss is most consistent with an ischemic event of the optic nerve, this case illustrates the value of neuroimaging in the absence of classic findings of NAION. Prompt neurosurgical intervention is critical to preserve vision in the setting of a pituitary macroadenoma. A multidisciplinary approach with endocrinologists and neurologists is essential for managing tumor growth, and visual impairment, focusing on preserving and recovering visual function.

References (Available upon Request)

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Repeatability of Pediatric Dry Eye Questionnaire and Modified Ocular Surface Disease Index Questionnaire in Children Aged 5 to <18 Years

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INTRODUCTION

Our previous study found that 16.9%, 8.8%, and 12.5% of the children aged 5 to <18 years have mild, moderate, and severe dry eye symptoms assessed with the Ocular Surface Disease Index questionnaire.[1] We developed a new Pediatric Dry Eye Questionnaire (PedDEQ) which was designed to measure dry eye symptoms in children. The purpose of this study was to determine the repeatability of PedDEQ and modified Ocular Surface Disease Index (OSDI) in measuring dry eye symptoms in children.

METHODS

A total of 59 children aged 5 to <18 years were recruited from Illinois Eye Institute, a primary eye clinic. Children were surveyed on dry eye symptoms using both the PedDEQ and modified OSDI. PedDEQ consisted of a total of 10 questions (Figure 2). PedDEQ score was calculated using the following formula: total score x 25 / total number of questions answered with a minimum score of 0 and a maximum score of 100.

- **Three questions of OSDI were modified to test in children:**

o 2nd question: (Eyes that feel gritty) was edited to "eyes that feel something inside"
o 7th question: (Driving at night) was removed based on life experience of our study population
o 8th question: ("Working with a computer or bank machine (ATM)") was modified to "using a computer, iPad or tablet"

All participants, including their legal guardian, were retested with both questionnaires in 30 minutes. Both questionnaires were read to the children by one of the authors and tested in randomized sequences in first and second administration. Questions were reiterated when prompted. Repeatability of both PedDEQ and modified OSDI between two administrations was evaluated using both 95% limits of agreement and Intraclass Correlation Coefficient (ICC). Agreement between PedDEQ and modified OSDI was measured using 95% limits of agreement.

TABLE 1
Demographic Characteristics of Participant (n= 59)

Age	11.7±2.6 years
Sex	49.2% Males 50.8% Females
Race/ Ethnicity	0% non-Hispanic White 43.9% Asian 33.3% African American 21.1% Hispanic 1.8% Multiracial

FIGURE 1
Modified Ocular Surface Disease Questionnaire (OSDI)

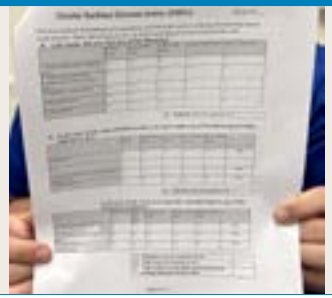


FIGURE 2
Pediatric Dry Eye Questionnaire (PedDEQ)

FIGURE 3
95% Limits of Agreement for PedDEQ

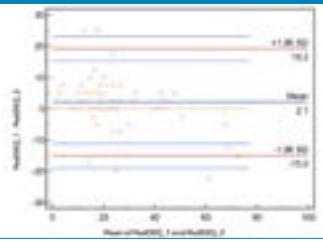


FIGURE 4
95% Limits of Agreement for Modified OSDI

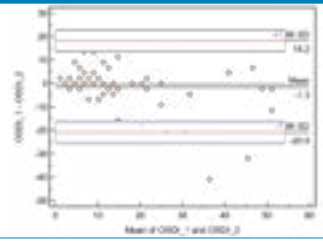
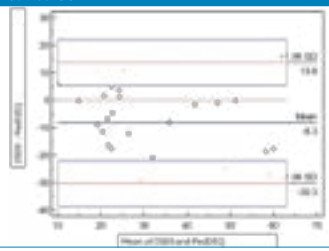


FIGURE 5
95% Limits of Agreement Between PedDEQ and Modified OSDI



RESULTS

The mean (SD) age of participant was 11.7±2.6 years.

- Average scores of PedDEQ and modified OSDI were 25.4±14.4 and 14.8±12.0 respectively for the 1st administration, and 23.1±18.3 and 16.3±16.2 for the 2nd administration.
- ICC was 0.92 (95% CI: 0.87-0.95) for PedDEQ and 0.86 (95% CI: 0.77- 0.92) for modified OSDI. The 95% limits of agreement were ±17.1 for PedDEQ and ±19.5 for modified OSDI. The 95% limits of agreement between PedDEQ and modified OSDI were ±17.7.

CONCLUSION

Both PedDEQ and modified OSDI demonstrated a good test-retest repeatability and reliability. Our findings suggest that both PedDEQ and modified OSDI can be used to evaluate dry eye symptoms in children aged 5 to <18 years.

RESEARCH SUPPORT

Authors would like to thank ILLINOIS SOCIETY for the PREVENTION of BLINDNESS for providing research funding for this study.

Key Words: dry eye, symptom survey, ocular surface disease index, non-contact infrared meibography, meibomian gland expression

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Test Duration Comparison Between Two Static Automated Perimetry Devices

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Daniel Roberts, OD, PhD, FAAO • Michael Chaglasian, OD, FAAO
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INTRODUCTION

Standard automated perimetry (SAP) is important for diagnosing and monitoring glaucoma. A faster visual field testing device reduces patient fatigue and improves clinical efficacy. While the Humphrey Field Analyzer (HFA) (Carl Zeis Meditec, Dublin, CA) is the clinical standard, the novel TEMPO/IMOvifa (Topcon Healthcare/ CREWT Medical Systems, Tokyo, Japan) perimeter is compact, binocular, and operated in ambient lighting (Fig 1). Limited research has compared the TEMPO to the HFA. Nishida et al. found that TEMPO reduced 24-2 test time by 39% compared to HFA. This study compares the test durations of both the 24-2 and 10-2 protocols between the HFA and TEMPO. Additionally, we compare 24-2 test times across various stages of glaucoma severity for both devices.

METHODS

In this prospective study, subjects with glaucoma in at least one eye were recruited from an academic eye care center in Chicago, Illinois. Testing consisted of the following: HFA SITA-Fast 24-2 OD and OS, HFA SITA-Fast 10-2 OD and OS, TEMPO AIZE-Rapid test 24-2 OU, and TEMPO AIZE-Rapid test 10-2 OU. Testing order was randomized by subject number. Subjects were offered a rest between tests. Test times were recorded for the 30 subjects, aged 39-86 years (mean 66 years), 53% female and 93% African American. The default TEMPO test is binocular, with eyes being tested randomly. For comparison, monocular HFA test times were combined to match the binocular TEMPO duration. Glaucoma staging for the 24-2 test followed the Medicare system, using the more severe stage if there was a discrepancy between eyes.

RESULTS

Test duration was compared (Tables 1-3, Fig 2-3) between the TEMPO and HFA devices using 24-2 and 10-2 tests. TEMPO was significantly faster than HFA for both the 24-2 (287 sec vs 442 sec, mean difference=156 sec, 95% LOA=16 to 295 sec, P<.0001) and 10-2 (324 sec vs 514 sec, mean difference=190 sec, 95% LOA=3 to 377 sec, P<.0001). Test time reductions by the TEMPO were approximately 35% for the 24-2 protocol and 37% for the 10-2 strategy. Test times tended to increase with glaucoma severity for both devices, but the TEMPO yielded lower median test times than HFA across all stages: mild (226 sec vs 375 sec), moderate (253 sec vs 396 sec), and severe (316 sec vs 466 sec). 24-2 test time reductions with TEMPO were approximately 40%, 36%, and 32% for mild, moderate, and severe glaucoma stages, respectively.

FIGURE 1
Subject Performing TEMPO

FIGURE 2
Difference vs. Means Plot comparing test times: HFA 24-2 vs. TEMPO 24-2

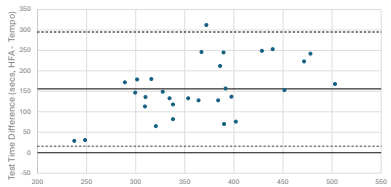

FIGURE 3
Difference vs Means Plot comparing test times: HFA 10-2 vs TEMPO 10-2

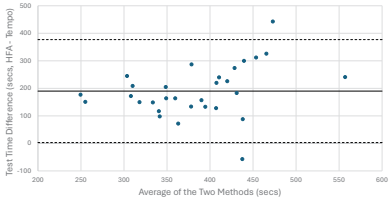

TABLE 1
Test times for HFA and TEMPO using 24-2 and 10-2 protocols

	HFA	TEMPO
24-2	442 sec	287 sec
10-2	514 sec	324 sec

TABLE 2
Test times for HFA and TEMPO using 24-2 in mild, moderate, and severe glaucoma

Glaucoma Severity	HFA	TEMPO
Mild	375 sec	226 sec
Moderate	396 sec	253 sec
Severe	466 sec	316 sec

TABLE 3
Comparison of mean test time differences for the HFA and TEMPO

Reliability Measure and Testing Paradigm	Mean Differences (HFA minus TEMPO)	P-value	95% Limits of Agreement
Test time 24-2	155.5 secs	<0.0001	16.5 to 295.0
Test time 10-2	190.3 secs	<0.0001	3.1 to 377.5

CONCLUSION

This study was the first to compare TEMPO test time with HFA using the 10-2 protocol, and it found a significantly reduced test time for TEMPO. Additionally, the results confirmed earlier findings of significantly shorter testing times with TEMPO for the 24-2 protocol. Furthermore, TEMPO tended to yield faster test times than HFA across all stages of glaucoma severity.

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Comparison of Reliability Indices Between Two Static Automated Perimeters

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BACKGROUND

Static automated perimetry is considered the gold standard for detecting vision loss secondary to glaucoma. The reliability of visual field testing is based on three reliability indices: fixation losses (FL), false positives (FP) and false negatives (FN). Previous studies have demonstrated reduced testing time and improved repeatability with a novel, binocular tabletop perimeter.

PURPOSE

This study evaluated the reliability indices in glaucomatous eyes between the Humphrey Field Analyzer (HFA) (Carl Zeis Meditec, Dublin, California) and the TEMPO/IMOvifa (Topcon Healthcare/ CREWT Medical Systems, Tokyo, Japan).

METHODS

In this prospective, single-center study, 67 glaucomatous eyes from 36 subjects were tested at the Illinois Eye Institute at the Illinois College of Optometry in Chicago, Illinois. Patient ages ranged from 50 to 86 years old. HFA and TEMPO/ IMOvifa testing with 24-2 and 10-2 test strategies were performed on the same day, with testing order randomized by subject number. Reliability criteria were established by Humphrey Instruments, Inc. as less than 20% FL and less than 33% FP or FN errors. The right eye was used for statistical analysis, but when right eye data was unavailable, left eye data was used. Bland-Altman plots were used to evaluate reliability indices between devices. Fixation losses were given as percents on TEMPO. Fix quotients were used to calculate the percentage of fixation losses for HFA.

RESULTS

Thirty-six eyes were used for comparison (31 OD, 5 OS). Bland-Altman (difference vs means, HFA minus TEMPO/IMOvifa) analyses tended to show larger mean values on HFA as compared to the TEMPO/ IMOvifa relative to all comparisons, with statistically significant differences for FL (P=0.001), FP (P=0.001), and FN (P<0.0001) on the 24-2 test strategy and for FN (P=0.001) on the 10-2 test strategy (Table 1). Differences were not significantly different (P>0.05) for FL and FP on the 10-2 test strategy. For all comparisons except for FL on the 10-2 test strategy, there was a preponderance of subjects who showed higher values with the HFA testing as compared to when tested with the TEMPO/ IMOvifa device (Figures 1-3).

TABLE 1

Mean differences and limits of agreement for the reliability indices, comparing the two devices. The mean biases were statistically significant for several values.

Reliability Measure and Testing Paradigm	Mean Differences (HFA minus TEMPO)	P-value	P-value
Fixation 24	12.4	0.001	-44.1 to 68.9
Fixation 10	2.7	0.14	-23.8 to 29.1
False Positive 24	2.2	0.001	-7.4 to 11.8
False Positive 10	1.6	0.098	-7.8 to 10.9
False Negative 24	5.4	<0.001	-6.2 to 17.0
False Negative 10	2.8	0.001	-7.5 to 13.2

FIGURE 1

Difference vs means plots (HFA minus TEMPO/IMOvifa) on fixation losses (%) for 24-2 (left) and 10-2 testing patterns (right). The mean bias was statistically significant for the 24-2 test strategy, with the HFA giving higher values compared to the TEMPO/ IMOvifa perimeter.

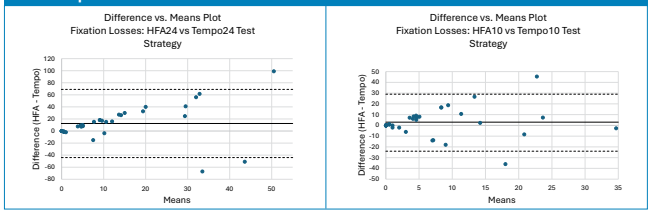


FIGURE 2

Difference vs means plots (HFA minus TEMPO/IMOvifa) on false positive values (%) for 24-2 (left) and 10-2 testing patterns (right). The HFA tended to have higher false positives with a preponderance of higher values, especially for the 10-2 strategy.

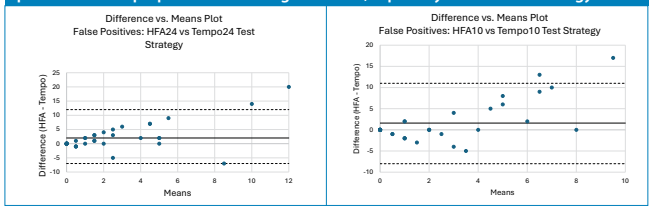
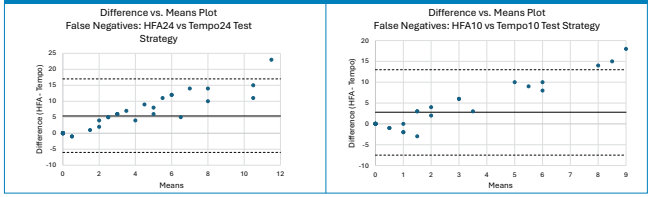


FIGURE 3

Difference vs means plots (HFA minus TEMPO/IMOvifa) on false negative values (%) for 24-2 (left) and 10-2 testing patterns (right). The HFA tended to have higher false negatives with a preponderance of higher values for both test strategies. Marked skewdness was observed.



CONCLUSIONS

These initial analyses indicate that TEMPO/ IMovifa and HFA tend to show differences with respect to reliability indices. In general, for the FL, FP, and FN indices, the HFA tended to exhibit higher values as compared to the TEMPO/IMOvifa. Therefore, test reliability on similar patients may vary depending on the testing instrument.

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Epithelial Bullae as Initial Presentation of HSV Endotheliitis

Reneta Simeon, OD, Brittney Brady OD, FAAO, Courtney Luce, OD

INTRODUCTION

A pseudophakic patient with significant bullous keratopathy experiences a rapid increase in IOP which becomes unresponsive to hypotensive treatment. HSV endotheliitis, with secondary trabeculitis, was diagnosed and successfully managed with antiviral therapy and topical steroids.

CASE PRESENTATION

CASE HISTORY:

- 76-year-old African American female
- CC: moderate eye pain and lid swelling OS with distortion of vision for the past 3 days
- POH: Pseudophakic OU, Dry Eye OU
- PMH: hypertension, type 2 diabetes mellitus, hyperlipidemia, arthritis, seasonal allergies
- Meds: lisinopril, Januvia, hydrochlorothiazide, glipizide, Eliquis, Diltiazem, atorvastatin, fluticasone, metoprolol succinate

CLINICAL FINDINGS

TABLE 1
Exam findings at patient's initial visit.

	OD	OS
Visual Acuity	20/20-	**20/400 @ 8ft, PHNI**
Pupils	PERRL, (-) APD	**2+ Reactive, (-) APD**
CVF	FTFC	FTFC
EOMs	FROM	FROM, pain in right gaze
Adnexa	Normal, 2-3+ collarettes	1+ scurf
Conjunctiva/ Sclera	White and quiet	3-4+ diffuse injection, (-) circumlimbal flush
Cornea	2-3+ diffuse guttata, arcus	**4+ diffuse hazy edema, large central bullae w/o rupture, I>S, (-) NaFL staining**
Angles	GR 3-4 N/T	GR 3-4 N/T
Anterior Chamber	Deep and quiet	**Poor view due to corneal haze**
Iris	Normal, (-) NVI	Normal (hazy view)
Lens	PCIOL clear and centered	PCIOL clear and centered (hazy view
IOP	**15 mmHg**	**20 mmHg**

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FIGURE 1
Anterior segment photos of the left eye at initial presentation show diffuse bullae across the cornea without rupture. No epithelial staining seen with sodium fluorescein.

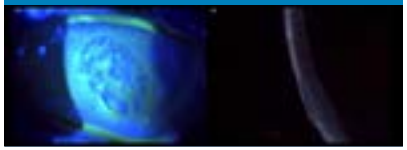
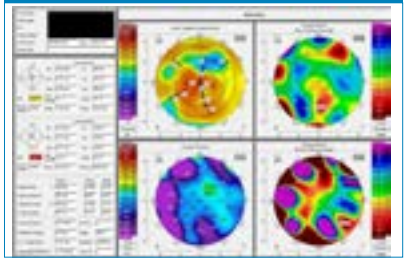


FIGURE 2
Pentacam tomography of the left eye showing a global increase in elevation across the cornea and an increase in pachymetry as well.



IMAGING

- Pentacam (Figure 2)
  - OD: normal, 532 um central pachymetry
  - OS: global topographical elevation, 645 um central pachymetry, max pachymetry of 837 um inferiorly
- Anterior Segment OCT (Figure 3)
  - OD: normal, 550 um central pachymetry
  - OS: diffuse corneal thickening, confluent bullae, no ruptured bullae or break in Descemet's, central pachymetry 718-836 um, no cells in the anterior chamber

DIFFERENTIAL DIAGNOSIS

- Pseudophakic Bullous Keratopathy
- Fuchs Endothelial Dystrophy
- Angle Closure
- Posner-Schlossman Syndrome
- Viral Endotheliitis

TABLE 2
Exam findings at follow-up visits.

	Day 2	Day 3	Day 4
VA	20/400, PHNI	**20/400, PHNI**	**20/400, PHNI**
Pupils	**2+ Reactive, (-) APD**	**2+ Reactive, (-) APD**	**2+ Reactive, (-) APD**
Conjunctiva/ Sclera	3-4+ diffuse injection, (-) circumlimbal flush	3-4+ diffuse injection, (-) circumlimbal flush	4+ diffuse injection
Cornea	**4+ diffuse hazy edema, 2+ diffuse bullae, (-) NaFl staining**	**4+ diffuse hazy edema, 1-2+ diffuse bullae, (-) NaFl staining**	**4+ diffuse hazy edema, 1+ diffuse bullae, (-) NaFl staining**
Angles	GR 3-4 N/T	GR 3-4 N/T	GR 3-4 N/T
Anterior Chamber	**Poor view due to corneal haze**	**Poor view due to corneal haze**	**Poor view due to corneal haze**
Iris	Normal (hazy view)	Normal (hazy view)	Normal (hazy view)
IOP	**21 mmHg**	**31 mmHg**	**37 mmHg**

FIGURE 3
Anterior Segment OCT OS showing confluent epithelial bullae but no visible break in Descemet's membrane.

DISCUSSION

As the fellow eye showed diffuse guttae and given the patient's recent history of cataract surgery, an initial diagnosis of Fuchs endothelial dystrophy was made. The patient was started on topical sodium chloride 0.5%. The bullae responded quickly to treatment at the 1-day follow-up and continued to do so for the next few days. The lack of epithelial ulceration, corneal neovascularization or visible anterior chamber reaction did not suggest HSV initially. However, with the rapid rise in IOP at subsequent visits, suspicion of an underlying inflammatory or infectious etiology developed. Initially, topical therapy showed some ability to lower IOP, but eventually the patient became unresponsive to topical and oral hypotensive therapies. The unilateral nature of the condition and elevated IOP most supported herpetic etiology. The lack of epithelial staining or focal stromal involvement suggested herpetic endotheliitis specifically.

TREATMENT AND MANAGEMENT

Initially, sodium chloride 0.5% QID OS and 1000mg po Vitamin C were prescribed, and the patient followed the next day. There was an improvement in the bullae appearance and a decrease in global pachymetry per Pentacam and anterior segment OCT. On day 3, the increase in IOP was lowered in office. Brimonidine-timolol, cyclopentolate, and pred acetate were prescribed with new suspected inflammatory etiology. The patient was unable to obtain the prescribed medications before the next-day follow-up where IOP continued to rise, reaching a maximum value of 40 mmHg. Gonioscopy was deferred due to corneal haze and risk of rupturing the bullae, but anterior segment imaging showed a structurally open angle. With suspected viral etiology and the IOP now unresponsive to either topical hypotensive therapy or 500mg po Diamox, a referral to ophthalmology was made. The patient was started on Valtrex 500mg po TID (later increased to 1g TID) and dorzolamide TID in addition to the brimonidine-timolol and prednisolone acetate previously prescribed. Considering the patient's demographics and the lack of serology, the Valtrex dosing was later increased to 1g TID to increase coverage for HZV as well. Within a few days of treatment, there was an improvement in IOP, and corneal edema was beginning to resolve. After a few weeks of treatment, IOP was normal, and vision had significantly improved with a marked reduction in the corneal bullae and haze.

CONCLUSION

The presumed progression of this case is that an initial HSV endotheliits lead to diffuse corneal decompensation, stromal edema and epithelial bullae. Although the bullae responded to sodium chloride initially, the immune response to chronic viral cell proliferation escalated to trabeculitis and presumed iritis, causing the rapid rise in IOP that followed. This case highlights that, although rare, herpes keratitis can present initially as epithelial bullae mimicking a bullous keratopathy in contrast to our typical herpetic keratitis. This case demonstrates a clinical situation where clinicians should consider a viral-mediated disruption in endothelial and trabecular meshwork function when presented with unilateral corneal edema and a rise in IOP that is non-responsive to topical and oral hypotensive therapy.

Bibliography (not on poster, available upon request)

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Pathology Pending: Balancing Initial Care and Targeted Treatment of Corneal Ulceration Based on Pathology Results

Kennedy M. Simmons, OD
Associated Eye Care, Stillwater, MN

CASE REPORT

- *49-year-old Caucasian Female*
- *CC: New patient referred by outside provider for pain in left eye*
  - Reports pain, discharge and swollen shut left lid approximately 2 weeks post removal of daily soft contact lens. She went to the ER who referred her to the eye clinic.
- Unremarkable previous OHx or MHx
- Medication: tobramycin ophthalmic solution 0.3% given by ER
- Reports noncompliance with contact lenses including swimming in lenses and frequently sleeping with lenses in multiple nights in a row

RESULTS

- **Initial Presentation 07/11/2024:**

	OD	OS
Visual Acuity	20/20	LP
Pupils	PERRLA	Unable to visualize
IOP	UTT	UTT
Eyelids	WNL	
Sclera/Conj.	WNL	4+ diffuse injection
Cornea	WNL	Complete epi defect and opacification
A/C	WNL	3.2mm hypopyon

FIGURE 1
Initial Encounter

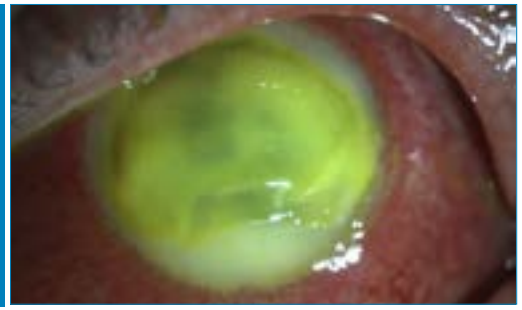


FIGURE 2
6 week follow up

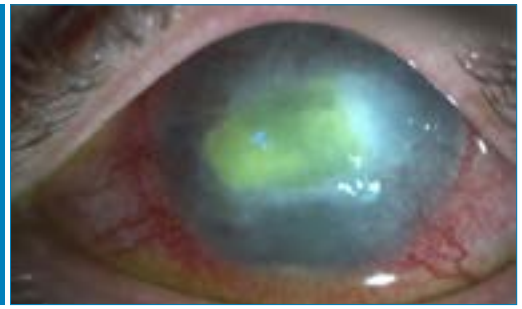
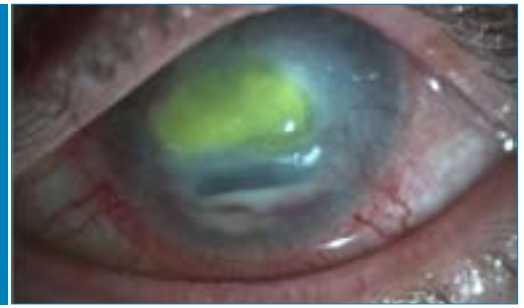


FIGURE 3
2 month follow up



DISCUSSION

- **Initial suspicion:** *Bacterial keratitis* due to a history of *chronic contact lens abuse*
  - However, the patient's swimming habits (especially in lakes) raised the suspicion for amoebic keratitis.
- **Case complexity:**
  - *No insurance* and limited access to care
  - *Frequent tardiness and missed appointments*
  - *Difficulty adhering to* the prescribed treatment regimen
  - Infection was highly aggressive, with symptoms reported for two weeks before the appointment.

TREATMENT/ MANAGEMENT

Initial:
- Fortified vancomycin (25 mg/ml) every hour OS
  - Gram-positive and negative coverage particularly for staph
- Fortified tobramycin 15 mg/ml) every hour OS
  - Gram-negative coverage great for pseudomonas aeruginosa
- Cyclopentolate 1%, twice daily OS
  - Pain relief
- Dorzolamide/timolol, twice daily OS
  - Intraocular pressure (IOP) management.
- Oral doxycycline 100 mg, twice daily
  - Reduce inflammation and aid in bacterial inhibition
- Chilled artificial tears and cool compresses as needed for comfort.

Adjusted treatment post culture results:
- Switched vancomycin to moxifloxacin (fluoroquinolone), every hour OS
  - Extra gram-negative bacteria coverage
- Introduced prednisolone, 3x/day OS, later increased
  - To address inflammation and reduce corneal scarring
- Later changed to Durezol 0.05% 4x/ day due to need for higher strength

CONCLUSION/ CLINICAL PEARLS

- Broad-spectrum coverage is essential, especially for *large ulcers*(>2mm) or those near the central cornea (within 3mm of corneal center)
- Always *consider nonbacterial pathogens*, they shouldn't be ruled out prematurely
- Obtaining a culture is key for accurate pathogen identification and effective treatment
- After identifying the pathogen, promptly transition to *targeted treatment* to optimize patient outcomes

REFERENCES

Available upon request

CONTACT

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Pediatric Treatment Considerations in Combined Hamartomas of the Retina and RPE

Denise Skiadopoulos, OD, FAAO • Raman Bhakhri, OD, FAAO
Chicago, Illinois

INTRODUCTION

Combined hamartoma of the retina and RPE (CHRRPE) is a rare tumor typically diagnosed in childhood. Thought to be congenital in nature, the lesion consists of glial cells, vascular tissue, and areas of retinal pigment epithelial cells.[1] While the lesion is benign, if located at the macula, it can lead to visual complications such as amblyopia, strabismus, and metamorphopsia. This case describes the diagnosis of CHRRPE in a pediatric patient while highlighting potential treatment and management options.

CASE REPORT

A 15-year-old Black male patient presented for a comprehensive eye exam after failing a school vision screening. Systemic history included a slight developmental delay and a spinal cord tumor removed 3 years prior.

TABLE 1
Relevant Clinical Findings

	OD	OS
Best Corrected Visual Acuity	20/20	20/70
Cover Test (D & N)	20pd CLXT with DVD No improvement with full refractive correction	
Dilated Fundus Exam	Unremarkable (Figure 1)	Elevated macular lesion with fibrosis and traction (Figure 2)
Macular OCT with 5-line Raster	Unremarkable (Figure 3)	Epiretinal membrane and disorganization of the retinal layers (Figure 4)

FIGURE 1
Fundus Photo OD

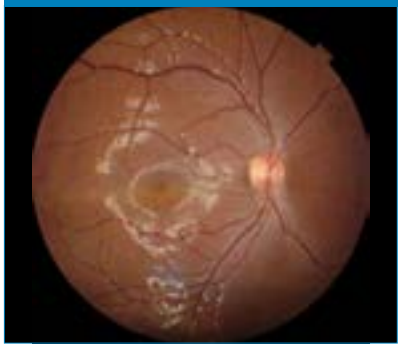


FIGURE 2
Fundus Photo OS

FIGURE 3
OCT OD

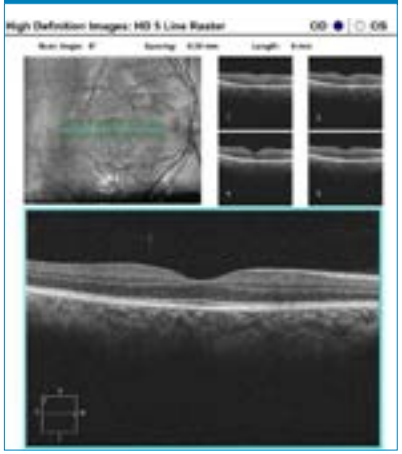
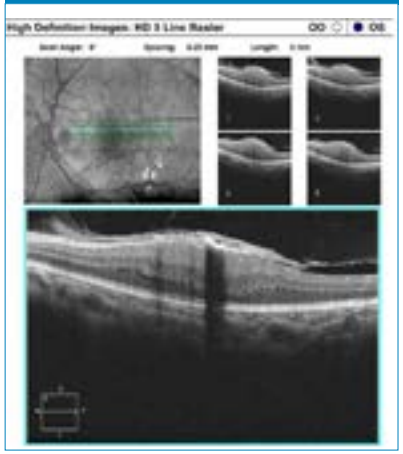


FIGURE 4
OCT OS



A tentative diagnosis of **CHRRPE** with **secondary deprivation amblyopia** and **sensory exotropia** was made. A polycarbonate spectacle prescription was released for full time wear, and the patient was referred to a retinal specialist. The retina specialist confirmed the diagnosis and elected to observe the patient, with vitrectomy with a membrane peel as potential treatment options to be considered in the near future. At the next follow-up visit with pediatric optometry in three months, occlusion therapy and a pediatric vision rehabilitation referral will be considered. The question of whether this is a case of deprivation amblyopia with sensory exotropia vs. strabismic amblyopia in the presence of CHRRPE will continue to be explored.

CONCLUSION

This case illustrates the many detrimental effects a CHRRPE could cause. Treatment varies based upon the degree of presentation. While mild cases can be observed, surgical intervention with vitrectomy and membrane peel may be needed in more severe cases to achieve improved vision. However the literature shows that visual acuity may not improve in some patients despite membrane removal.[2] Clinicians should also be mindful that routine follow-up is essential to gauge for possible CHRRPE progression. Most importantly, as most patients are young, amblyopia intervention and pediatric vision rehabilitation referrals are vital in maximizing visual outcomes.

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Unmasking the Great Masquerader: Acute Syphilitic Posterior Placoid Chorioretinitis

Husna Syeda, OD; Shelly Kim, OD, FAAO • Chicago, Illinois

INTRODUCTION

Acute Syphilitic Posterior Placoid Chorioretinitis (ASPPC) is a rare but distinctive manifestation of ocular syphilis, caused by the bacterium Treponema pallidum. ASPPC is characterized by large, yellow placoid lesions at the level of the retinal pigment epithelium (RPE), often accompanied by retinal vasculitis and vitritis. Early recognition of these hallmark features is crucial for prompt diagnosis and treatment. This case presents a 49-year-old male with sudden vision loss, ultimately diagnosed with ASPPC and treated with intravenous (IV) penicillin. This case highlights the importance of interdisciplinary collaboration in managing ocular syphilis.

CASE PRESENTATION

A 49-year-old male presented with a complaint of a dark spot in the inferior field of his right eye. His past medical history revealed a lesion in his groin area two years ago which was treated with antibiotics, a period of fatigue last year, drug use for the past ten years but no IV drug use or blood transfusions. He reported having unprotected sexual intercourse with a woman one year prior.

Clinical examination showed best-corrected visual acuity of 20/20 in both eyes, with inferior nasal visual field constriction in the right eye. Dilated fundus examination revealed mild vitritis in the right eye, and white placoid lesions in both eyes. OCT in the right eye showed RPE disruption and ELM atrophy. Fluorescein angiography revealed hyperfluorescence along superior arcades in the right eye, and hyperfluorescence along superior and inferior nasal arcades in the left eye. Laboratory tests confirmed a diagnosis of syphilis with reactive Treponema pallidum particle agglutination (TP-PA), and rapid plasma reagin (RPR) titer of 1:16.

FIGURE 1
Fundus photo of the right eye showed a large white placoid lesion superior temporal to the optic disc

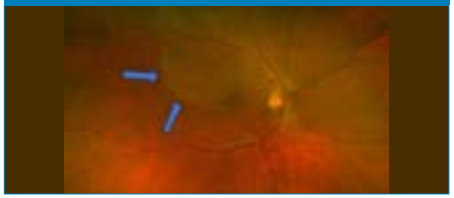


FIGURE 2
Fluorescein angiography of the right eye demonstrated hyper-fluorescence at the optic disc and along the superior temporal arcades, corresponding to the area of the placoid lesion.

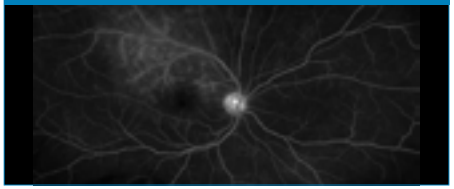


FIGURE 3
Fundus photo of the left eye showed a large white placoid lesion in the nasal retina.

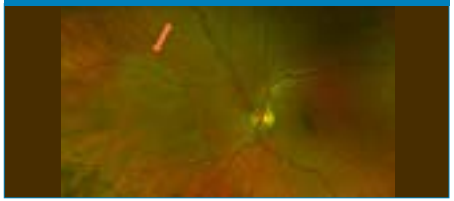


FIGURE 4
Fluorescein angiography of the left eye showed hyper-fluorescence corresponding to the nasal placoid lesion.

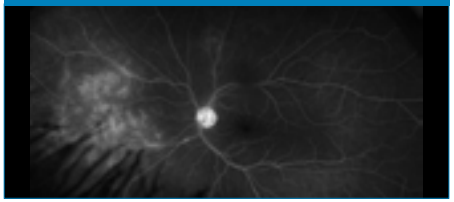


FIGURE 5
OCT showed diffuse loss of the outer ellipsoid zone and nodular irregularity of the retinal pigment epithelium and outer retina OD (green arrows).

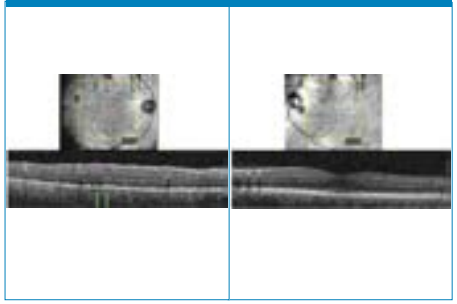
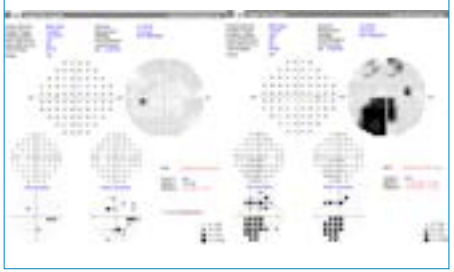


FIGURE 6
There was an absolute defect that extends inferiorly from the horizontal midline OD, which correlated to the location of the placoid lesion. There was a possible inferior nasal defect OS which was not consistent with the location of the placoid lesion.



DISCUSSION

ASPPC is a rare manifestation of syphilitic uveitis and requires prompt recognition to avoid long-term visual sequelae. The presence of placoid lesions at the RPE and retinal vasculitis are hallmark signs that distinguish ASPPC from other posterior uveitic conditions. Early serological testing, including both non-treponemal and treponemal assays, is critical for accurate diagnosis. Ocular syphilis frequently co-exists with neurosyphilis. However, CSF analysis is required to definitively diagnose neurosyphilis. Based on the CDC, the treatment is the same for ocular syphilis and neurosyphilis. The standard treatment involves intravenous penicillin, which effectively crosses both the blood-brain and blood-ocular barriers, addressing both systemic and ocular involvement. In this case, the patient experienced significant visual recovery following treatment.

CONCLUSION

This case emphasizes the importance of recognizing ASPPC as a distinct form of ocular syphilis. The characteristic placoid lesions, combined with serological confirmation, allow for timely diagnosis and treatment. Early diagnosis and treatment are crucial to prevent irreversible vision loss. Successful management requires a multidisciplinary approach, integrating optometry, infectious disease, and neurology to address both ocular and systemic aspects of syphilis.

REFERENCES

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CONTACT
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Deducing Deposits: A Case of Secondary Lipid Keratopathy Following an Infectious Corneal Ulcer

Claire Tashner, OD

SSM Health Davis Duehr Dean – Optometry Residency Affiliate of Illinois College of Optometry; Madison, Wisconsin

BACKGROUND

Secondary lipid keratopathy is a rare but important diagnosis to consider for new onset corneal deposits. Secondary lipid keratopathy develops from corneal neovascularization leaking lipid deposits into the corneal stroma, resulting in corneal haze and reduced vision[1]. Differentiating between secondary lipid keratopathy versus other causes of corneal deposits is critical because there are effective treatment options available to treat secondary lipid keratopathy and improve the patient's visual potential/prognosis.

CASE DETAILS

- 44 year old white female
- CC: Blurry vision and photophobia OD. Onset 1 week ago. Denies pain or discharge.
- Ocular History:
  - o Pseudomonas positive contact lens induced corneal ulcer OD 6 months prior
    - Treated with ciprofloxacin, tobramycin, and later prednisolone with reported resolution after 2 months but a residual stromal scar OD
    - Patient was lost to follow up after corneal ulcer resolution and self-discontinued topical steroid therapy, returning 4 months later with the present symptoms
  - o Contact lens abuse OU
    - (+) sleeping in lenses, (+) rinsing with tap water, (+) extending lens replacement schedule
- Medical History: Anxiety, bipolar disorder, depression, ADHD
- Medications: Adderall, albuterol, fluoxetine, Norco, Lithium, Mirapex
- Allergies: None

PERTINENT CLINICAL FINDINGS

TABLE 1	OD	OS
BCVA	20/40 PH 20/30	20/20
SLE Cornea	Moderate density temporal scar with variable thinning, 2 prominent vessels of stromal neovascularization at 8 and 10 o'clock, additional haze temporal to leading edge of granular deposits; epithelium intact, no NaFl staining	Clear
Anterior chamber	Deep and quiet	Deep and quiet
IOP (Tonopen)	13	12
DFE	Unremarkable	Unremarkable
Slit Lamp Photos	2 large trunks of anterior stromal neovascularization in the temporal cornea branching centrally and encroaching the visual axis; adjacent granular deposits fanning out from the leading edge of the corneal neovascularization branches (See Figures 1,2)	N/A

DIFFERENTIAL DIAGNOSES AND DISCUSSION

- Secondary lipid keratopathy
- Primary lipid keratopathy
- Infectious corneal ulcer
- Band keratopathy
- Schnyder corneal dystrophy
- Drug induced corneal deposits

Lipid keratopathy is identified as lipids depositing in the cornea, commonly found adjacent to corneal neovascularization due to the increased vessel permeability of the new vessels[1]. These fat deposits lead to corneal clouding and reduced visual acuity. Primary lipid keratopathy is typically a bilateral condition whereas secondary lipid keratopathy is often unilateral and associated with corneal damage from infection, inflammation, or trauma that results in corneal neovascularization[1,2]. The lipid deposits in secondary lipid keratopathy deposit in a disc pattern and fan out from the neovascular vessels as globular or granular shaped deposits[1,3]. Any condition that can result in corneal neovascularization can lead to secondary lipid keratopathy, allowing for many etiologies. The patient had the associated signs of granular deposits fanning out from adjacent corneal neovascularization. It presented unilaterally in the eye that had a previous corneal infection. No active infection was present, and no medications were taken that are known to cause corneal deposits[4].

FIGURE 1
Slit lamp photo of right cornea, initial presentation

FIGURE 2
Slit lamp photo of right cornea, initial presentation

FIGURE 3
Slit lamp photo of right cornea, 1 month follow up

FIGURE 4
Slit lamp photo of right cornea, 1 month follow up

TREATMENT AND MANAGEMENT

Treatment of secondary lipid keratopathy involves treating corneal neovascularization. Topical steroids are the standard first line of treatment to reduce the inflammatory factors that stimulate neovascular development[1]. If steroid therapy is not sufficient in reducing the lipid keratopathy, other options include photodynamic therapy, needlepoint cautery, argon laser treatment, mitomycin intravascular chemoembolization, and penetrating keratoplasty[1,5,6]. It is important to obtain regular IOP measurements and ocular health evaluations to reduce the risk of steroid side effects such as cataracts and glaucoma[6]. Specialty lenses should be considered in management to improve vision from persistent corneal scarring and irregular astigmatism after lipid keratopathy treatment[7].

Topical corticosteroid therapy was initiated in the patient's right eye. After 1 month, vision had improved to 20/25 OD. The patient's symptoms improved and slit lamp photos documented the corresponding regression of corneal neovascularization and lipid deposits (see Figure 3,4). Steroid therapy was tapered, and 1 month later vision and examination findings were still stable (see Table 2). Specialty contact lenses were discussed but the patient was happy with their resulting vision and deferred contacts.

TABLE 2	Initial Visit	Visit 1 month later	Visit 2 months later
BCVA	OD: 20/40 PH 20/30 OS: 20/20	OD: 20/25 PHNI OS: 20/20	OD: 20/25 PHNI OS: 20/20
IOP (Tonopen)	OD: 13 OS: 12	OD: 11 OS: 12	OD: 13 OS: 13

CONCLUSION

In patients with complaints of unilateral reduced vision following previous corneal insult, secondary lipid keratopathy should be considered as a differential diagnosis. Corneal neovascularization can be treated with first line topical corticosteroid therapy to suppress inflammatory cells that mediate new vessel growth, which in turn reduces lipid deposition and corneal clouding that can affect vision clarity and quality.

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Effect of Blink Rate and Visual Setting on Binocular Vision Measurements in Young Adults

Zhiming Tu; Yi Pang, OD, PHD, FAAO
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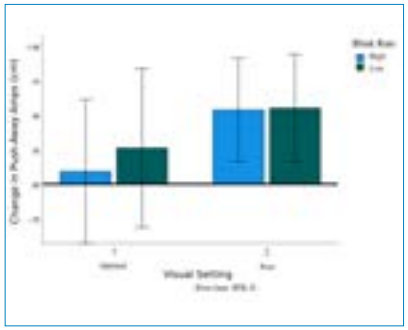
INTRODUCTION

Digital Eye Strain (DES) is a group of vision-related problems that are aggravated by digital screen use. Previous research suggests that a reduced blink rate and poor visual settings are major risk factors for developing symptoms of DES. The purpose of this study was to investigate the effect of blink rate and visual setting on binocular vision measurement in young adults between the age of 21 to 35 years old.

TABLE 1
Experimental Conditions and Parameters

Condition	Description
Optimal Visual Setting	60cm working distance, photopic condition (lux=200)
Poor Visual Setting	30cm working distance, scotopic condition (lux=0)
High Blink Rate	20 blinks per minute, instruction given to blink fully
Low Blink Rate	10 blinks per minute, no instructions given
Controlled Factors	Screen brightness (lux=300), Standard IEI Humidity, Viewing Angle 30° below eye level

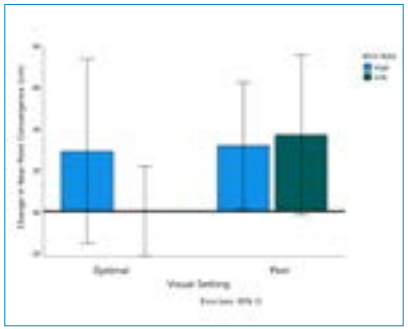
FIGURE 1
Means of Accommodative Amplitude



METHODS

This study recruited 38 young adults with a mean age of 25.9 ±2.9 years. Each participant was asked to watch a 15-minute video in four different conditions in which a high or low blink rate was paired with an optimal or poor visual setting. The four test conditions were randomized. The optimal visual setting was a working distance of 60cm in photopic condition (Lux=200). The poor visual setting was a working distance of 30cm in scotopic condition (Lux=0). The high blink rate was defined as 20 blinks per minute and the low blink rate was 10 blinks per minute. In the high blink rate condition, participants were also instructed to blink fully. The following binocular vision measurements were tested before and after each trial: accommodative amplitude with the pull-away method and near point convergence (NPC). Two-way repeated measures ANOVA was performed to determine whether blink rate and visual setting affected the binocular vision measurements.

FIGURE 2
Means of Near Point Convergence



RESULTS

At baseline, the mean accommodative amplitude was 12.04 ± 3.04 cm and NPC break was 6.68 ± 4.91 cm. No statistically significant difference in accommodative amplitude or NPC break was found when comparing high blinks to low blinks and comparing optimal to poor visual settings (all Ps > 0.05). The changes in binocular vision measurements from baseline are listed in Table 2.

DISCUSSION

- Similar recent studies have yielded mixed results, with limited evidence suggesting that changes in accommodative amplitude or NPC changes can be measured immediately after screen viewing.
- Interestingly, studies have found that those who self-report high amounts of DES symptoms tend to also have a reduction in accommodative amplitude and NPC when compared to those who self-report low amounts of DES symptoms.

TABLE 2
Change of Accommodation Amplitude and NPC from Baseline (N=38, Mean ± SD)
in Different Visual Settings and Blink Rates

Visual Setting	Blink Rate	Pull-Away Amps	Near Point of Convergence (cm)
Optimal	High	0.09 ± 0.26	0.04 ± 0.04
	Low	0.26 ± 0.29	0.01 ± 0.05
Poor	High	0.54 ± 0.19	-0.05 ± 0.07
	Low	0.55 ± 0.19	0.03 ± 0.07

Note: A positive value indicates an increase in value whereas a negative value indicates a decrease.

- These findings suggest that while short term screen use may not immediately cause binocular vision changes such as accommodative amplitude or NPC, there may still be cumulative effect of prolonged screen use. Future studies should investigate the effect of prolonged screen use on binocular vision measurements.

CONCLUSION

Viewing digital screen with either low blink rate or poor visual setting (short working distance and scotopic condition) for 15 minutes did not significantly change binocular vision measurements including accommodative amplitude and NPC.

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Development and Evaluation of Repeatability of Pediatric Dry Eye Questionnaire in Children Aged 5 to <18 Years

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PURPOSE

Our previous study found that 16.9%, 8.8%, and 12.5% of the children aged 5 to <18 years have mild, moderate, and severe dry eye symptoms. We developed a new Pediatric Dry Eye Questionnaire (PedDEQ) which was designed to measure dry eye symptoms in children. The purpose of this study was to determine the repeatability of PedDEQ in measuring dry eye symptoms in children compared to dry eye questionnaire (DEQ-5).

METHODS

A total of 59 children aged 5 to <18 years were recruited from Illinois Eye Institute, a primary eye care clinic. Demographic characteristics of participants are listed in Table 1. Children were surveyed on dry eye symptoms using both the PedDEQ and DEQ-5. PedDEQ consisted of a total of 10 questions (Table 2). PedDEQ score was calculated using the following formula: total score x 25 / total number of questions answered with a minimum score of 0 and a maximum score of 100. The minimum and maximum score of DEQ-5 was 0 and 22. All participants were retested with both questionnaires in 30 minutes to measure the repeatability. Both questionnaires were read to the children by one of the authors and tested in randomized sequences in first and second administration. Repeatability of both PedDEQ and DEQ-5 between two administrations was evaluated using both 95% limits of agreement and Intraclass Correlation Coefficient (ICC). To determine relationships between PedDEQ and DEQ-5 performance, Spearman Rank Correlation was performed.

TABLE 1
Demographic Characteristics of Participant (n= 59)

Age (mean ± SD)	11.7±2.6 years
Sex	49.2% Males 50.8% Females
Race/ Ethnicity	0% Non-Hispanic White 43.9% Asian 33.3% Black 21.1% Hispanic 1.8% Multiracial
Screen Time (hours/day)	5.20 ± 3.08 (reported by parent)
Outdoor time (hours/day)	1.85 ± 1.74 (reported by parent)

TABLE 2
Pediatric Dry Eye Questionnaire

Please answer the following questions based on the past week, including today.

	All the time	Most of the time	Half of the time	Some of the time	None of the time
1. How often do you rub your eyes?	4	3	2	1	0
2. How often do your eyes feel painful?	4	3	2	1	0
3. How often do your eyes feel tired?	4	3	2	1	0
4. How often do you feel like there is something in your eye (like sand or dirt)?	4	3	2	1	0
5. How often are your eyes uncomfortable at nighttime?	4	3	2	1	0
6. When you are reading or doing close work (like using phone, iPad, book or computer), how often do your eyes feel uncomfortable?	4	3	2	1	0
7. When it's really bright, like when you're in the sun, how often do your eyes feel uncomfortable?	4	3	2	1	0
8. How often do you blink or close your eyes on purpose to make your eyes feel better?	4	3	2	1	0
9. How often do you have to blink on purpose in order to see better?	4	3	2	1	0
10. When you're not crying, how often do your eyes feel watery or teary?	4	3	2	1	0

Total score: _____ = 4 x (_____) + 3 x (_____) +2 x (_____) +1 x (_____)
Calculated Score: _____= total score x 25 / total number of questions answered

TABLE 3
DEQ-5

FIGURE 1
95% limits of agreement for PedDEQ was ±17.1 (range: 0-100). ICC was 0.92 (95% CI: 0.87-0.95)

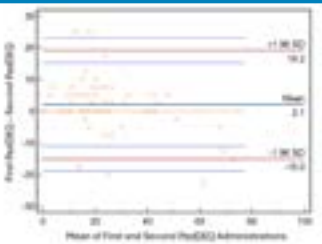


FIGURE 2
95% limits of agreement for DEQ-5 was ±5.4 (range: 0-22). ICC was 0.83 (95% CI: 0.71-0.90)

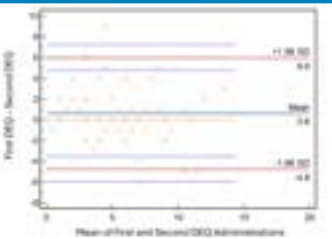
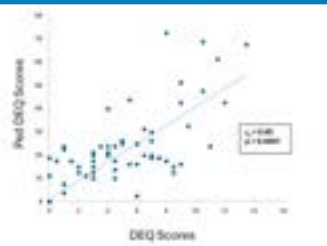


FIGURE 3
Correlation of PedDEQ and DEQ-5 scores



RESULTS

- The mean (SD) age of participant was 11.7±2.6 years. Average scores of PedDEQ and DEQ-5 were 25.4±14.4 and 5.6±3.6 respectively for the 1st administration, and 23.1±18.3 and 5.0±3.6 for the 2nd administration.
- The 95% limits of agreement were ±17.1for PedDEQ and ±5.4 for DEQ-5. Because of the scale difference between PedDEQ (range: 0-100) and DEQ-5 (range: 0-22), the 95% limits of agreement was also expressed in percentage: ± 17.1% for PedDEQ and ± 25.8% for DEQ-5. ICC was 0.83 (95% CI: 0.71- 0.90) for DEQ-5 and 0.92 (95% CI: 0.87-0.95) for PedDEQ.
- Statistically significantly positive correlation was found between PedDEQ and DEQ-5 ($r_s = 0.65$, $p < 0.0001$).

CONCLUSION

Both the DEQ-5 and PedDEQ demonstrated a good test-retest repeatability and reliability. Our findings suggest that both DEQ-5 and PedDEQ may be used to evaluate dry eye symptoms in children aged 5 to <18 years.

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Keywords: dry eyes, symptoms survey, ocular surface disease index

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Metric Comparison Between Two Perimeters for the Central Visual Field

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INTRODUCTION

A compact, tabletop perimeter is now available which does not require a dark room and can be performed binocularly. Previous studies have demonstrated a reduced testing time of up to 39 percent and showed good agreement to the Humphrey Field Analyzer for the central 24 degrees with a focus on Caucasian and Asian populations. The purpose of this study was to compare the performance of this new device, TEMPO, to the Humphrey Field Analyzer in the central 10 and 24 degrees of the visual field in a cohort of primarily African American glaucoma patients.

METHODS

A prospective, single center study was conducted at the Illinois College of Optometry/Illinois Eye Institute, Chicago, Illinois. Inclusion criteria included: best corrected visual acuity of 20/40 or better in each eye, a diagnosis of glaucoma in one or both eyes, refractive error within -8.00 to +3.00 diopter sphere or cylinder up to 2 diopters, and no history of significant non-glaucomatous ocular disease. Glaucoma was staged as mild, moderate, or severe, based on the Medicare staging system. Perimetry testing of the central 10 and 24 degrees was performed using both the TEMPO/IMOvifa (Topcon Healthcare/CREWT Medical Systems, Tokyo, Japan) AIZE-Rapid program and the Humphrey Field Analyzer (HFA) (Carl Zeis Meditec, Dublin, California) SITA-Fast algorithm. Testing order was randomized by subject number. Main outcome measures included mean deviation (MD) and pattern standard deviation (PSD). The correlation was evaluated using linear regression and limits of agreement based on Bland-Altman analysis. A brief patient preference survey was performed immediately following testing.

RESULTS

Measurements from 67 eyes for the 24-2 and 68 eyes for the 10-2 of 38 glaucoma patients were compared (age range 39-86yrs). Patient demographics are described in Table 1. One subject only completed 10-2 testing. 14 eyes had mild glaucoma, 28 eyes had moderate glaucoma, and 26 eyes had severe glaucoma. Measurements positively correlated between the devices for both the 24-2 and 10-2 tests with Pearson's r = 0.89, and 0.88 for MD respectively, and 0.88 and 0.96 for PSD respectively (Figure 1). There was a strong linear correlation between devices with R2 = 0.80, 0.77 for MD and PSD in the 24-2 test and R2 = 0.77 and 0.93 for MD and PSD respectively in the 10-2 test (Figure 2). There was less than 1dB offset between devices and limits of agreement fell within + 6dB. Patient survey data revealed a strong preference, 92.1%, for TEMPO over HFA.

TABLE 1
Participant Demographics

Gender		**Age**	
Male	18	30-39	1
Female	20	40-49	0
Race		50-59	10
Black	35	60-69	13
White	2	70-79	11
Asian	1	80-89	3
Ethnicity			
Hispanic	2		
Non-Hispanic	36		

FIGURE 1
Bland-Altman analysis of MD and PSD for the TEMPO® and HFA® for central 10-2 and 24-2 testing patterns.

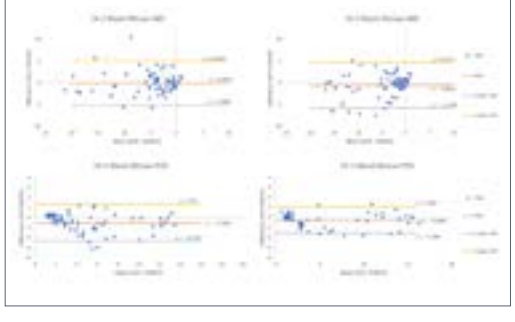
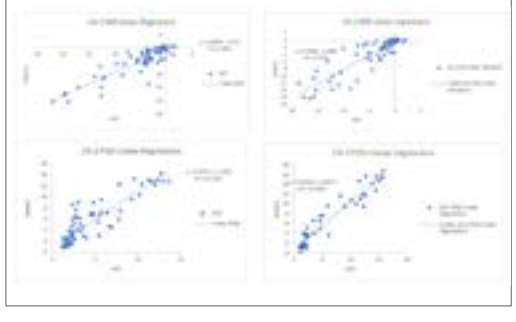


FIGURE 2
Linear Regression analysis of MD and PSD for the TEMPO® and HFA® for central 10-2 and 24-2 testing patterns.



CONCLUSIONS

This study presents clinical results comparing perimetry testing using the new compact, binocular, tabletop TEMPO perimeter to the HFA for glaucoma patients in a primarily African American cohort. The results provide insight into the accuracy of visual field defects between the two devices. TEMPO was found to have comparable results to HFA for both 24-2 and 10-2 testing patterns, and a clear patient preference for TEMPO was identified. These results are unique and valuable as previous studies have not investigated performance in the central 10 degrees. Additionally, while prior studies focused on Caucasian or Asian populations, this study expands to include a new demographic.

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Accuracy of Glaucoma Detection with a Novel Imaging Device: Combined UWF-SLO and SD-OCT

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INTRODUCTION

To determine the diagnostic accuracy of OCT measurements for detecting glaucoma in a new imaging device with glaucoma patients and age-matched controls. The Monaco (Optos PLC, Dunfirmline UK) is a novel imaging device that combines UWF-SLO and SD-OCT. Diagnostic accuracy for currently available SD-OCT devices has previously been reported1,2,3. In this study we reported on various OCT measures of the optic nerve head (ONH), retinal nerve fiber layer (RNFL) and ganglion cell complex (GCC) for the Monaco.

METHODS

Subjects were imaged on the Monaco device after signing an IRB approved consent and undergoing a complete clinical examination to confirm eligibility and diagnosis. OCT measurements including RNFL, GCC, and ONH were compared from 33 glaucoma patients and 33 age-matched healthy controls. Glaucoma was defined as having reliable visual field (VF) loss consistent with glaucoma as well as optic nerve damage consistent with glaucoma. VF mean defects ranged from -2.5B to -15.50dB and serve as an indication of glaucoma severity in this limited sample size. Of the 33 glaucoma patients 12 were mild stage, 12 moderate and 9 severe stage, based upon the CMS Staging/Severity Scale. Diagnostic accuracy was determined using area under the ROC curves.

FIGURE 1

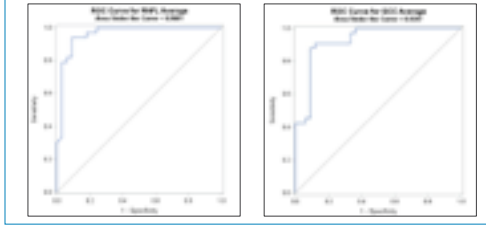


FIGURE 2

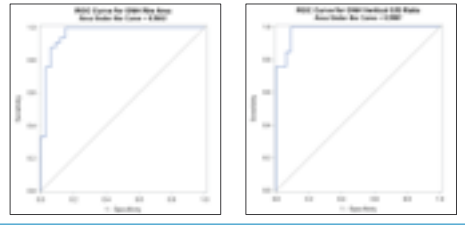


FIGURE 3

Example Fundus Photo (UWF) and Visual Field Test on Subject with Moderate Stage Glaucoma

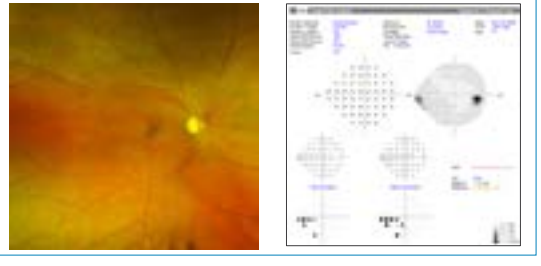


FIGURE 4 Monaco SD-OCT Imaging of the Same Subject

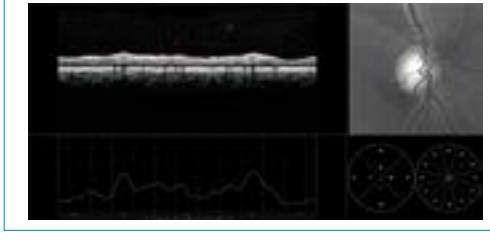
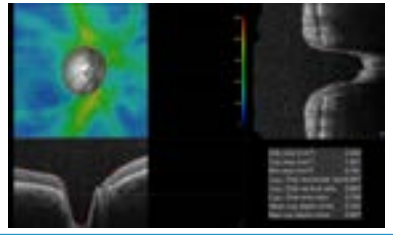


FIGURE 5 Monaco SD-OCT Imaging of the Same Subject



RESULTS

Mean age of the glaucoma patients was 63.5 years of age +/- 9.1 SD and the mean age of the healthy subjects was 57.2 years of age +/- 10.9. AROCs ranged from 0.82 to 0.98 with the highest generally being the VCDR, Rim Area, Average RNFL, Inferior and Superior RNFL quadrants, and Average GCC. Highest sensitivity and specificity values for optimal cut-offs were for Rim Area (sensitivity 91% and specificity 90%), Vertical C/D (sensitivity 97% and specificity 90%), Inferior RNFL quadrant (sensitivity 88% and specificity 85%), and Average RNFL thickness (sensitivity 94% and specificity 90%).

	Measurement	AROC			AROC			AROC
ONH	Rim Area	**0.96**	**RNFL**	Average	0.96	**GCC**	**Average**	**0.93**
	C/D Vertical	**0.98**		Temporal	0.89		Superior	0.88
	C/D Horizontal	0.91		Superior	0.92		Inferior	0.91
	C/D Area	0.84		Inferior	**0.94**			
				Nasal	0.82			

CONCLUSIONS

Monaco SD-OCT measurements can differentiate healthy from glaucomatous eyes with a high degree of accuracy across a spectrum of patients with different stages of glaucoma.

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Lifestyle Risk Factors for Dry Eye Symptoms in Children Aged 5 to <18 Years

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PURPOSE

To determine whether dry eye symptoms were associated with lifestyle factors including screen time, outdoor activities, diet, and body mass index (BMI) in children aged 5 to <18 years.

METHODS

A total of 160 children presenting at the Illinois Eye Institute were recruited into the study. All children had a comprehensive eye exam. Children were surveyed regarding electronic screen time and a modified, child friendly OSDI.

- **Modified OSDI questions for children:**
  - Q2: ("Eyes that feel gritty") was modified to "feels like something is inside your eyes"
  - Q7: ("Driving at night") was left as "not applicable" as majority of study population does not drive.
  - Q8: ("Working with a computer or bank machine (ATM)") was adjusted to "using an iPad or tablet"
  - Standard OSDI calculation was used (sum of scores for all questions answered x 25 divided by 11 questions answered (since Q7 was "skipped" for all participants)[1]

The examiner was allowed to repeat questions if the child did not understand the question. Parents were surveyed on their child's screen time, diet, and outdoor activity. BMI was calculated using measured height and weight. To determine relationships between OSDI and potential risk factors for dry eye (including age, gender, race/ethnicity, refractive error, screen time, diet, outdoor activity, and BMI), multiple linear regression analyses were performed.

TABLE 1
Demographics and Average Screen Time, Outdoor Time, and Body Mass Index Level (n = 160)

Age	10.9 ± 3.0
Gender	47.5% Males, 52.5% Females
Race/Ethnicity	2.5% non-Hispanic White, 17.5% Asian, 51.9% African American, 27.5% Hispanic White
Screen Time (hours/day)	9.4 ± 3.1 (reported by children) 8.5 ± 4.1 (reported by parents)
Outdoor Time (hours/day)	2.6 ± 1.9
Body Mass Index	23.2± 6.6

FIGURE 1
OSDI Questionnaire

FIGURE 2
Association between BMI and OSDI Scores in Children

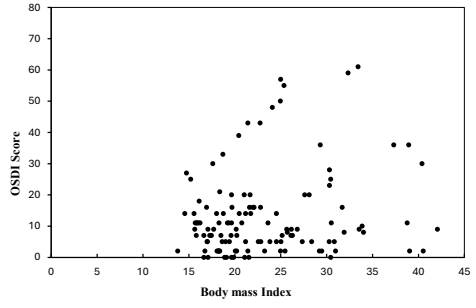
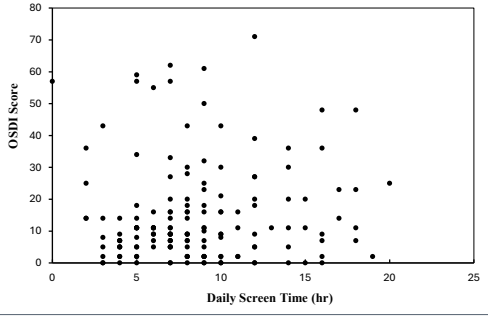


FIGURE 3
No Association between Daily Screen Time and OSDI Scores in Children



RESULTS

Among the 160 children recruited into the study, 76 were boys and 84 were girls (mean age = 10.9 years, ranged from 5.7 to 17.8). Demographics of the participants is listed in Table 1.

- The mean OSDI score was 14.7± 15.2, with 16.9%, 8.8%, and 12.5% of the children having mild, moderate, and severe dry eye symptoms respectively.
- Average screen time per week was 9.2 and 8.5 hours reported by children and parents, respectively, with a statistically significant difference (P= 0.04). Significant correlation was found between the screen time reported by children and parents (rs= 0.40, P< 0.0001).
- Multiple regression showed that high BMI was a significant risk factor for dry eye symptoms (β= 0.16, P = 0.04), Figure 2.
- BMI was significantly correlated with age (rs= 0.54, P< 0.0001) and outdoor activity (rs= -0.24, P= 0.008).
- However, the OSDI score was not associated with age, race, gender, screen time (Figure 3), outdoor activities, and diet (Ps >0.05).

CONCLUSIONS

- High BMI was a significant risk factor for dry eye symptoms in children aged 5 to <18 years.
- Dry eye symptoms were not associated with age, race, gender, screen time, outdoor activities, and diet in children.
- Our findings may assist with defining strategies to prevent dry eye in children.

Key Words: meibomian gland dysfunction, dry eye, symptom survey, non-contact infrared meibography, ocular surface disease index, meibomian gland expression, meibomian gland atrophy

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Repeatability of ETDRS Visual Acuity Test with Black and White Optotypes in Myopic and Non-Myopic Children Aged 8-12 Years

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INTRO/BACKGROUND

The current black optotype on white background (B-on-W) visual acuity tests differ from the white optotype on black background (W-on-B) visual acuity tests with the opposite polarity when considering cortical pathways. We utilized ETDRS visual acuity testing to determine the repeatability of black and white optotype in myopic as compared to non-myopic children aged 8-12 years.

METHODS

A total of 36 children (18 girls and 18 boys) aged 8-12 years were tested utilizing an electronic automated ATS isolated surrounded ETDRS distance acuity chart (M&S Technologies Inc) with both B-on-W and W-on-B testing conditions (Table 1). Participants were tested monocularly at a 3-meter viewing distance. The testing screen was calibrated to a luminance of 90-100 lux. Participants were retested after a 30-minute break (± 15 minutes) and were randomized to their condition order. Only right eye data was used for statistical analysis. Bland-Altman analysis was conducted with a 95% limit of agreement (LoA). Paired T-Tests were implemented to evaluate test and retest. Refractive error cut off for myopic participants was a spherical component in the right eye of <-0.50 D and =/> for non-myopic participants. Independent T-Tests were utilized to compare myopic (n=19) and non-myopic participants (n=17).

TABLE 1
Participant Demographics

		Myopes (n=19)	Non-Myopes (n=17)
Age			
	Mean	10.18	10.25
	Median	10.24	10.52
	Range	8.06 to 12.11	8.17 to 12.28
Gender			
	Males	8	10
	Females	11	7
Refractive Error (SE)			
	Mean	-3.55	0.2
	Median	-3.63	0.25
	Range	-5.75 to -1.38	-0.50 to 0.88

FIGURE 1
Bland Altman depicting agreement of repeatability between test, re-test in black optotype conditions.

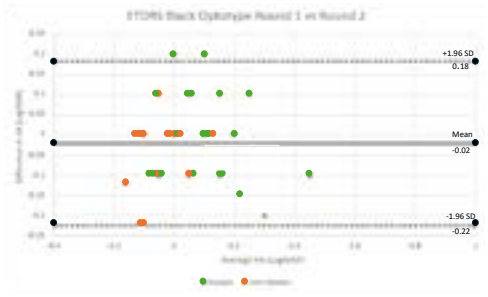


FIGURE 2
Bland Altman depicting agreement of repeatability between test, re-test in white optotype conditions.

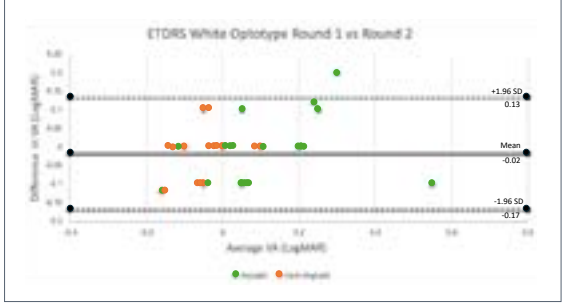
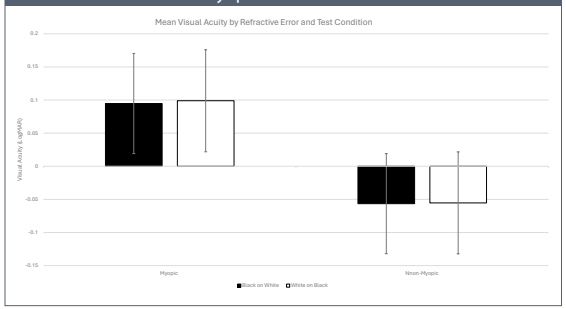


FIGURE 3
Bland Altman depicting agreement of repeatability between black and white optotype conditions.

FIGURE 4
Mean visual acuity compared to refractive error and test condition (black or white optotype). Mean VA in myopes was 0.15 logMAR worse than that in non-myopes



RESULTS

Agreement of repeatability between test and retest shows a 95% LoA of ± 0.20 LogMAR for black optotype (upper LoA = 0.18 and lower LoA = –0.22, mean difference = -0.02, P > 0.05) and ± 0.15 LogMAR for white optotype (upper LoA = 0.13 and lower LoA = –0.17, mean difference = -0.02, P > 0.05) (Figure 1, Figure 2). The agreement of black optotype and white optotype test conditions resulted in a 95% LoA of ± 0.17 LogMAR (upper LoA = 0.15 and lower LoA = -0.19, mean difference = -0.02, P > 0.05) (Figure 3). When comparing myopic with non-myopic children, the myopic group habitual visual acuity was poorer in the black optotype condition (mean difference = -0.14 LogMAR, P < 0.001) and the white optotype condition (mean difference = -0.15 LogMAR, P < 0.001) (Figure 4).

CONCLUSIONS

When using the ATS-ETDRS method, both white and black optotypes are repeatable visual acuity tests in children aged 8-12 years. Thus, we can conclude that either method is an acceptable way to test visual acuity.

DISCUSSION

Some of the strengths presented in our study include use of isolated surrounded ETDRS letters to determine accurate visual acuity and randomization of the order of test conditions between patients. Our study was limited primarily by sample size.

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Repeatability of HOTV Visual Acuity Test with Black and White Optotypes in Myopic and Non-Myopic Children Aged 4-7 Years

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INTRO/BACKGROUND

Cortical processing varies in response to visual stimuli, exhibiting distinct pathways for dark and light inputs. This difference can be observed through visual acuity testing with black optotype on a white background (B-on-W) and white optotype on a black background (W-on-B). The study's purpose was to determine the repeatability of black and white optotype in myopic and non-myopic children aged 4-7 years.

METHODS

A total of 11 children (9 girls, 1 boy, 1 unspecified) aged 4-7 years were tested utilizing an electronic automated ATS surrounded HOTV distance acuity chart (M&S Technologies Inc) with both B-on-W and W-on-B testing conditions (Figure 1). Participants were tested monocularly at a 3-meter viewing distance. The testing screen was calibrated to a luminance of 90-100 lux. Participants were retested after a 30-minute break (+ 15 minutes). Only right eye data was used for statistical analysis. We conducted Bland-Altman analysis with a 95% limit of agreement (LoA) to compare test conditions. Paired T-Tests were implemented to evaluate test and retest. Refractive error cut off for myopic participants was a spherical component in the right eye of < -0.50D and > -0.50D for non-myopic patients. Independent T-tests were utilized to compare LogMAR acuity in myopic (n=3) and non-myopic (n=8) eyes with both black and white optotypes.

RESULTS

Agreement of repeatability showed a 95% LoA between test and retest was ± 0.21 LogMAR for black optotype (upper LoA = 0.22 and lower LoA = −0.20, mean difference = 0.01, P >0.05) and was ± 0.10 LogMAR for white optotype (upper LoA = 0.06 and lower LoA = −0.14, mean difference = -0.04, P=0.04) (Figure 2, Figure 3). The average acuity difference between white optotype and black optotype was −0.03 LogMAR (P > 0.05, Cohen's d = -0.29). The agreement of white optotype and black optotype test conditions results in a 95% LoA of ± 0.17 (upper LoA = 0.13 and lower LoA = -0.20, mean difference = -0.03, P > 0.05). When comparing myopic with non-myopic children, the myopic group habitual visual acuity was poorer than non-myopic patients in the black optotype condition (mean difference = -0.13 LogMAR, P = 0.02), but there was no significant difference in the white optotype condition (mean difference = -0.04 LogMAR, P > 0.05).

FIGURE 1
Participant Demographics: age (years).

FIGURE 2
Bland Altman depicting agreement of repeatability between test, re-test in black optotype conditions.

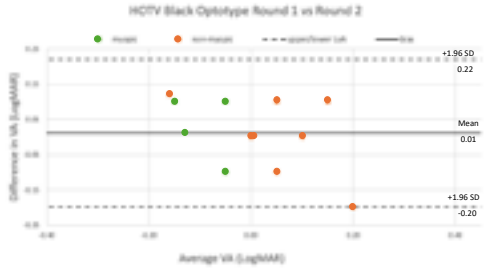


FIGURE 3
Bland Altman depicting agreement of repeatability between test, re-test in white optotype conditions.

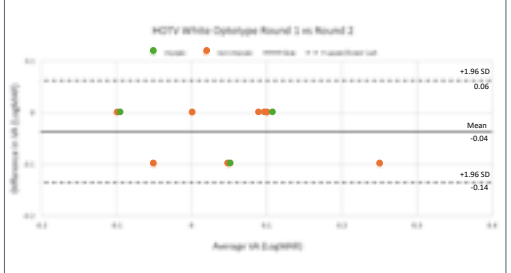
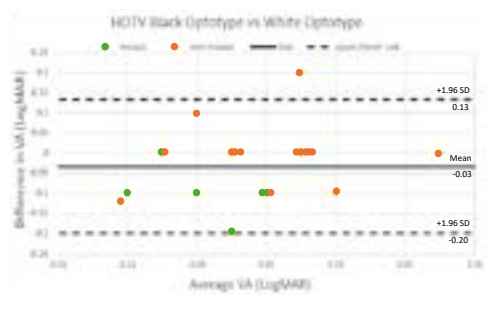


FIGURE 4
Bland Altman depicting agreement of repeatability between black and white optotype conditions.



DISCUSSION

Strengths for our study include the use of crowding bars surrounding single HOTV letters to accurately determine visual acuity and randomization of test conditions among patients. Potential weaknesses for our study center around the age of participants. Myopia tends not to occur until school age, with most children aged 4-7 years slightly hyperopic or emmetropic, limiting our myopic sample size to 3 participants. Children of this age are less reliable participants, accounting for the significant difference in LogMAR between black and white optotype.

CONCLUSION

When using the ATS-HOTV method, the white optotype visual acuity testing is more repeatable than black optotype visual acuity testing in children aged 4-7 years. Potential future applications suggested by this study include the adoption of white optotype visual acuity testing in young children to improve repeatability.

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Poster #: 2684 B0520

Post-Keratoplasty Contact Lens Fitting Considerations

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INTRODUCTION

- A keratoplasty, or corneal transplant, is indicated in cases of corneal ectasia, scarring, edema, dystrophy, trauma, keratitis, or non-clearing bullous keratopathy. It may also be indicated in corneal melt or ectasia with contact lens intolerance.[1]
- Four common corneal transplants are: deep anterior lamellar keratoplasty (DALK), Descemet stripping endothelial keratoplasty (DSEK), Descemet membrane endothelial keratoplasty (DMEK), and full-thickness penetrating keratoplasty (PKP).[2]
- Eyecare providers (ECPs) should consider contact lenses as a vision correction option to meet these patient's visual demands and improve their quality of life.

METHODS

- A retrospective chart review of patients seen at the Illinois Eye Institute (IEI) in Chicago, Illinois, between 2011 and 2022 who reported receiving a corneal transplant in one or both eyes was completed.
- The IEI provides eye care to an average of 50,000-60,000 patients annually.
- Over the ten-year study period, the clinic examined 49 patients with keratoplasty, with a total of **69** corneal transplants (surgery date range: 1989-2022).
- The two types of keratoplasty procedures primarily observed in this study population were PKP and DALK.

RESULTS

- The average age at time of study was 51 ±13.3 (range 24-76) and 59.2% of the transplant recipients were male.
- The most common keratoplasty procedure observed was PKP (95.7%).
- The most prevalent indication for keratoplasty was **corneal ectasia/keratoconus** (**97.1%**).

Contact Lenses Dispensed Post Operatively

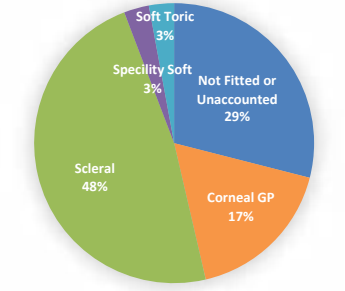

Figure 1: Most patients were fitted in scleral or corneal GP lenses post-operatively. The average daily wear time for all dispensed lenses was 10.5 ± 3.5 hours per day (n=46).

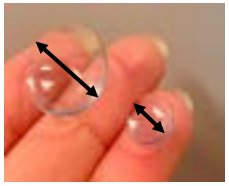

Figure 2: Comparison of contact lenses – scleral lens (left) with 16.8mm diameter and corneal gas permeable lens (right) with 9.2mm diameter. The average horizontal diameter of the iris is about 12mm.

Common Corneal Transplant Complications

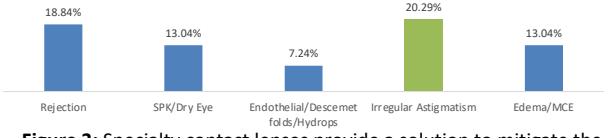

Figure 3: Specialty contact lenses provide a solution to mitigate the irregular astigmatism commonly observed after corneal transplant.

Types of Lens	Number of Eyes Fit	% with Mechanical Complications
Scleral	33	15%
Corneal GP	12	42%
Specialty Soft	2	0%
Soft Toric	2	50%

Figure 4: Mechanical complications were the most common complication observed overall (24.5%). Of the two most fit lens types, corneal GPs had the most mechanical complications in post-transplant eyes.

CONCLUSION

- Corneal ectasia/keratoconus was the most common indication for keratoplasty.
- Patients were most likely to undergo penetrating keratoplasty.
- Many patients successfully reached their best-corrected visual acuity with scleral or corneal lenses.
- The most common contact lens complications seen were mechanical in nature; however, most patients successfully wore their lenses for extended periods.

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Comparison of Optic Disc Size between Two Spectral Domain Imaging Devices

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INTRODUCTION

Correctly assessing the size of the optic disc is a key component of optic nerve head examination, as optic disc parameters such as neuroretinal rim area and cup-to-disc ratio vary with the disc size. This challenge is particularly pronounced in individuals with small or large discs, where the distinctive anatomical features of glaucoma may be more challenging to discern. Accurately measuring the size of the optic disc is important in the diagnosis and management of glaucoma, as research indicates size may be a significant risk factor. Several studies have found that large optic discs are more susceptible to glaucoma.[1-4] Conversely, other research found that in individuals with small optic discs, Asian versus non-Hispanic white ethnicity, was associated with a higher rate of glaucomatous progression.[5]

High-resolution imaging using spectral domain optical coherence tomography (SD-OCT) devices provides detailed insights into the peripapillary structures and the formation of the optic disc border. While SD-OCT instruments provide measurements of optic disc size, discrepancies between different devices can complicate the interpretation of size-related implications with glaucoma, particularly for clinicians who may use multiple devices from different manufacturers, or transition from one device to another. A 2018 study found that the Zeiss Cirrus and Heidelberg Spectralis OCT measurements of disc area size were strongly correlated, yet significantly different with the latter, on average, providing marginally larger measurements.[6]

The purpose of this study was to assess the correlation between optic disc size measurements obtained from the Zeiss Cirrus and Topcon Maestro2 SD-OCT devices to improve optic nerve head assessment and interpretation, especially in the context of glaucoma management.

METHODS

A retrospective analysis of records was conducted using an established database of patients from an academic eye care center in inner-city Chicago, IL, USA. Inclusion criteria required at least one Cirrus (Carl Zeiss Meditec, Dublin, CA) and one Maestro2™ robotic OCT and color fundus camera (Topcon Healthcare, Tokyo, Japan) in the past three years, and a clinical examination during the same timeframe with a diagnosis of glaucoma, glaucoma suspect, or normal. The subjects' SD-OCT reports were reviewed to confirm reasonable quality, with a random 10% subset undergoing an additional quality verification. The optic disc area measurements for both eyes of each subject were recorded for both devices.

RESULTS

The study cohort included 198 subjects with optic disc area measurements recorded for 183 right eyes and 181 left eyes on both the Cirrus and Maestro2 SD-OCT. For the right eyes, the mean optic disc area for Cirrus was 2.09 +/- 0.45 mm^2 (range=1.01 to 3.68 mm^2) and for Maestro2 it was 2.55 +/- 0.51 mm^2 (range = 1.42 to 4.25 mm^2). For the left eyes, the mean optic disc area for Cirrus was 2.08 +/- 0.46 mm^2 (range = 1.03 to 3.75) and for the Maestro2 it was 2.52 +/- 0.50 mm^2 (range = 1.53 to 4.01 mm^2). Bland Altman analysis of the right eyes showed a mean bias of 0.46 +/- 0.25 mm^2 (95% LOA = -0.03 to 0.95), with the Maestro2 consistently giving higher disc areas than the Cirrus (Figure 1).

This variation was consistent across all disc size levels. Analyses of the left eyes gave comparable results to the right eyes. Regression analysis of the Cirrus and Maestro2 disc area paired values showed a linear relationship with R^2 values of 0.765 and 0.794 for the right and left eyes, respectively. Categorizing disc size according to small, medium, and large for each device, good agreement was present between devices (77% agreement, kappa=0.65).

CONCLUSIONS

The Topcon Maestro2 consistently yields larger measurements of optic disc size compared to the Zeiss Cirrus SD-OCT likely attributable to the devices' distinctive optic nerve head analysis algorithms. Studies have shown that optic disc size plays a role in influencing the diagnosis and progression of glaucoma. Therefore, it is important to consider the specific OCT device utilized when assessing optic disc size to ensure accurate and meaningful interpretations.

FIGURE 1
Bland-Altman plot of right eyes illustrating mean differences between devices across measurement levels.

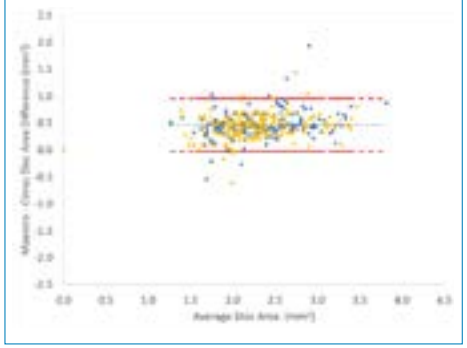


FIGURE 2
Example of typical optic disc area measures from the Cirrus OCT (left) and Maestro2 (right).

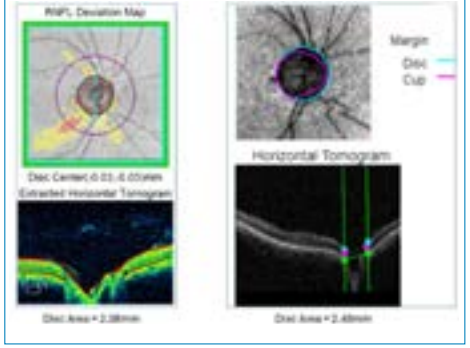
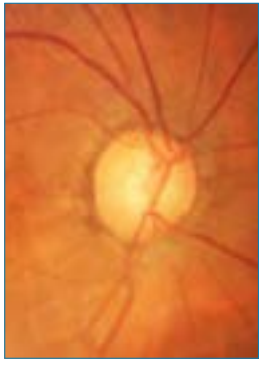


FIGURE 3
Color disc photo from the Maestro2™ for this patient.



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DISCLOSURES

Anne Rozwat: none. Ashley Speilburg: Commercial Relationship(s) Code C (Consultant/Contractor): Topcon Healthcare. Patty Salazar: none. Mary Durbin: Commercial Relationship(s) Code E (Employment): Topcon Healthcare. Michael Chaglasian: Commercial Relationship(s) Code C (Consultant/Contractor): Topcon Healthcare.

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Optical Coherence Tomography Measurement Correlations with Age and Optic Disc Size

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INTRODUCTION

Age and optic disc size are known to affect optical coherence tomography (OCT) measurements and optic nerve head (ONH) parameters. The purpose of this study was to investigate the effect of age and optic disc size on OCT measurements in a large, normal, mixed-race population using a novel device, and evaluate the strength of correlations across measurement types and against other OCTs.

METHODS

Eight hundred sixty-two healthy eyes were enrolled from nine clinics across the United States. Patient ages ranged from 22 to 85 years old, with a mean age of 51.7 years. All participants had eye examinations to confirm no ocular pathology was present. Subjects were imaged on the Monaco®, a novel imaging device with an ultra-widefield scanning laser ophthalmoscope (UWF-SLO) capability combined with spectral-domain optical coherence tomography (SD-OCT). Correlations were analyzed between both age and optic disc size against various OCT measurements including retinal nerve fiber layer (RNFL) thickness, ganglion cell complex (GCC) thickness, and ONH parameters.

TABLE 1
Summary of all OCT parameters evaluated between age (left) and optic disc size (right).

Correlations for Age &	r value	slope
Sup RNFL Quadrant	0.31	-0.4
Inf RNFL Quadrant	0.23	-0.3
Temp RNFL Quadrant	0.17	-0.1
Nasal RNFL Quadrant	0.03	-0.03
Avg RNFL	0.27	-0.2
Rim Area	0.13	0.003
C/D Vertical	0.18	0.002
C/D Horizontal	0.14	0.002
C/D Area	0.17	0.002
Superior GCC	0.33	-0.17
Inferior GCC	0.35	-0.18
Average GCC	0.36	-0.18

Correlations for Optic Disc size &	r value	slope
Sup RNFL Quadrant	0.23	10.5
Inf RNFL Quadrant	0.26	11.7
Temp RNFL Quadrant	0.03	-0.08
Nasal RNFL Quadrant	0.21	8.0
Avg RNFL	0.26	7.3
Rim Area	0.48	0.39
C/D Vertical	0.37	0.19
C/D Horizontal	0.40	0.19
C/D Area	0.44	0.17
Superior GCC	0.03	0.64
Inferior GCC	0.05	1.1
Average GCC	0.04	0.85

FIGURE 1
Correlations were higher with disc area when analyzed against rim area (A) compared to age and rim area (B). Correlations were also higher with disc area when analyzed against vertical C/D ratio (C) compared to age and vertical C/D ratio (D).

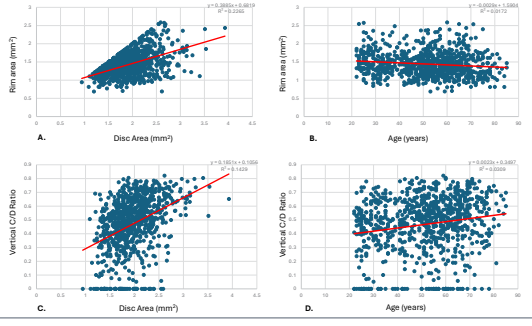
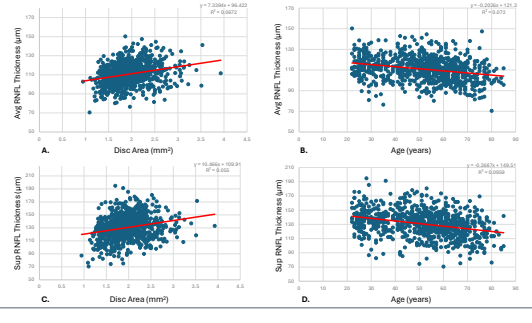


FIGURE 2
Both average RNFL thickness and superior RNFL thickness measurements had similar correlations between optic disc size ((A) and (C), respectively) and age ((B) and (D), respectively).



RESULTS

The highest correlations for age comparisons were for superior, inferior, and average GCC thickness parameters with Pearson coefficient r-values being 0.33, 0.35, and 0.36, respectively. Correlations were also strong for average and superior quadrant RNFL thickness at r=0.27 and r=0.31, respectively. Correlations for age and ONH parameters were weak. Correlations for optic disc size were strongest for the ONH parameters with rim area, vertical cup-to-disc (C/D) ratio, horizontal C/D ratio, and average C/D ratio with r-values at 0.48, 0.37, 0.40 and 0.44, respectively. Correlations were also strong for optic disc size and superior and inferior RNFL quadrant parameters (r=0.23 and 0.26, respectively) and average RNFL thickness (r=0.26). All evaluated parameters are summarized in Table 1. Figure 1 illustrates correlations for disc area and age on rim area and vertical C/D. Figure 2 illustrates correlations for disc area and age on average RNFL and superior RNFL thickness measurements. While age has good correlations for both parameters, optic disc size has stronger correlations with ONH parameters compared to age.

CONCLUSION

Correlations for age and OCT measurements were similar and generally strong for average RNFL thickness, as well as superior and inferior RNFL quadrants. The strongest correlations found were between optic disc size and ONH parameters, suggesting that during the clinical assessment of a patient, it may be helpful to consider the size of the optic disc more than age, especially for ONH parameters like C/D ratios. This is consistent with reference database comparisons provided by other OCT software.

REFERENCES

Available upon request

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Inter-examiner repeatability of the neurolens measurement device (nMD) compared to two conventional heterophoria tests

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INTRODUCTION

Heterophoria is routinely measured in a comprehensive eye exam. There are different ways to assess phoria and several studies have quantified the accuracy and precision of these methods. Most of the methods are subjective and have limitations. The aim of the current study is to quantify a commercially available objective way to assess phoria, the Neurolens measurement device (nMD), and compare its inter-examiner repeatability with that of prism alternating cover test and the Von Graefe method.

Methods: 90 young adults, aged between 18-40 years, with normal binocular vision were enrolled into the study. Two experienced optometrists assessed phoria on each subject using three methods: Von Graefe (VG), prism alternating cover test (PCT) and nMD. All the measurements were performed at distance (6m) and near (40cm). All the tests were performed in a similar way by both the examiners in a randomized order.

FIGURE 1
Absolute mean difference between the two examiners (PD) was plotted for each test at both distance and near. Error bars indicate the 95% confidence intervals.

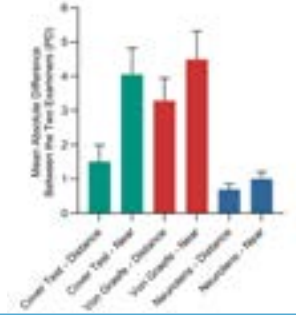


FIGURE 2
Bland-Altmann Plots. The difference in the phoria measurement between the two examiners were plotted as a function of the mean phoria measurement. The shaded region indicates the 95% limits of agreement i.e., 1.96 times the SD of the differences in the measurement. The numbers on each plot indicate the mean difference in the phoria measurement between the two examiners and the standard deviation (SD).

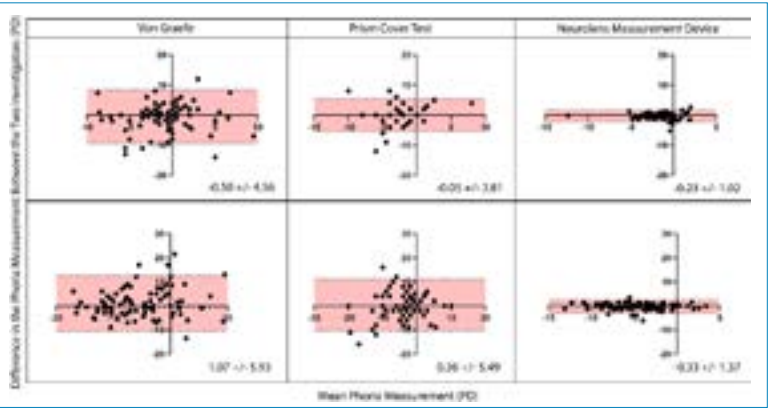
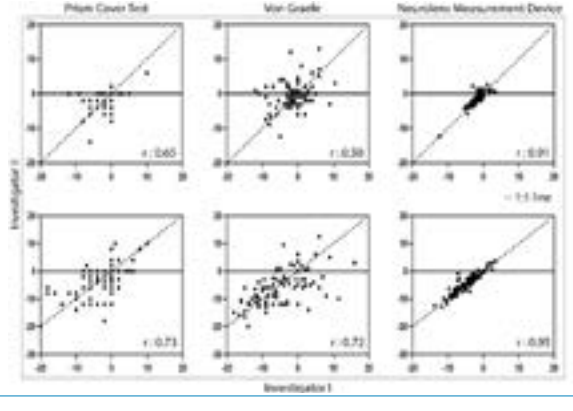


FIGURE 3
Correlation plots between the two examiners. The dotted line indicates the 1:1 line. Any points on this line would indicate that both examiners reported the same phoria measurement. The top row indicates distance measurements and bottom row indicates near measurements for each test. 'r' value indicates the correlation coefficient. Negative value indicates exophoria and positive value indicates esophoria.



RESULTS

The nMD (dist: 0.69 ± 0.77PD; near: 1.00 ± 0.98PD) has the smallest mean absolute difference at both distance and near compared to VG (dist: 3.28 ± 3.18PD; near: 4.48 ± 3.99PD) and PCT (dist: 1.50 ± 2.36PD; near: 4.05 ± 3.69PD) (Figure 1). Bland Altmann Plots showed that the phoria measurements from nMD exhibited significantly less variability when compared with VG and PCT (Figure 2). Overall, using intraclass correlations, high agreement was noted between the two examiners with the nMD (r_distance: 0.91; r_near: 0.95) compared to VG (r_dist: 0.50; r_near: 0.72) and PCT (r_dist: 0.65; r_near: 0.73) (Figure 3).

CONCLUSION

The study results showed that the Neurolens measurement device (nMD) exhibited the highest inter-examiner repeatability when compared to traditional VG and PCT methods. Objective and repeatable phoria measurement technology can be a beneficial addition to the current battery of binocular vision testing that eye care practitioners routinely use. Notably, this study only assesses inter-examiner repeatability, not the validity or reliability of each test, and not intra-examiner comparisons between tests. Future studies on these topics, particularly evaluating the accuracy of the nMD to existing associated and dissociated phoria measurements, would certainly be of value to clinicians.

Disclosures: This research study was sponsored by Neurolens, Inc. However data analysis was performed and confirmed by an independent statistician, Dr. Elsa Zhuang (ICO), who has no financial disclosures.

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The Normal Distribution of Disc Area measured on Monaco UWF-SLO + SD-OCT with Comparison to Cirrus OCT

Speilburg, Ashley[1]; Salazar, Patricia[1]; Rozwat, Anne[1]; Turner, Lauren[2]; Chaglasian, Michael[1]; Sinai, Michael[2]

1. Illinois Eye Institute, Illinois College of Optometry, Chicago, IL, United States. • 2. Optos plc, Dunfermline, Fife, United Kingdom.

INTRODUCTION

Evaluation of optic disc size is fundamental to the assessment of patients suspected of glaucoma due to its role in determining expected neuroretinal rim thickness and cup-to-disc ratio (CDR). Common optical coherence tomography (OCT) imaging devices provide a measure of optic disc area. This measurement is often determined by the termination of Bruch's membrane, as identified by individual software algorithms. Variability in CDR and cup volume measurements attributed to differences in software algorithms, hardware specifications and scan patterns between devices have been observed1, but less have compared disc area.2-3 Discrepancies between different devices can complicate the interpretation of disc size-related implications in glaucoma, particularly for clinicians who may use multiple devices from different manufacturers, or transition from one device to another. Familiarity with the device-specific distribution of disc size across a population of normal eyes can help the clinician group disc area measurements into size categories to help aid in clinical decisions. Identification of relative disc size helps the clinician draw appropriate conclusions with respect to CDR and neuroretinal rim thickness.

Here we report the distribution of disc area measured with the Monaco (Optos PLC, Dunfermline, UK), a combined ultra-widefield scanning laser ophthalmoscope (UWF-SLO) + spectral domain OCT (SD-OCT) in a large, mixed-race population of healthy eyes. Additionally, we compare the disc area measurement of 43 glaucomatous eyes imaged on both Cirrus (Carl Zeiss Meditec, Dublin, CA) and Monaco devices.

METHODS

Optic disc scans were obtained from one randomly selected eye of 861 normal, healthy subjects using the Monaco device only and 43 glaucoma subjects using both Monaco and Cirrus devices. Images were reviewed for quality. Scans with low signal strength or artifact affecting the disc measurement area were excluded. Glaucoma was defined by correlating structural and functional damage patterns characteristic of glaucoma. We report the mean, standard deviation, and cut off points of 33% and 66% to characterize the values for 'small', 'average' and 'large' optic disc grouping. Regression analysis and Bland Altman plots were used to determine the agreement of optic disc area measurements between devices.

RESULTS

The mean disc area of normal eyes measured on the Monaco was 1.96 mm2 ± 0.41. The 1% percentile value was 1.2 mm2 and the 99% percentile was 3.1 mm2. When the distribution is split evenly into thirds, the 'small' group is < 1.77 mm2, the average group is 1.77 – 2.1 mm2, and the large group is > 2.1 mm2.

The correlation between the optic disc size from the Monaco device and the Cirrus device was very strong in the glaucoma patient cohort. The Pearson correlation coefficient was r = 0.97. The mean optic disc size for Monaco was 2.18 mm2, and for the Cirrus it was 2.01 mm2, with a mean difference of -0.18.

FIGURE 1
Normative distribution of optic disc area measurements with the Monaco. Cut offs of 33% and 66% were used to describe small, average, and large disc areas.

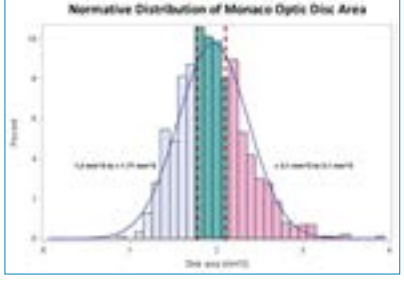


FIGURE 2
Regression analysis comparing Cirrus and Monaco disc area measurements shows very strong correlation. The Pearson correlation coefficient was r = 0.97.

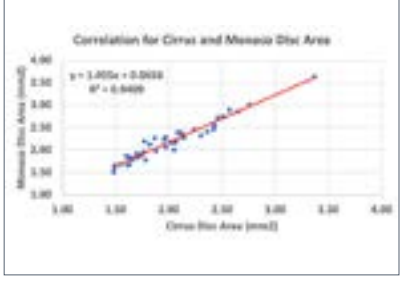


FIGURE 3
Bland Alman showing difference in disc area between Cirrus and Monaco devices vs the mean. The mean difference was -0.18, 95% CI [0.04, -0.40].

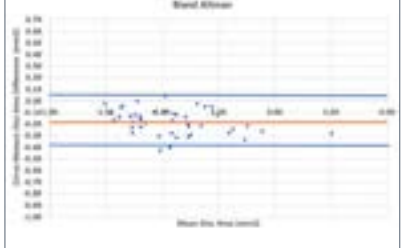
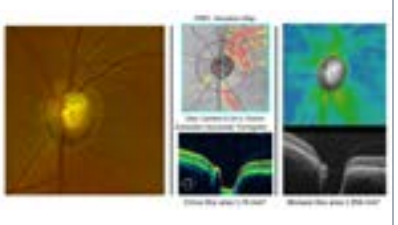


FIGURE 4
Disc area measurement from Cirrus and Monaco in a representative subject. Applying the normative distribution ranges from the Cirrus (middle one third is 1.58 – 1.88 mm2) to the Monaco, would result in a size categorization change from "average" to "large."



CONCLUSION

Disc area measurements are highly correlated but differ between the Monaco and Cirrus devices by around 8%. This difference suggests that the disc area measurements are not interchangeable between these two devices. However, knowing the relative size compared to the normal distribution can help clinicians understand if they are assessing a relatively small or large optic disc when making clinical judgements. For the clinician, knowing the distribution of disc size for a particular device can aid in the clinical assessment of the optic nerve by considering the relative disc size and its effect on the neuroretinal rim thickness and CDR.

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Flicker adaptation with the pulsed-pedestal paradigm in glaucoma patients: contrast sensitivity in the parvocellular pathway or not

Xiaohua Zhuang, PhD, FAAO; Doris Jin, OD; Daniel K. Roberts, OD, PhD, FAAO

1. INTRODUCTION

Our earlier studies demonstrated temporal contrast sensitivity reduction (i.e., desensitization) due to flicker adaptation in visually normal subjects and glaucoma patients using the steady-pedestal paradigm. A larger desensitization effect was observed in glaucoma patients than in the visually normal subjects [1].

PURPOSE: The current study investigated whether flicker adaptation with the pulsed-pedestal paradigm have similar desensitization effect or not in glaucoma patients.

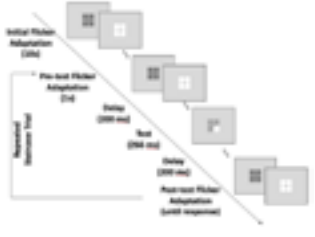
2. METHODS

Observers: Contrast sensitivity was measured on two groups of subjects: 6 glaucoma patients and 9 age-matched visually normal control subjects.

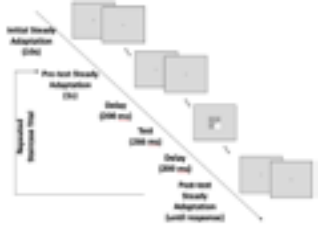
Stimuli: The pulsed-pedestal paradigm was used [2,4]. A pedestal of four 1°x1° squares with a predefined luminance (15.0, 16.86, 18.88, 21.19, or 23.77 cd/m^2) in a background at 15.0 cd/m^2.

Apparatus: An Apple computer and a 21" NEC CRT monitor.

Paradigm:



(a) Flicker Adaptation



(a) Non-flicker Adaptation

Task and Threshold Estimation: To identify the test square that differs from the other three in a 4AFC double-random staircase procedure, with the average of last six reversals taken as the estimate of contrast threshold.

Adaptation Conditions:

(a) **Flicker:** **7.5 Hz** square-wave luminance modulated pedestal at time-averaging luminance of 15.0 cd/m^2 and 50% contrast.

(b) **Non-flicker:** Adapt to a background luminance of 15.0 cd/m^2.

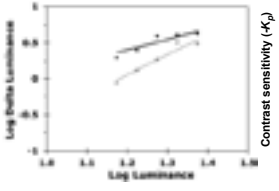
3. RESULTS

Analysis:

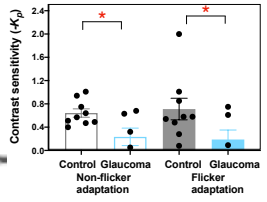
(1) Pulsed-pedestal model based on primate physiology findings [2-4]:

- $\log(\Delta I) = K_p + \log[(C+C_{sat})^2] - \log(C_{sat})$
- K_p and C_{sat} are free parameters. -K_p: represents the log sensitivity, and C_{sat} is related to the contrast gains.

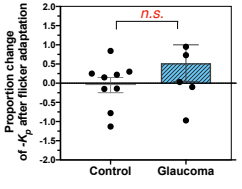
(2) Linear mixed model was used to analyze the effects of patient group, visual adaptation condition, and their interaction on contrast sensitivity.



Example of an individual's results: shows the main effect of adaptation



Contrast sensitivity by group by adapting condition



Desensitization effect by subject group

Results:

(1) significant main effect of patient group (p=0.03), indicating contrast sensitivity in the glaucoma group is significantly lower than in the control group; and

(2) non-significant main effect of adaptation condition (p=0.54), indicating no desensitization effect from flicker adaptation; and

(3) non-significant interaction effect (p=0.524), showing no desensitization effect from flicker adaptation in the glaucoma patient group or in the control group.

4. CONCLUSION

Contrast sensitivity estimated from the pulsed-pedestal paradigm is significantly reduced for glaucoma patients compared to visually normal subjects. Flicker adaptation does not show a desensitization effect on either group of subjects. The pulsed-pedestal paradigm may reveal the contrast sensitivity in the parvocellular pathway. It showed different effects than the steady-pedestal paradigm on glaucoma patients and visually normal subjects, suggesting that different visual contrast processes are involved in these two paradigms.

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COVD

1 ICO PRESENTATION

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An Overview of the Illinois College of Optometry Pediatric Optometry, Vision Therapy and Vision Rehabilitation Residency Program

Christine L. Allison, OD, FAAO, FCOVD • Illinois College of Optometry, Chicago, IL

3241 South Michigan Avenue, Chicago, Illinois 60616

HISTORY OF THE PROGRAM

The ICO Binocular Vision & Pediatric Residency Program began in 1990. Dr. Janice Scharre served as the first Program Coordinator and held that position until 1995. Dr. Susan Cotter held the position of Program Coordinator from 1995-97, and then Dr. Valerie Kattouf held the position until 2003. Dr. Christine Allison held the position from 2003-2024, and Dr. Aubrey Breihaupt is the current interim program coordinator. Sixty-four residents have completed the program, with two residents currently participating in the program.

The program's Mission Statement is:

Offering advanced competency in pediatrics and binocular vision management through education, scholarship, and patient care.

THE PROGRAM

The Program begins on July 1 and runs for 53 weeks. The benefits are listed in Table 1.

The residents will be provided advanced clinical education in the areas of binocular vision, perception, pediatric optometry, and developmental disabilities. The residents provide direct care to patients in the Binocular Vision/Pediatric Optometry Clinic and the Developmental Disabilities Clinic at ICO. The patients range in age from infants to adults, with a large variety of conditions. Residents perform comprehensive eye examinations, visual efficiency evaluations, strabismus/amblyopia evaluations, developmental disability examinations, visual perceptual evaluations, and vision therapy on a routine basis.

In order to keep their therapeutic skills fresh, the residents spend one session per week for the entire length of the program in the Urgent Care Service of the Center for Advanced Ophthalmic Care at ICO. This is an urgent care clinic where the residents will be seeing a variety of anterior segment and posterior segment emergency patients.

The residents teach in one 3rd year laboratory per quarter for the Fall, Winter, and Spring quarters. The labs that they teach are the Treatment of Binocular Vision Disorders Lab (VT procedures), the Strabismus/Amblyopia Lab (strabismus testing procedures), and the Infant/Child Development and Management Lab (visual-perceptual testing procedures). The residents also start precepting students in the Binocular Vision and Pediatric Clinic beginning in the Winter quarter.

To develop skills in the area of Pediatric Low Vision, the residents take two trips to the Illinois School for the Visually Impaired, where they examine pediatric low vision patients and provide them with low vision devices provided by the Lions Clubs. They also have the opportunity to work with one of our Pediatric Low Vision Specialists in the Pediatric department on campus. The residents also participate at two Special Olympics Lions Club International Opening Eyes Screening events. One called Medfest, is held in the Fall each year at the United Center, and the other is during the summer at the Illinois State Summer Special Olympics Games.

The residents are required to give three Grand Rounds presentations to the 4th year students and the faculty based on cases that they see at ICO. Each presentation is to be given in a power point format and lasts approximately 15 minutes.

In order to provide flexibility in the program, the residents can select to work one session in another service at ICO, outside of the pediatric service. For instance, they may choose to work one session in the Cornea/Contact Lens Service, the Neuro Service, the Glaucoma Service, the Primary Care Clinic, or the Low Vision Service.

Tables 2-4 show the educational, teaching, and research responsibilities required for the program.

Figures 1-4 show an example of one of the previous resident's schedules for the year.

The minimum number of patients the residents are required to see in each area are listed below:

Strabismus/amblyopia	20
Visual Processing Evaluations	20
Pediatric Primary Care/Visual Efficiency Examinations	140
Special Needs Primary Care Evaluations	25
Vision Therapy Sessions	100
Pediatric Low Vision Evaluations	10
Advanced Care Patient Visits	100
Infant Examinations	25

Why Do a Residency Program?

- Increased competency with all examination techniques
- Increased experience with challenging cases
- Increased ability to examine infants and toddlers
- Increased experience with public speaking
- Increased marketability for the future
- Increased ability to work in education or hospital-based optometry
- Increased confidence in your own skills and knowledge

How do I Apply?

There are currently two residency positions available each year.

- You must first apply to the National Matching Services, Inc at **ormatch@natmatch.com**.
- A Letter of Intent must be sent to ORMatch
- A Curriculum Vitae must be sent to ORMatch
- You must have the following materials sent to ORMatch
  - o An official Optometry Transcript
  - o Official National Board of Optometry Scores for Part I and Part II
  - o Three letters of recommendation from clinical faculty

ALL MATERIALS MUST ARRIVE TO THE PROGRAM COORDINATOR BY JANUARY 31.

Once an application is complete, the Program Coordinator may invite the applicant for an interview in early to mid- February. An interview will be given with the Program Coordinator and members of the ICO Pediatric Faculty. A tour of the ICO facilities will also be provided at that time by the current residents.

Questions can be directed to:
Aubrey Breithaupt, O.D.,
Interim BV & PO Residency Program Coordinator
Illinois College of Optometry
3241 S. Michigan Avenue
Chicago, IL 60616
abreithaupt@ico.edu
callison@ico.edu

TABLE 1
Benefits

1. Medical and dental insurance; prescription card (monthly fee to participate)
2. Professional liability insurance
3. 1 week paid vacation
4. 5 days for continuing education / meetings
5. Group term life insurance
6. Disability insurance

TABLE 2
Educational Responsibilities

1. Direct patient care in the Binocular Vision & Pediatric Service.
2. Supervision of fourth year optometry students in the Binocular Vision & Pediatric Service and other specialty rotations.
3. Direct patient care in the Emergency Service.
4. Co-management of cases with ophthalmology and other health care providers.
5. Literature review and clinical research.
6. Weekly seminar and case discussions with senior faculty from the Binocular Vision & Pediatric Service.
7. Opportunity to provide some pediatric low vision services.
8. Seminar on didactic and clinical teaching methods from an expert in medical education.
9. Opportunity to attend the annual meetings of the American Academy of Optometry and College of Optometrists in Vision Development.

TABLE 3
Teaching Responsibilities

1. Provide clinical consultation to optometry student interns, under the supervision of experienced clinical faculty.
2. Participate in clinical grand rounds for fourth year optometry students, other residents, and optometric faculty.
3. Provide didactic or laboratory instruction to students in courses pertaining to binocular vision and vision perception.
4. Provide didactic instruction and lead discussion groups for optometry students in the Binocular Vision & Pediatric Seminar groups.
5. Opportunities to provide continuing education to optometrists or other health care professionals through grand rounds and other presentations.

TABLE 4
Research Responsibilities

1. Required (one or the other): a. A completed research project of publishable quality. b. Literature review or case report of publishable quality.
2. Recommended: Presentation of research or patient case report at state, regional, national, or international meetings.

FIGURE 1
Example of a Starting Summer Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM	DAY	Visual Perceptual Lab TA		Direct Care of Peds Patients	Development Time and Peds Resident Conferences	Vision Therapy 9:00-1:00
PM	OFF	Peds Pts with Peds MD on campus	Direct Care of Peds Patients	Urgent Care Service	Faculty Conference Series & Resident's Conference	
EVE		Vision Therapy	Direct Care of Peds Patients			

FIGURE 2
Example of a Fall Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM	DAY	Vision Therapy Lab TA	Direct care of Peds Patients	Direct Care of Peds Patients	Development Time and Peds Resident Conferences	Vision Therapy 9:00-1:00
PM	OFF	Peds Pts with MD on campus or Peds Low Vision		Urgent Care Service	Faculty Conference Series & Resident's Conference	
EVE		Vision Therapy	Direct Care of Peds Patients			

FIGURE 3
Example of a Winter Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM	DAY	Cornea/ Contact Lens Resident selected session		Strabismus Testing Lab TA	Development Time and Peds Resident Conferences	Vision Therapy 9:00-1:00
PM	OFF	Peds Pts with MD on campus or Peds Low Vision	Peds Clinic Precept Students	Urgent Care Service	Faculty Conference Series & Resident's Conference	
EVE		Vision Therapy	Direct care of patients			

FIGURE 4
Example of a Spring Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM	DAY	Primary Care Resident selected session	Direct care of Peds Patients	Peds Clinic Precept Students	Development Time and Peds Resident Conferences	Vision Therapy 9:00-1:00
PM	OFF	Peds Pts with MD on campus or Peds Low Vision		Urgent Care Service	Faculty Conference Series & Resident's Conference	
EVE		Vision Therapy	Direct care of patients			

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GSLS

4 ICO PRESENTATIONS

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A Smashing Success: Corneal GP Fits in a Keratoconic Patient

Rachel Bushey, OD
SSM Health Davis Duehr Dean- Optometric Residency Affiliate of Illinois College of Optometry
Madison, Wisconsin

Background

Contact lenses are used for visual rehabilitation in keratoconus and other forms of corneal ectasia. While mild cases of keratoconus can be well corrected with soft contacts that drape over the cornea, moderate to severe keratoconic eyes require rigid materials to achieve acceptable corrected visual acuity. Patients who are established in corneal gas permeable (cGP) lenses can benefit from updates to lens material and design with the goal of enhanced comfort and vision.

Case Details

- **70 Year Old Caucasian Female**
- **CC: Vision isn't as clear as it used to be with habitual cGP lenses**
- **Medical History:** Sleep apnea, hypertension
- **Allergies:** None
- **Medications:** Redness reducing drops every morning
- **Ocular History, both eyes:**
  - Keratoconus
  - Presbyopia
  - Nuclear sclerosis
  - Marginal keratitis
- **Vision**
  - With habitual cGP
    - Right eye 20/50
    - Left eye 20/250
- **Contact lens assessment**
  - Unknown parameters
  - Both eyes: inferior decentration and central bearing
  - Right eye: adequate movement
  - Left eye: fixed on the inferior cone without movement, superior edge bisecting pupil
- **Cornea assessment**
  - Right eye: moderate cone without scarring
  - Left eye: severe cone with Fleischer ring, without scarring

Contact Lens Selection

Rose K2 lenses (Menicon) are designed with aspheric optics and have automatic adjustments made to the lens as the BC or edges are change in order to preserve the sagittal fit. Their Asymmetric Corneal Technology (ACT) design can further optimize fit and comfort in keratoconic eyes. If fitting empirically, the average K taken at a 5mm radius on the axial map is found to be a reliable predictive parameter of base curve.

Demonstration of Rose K's optional ACT, where the inferior edge is "tucked" to go under the edge of a central cone

Clinical Findings

Progression of Lenses on Left Eye

Habitual lens: Decentered inferior, bearing over cone, minimal movement, insufficient edge lift

Goal: decrease bearing, improve centration, improve comfort and vision

Changes: steepened BC, use toric PC, small diameter

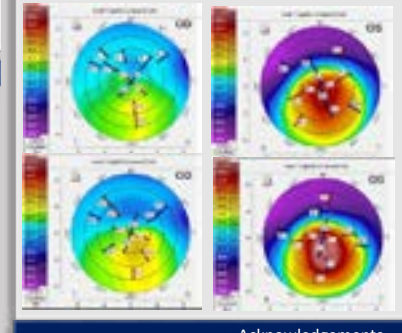
Lens 2: moving with blink, still apical bearing, though lessened

Goal: decrease bearing to 3-point-touch relationship

Change: steepened BC

Lens number	Right Lens BC/Diam	Left Lens BC/Diam
Trial Lens	7.6 / 9.2	6.1 / 8.7
Lens 1	7.52 / 9.2	5.99 / 8.7
Lens 2	7.52 / 9.2 toric PC	5.88 / 8.7 toric PC
Lens 3	-	5.73/9.0 toric PC

Lens 3: too steep, bubble superior with partial cone clearance, close to 3-point-touch



	OD	OS
Baseline KMax	46.1	64.5
Follow Up KMax	48.4	71.0

Tomography and table of both eyes demonstrating the change in corneal shape (axial map) over a 3 month period

Acknowledgements

I would like to express my gratitude towards Art Optical for their guidance and consultation. Thank you to Noelle Bock, OD and Christopher Croasdale, MD for their mentorship throughout this residency program.

Discussion

Approach to Fitting cGPs on Keratoconic Eyes

- Vision rehabilitation with cGP lenses was found to improve vision, depth perception, and vision-related quality of life, compared to spectacle lens correction.
- cGPs may be fit by three methods: flat, steep, or 3-point-touch
  - **Flat** (apical touch): cGP rests on the apex
  - **Steep** (apical clearance): cGP rests on the midperiphery
  - **3-point touch**: cGP rests partially on both the apex and midperiphery
- cGP lenses have traditionally been fit flat on keratoconic eyes. The reasons cited for this have not held up as true in longitudinal studies, but include:
  - Easier fitting process for the practitioner
  - Better vision for the patient
  - Flattening the cone decreases disease progression and the need for PK

Evidence-Based Fitting

- Fitting guides of cone-specific lenses are designed with the goals of simplicity and minimal chair time in mind.
  - For any cGP lens, FDACL based fitting, as demonstrated by the CLEK study, provides a high first-lens success rate. 83% of 3-point-touch and 71% of apical touch lenses were acceptable final lenses.
  - For the Rose K lens, the 5mm average K on the axial map has been found a reliable parameter in initial base curve selection.
- Two longitudinal studies, CLEK and DUSKS, found that BCVA was not better in flat or steep fitting lenses.
- There is no evidence to support the theory that a flat lens fit delays the progression of keratoconus.
  - Any lens fit can improve BCVA as it corrects for irregular astigmatism. Therefore, the need for PKs based on unacceptable BCVA is lessened.
  - A poor lens fit may contribute to the need for a PK if a scar is formed.
- Comfort must also be considered in cGP fits for KCN. The CLEK study group found that appropriate edge design was the most important factor in lens comfort, and that apical fitting relationship did not impact comfort.
- The CLEK study determined that corneal scarring is associated with disease severity, as determined by Kmax. Apical fitting relationship was not found to affect scar formation of an 8 year period. However, there has never been a clinical trial to evaluate if flat or steep lenses cause, or worsen, apical scarring.

Conclusion

Habitual cGP wearers can be refit into new cGP lenses that are designed with keratoconus in mind to improve comfort, vision, and corneal health. A challenging aspect of these cases is dealing with corneal rebound. Many patients are happy with their vision in an apical touch lens causing cone compression. As steeper cGP lenses are used, the cornea will rebound, causing the fit of the lens to differ from dispense to follow up. During this time, patients may notice fluctuations in vision. This anatomical change necessitates lens adjustments to continue to improve the fit.

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Fitting Free-Form Scleral Lenses on a Patient with Limbal Stem Cell Deficiency Secondary to Stevens-Johnson Syndrome

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BACKGROUND

Limbal Stem Cell Deficiency (LSCD), a chronic ocular sequelae seen in patients with Stevens–Johnson Syndrome (SJS), involves the destruction of limbal stem cells caused by chronic ocular surface inflammation and replacement of the corneal epithelium by abnormal conjunctival tissue.[1] SJS is characterized by the destruction of epithelium and mucus membranes.[2] Scleral lenses (SL) may be used as an option to optimize the health of the ocular surface.[3] As new SL technology emerges, it is worthwhile to examine how profilometry-driven SL increase the efficiency of the fitting process while providing optimal comfort with lens wear.[4]

CASE DESCRIPTION

- 39-year-old Caucasian female presented for dry eyes.
- Previously diagnosed with LSCD secondary to SJS of unknown etiology since 1998.
- OSD managed with Xiidra, preservative free artificial tears, and Tobradex. Medications for the condition are being managed by an outside corneal specialist.
- Current scleral lenses are 3 years old, and patient reports constant cloudy vision. Uses PuriLens for filling solution.
- Entering corrected VA: 20/40 OD, 20/30 OS
- Slit lamp examination of cornea: 360 degrees of peripheral neovascularization and opacification with 4+ diffuse punctate epithelial erosions OU (Figure 1). OS showed neovascularization extending to the visual axis (Figure 2).
- Tomography showed irregular astigmatism with keratometry values of 42.2 / 44.2 D OD, and 40.1 D / 44.2 D OS (Figure 3).
- Due to keratinization of the conjunctiva and irregularity of the corneal surface, a free-form design SL was ordered using the Pentacam CSP software (Figure 4).
- A diagnostic lens was applied to determine the appropriate base curve and power for the initial SL order.
- Over the course of twelve weeks, a total of three lenses were ordered to improve landing zone alignment and corneal vault.

FIGURE 1
Slit lamp photo of OD showing neovascularization and diffuse 4+ PEE.

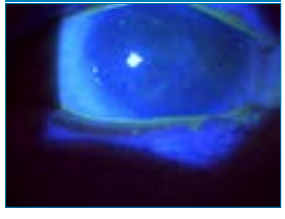

FIGURE 2
Slit lamp photo of OS showing neovascularization and diffuse 4+ PEE.

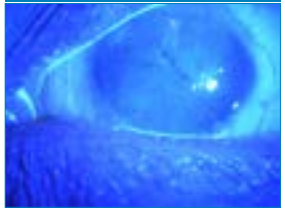

FIGURE 3
Tomography of OD illustrating the highly irregular nature of the patient's cornea with areas of steepening and flattening within the pupil.

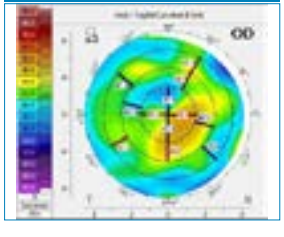

FIGURE 4
OD Pentacam CSP Report used to order a free-form design scleral lens showing irregular variations in corneal and scleral elevation.

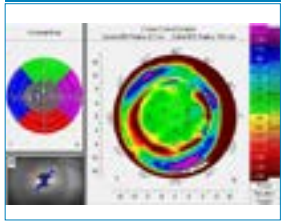

FIGURE 5
Final scleral lens fit OD showing adequate clearance over areas of neovascularization, and great edge alignment with mild edge lift nasally. VA: 20/25

FIGURE 6
Final scleral lens fit OS showing adequate clearance over areas of neovascularization, and great edge alignment with mild edge lift nasally. VA: 20/30

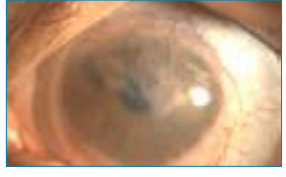

FIGURE 7
AS-OCT of final lens design OS showing 270 µm of clearance over area of neovascularization after 2.5 hours of wear.

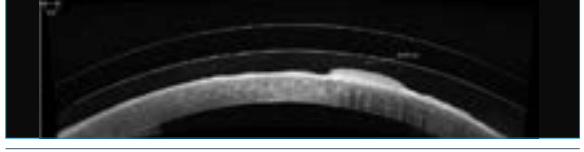

TABLE 1
Final scleral lens design OD and OS

	Type	Power	BC	Diameter	Total Sag	Edges by Quadrant	Material
OD	BostonSight Smart 360	-5.13	8.32	17.00	2754	1: 0 2: 0 3: 0 4: 0	Optimum Extreme
OS	BostonSight Smart 360	-1.28	8.72	17.00	2813	1: 0 2: 0 3: 0 4: 100	Optimum Extreme

CONCLUSIONS

- This case illustrates how free-form design scleral lenses have the potential to improve outcomes of patients with severe ocular surface disease.
- Profilometry allowed for exact measurements of the highly irregular cornea and scleral landing zones, evident on the CSP report.
- A diagnostic fitting alone would cause countless challenges with the conjunctival irregularities demonstrated in this case, outlining the versatility of this methodology to improve patient outcome in terms of comfort and wear time.

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Shades of Relief: Tinted Prosthetic Contact Lenses in Post-Stroke Visual Rehabilitation

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BACKGROUND

A patent foramen ovale (PFO) is a congenital heart defect of the atrial septum and a remnant of the fetal vasculature (1). It is present in 20-25% of the population and has been associated with cryptogenic stroke, or ischemic stroke of unknown or obscure origin, particularly in patients younger than 55 years old (2,3). Visual problems after stroke result in reduced quality of life due to loss of independence in performing activities of daily living (ADLs) and depression, especially in younger patients (4).

Common Visual Complaints After Stroke (5,6)

- Photophobia
- Glare
- Visual field loss
- Reading difficulties
- Blurred vision
- Visual snow

CASE REPORT

A 35-year-old Black female presented for a prosthetic contact lens evaluation having had a stroke one month prior secondary to a PFO. The patient was previously diagnosed with visual snow syndrome and described her vision as a "kaleidoscope" and like "looking through a VHS tape". Her work as a graphic designer, along with her activities of daily living (ADLs), were greatly impacted by glare symptoms. Her best corrected visual acuity was 20/20 OD and OS in her habitual standard soft contact lenses. Entrance testing revealed a left superior homonymous quadrantanopia confirmed with kinetic visual field. Ocular health was otherwise normal. She was referred to the vision rehabilitation clinic for a tint evaluation, where she appreciated a reduction in symptoms with an Eschenbach #18 Gray tint (58% light transmittance; blocks 400nm light). The preferred tint color was replicated, with the assistance of the manufacturing laboratory. After three months of successful wear, the patient reported an improvement in glare symptoms and a reduced impact of glare on her ADLs as the lenses immediately "relax her brain".

FIGURE 1
Preferred Eschenbach Tint

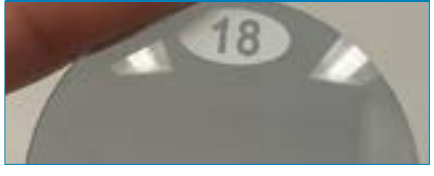

FIGURE 2
Lenses

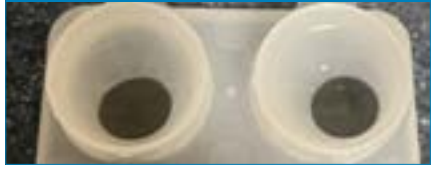

FIGURE 3
Without Lenses

FIGURE 4
With Lenses

TABLE 1
Contact Lens Parameters

	Tint	Zone	Power	Material	Replacement
OU	70% Sun Tac	11.5 mm (HVID 11.4 mm)	-6.00 D	Methafilcon 55%	Annual

CONCLUSION

For patients with visual symptoms post-stroke, tinted soft prosthetic contact lenses offer an alternative to standard lenses and other common non-optical devices. They may improve self-esteem and provide the comfort of routine for previous contact lens wearers during a time of transition (7). Tinted prosthetic soft contact lenses should be considered for all patients with symptoms of glare and/or photophobia after stroke. Severely symptomatic patients may not benefit fully from these contact lenses and additional management will likely be necessary, such as fitovers to increase darkening or neuro-optometric rehab.

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Free-Form Designed Corneal GP lens for a Penetrating Keratoplasty

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BACKGROUND

Penetrating keratoplasty (PK) is one of the most common surgical techniques used for keratoconus patients[1]. Often times after a PK, patients have irregular astigmatism with various peaks and valleys leading to a difficult contact lens fitting process. Corneal gas permeable (GP) contact lenses are the lens of choice for post PK fitting due tear exchange and less concern about causing endothelial compromise compared to scleral lenses. Can new technology such as corneo-scleral profilometry be used to design a free-form GP lens that leads to improved patient outcomes compared to diagnostic fitting.

CASE

- A 39-year-old Middle Eastern Male presented for a contact lens fitting.
- ocular history: keratoconus OU, penetrating keratoplasty (PK) OD (2003), intra corneal ring segment OS (2007)
- VA: OD cc: 20/30; OS sc: 20/60 pinhole improved to 20/20.
- He reported the GP lens frequently ejected from the eye.
- Manifest refraction: -1.75-4.75x095 with a VA of 20/20 OD; +1.75-0.50x165 with a VA of 20/25 OS.
- Tomography: high amounts of against the rule astigmatism OD, inferior steepening and thinning consistent with keratoconus OS
- Keratometry: 42.8D/48.1D @ 170 OD, 41.5D/47.2D @ 062 OS
- Current GP lens showed a flat fitting lens with apical bearing, excessive midperipheral pooling and excessive edge lift.
- Slit lamp: Clear PK with no sutures OD and one inferior intra corneal ring segment OS.
- A corneo-scleral profilometry scan was done OD and a free-form corneal GP lens was designed based off the scan. His OS was fit with a daily disposable soft contact lens allowing him to achieve VA of 20/25. Over the course of 3 months and 2 lens exchanges, he has successfully worn the free-form corneal GP lens OD with improved comfort and vision compared to his previous GP lens.

FIGURE 1
Axial map showing against-the-rule astigmatism after a corneal transplant. Front elevation showing different levels of elevation in each quadrant.

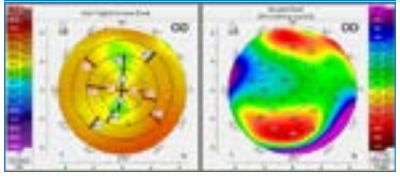

FIGURE 3
Final GP lens fit showing adequate fluorescein pattern.

FIGURE 2
CSP report showing moderate scan quality with some missing data. Enough data was obtained to design a free-form GP lens.

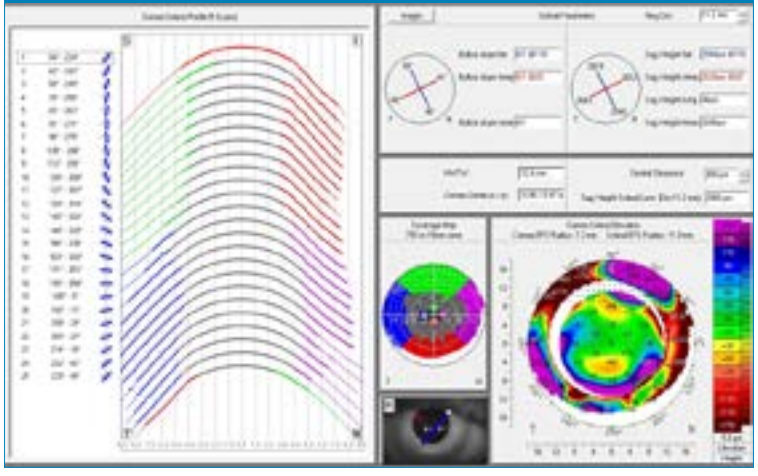

TABLE 1
Final free-form lens parameters.

power	OAD	BC	CT	ET
-3.89 +/- 4.64	11.0	7.55 +/- 0.78	0.22	0.18

CONCLUSION

Free-form corneal GP lenses should be considered in post PK patients. This technology has the potential to improve patient outcomes with corneal GP lenses and not have to make the switch to scleral lenses.

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HEART OF AMERICA

20 ICO PRESENTATIONS

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Atypical Optic Neuritis: An Overview of Neuromyelitis Optica Spectrum Disorders (NMOSD)

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INTRODUCTION

Neuromyelitis Optica (NMO) is a rare autoimmune disorder affecting the optic nerve, spinal cord, and brainstem centers. NMO damages the myelin sheath surrounding nerve fibers. Relapsing attacks of those regions disrupt function and can cause a wide variety of clinical signs. Signs may include optic neuritis, muscle weakness, and autonomic center dysfunction manifesting as intractable nausea, hiccups, and vomiting. This case outlines the importance of prompt diagnosis and appropriate referral of a patient with NMO Optic Neuritis (ON).

CASE PRESENTATION

A 26- year-old female presented with complaints of acute blurry vision OD upon awakening. The patient also reported periorbital pain, headaches, and recent general fatigue.

TABLE 1
Pertinent Clinical Findings

	OD	OS
VA	CF @ 2ft	20/20
EOM	FROM	FROM
Pupils	PRRLA, 1+ APD	PRRLA, no APD
CVF	FTFC	FTFC
IOP	15 mmHg	16 mmHg

Ocular History: Myopia OU.
Medical History: no known systemic conditions.
Family History: Type 1 Diabetes Mellitus (uncle); no other autoimmune diseases.
Medications: no medications.
ROS: all normal, except frequent thirst and urination.
Anterior Segment: lens with small central congenital cataracts OD> OS, otherwise unremarkable.
DFE: ONH well perfused with distinct margins 360, no hemes or pallor OD, OS.
Optical Coherence Tomography (OCT): Spectral domain OCT: WNL, no elevation or edema noted OD, OS. (Figure 1B).
HVF: HVF 24-2: OD: complete deep suppression (Figure 1A). OS: not assessed

MRI: MRI brain was significant for confluent areas of hyperintensity bilaterally within the medial thalami, optic chiasm, and basal ganglia, extending into left pons. Additionally, there was a subtle enhancement of the right posterior optic nerve.
Blood test: Positive NMO IgG, Negative Myelin Oligodendrocyte Glycoprotein (MOG).

FIGURE 1A
HVF OD at initial visit.

FIGURE 1B
ONH & RNFL analysis OD at initial visit.

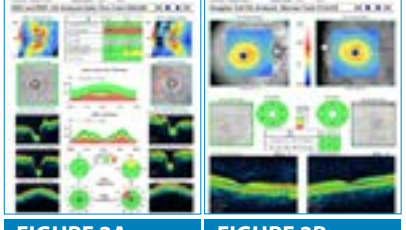

FIGURE 2A
Coronal MRI with enhancing lesions of the thalamus.

FIGURE 2B
Coronal MRI with enhancing lesions of the thalamus.

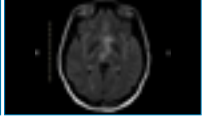

FIGURE 3A
Posterior Pole OD at follow up visit.

FIGURE 3B
Posterior Pole OS at follow up visit.

FIGURE 4
ONH & RNFL analysis OD at initial visit.

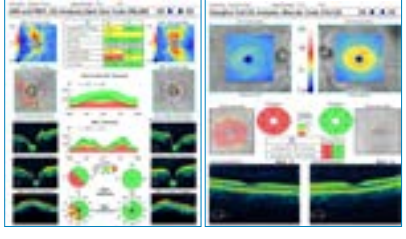

FIGURE 5
HVF OD, OS at follow up visit.

TREATMENT AND MANAGEMENT

Upon admission to the hospital, the patient received intravenous steroids and therapeutic plasma exchange with a good response. The patient later received 2 Uplizna® infusions within a 2-week interval and was scheduled to receive them every 6 months. She was also prescribed gabapentin 300 mg PO bid.

At an 8-month-follow-up visit to the eye clinic, optic nerve pallor OD was present. This finding correlated with thinning of the retinal fiber/ganglion cell layer on OCT and reduced vision OD only. The patient was best corrected to 20/60 OD and 20/20 OS (See Figure 4).

DISCUSSION

Optic neuritis can be one of the first presentations of the NMOSD patients present with, mimicking many other ocular conditions and etiologies. Multiple sclerosis (MS) can present with similar symptoms of NMOSD but differs in prognosis, neuropathology, and treatment.

A study conducted by Pittock et al. found that among the 60 patients diagnosed with NMO and followed, 36 individuals (60%) exhibited MRI findings indicative of brain abnormalities. In 17% of those NMO patients, the brain lesions were clinically symptomatic. NMO brain abnormalities can become more evident on MRI imaging with time.

Therefore, MRI imaging can be a helpful tool in differentiating NMOSD from other CNS diseases especially MS. See Table-2 for a summary of special characteristics of both.

In this case, the patient's MRI was significant for confluent areas of hyperintensity bilaterally within the medial thalami, basal ganglia, and optic chiasm. Those observations raised concern for demyelinating disease, particularly NMOSD. Additionally, an enhancing lesion within the region of the left pons highly suggested an active demyelination.

TABLE 2
Summary of MRI findings for NMO vs. MS.

CNS Region	NMOSD	MS
Optic nerve	Long-segment inflammation, more posterior involvement of the optic chiasm.	Short segment
Brain	Cortical lesions are hyperintense, nonspecific, and localized deep in white matter. Mostly diencephalic lesions surrounding the third ventricles Less clinically silent	Cortical lesions are ovoid, have more distinct borders, and perpendicular to the lateral ventricles. More clinically silent
Spinal Cord	Abnormalities are mostly in the cervical and upper thoracic regions, involving ≥ 3 consecutive vertebral levels, and can extend to the medulla.	Short, often multiple

CONCLUSION

This case outlines the importance of a thorough eye exam, including inquiring about systemic symptoms to reach a prompt diagnosis. Optic neuritis can be one of the first symptoms of NMOSD, mimicking many other ocular conditions. Recurrent attacks of NMOSD are highly suggestive of poor prognosis, especially when there are delays in treatment. Many cases can end up with poor vision, ascending myelitis, and permanent disability. Therefore, a neurological referral is crucial to confirm the diagnoses and start appropriate treatment. This includes monoclonal antibodies, plasma exchange, and high-dose intravenous corticosteroids.

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Available upon request

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N/A

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Unilateral Cranial Nerve Six Palsy Secondary to Prepontine Cistern Meningioma

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INTRODUCTION

A 65-year-old African American female presents with complaints of horizontal binocular diplopia, onset several months ago. The patient reports worsening of double vision at distance and in right gaze. The patient's medical history is significant for diabetes, hypertension, heart disease, and arthritis. Upon the initial presentation of isolated right cranial nerve VI palsy, the etiology was considered vascular given the patient's systemic history of diabetes and hypertension. However, no improvement in signs and symptoms after six months suggested a different causative mechanism.

CLINICAL FINDINGS

An MRI of the brain and orbit was done revealing a 23.19mm x 7.12mm meningioma localized in the right prepontine cistern with potential extension into Mackel's cave. Prepontine cistern is a subarachnoid space filled with cerebrospinal fluid located between the pons and clivus. The abducens nerve traverses the prepontine cistern as it exits the brainstem. This anatomical course renders the nerve vulnerable to compression or injury due to lesions or abnormalities within this space. Consequently, space occupying lesions in the prepontine cistern could exert pressure or impinge the abducens nerve, resulting in impairment of its function. Thus, the underlying cause of this patient's non-resolving unilateral abducens palsy was a compressive lesion, specifically a prepontine meningioma.

TABLE 1
Entrance Testing

	OD	OS
BCVA	20/20	20/20
Pupils	pupils equal, round, reactive, no APD	pupils equal, round, reactive, no APD
CVF	full to finger count	full to finger count
Motility	**abduction deficit**	EOM is full

TABLE 2
Posterior Segment Findings

	OD	OS
Vitreous	clear	clear
C/D	0.4/0.4	0.4/0.4
Optic Nerve	flat, sharp, good color	flat, sharp, good color
Macula	flat, no hemorrhages, exudates, pigmentary changes, or macular edema	flat, no hemorrhages, exudates, pigmentary changes, or macular edema
Vessels	normal	normal
Periphery	temporal WsP	temporal WsP

IMAGE 1
MRI sagittal T1 with contrast - enhancing mass within the right aspect of the prepontine cistern, causing compression on the right abducens nerve

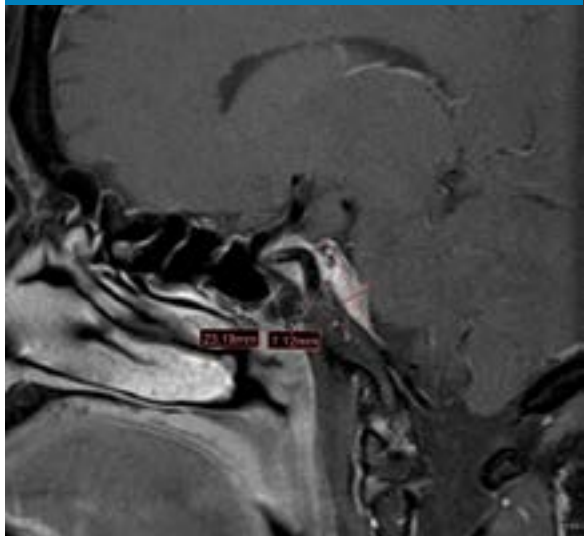
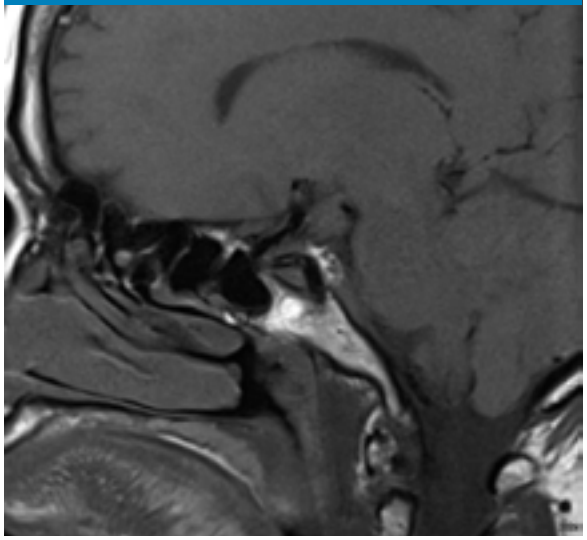


IMAGE 2
MRI sagittal T1 without contrast - isointense mass involving the right prepontine cistern



MANAGEMENT

Meningiomas represent the most common type of benign intracranial tumors. No further treatment is currently indicated for this patient. However, regular MRIs are recommended to monitor any changes in the size or characteristics of the meningioma. To alleviate the patient's diplopia, 8 diopters of base-out prism was prescribed at distance only.

CONCLUSION

In cases of unilateral abducens palsy with positive systemic history of diabetes and hypertension, an initial consideration may be vascular etiology. However, persistence of symptoms beyond 3-4 months necessitates imaging to exclude alternative pathologies. This case enlightens the anatomical relationship between cranial nerve six and the prepontine cistern along with significance of adjusting treatment strategies based on newly identified causative factors.

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Multiple Myeloma Chemotherapy Drug Bortezomib Increases Intensity and Severity of Eyelid Chalazia

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INTRODUCTION

A 39 yo female patient presents with multiple chronic severe chalazia that affect both upper eyelids. The chalazia began two months after starting a chemotherapy drug (bortezomib) used to treat multiple myeloma. Several case reports show a correlation between bortezomib use and severe eyelid chalazia. The chalazia are most commonly involving the upper eyelid and are challenging to treat. Low level light therapy (LLLT) with meibomian gland expression was utilized to improve patient signs and symptoms.

CLINICAL FINDINGS

39 yo black female presents to the urgent care optometry clinic with a complaint of painful swollen eyelids two months after starting the medication bortezomib for multiple myeloma. She is currently on doxycycline (100mg BID PO), erythromycin ointment, lid scrubs, and warm compresses.

CLINICAL EXAM

VA: 20/20 OD, 20/20 OS

Anterior slit lamp

OD: 4+ UL edema, 3+ scurf, capped glands, thick meibum

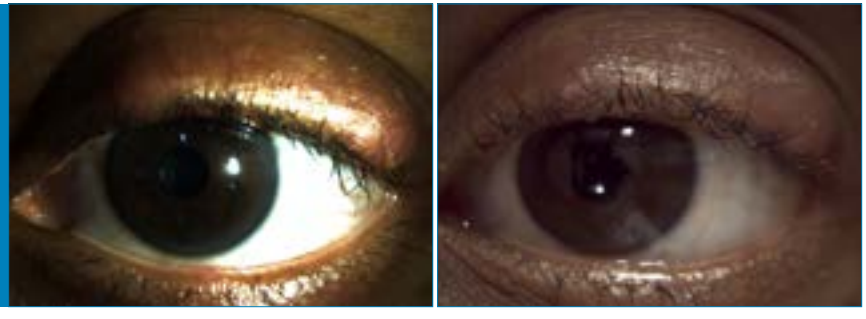
OS: 3+ UL edema, two hard nodules, 3+ scurf, capped glands, thick meibum

DISCUSSION

A chalazion is caused by a blockage or obstruction of either the meibomian glands or glands of Zeis. This patient had not experienced a chalazion before being treated for multiple myeloma. Bortezomib is a proteasome inhibitor chemotherapy drug which is FDA approved to treat multiple myeloma. There have been numerous reported cases of bortezomib causing multiple severe chalazia in patients. While the exact mechanism is unknown, it is believed an increase in inflammatory markers such as IL-6, TNF, and CRP causes inflammation in the eyelid glands. The complication is rare but if it does occur most patients experience the chalazia three months after treatment begins. It has been shown that the chalazia subside after the conclusion of bortezomib treatment.

FIGURE 1
Before treatment and after treatment anterior slit lamp photos of right eye. Improvement in upper eyelid edema and erythema is observed.

FIGURE 2
Before treatment and after treatment anterior slit lamp photos of left eye. Mild improvement in upper eyelid edema and erythema is observed.



TREATMENT AND MANAGEMENT

This patient was already utilizing numerous chalazia treatment options including doxycycline, warm compresses, lid scrubs, and erythromycin ointment without resolution. Low level light therapy (LLLT) was initiated at the first visit. Four rounds of LLLT with meibomian gland expression after rounds three and four were concluded. LLLT with expression improved the patient's comfort and overall appearance.

CONCLUSION

Bortezomib is considered one of the first line chemotherapy drug treatments for multiple myeloma and can have profound ocular side effects. Eyecare providers can increase the quality of life in patients by actively treating chalazion in these patients. Treatments include antibiotics, warm compresses, LLLT, gland expression, and intense pulsed light therapy. Improved ocular comfort can extend the patients' time on the medication and thus improve their prognosis.

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Multiple, Unilateral Retinal Emboli: The Ocular Impact of Chronic Vascular Disease

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Jackie Walorski VA Clinic, Mishawaka, Indiana

INTRODUCTION

Retinal arterial plaques are associated with chronic vascular disease and may lead to sight threatening complications and even an increased risk of mortality due to subsequent cerebrovascular events. This case demonstrates an asymptomatic clinical presentation, diagnostic testing, and management of multiple, unilateral retinal emboli.

CASE SUMMARY

Case History:

- 74-year-old Caucasian male
- **Medical history:** Coronary artery disease, Congestive heart failure, Chronic Kidney Disease (CKD) stage IIIb, Hyperlipidemia
- **Meds:** Clopidogril, metoprolol, sacubitril/valsartan

Clinical Exam Findings:

- BCVA: 20/20 OD, 20/20 OS
- Pupils: OU PERRLA (-)APD
- EOMS: OU FROM
- CVF: OU FTFC
- Anterior segment: OU unremarkable
- IOP: 18/18 mmHg
- (-) History of stroke/stroke symptoms
- DFE:
  - OD: WNL
  - OS: See Figure 1

Laboratory/Ancillary Testing:

See Table 1.

Differential Diagnosis:

See Table 2.

TABLE 1

Pertinent lab work and imaging results.

Testing	Results	
Cholesterol	168 mg/dL	Normal
Triglyceride	171 mg/dL	High
dHDL	39 mg/dL	Low
LDL-calculated	95 mg/dL	Normal
Serum creatinine	1.59 mg/dL	High
Estimated GFR	45 mL/min/1.73m^2	(+) Kidney disease
Carotid ultrasound	Less than 50% stenosis of bilateral ICA	

TREATMENT & MANAGEMENT

Any number of emboli require an assessment of stroke risk, including potential immediate emergency department referral. Presentation may range from asymptomatic to life-threatening, emphasizing rapid action. Appropriate referrals should be made to ensure care and management of vascular risk factors. This patient had pertinent lab work completed as well as a bilateral carotid doppler ultrasound (see laboratory/ancillary testing section). It's necessary to thoroughly educate the patient by reviewing stroke symptoms and performing frequent dilated fundus exams to monitor for sight and life-threatening complications.

Figure 1

Fundus photography of initial encounter (A) displaying an emboli at the IT arcade bifurcation, a parafoveal emboli, and a ST arcade emboli. At the 3 month f/u encounter (B) 2 emboli are no longer present (white arrows); however, the remaining parafoveal emboli has visibly moved upstream from its initial location (blue arrow).

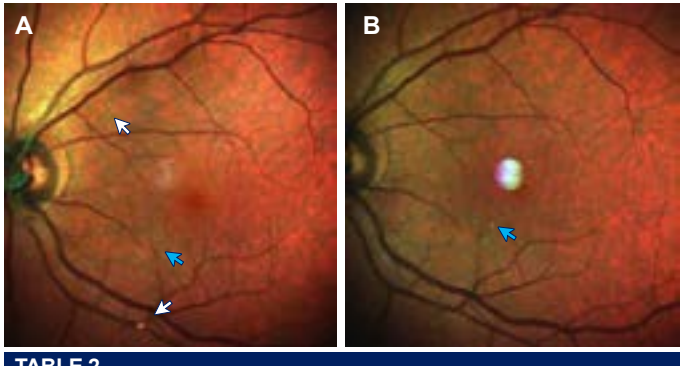

TABLE 2

Differential diagnosis may include varying types of plaque composition with subsequently different etiologies.

Composition	Description
Cholesterol	Yellow, refractile deposits also known as Hollenhorst plaques, the most common of retinal emboli, often located at arteriole bifurcations, originating from atherosclerotic lesions of carotid disease
Calcific	Dull and white appearance, often located in the CRA or near the ONH due to larger size, originating from heart valve calcifications
Platelet-fibrin	Dull grey/white with elongated appearance often found in conjunction with cardiac/carotid disease
Talc	Highly refractile, small white/yellow appearance most notably found in the macular region, associated with intravenous drug abuse
Lipid/Fat	Difficult to visualize emboli however often present concurrently with cotton wool spots, typically associated with long bone fractures and chest trauma
Tumor	Proliferative neoplastic cells that originate from a main lesion elsewhere systemically
Septic	Deposits resulting from an infected thrombus traveling upstream likely due to bacterial endocarditis

DISCUSSION

Arterial plaques present frequently as a single embolus lodged at a bifurcation. Rarely, multiple, unilateral emboli may be seen, warranting immediate attention. Only 12% of cases present with multiple emboli. Arterial plaques can be composed of cholesterol, platelet-fibrin, or calcium, and are most frequently found in men greater than 70 years of age. Associated factors linked to increased prevalence of retinal emboli range from systemic vascular disease to drug abuse. Emboli formation occurs from turbulent blood flow through a stenotic vessel or diseased valve that often dislodges plaques leading to blockages elsewhere in circulation. Ophthalmic complications of arterial plaques may lead to a retinal artery occlusions and an increased risk of cerebrovascular accident. This patient presented with vascular risk factors which can be further exacerbated by renal disease. CKD increases the stroke risk by 30%. Despite this patient's asymptomatic presentation and no hemodynamically significant stenosis of the carotid arteries, it is important to recognize that the risk of a stroke and ocular sequelae remains and requires thorough evaluation.

CONCLUSION

Presence of retinal emboli may indicate the possibility of further emboli being present in the systemic circulation, increasing the likelihood of a cerebrovascular accident, which could be fatal. Optometrists play a crucial role in ensuring timely care of patients presenting with arterial plaques. It is important to consider possible clinical complications and associated conditions to provide the appropriate treatment and management.

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Bilateral Optic Neuropathy as the Presenting Sign of Neurosyphilis

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INTRODUCTION

A patient presents with progressive bilateral reduction in vision and bilateral optic atrophy. Blood work reveals a reactive rapid plasma reagin result and a reactive treponemal pallidum antibodies test.

CLINICAL FINDINGS

Case History

- 58-year-old African American male
- **CC:** Progressive reduction in vision OU for the past two months
- **POH:** presbyopia
- **PMH:** human immunodeficiency virus, hypertension, coronary artery disease, hyperlipidemia, prediabetes, stage 3 chronic kidney disease, vitamin D deficiency
- **Meds:** Genvoya, amlodipine, chlorthalidone, losartan, metoprolol tartrate, prasugrel, atorvastatin, ergocalciferol

Clinical Findings

- **BCVA:** OD 20/150, OS 20/500
- **Pupils:** equal, round, reactive to light OD, OS
- **Red-cap desaturation:** reduced saturation OS > OD
- **Color vision:** reduced OD, OS
- **DFE:** temporal optic nerve pallor OS > OD

Imaging

- **Optos:** temporal optic nerve pallor OS > OD
- **Cirrus OCT:** mild superior-temporal RNFL thinning and diffuse GCL thinning OD, mild inferior-temporal RNFL thinning and diffuse GCL thinning OS
- T1 weighted MRI of the brain and orbits reveals old lacunar infarct of right basal ganglia, non-specific paraventricular white matter lesions, and slight enlargement of the medial and inferior recti muscles OU

Blood Work

- CBC, Thyroid Panel, Lead, Folate, Vitamin B12: within reference interval
- CMP: elevated glucose, elevated creatinine, reduced glomerular filtration rate
- Rapid Plasma Reagin, Treponema Pallidum Antibodies: reactive

FIGURE 1A
Optos image showing temporal optic nerve pallor OD

FIGURE 1B
Optos image showing temporal optic nerve pallor OS

FIGURE 2A
Cirrus OCT showing mild superior-temporal RNFL thinning OD and mild inferior-temporal RNFL thinning OS

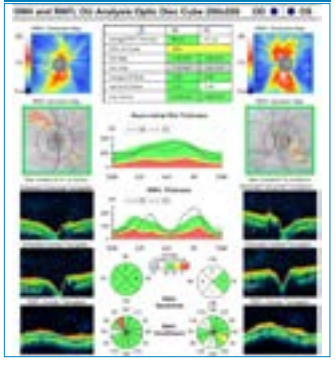


FIGURE 2B
Cirrus OCT showing diffuse GCL thinning OS > OD

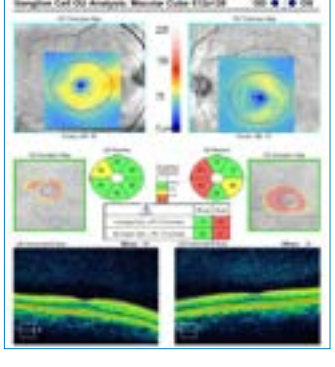


FIGURE 3
T1 weighted FLAIR MRI of the brain showing old lacunar infarct of right basal ganglia and non-specific paraventricular white matter lesions

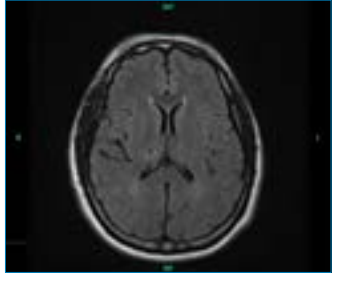
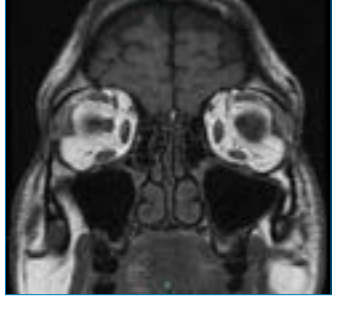


FIGURE 4
T1 weighted MRI of the orbits showing slight enlargement of the medial and inferior recti muscles OU



DIFFERENTIAL DIAGNOSIS

Neurosyphilis, compressive lesion, ischemic optic neuropathy, nutritional optic neuropathy.

DISCUSSION

Syphilis typically occurs in three stages. Ocular involvement can occur at any stage of the disease course. Syphilis is referred to as 'The Great Masquerader' because it can present with a wide variety of clinical signs and symptoms. Syphilis typically presents itself within the eye as uveitis, retinal vasculitis, interstitial keratitis, and optic neuropathy. When the central nervous system is affected, it is called neurosyphilis. Studies show that ocular manifestations of syphilis are more common in HIV positive individuals. Research suggests that as high as 85% of HIV positive individuals with ocular syphilis had concomitant neurosyphilis.

MANAGEMENT

Optic nerve involvement in the presence of positive syphilis titers warrants a diagnosis of neurosyphilis. The patient was admitted and received a 10-day course of IV penicillin. Prompt treatment is associated with good visual prognosis.

CONCLUSION

Syphilis should be considered in all ocular inflammatory manifestations, especially in high-risk individuals. Co-infection of HIV and syphilis can be a deadly combination; once a diagnosis is made, immediate treatment is required.

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Rapid Progression of Primary Open Angle Glaucoma in Adult Male Associated with Prolonged Postural Change

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INTRODUCTION

Glaucoma is a multifactorial disease characterized by progressive degeneration of retinal ganglion cells and is the leading cause of irreversible blindness worldwide. Elevated intraocular pressure (IOP) is an important known risk factor for glaucoma development and progression, including cases with statistically normal pressure. In primary open-angle glaucoma, which constitutes 80% of cases in the United States, the level of IOP is related to retinal ganglion cell death. IOP can cause mechanical stress to the lamina cribrosa, which may result in the lamina's compression, deformation, and remodeling. The lamina damage leads to mechanical axonal damage and disruption of the axon transport. Fluctuation of IOP occurs with changing body and head position, with the magnitude of change related to the angle of tilt and duration of time in that position, and glaucoma patients have more significant variation than healthy individuals. Thus, a fully inverted position results in more significant IOP elevation (15.1 +/- 4.1 mmHg) than changing to a horizontal position as in sleep (average 6.6 +/- 0.8 mmHg). Along with IOP changes, blood flow changes affecting ocular perfusion pressure also occur with postural changes. This case presents the importance of questioning glaucoma patients regarding postural changes, especially during physical exercise, as this may be a critical factor in IOP fluctuation and, thus, in glaucoma progression.

CASE

A 45 y/o AA male was referred for a glaucoma consultation secondary to asymmetric and glaucomatous optic nerve appearance OD>OS. The patient reported being hit with a fist OD x 20 years prior and denied any complications following the injury. There was no family history of glaucoma. The last medical exam was 1 year prior, and the patient denied any systemic conditions or medications.

TABLE 1
Pertinent Clinical Findings

	OD	OS
Visual Acuity (sc)	20/20	20/20
Pupil Testing	PERRL, (-) APD	PERRL, (-) APD
CVF	FTFC	FTFC
EOM	FROM	FROM
4M Gonioscopy	CB x 360 degrees (-)AR, (-)PAS, (-)NVA, trc TM pigment	CB x 360 degrees (-)AR, (-)PAS, (-)NVA, trc TM pigment
IOP (Goldmann)	20mmHg	21mmHg
Vitreous	Clear	Clear
Lens	Clear	Clear
Optic Nerve	Flat, severe thinning superior/inferior, C/D: 0.85H/0.9V (Image 1)	Flat, severe thinning superior/inferior, C/D: 0.75H/0.8V (Image 2)
Macula	Flat with normal foveal contour	Flat with normal foveal contour
Fundus	Flat x 360 degrees, (-) RD/holes/tears	Flat x 360 degrees, (-) RD/holes/tears

IMAGE 1
Optos photo OD showing significant thinning of NRR superior and inferior

IMAGE 2
Optos photo OD showing significant thinning of NRR greater superiorly

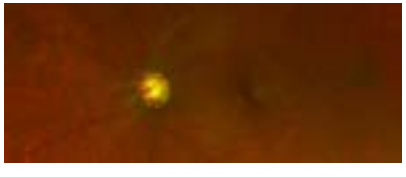

IMAGE 3
Cirrus ONH OCT with significant RNFL loss OD, OS

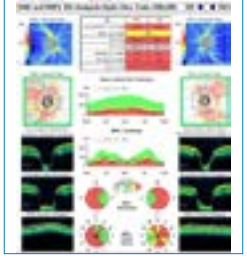

IMAGE 4
Baseline 24-2 SITA FAST HVF - superior and superior arcuate defect with paracentral scotoma

IMAGE 5
Baseline 24-2 SITA FAST HVF OS – superior arcuate defect with paracentral scotoma

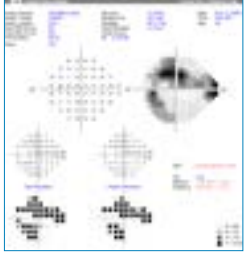

IMAGE 6
Baseline 10-2 HVF OD – superior paracentral defect

IMAGE 7
Baseline 10-2 HVF OS – superior arcuate paracentral defect

DIAGNOSIS AND DISCUSSION

After secondary causes of glaucoma were ruled out, the patient was diagnosed with severe primary open-angle glaucoma OD, OS. Due to the patient's young age and the severity of the condition, the patient was started on latanoprost QHS OU and dorzolamide–timolol BID OU. On topical therapy, there was only a 15-20% reduction in IOP from the previous visit, and the patient did report poor adherence to topical dosage. With the severity of the condition, the patient's age, and the poor adherence to topical drops, the patient was referred to ophthalmology for possible SLT.

When reviewing the risk factors and the potential causes of glaucoma, it is essential to question the patient on postural changes, especially during physical exercise.

Although the patient's in-office pre-treatment IOP measurements were stable, there was likely a more significant fluctuation in IOP outside of clinical measurement. The diurnal physiological IOP variation is not likely to lead to progressive loss; however, irregular or large fluctuations in IOP lead to more significant stress and strain on the lamina cribrosa, thus leading to more progressive damage. This makes it essential to not only treat and measure the IOP value but also ensure the patient's IOP is sustained throughout the day.

This patient reported using inversion tables frequently for back pain and stretching. This positioning is like inverted yoga positions, headstands, and other positions that place the head lower than the heart. This position leads to a significant fluctuation in IOP of 15.1 +/- 4.1mmHg, thus increasing the risk of disease progression.

CONCLUSION

It is crucial to appropriately diagnose and treat glaucoma, as glaucoma is the leading cause of irreversible vision loss. Once secondary glaucoma and angle closure glaucoma have been ruled out, eye care providers must question a patient's lifestyle. In this case, the patient had rapid progressive changes without significantly elevated pre-treatment IOP, no family history, and no secondary causes. Likely, the progression of the disease occurred rapidly due to large IOP fluctuations secondary to an inverted postural change. Thus, it is crucial to consider the IOP measured in the office and the stability of IOP throughout the day. Advising glaucoma suspects and glaucoma patients on IOP fluctuation associated with postural changes may not only help recognize a potential cause of glaucoma progression but may benefit in preventing further damage.

REFERENCES

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A Safe Space: Scleral Lenses Helping to Heal Epithelium in Limbal Stem Cell Deficiency

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Background

Limbal stem cell deficiency (LSCD) is a condition in which the stem cells found in the limbus are dysfunctional, leading to a subsequent disruption of the corneal epithelium.
Etiologies of total LSCD include aniridia, Stevens Johnson, OCP, and severe chemical injury. Etiologies of partial LSCD are contact lens overwear, ocular surgery, mild chemical or thermal burns, and medication toxicity.

Case Details

- **57 year old Caucasian Female**
- **Chief Complaint:** blurry vision in the left eye in the last 6 months
- **Initial Diagnosis and Treatment:**
  - Previous diagnosis of interstitial keratitis due to corneal neovascularization with haze, vortex keratopathy and microcystic edema
  - Pertinent lab work was all negative (CBC, ACE, RPR, Lyme)
  - Treatment with topical ofloxacin and prednisolone acetate, as well as oral valacyclovir
  - No improvement in symptoms over 3 weeks, leading to referral for corneal services
- **Contact Lens History:**
  - Corneal Gas Permeable (cGP) contacts for 40 years, then soft contacts for 5 years for high myopia
- **Pertinent History:**
  - High myopia, bilateral
  - Myopic degeneration, bilateral
  - Dry eyes, bilateral
- **Examination:**
- Right eye: no degenerative findings
- Left eye:
  - Fine stromal neovascularization superior and inferior
  - Focal pannus inferior
  - Thickened and irregular anterior stroma and epithelium superior, extending into visual axis

Limbal stem cell deficiency: Staging

Epithelial involvement
Stage 1: peripheral involvement only
Stage 2: involves periphery and central 5mm of cornea
Stage 3: involves entire corneal surface

Scleral Contact Lens Use

This patient was diagnosed with limbal stem cell deficiency due to her irregular, dystrophic, whorl epithelium and fine neovascularization, which caused her secondary poor vision. Diagnosis of LSCD can be made at the slit lamp and confirmed by cellular sampling.
A recommendation of lubricating agents, discontinuation of habitual soft contact, and referral for specialty lens services was made by the corneal specialist.
Presenting VA was 20/150.
At the initial fitting visit, best potential VA with a scleral lens was 20/70.

Symptoms of LSCD
Blurred vision
Ocular discomfort/irritation
Foreign body sensation
Redness
Tearing
Pain
Photophobia

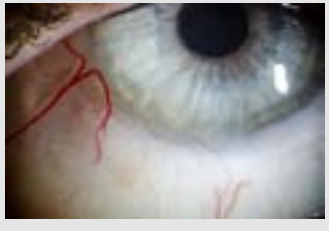

Fig 1: slit lamp image demonstrating thickened and irregular epithelium superiorly (above) and focal inferior pannus (below)

Fig 2: anterior segment OCT of scleral lens vaulting the thickened and irregular inferior limbus

Acknowledgements

I would like to express gratitude to Noelle Bock, OD and Christopher Croasdale, MD for their mentorship throughout this residency program.

Treatment and Management

The exact mechanism of contact lens induced keratopathy and subsequent limbal stem cell deficiency is not clear and is thought to be multifactorial.
Chronic contact lens use and overwear can cause microtrauma leading to loss of stem cells, poor corneal epithelization, conjunctivalization, and subsequent vision decrease.

The Global Consensus on the Management of LSCD released a stepwise approach in 2020.
- Ocular surface optimization
  1) Eyelids and conjunctiva
  2) Anti-inflammation treatments
  3) Optimize tear film
  4) Optimize ocular surface epithelium
     - Including therapeutic scleral lens use
  5) Surgery

Goals for fitting therapeutic scleral lenses for LSCD patients:
- Protect the unstable surface
  - Decrease discomfort
  - Decrease risk of ED
- Improve vision

LSCD patients need close monitoring for:
- Infectious keratitis
- Exacerbation of stem cell deficiency

Discussion and Conclusion

Chronic contact lens use and overwear causes multifactorial damage to the limbus, leading to loss of stem cells, poor corneal epithelialization and/or conjunctivalization, and subsequent symptoms. When mild, LSCD caused by contact lens use is reversible. These patients are unlikely to need surgical management once the ocular surface is properly cared for.

Scleral lenses can be used in the therapeutic management of LSCD. Patients are likely to benefit from vision correction and surface protection. However, scleral lenses are unlikely to be successful as monotherapy. Full treatment should address all aspects of the ocular surface.

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Double trouble: Branch retinal vein occlusion and retinal neovascularization in an eye with previous branch retinal artery occlusion

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INTRODUCTION

Branch retinal artery occlusions (BRAO) and branch retinal vein occlusions (BRVO) can result in significant acuity and field loss. Although patients can have risk factors for both, the two are rarely reported in succession in the same eye, and the associated complications are not clearly defined. This case describes a patient with a BRAO who subsequently developed a BRVO with neovascularization of the retina and a vitreous hemorrhage (VH) six months later.

CASE PRESENTATION

A 67-year-old AA male presented with complaints of new floaters OS. He denied flashes. His ocular history was significant for DMII without retinopathy OU, POAG moderate stage OU (treated with latanoprost qd OU) and a superior BRAO OS without plaque (an incidental, asymptomatic finding at his CEE 6 months prior). His systemic history was significant for DMII, HTN, hyperlipidemia, and a history of a stroke 14 years prior; all under good control as reported by the patient. After the diagnosis of BRAO at the CEE 6 months prior, carotid ultrasound testing revealed severe atherosclerosis of both ICA's and bilateral carotid stenting was recommended but had not yet been completed due to the patient's elevated HTN.

DIAGNOSIS & TREATMENT

This patient had a BRAO then subsequently developed a BRVO with neovascularization of the retina and a VH. He was treated with PRP OS. He was also advised to follow up with his vascular surgeon. His VH resolved after PRP, and vision has remained stable since.

IMAGE 1
10-2 HVF OS at CEE - dense inferior nasal > temporal field loss from previous superior BRAO

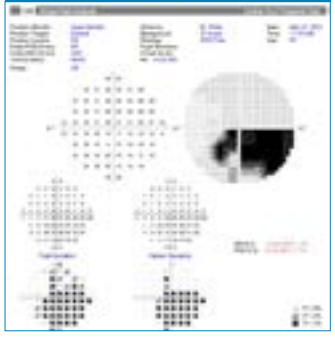


IMAGE 2
Wide field fundus image OS at CEE – previous superior BRAO found as an incidental finding

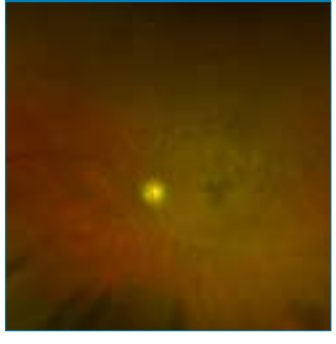


IMAGE 3 & 4
Macula OCT OS at CEE - inner retinal thinning and atrophy superiorly due to previous superior BRAO

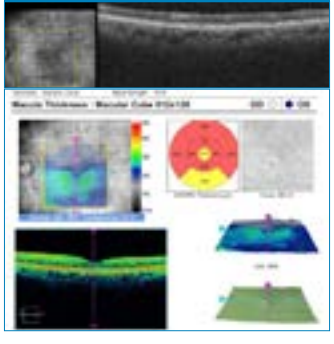
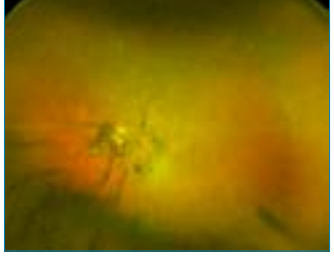


TABLE 1
Clinical Findings

OD		OS
20/20	BCVA	20/20-
FROM	EOM	FROM
FTFC	CVF	Inferior restriction; longstanding due to past BRAO
ERRL, (-) APD	Pupils	ERRL, 1+ APD
Unremarkable, (-) NVI	SLE	Unremarkable, (-) NVI
17 mmHg	IOP	18 mmHg
Mild arteriolar narrowing, (-) NVE	Posterior pole	New intraretinal hemes, NVE, and dilated venules along the inferior arcade. Longstanding superior retinal atrophy/sclerosed arterioles
clear	Vitreous	2+ VH (Image 5)
flat and intact, (-) break/RD	Periphery	flat and intact, (-) break/RD

IMAGE 5
Wide field fundus image OS (6 months after CEE) - 2+ vitreous hemorrhage and NVE along the inferior arcade



DISCUSSION

BRVO following BRAO in the same eye is rarely reported in literature. More commonly reported, though still rare, are simultaneous vein and artery occlusions in the same quadrant. This patient was unique in that he had risk factors for both conditions (carotid occlusive disease and microvascular disease) and therefore developed both conditions in the same eye at different times in different quadrants. Additionally, eyes with combined venous and arterial occlusions may be at higher risk of ocular neovascularization (ONV). The rate of ONV with BRVO and major arterial insufficiency, as reported by Lee et al, is 21%, which is substantially higher than the rate with BRVO alone (3.9%) and BRAO alone (0-1%).

CONCLUSION

A patient with previous artery occlusion can still develop a vein occlusion, especially in the presence of comorbid systemic conditions. Most commonly these occur simultaneously in the same retinal quadrant but can occur at different times or in different quadrants as seen in this case. Eyes with combined venous and arterial occlusions may be at higher risk of ONV compared to eyes with isolated occlusive events. Clinicians should be aware of this risk and follow these patients more closely for neovascular complications.

REFERENCES

Available upon request

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CLEARING UP COMMUNICATION

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INTRODUCTION

Commonly, conditions causing paralysis or muscular weakness can lead to desiccation of the ocular surface. Specifically, incomplete lid closure and partial blinks lead to prolonged exposure, resulting in various keratopathies. Examples include generalized inflammation of the ocular surface, microbial keratitis, ulceration, and permanent vision loss from scarring, among other complications.

This case reviews a 43-year-old male with a history of a brain-stem stroke resulting in quadriplegia and aphasia and with inability to eat or breathe without assistance. Interestingly, the patient's cortex was spared resulting in Locked-in Syndrome - a condition in which cognitive function is preserved. The most common cause of this condition is basilar artery thrombosis resulting in ventral pontine damage (see figure 1.) These patients often develop ocular surface conditions secondary to surface exposure. Diplopia is also a common ocular complication associated with Lock-in Syndrome as cranial nerves III and VI originate within the affected area at the pontine-midbrain and the pontine-medullary junctions, respectively. Table 1 reviews the origins of the cranial nerves that control ocular movement as well as important gaze centers.

The prognosis for this condition is poor, although the condition itself is not fatal. Favorable prognostic features include early recovery of lateral eye movements. The average time to accurate diagnosis is approximately 2 months following the inciting event.

FIGURE 1

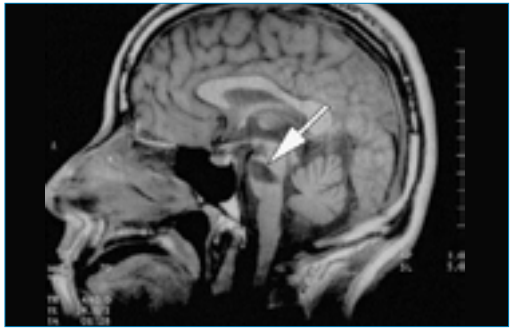


TABLE 1
ORIGIN OF OCULAR CRANIAL NERVES AND GAZE CENTERS

Cranial Nerve III	Pontine-midbrain junction
Cranial Nerve IV	Dorsal Aspect of the midbrain
Cranial Nerve VI	Pontine-medullary junction
Horizontal Gaze Center	Paramedian Pontine Reticular Formation (PPRF) located in the pons near the nucleus of CN VI
Vertical Gaze Center	rostral interstitial nucleus located in the midbrain

TABLE 2
LOCKED-IN SYNDROME CLASSIFICATIONS

Classic	Quadriplegia and anarthria with preserved consciousness and vertical ocular movements
Incomplete	Same physical and mental capabilities as classic with additional voluntary muscle movement
Total	Full consciousness with quadriplegia and anarthria but with no muscle movement, including vertical saccades

CASE HISTORY

43-year-old male presents for evaluation of swollen lids with hazy cornea OD with "bumps" on cornea, per wife who is also his caretaker. This has both reduced vision in his right eye and impeded his ability to communicate using vertical eye movements due to consequent swelling/ptosis. Four years prior, this patient was diagnosed with the "classic" form of Locked-in Syndrome, where vertical eye movements and blinking are the only muscular controls that are spared following his stroke. The classifications of this condition are detailed in Table 2.

Patient's current treatment for longstanding surface dryness and neurotrophic changes include: FML bid OU, N-acetyl cysteine bid OU, and lubricating ointment qid OU. Patient also utilizes an occlusive lens OD to relieve diplopia but has been intolerant to this lens due to this acute ocular flare-up.

TABLE 3
LOCKED-IN SYNDROME CLASSIFICATIONS

OD	Eye	OS
20/200	**VA**	20/30
PERRL (-) APD	**Pupils**	PERRL (-) APD
FTFC	**CVF**	FTFC
Limited horizontal movement, full vertical range of motion, nystagmus	**EOMs**	Limited horizontal movement, full vertical range of motion. nystagmus
Stromal scarring, significant filaments Upper lid swelling with mild ptosis	**Slit Lamp Exam**	WNL - corneal epi intact, mild stromal scarring

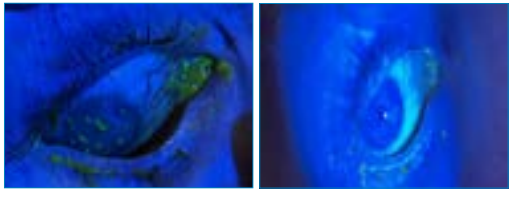
TREATMENT AND MANAGEMENT

As with any case of filamentary keratitis, removal of corneal filaments is important to improve patient comfort and facilitate healing of the ocular surface. This patient's inability to sit behind a slit lamp combined with his erratic ocular movements through lateral and torsional nystagmus created a challenging case for removal with forceps. A cotton tip applicator and Weck-Cel Sponge were used instead. Figure 1 shows the patient's eye after removal of most of the large filaments.

An Acuvue Oasys bandage contact lens was placed in-office on the right eye, and the current therapy was continued with the addition of PFAT's every hour while awake in both eyes. Of note, the BCL was placed over the filaments shown in figure 1.

Figure 2 shows the patient's right eye 4 days after the initial visit. His vision had improved to 20/100 and no filaments were present upon examination with fluorescein dye.

FIGURE 2



DISCUSSION

Treatment of this patient's ocular surface plays an important role in both improving his vision and preserving his method of communicating with the world around him. Due to corneal nerve damage and incomplete lid closure, stroke patients are often at high risk for ocular surface diseases. Aggressive prophylactic treatment is recommended to maintain ocular health. This may include consistent daytime lubrication and nighttime ointment usage, long-term low dose anti-inflammatory therapy through either corticosteroids or a cyclosporine, treating the neurotrophic component through Oxervate, use of an amniotic membrane to promote healing, and removal of corneal filaments when present.

Histologically, filaments consist of mucin combined with devitalized epithelial tissue, anchored at its epithelial cell core. During removal, it is important to remove at the base. That said, this case demonstrates that a bandage contact lens over remaining filaments is therapeutic in patients where complete removal of all filaments is not possible.

CONCLUSION

Aggressive treatment of concurrent ocular surface conditions in stroke patients is often warranted due to both corneal innervation deficit as well as mechanical paralysis of the muscles that control the lids. For a newly diagnosed stroke patient, it may be beneficial to attempt testing vertical ocular tracking to screen for a classic presentation of Locked-in Syndrome. Recall - patients with this condition are often fully cognizant of their situation and aware of their surroundings. These individuals are also thought to feel an array of emotions although unable to fully express them. So, when discussing findings and educating, it is important to speak directly to the patient rather than speaking to and facing the caretaker. This multifaceted condition requires co-management among various specialties, and eye-care providers play the important role of both preserving these patients' vision along with maintaining their last remaining mode of communication.

REFERENCES

Available upon request

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Optic Neuritis and Bilateral Internuclear Ophthalmoplegia in a Patient with Multiple Sclerosis

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INTRODUCTION

Multiple Sclerosis (MS) is an autoimmune condition that results in progressive demyelination of the central nervous system. MS can occur in most ethnic groups, but recent findings in the United States have suggested that African American females have a higher risk of developing MS. Although MS is a systemic disease, optometrists are privy to its ocular manifestations, such as optic neuritis (ON), internuclear ophthalmoplegia, and nystagmus. This is a presentation to review how treatment of the systemic disease may or may not treat its ocular manifestations, and how best to move forward if no improvement is seen.

CASE PRESENTATION

A 47-year-old female presented with bilateral internuclear ophthalmoplegia (BINO) with a history of bilateral optic neuritis and relapsing-remitting MS diagnosed in 2001. At the initial presentation, she denied pain on eye movement and reported stable vision.

TABLE 1
Exam findings from initial visit

	OD	OS
VA	20/25	20/25
EOM	Bilateral adduction deficit with associated nystagmus on abduction	Bilateral adduction deficit with associated nystagmus on abduction
Pupils	WNL	WNL
CVF	FTFC	FTFC

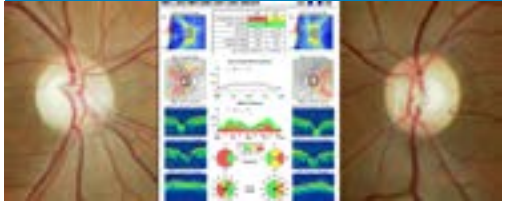
Ocular History: h/o optic nerve pallor OD>OS
Medical History: Relapsing-Remitting Multiple Sclerosis
Family History: unknown
Medications: fingolimod (at initial encounter)
Anterior Segment: unremarkable
DFE: optic nerve pallor OD>OS
Optical Coherence Tomography (OCT): diffuse retinal nerve fiber layer (RNFL) thinning OD>OS

IMAGE 1A
adduction deficit OS on right gaze

IMAGE 1B
adduction deficit OD on left gaze

IMAGE 1C
spared convergence

IMAGE 2
ONH photos show pallor OD>OS, and OCT reveals diffuse RNFL thinning OD>OS.



TREATMENT AND MANAGEMENT

Initially, she was treated with fingolimod for her MS. After communication with her specialist in 2017, the patient was switched to Tysabri® with an improvement seen in ocular motility. After another flare in 2022, the patient stopped Tysabri® and is now on Ocrevus® with stable motility patterns. The patient has been stable with new medication and no changes in treatment has been warranted thus far on Ocrevus®.

DISCUSSION

Treatment for ocular manifestations of MS may be dependent on the treatment for the systemic condition, and optometrists may be the first to encounter sequelae of systemic MS. In cases with diplopia often seen with BINO, patching or prism may be considered depending on the chronicity. In extreme cases, if a patient with BINO progressed and became "wall-eyed", surgical intervention may be indicated through EOM resection and recession to realign eyes.

TABLE 2
Summary of Current Treatment Options for Optic Neuritis

Treatment options for ON	Mechanism of Action	Adverse Effects
Steroid (IV)	Reduce inflammation surround the optic nerve	Weight gain, mood changes, facial flushing, stomach upset, insomnia
IFN beta-1a (injection)	Reduces the amount of inflammatory cells that cross the blood brain barrier	Skin reactions around injection site (e.g. cutaneous necrosis), headaches, tight muscles, dizziness, muscle/joint pain
IFN beta-1b (injection)	Reduces the amount of inflammatory cells that cross the blood brain barrier	Skin reactions around injection site (e.g. cutaneous necrosis), headaches, tight muscles, dizziness, muscle/joint pain

CONCLUSION

The complexity of this case allows eye care providers to learn about ocular manifestations of MS and the importance of collaborative patient care when treatment requires alteration. Collaboration with ophthalmology and neurology is crucial in the care of these patients. It is important to monitor these patients closely and regularly to treat aggressively if symptoms arise as swift and prompt treatment may have a higher chance of stabilizing visual symptoms.

REFERENCES

Available upon request

Financial Support: N/A

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Ocular Manifestations of Dandy Walker Syndrome

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INTRODUCTION

Dandy Walker Syndrome (DWS) is a congenital posterior fossa malformation characterized by hypoplasia of the cerebellar vermis with cystic enlargement of the fourth ventricle resulting in an upward displacement of the tentorium and torcula. The incidence of this syndrome is approximately 1 in 35,000 live births in the United States and is typically diagnosed within the first year of life. The clinical presentation of DWS varies among patients and depends heavily on the associated syndromic complications. DWS often presents with associated ocular manifestations, most commonly including myopia, nystagmus, strabismus, and optic neuropathy.

CASE HISTORY

Patient QD, an 18-year-old AAF presented with her mother for an annual eye exam with no visual complaints. Patient's mother reports a normal birth history; the patient was carried to full-term without complications at birth. Systemic medical history was remarkable for Dandy Walker Syndrome. Mother reported full time wear of current spectacle prescription.

EXAM FINDINGS

TABLE 1
Entrance Testing

	OD	OS
Dist VA cc	20/80 PHNI	20/80 PHNI
Pupils	Equal, round, reactive, no APD	Equal round, reactive, no APD
EOMS	FROM with right-beating jerk nystagmus in all gazes and occlusion, (-) null point	FROM with right-beating jerk nystagmus in all gazes and occlusion, (-) null point
CVF	Grossly FTFC	Grossly FTFC

Near CT sc/cc	44Δ CRET/22Δ CRET
Stereopsis	(-) forms
W4D	Deep LE suppression at distance and near

TABLE 2
Slit Lamp Examination

	OD	OS
Adnexa	normal	normal
L/L	normal	normal
Conjunctiva	white and quiet	white and quiet
Sclera	white and quiet	white and quiet
Cornea	Normal epithelium, stroma, and endothelium. Normal Tear Film.	Normal epithelium, stroma, and endothelium. Normal Tear Film.
Angle/PI	GR 3 N/T	GR 3 N/T
A/C	Deep and quiet	Deep and quiet
Iris	Normal iris, (-) coloboma	Normal iris, (-) coloboma
Lens	Clear lens capsule, cortex and nucleus	Clear lens capsule, cortex and nucleus
IOP mmHg	14	13

POSTERIOR SEGMENT

FIGURE 1
Optos imaging OD. Diffuse pallor of ONH, distinct margins. Attenuated vessels. Multiple chorioretinal colobomas within posterior pole, peripheral chorioretinal atrophy, and scattered pigmentary changes throughout the periphery.

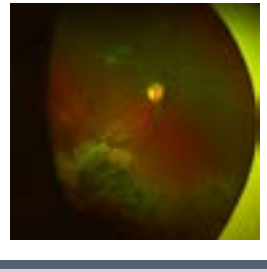


FIGURE 2
Optos imaging OS. Diffuse pallor of ONH, distinct margins. Attenuated vessels. Multiple chorioretinal colobomas within posterior pole, peripheral chorioretinal atrophy, and scattered pigmentary changes throughout the periphery.

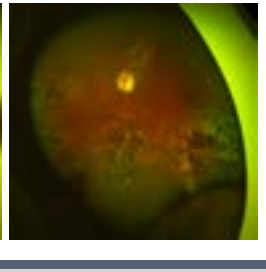


FIGURE 3
Shallow foveal contour.

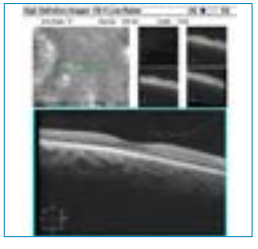
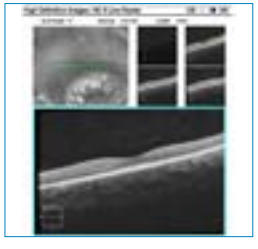


FIGURE 4
Shallow foveal contour.



DISCUSSION

The cause for the development of DWS is not fully understood, but it is proposed to have both chromosomal and environmental exposure components. Most cases of DWS occur in families with no family history of the disorder. The clinical presentation of DWS is varied and depends heavily on the severity of the condition. DWS can be detected during development via fetal ultrasound or infancy with neuroimaging. CT/MRI can identify the characteristic displacement and agenesis of the cerebellum and dilation of the fourth ventricles. Common clinical symptoms of DWS in infants may include delayed motor milestones such as crawling or walking, difficulty coordinating movements, or hypotonia. Upon physical examination, signs such as megalocephaly secondary to hydrocephalus, a prominent occiput, craniofacial abnormalities such as cleft pallet, or upward slanting of the eyes may be present. Adult patients with DWS will often display symptoms of muscle stiffness and weakness, visual and auditory impairment, and seizure activity. Malformations of the heart, face, limbs have also been reported. Over half of patients with DWS will have varying levels of intellectual disability that can range from mild to severe depending on the condition's severity.

Patient QD manifested several common ocular findings associated with DWS including reduced vision, nystagmus, strabismus, and optic neuropathy. Unlike most DWS cases in which patients are myopic, patient QD required hyperopic correction. The magnitude esotropia at near was significantly reduced with spectacle correction. Vitreoretinal findings occurring secondary to DWS are less commonly reported in the literature but may include macular edema, foveal hypoplasia, non-rhegmatogenous retinal detachment, or peripheral retinal ischemia. Patient QD presented with retinal dysgenesis in the form of chorioretinal colobomas of both eyes. The risk for retinal detachment secondary to a chorioretinal coloboma can be upwards of 40%, and in some cases, prophylactic barricade laser is considered. Patient QD was evaluated by a retinal specialist, and prophylactic barricade laser was not indicated in this case due to the chronicity and stability of her condition. Chorioretinal colobomas are non-progressive, and an annual dilated fundus exam is sufficient for monitoring the condition of the retina in these patients. Additionally, Patient QD had diffusely pale optic nerves in both eyes that occurred as a complication of hydrocephaly prior to obtaining a VP shunt to help control the elevated ICP. This finding in combination with other ocular complications has resulted in a best corrected visual acuity of 20/80 in both eyes that has remained stable for many years.

MANAGEMENT

The diagnosis of DWS is based on imaging studies such as fetal ultrasound or CT/MRI of the brain. The initial systemic management for DWS focuses on alleviating the elevated ICP that occurs secondary to hydrocephalus. Ventriculoperitoneal (VP) shunts are used to drain excess CSF in patients with DWS at the time of diagnosis. As patients age out of infancy, the mobility limitations that occur secondary to DWS may require supportive therapies such as physical or occupational therapy. Speech therapy may also be included in the medical management of a young patient with DWS. Management of the ocular manifestations may involve several subspecialties within optometry. Initial ocular management should include determining appropriate spectacle correction. From there, thorough evaluation of the binocular vision system and a dilated eye exam to evaluate the posterior segment should be performed to determine the need for involvement of other specialties. Strabismus surgery may be indicated if amblyopia is suspected in young patients with DWS. Vision therapy or vision rehabilitation services may also be indicated to maximize binocularity and/or functional vision depending on the severity of visual impairment.

CONCLUSION

Pediatric optometric healthcare providers should be aware of the ocular manifestations associated with DWS and refer to neurology for evaluation if not already diagnosed. Using all available optometric specialties is crucial for co-managing patients with DWS to maximize functional vision and increase independence for our patients.

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Spontaneous Resolution of a Stage 2 Idiopathic Full Thickness Macular Hole

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INTRODUCTION

Full thickness macular holes (FTMH) are defined by a lesion that disrupts all retinal layers in the fovea, forming a "hole". Although prevalence is small, the effects of FTMH have a debilitating impact on a patient's vision and quality of life. The most common etiology is idiopathic in association with vitreomacular traction or a posterior vitreous detachment (PPV). The standard treatment is currently pars plana vitrectomy once the hole has reached a certain stage. With the mainstay treatment being surgical, there may be benefits in offering observation as a potential treatment option when a patient presents with a FTMH. This case report seeks to discuss observation for spontaneous closure as a treatment option in FTMH.

CASE HISTORY

A 73-year-old African American male presented with a chief complaint of blurry vision in both eyes (OU) of unknown onset, wearing his current spectacle prescription. The patient had a history of a longstanding FTMH in the right eye (OD) since 2017, but deferred any surgical treatment at that time. He was last seen in 2017 and was lost to follow-up. The patient reported no outstanding systemic conditions or any medication use.

Upon examination, an OCT(optical coherence tomography) revealed a stage 4 full-thickness macular hole OD and a stage 2 full-thickness macular hole in the left eye (OS). He was referred for a 1-month follow-up to see a retinal specialist for macular hole consultation OU.

The patient returned for his macular hole consultation with the retinal specialist after one month and denied any changes since his last visit. An OCT revealed no changes OD, and a closed hole with traction OS. A Follow-up examination 3 years later showed stability of hole closure OS.

TABLE 1
Initial examination findings

OD		OS
20/80 PHNI	**Visual Acuity (cc)**	20/60+2 PHNI
L/L: 2+ MGD Lens: 1+ NS IOP: 16mmHg	**Slit Lamp**	L/L: 2+ MGD Lens: 1+ NS IOP: 16mmHg
PVD, Stage 4 FTMH, ERM with traction temporally	**Dilated Fundus Examination**	(+)Watzke-Allen sign, partial/FTMH, mild ERM

TABLE 2
1-month follow-up examination findings

OD		OS
20/100 PH 20/80	**Visual Acuity (cc)**	20/40 PH 20/30
stable	**Slit Lamp**	stable
stable	**Dilated Fundus Examination**	abnormal light reflex, vitreomacular traction, no FTMH

FIGURE 1
Cirrus OCT OD on initial visit - Stage 4 FTMH

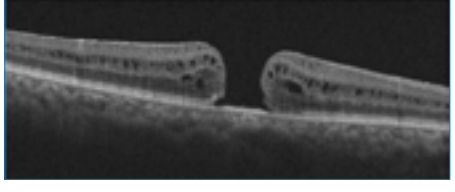


FIGURE 2
Cirrus OCT OS on initial visit - Stage 2 FTMH, pseudo-operculum with vitreomacular traction

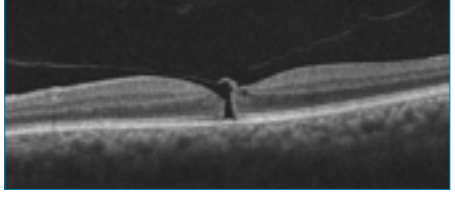
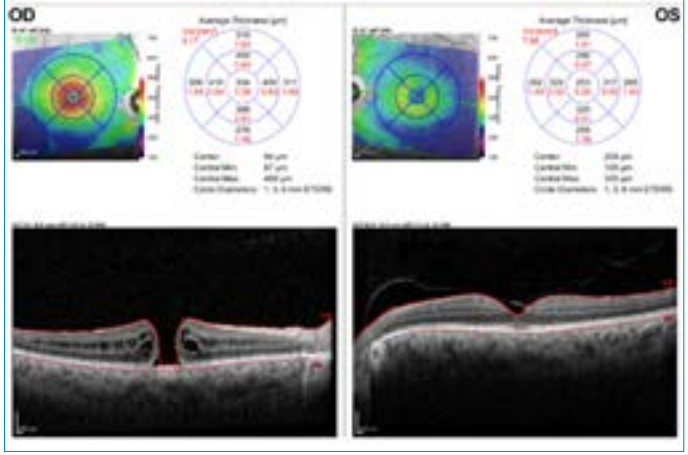


FIGURE 3
Spectralis OCT OU at follow-up visit - OD Stage 4 FTMH, OS no hole, vitreomacular traction



DISCUSSION

When considering treatment of a FTMH, it is important to consider all factors including, but not limited to, time of onset, staging, size, presence of associated clinical signs, and etiology of the patient's FTMH. The current standard of treatment for FTMH is a PPV.

Although still largely misunderstood, the most suggested mechanism that allows for spontaneous closure to occur involves the bridging of retinal tissue via retinal cell proliferation over the macular hole. It is thought that retinal glial cells, likely Muller cells, proliferate and cover the hole to prevent fluid into intraretinal spaces. This suggests that the smaller the hole is, the more likely proliferation may occur.

Despite PPVs being proven to show sustainable, reliable results, surgery is often difficult to approach for patients. In previously reported studies, 3-4 months of observation is an appropriate treatment to consider before suggesting surgery.

CONCLUSION

Although spontaneous closure does not frequently occur, being able to recognize signs that may lead to a possibility of spontaneous closure before recommending surgery may be valuable. It is important to be able to identify the true onset of an idiopathic macular hole. This implies that eye care professionals take a thorough case history to identify onset and cause. With identifying a more accurate onset of macular hole changes, an average time of monitoring the hole for 3-4 months can be suggested to the patient before undergoing surgery. This is extremely beneficial to those who are hesitant to undergo any surgery or simply cannot afford to do so. Having an observation period can provide assurance that there is more than one managing option. If no improvement occurs at the end of the observation period, surgical treatment may be easier for a patient to approach.

References: Available upon request

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Idiopathic Orbital Inflammation with a Concomitant Orbital Mass

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INTRODUCTION

A patient with acute ocular and neurologic symptoms underwent emergent workup encompassing neuroimaging, blood work, and biopsy remarkable for nonspecific orbital inflammation and an orbital mass. Following orbital mass resection and treatment for Idiopathic Orbital Inflammation (IOI), ocular and neurologic symptoms improved.

CASE PRESENTATION

Entrance testing

	OD	OS
Visual Acuity (cc)	20/30- PH 20/20	20/30- PH 20/20-
EOMs	Restricted in all gazes	FROM
CVF	UTT	FTFC
Pupils	PERRL, no RAPD	PERRL, no RAPD

SLE

	OD	OS
Adnexa	Normal	Normal
Lids and Lashes	UL edema temporal > nasal, large RUL ptosis	Normal
Conjunctiva and Sclera	2+ diffuse injection, 2+ chemosis > temp	White and Quiet
Cornea	Normal epithelium, stroma, endothelium, and tear film	Normal epithelium, stroma, endothelium, and tear film
Angles	3-4+ Nasal and Temporal	3-4+ Nasal and Temporal
Anterior Chamber	Deep and Quiet	Deep and Quiet
Iris	Normal	Normal
Lens	Clear	Clear

Referral: Emergency department for neuroimaging, blood work, and biopsy

1. MRI brain/orbits with and without contrast:
   a. Right orbital mass with a non-infectious inflammatory disorder of right orbit with lateral/superolateral predilection and extension into the right optic canal and inferior orbital fissure
   b. No definitive cavernous sinus involvement

2. Blood work encompassing CBC with differential, ESR, CRP, IgG4, lysozyme, TB, ANA, ANCA, ACE with chest x-ray (CXR), and TSH, T3, and T4 antibodies
   a. Normal blood work
   b. Negative CXR

3. Biopsy of EOMs, lacrimal gland, and orbital mass:
   a. Nonspecific chronic orbital inflammation
   b. Negative for vasculitis, granulomas, and neoplasm

DIAGNOSIS AND DISCUSSION

IOI is a benign inflammatory condition of the orbit without identifiable local or systemic causes. Before making the diagnosis, an extensive workup encompassing neuroimaging and blood work is often indicated. Biopsy, although not always essential to diagnosis, is indicated when clinical or radiological findings are inconclusive or IgG-4 related disease is suspected. In patients where biopsy is initially bypassed but treatment with steroids is ineffective, biopsy should be reconsidered. Regardless, a diagnosis of IOI should only be made upon ruling out systemic, infectious, and neoplastic disease.

IMAGE 1
Ptosis OD and motility pattern at initial presentation

IMAGE 2
Improved ptosis and motilities OD 2 weeks after starting treatment with oral steroids

Once the diagnosis of IOI was made, the patient was started on high-dose oral prednisone. At follow-up two weeks later, the patient reported resolution of diplopia. Extraocular motilities demonstrated full range of motion with significant improvement in right upper lid edema and ptosis. A taper of oral prednisone was started with consideration for future long-term treatment with methotrexate in the event of recurrent inflammation.

Treatment with corticosteroids remains the first-line treatment in IOI. Response to treatment is often rapid, with up to 75% of patients showing improvement within 24-48 hours after starting treatment. However, as high as 58% of IOI patients will have recurrent disease. Other treatment options such as radiation therapy or adjunctive pharmacological therapy with immunosuppressive drugs may be considered in such cases.

CONCLUSION

Following neuroimaging revealing a right orbital mass with a non-infectious inflammatory disorder of right orbit, blood work and biopsy were performed to resect the orbital mass and rule out systemic, infectious, or neoplastic disease. Upon ruling out an underlying disease process, the diagnosis of IOI was made and treated with oral steroids.

REFERENCES

Available upon request

CONTACT

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A Case of Presumed Peripapillary Pachychoroid Syndrome

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INTRODUCTION

Peripapillary pachychoroid syndrome (PPS) is the most recently described entity on the pachychoroid disease spectrum (PDS), and the literature on the condition is limited and variable. OCT imaging characteristics of PPS feature choroidal thickening greatest nasally along with dilated Haller layer vessels (also known as "pachyvessels"), thinning of the overlying inner choroid, and serious pigment epithelial detachments. Choroidal folds, hyperopia, shorter axial lengths and RPE alterations have also been linked to PPS. Indocyanine green angiography (ICGA) highlights the presence of choroidal hyperpermeability; though considered the gold standard for diagnosis, it is not readily available for most clinicians. In lieu of ICGA, utilization of optical coherence tomography (OCT) features can aid in the diagnosis of PPS. This case describes a patient with presumed PPS based on clinical findings and OCT analysis in the absence of ICGA.

CASE REPORT

A 66-year-old African-American female with a history of hypertension and smoking presented for a yearly eye examination. Entering acuities were 20/20 in each eye. Refractive error was remarkable for moderate hyperopia in both eyes. Dilated fundus examination was remarkable for bilateral peripapillary subretinal fluid adjacent to the optic disc. The right eye revealed subretinal fluid and exudates temporal to the optic disc. The left eye revealed superior-nasal fluid and hemorrhaging at multiple levels (Figure 1). Fundus autofluorescence (FAF) imaging revealed that the bilateral lesions were associated with RPE alterations and potentially early gravitational tracks in the right eye (Figure 2). OCT imaging revealed pachyvessels and increased nasal choroidal thickness of 454µm compared to 364µm temporally in the right eye, and 467µm nasally compared to 355µm temporally in the left eye (Figure 3). Despite the lack of ICGA, the patient was presumed to have PPS based on clinical findings (hyperopia and fundus examination), OCT analysis including choroidal measurements, and FAF results. Due to the potential for neovascularization, the patient was referred to a retinal specialist for further evaluation and treatment as needed (a variant of PPS with neovascularization has been reported).

FIGURE 1
Optos® UWF-SLO color photographs. The right eye revealed subretinal fluid and exudates temporal to the optic disc (A). The left eye revealed superior-nasal fluid and hemorrhaging at multiple levels (B).

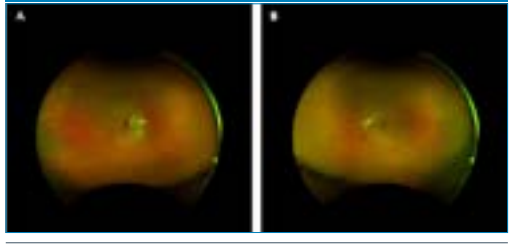


FIGURE 2
Optos® UWF-SLO fundus autofluorescence photographs revealed that the bilateral lesions were associated with RPE alterations (A and B) and potentially early gravitational tracks in the right eye (A).

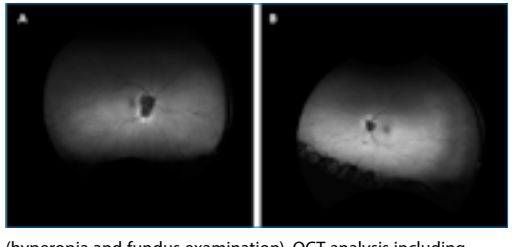
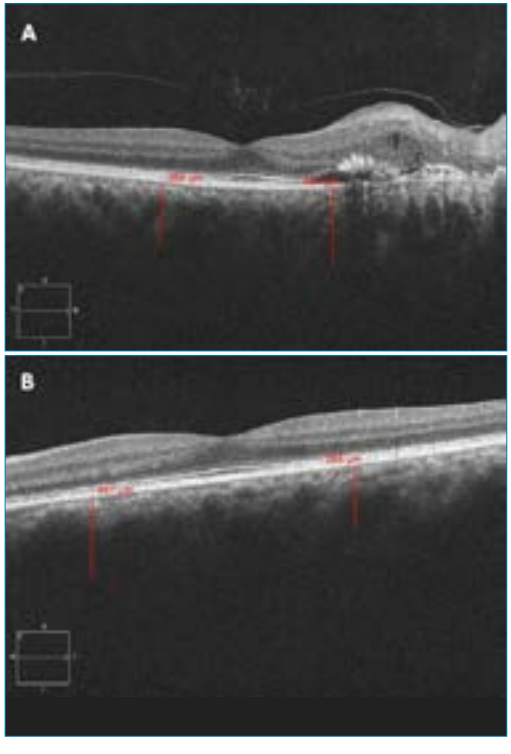


FIGURE 3
Cirrus® OCT images of right eye (A) and left eye (B) with choroidal thickness greater nasally than temporally in both eyes.



DISCUSSION

In a study by Phasukkijwatana et al., choroidal thickness measurements were taken 1500um from either side of the foveal center. While normal eyes were 200um and ~250um nasally and temporally, respectively, the PPS group revealed a much higher ratio of nasal-to-temporal thicknesses. The study found significantly thicker choroidal thickness measurements nasally than temporally in patients with PPS, especially when compared with normal or typical PDS subjects. This is consistent with our assumed case of PPS. In addition to choroidal hyperpermeability and pachyvessels, multimodal imaging surrounding the optic nerve is critical to observing not only peripapillary choroidal characteristics of PPS, but also helping differentiate from PCS with choroidal thickness measurements.

CONCLUSION

This case demonstrates the value of multimodal imaging, specifically OCT and FAF, in the absence of ICGA when suspecting PPS. Due to its novelty, there is a lack of diagnosis codes available under PDS with most falling under the broad category of Age-related Macular Degeneration (AMD). AMD may be diagnosed in the chart despite a diagnosis of PCS or PPS.

REFERENCES

Available upon request.

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Deferoxamine Toxicity and Low Vision Management

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INTRODUCTION

Deferoxamine toxicity is a potential risk for anyone who is undergoing frequent blood transfusions that require iron chelating agents due to transfusional hemochromatosis. This case highlights some clinical features of deferoxamine toxicity including the clinical presentation, patient symptoms, diagnostic studies, and management in the vision rehabilitation setting.

CASE PRESENTATION

A 59 y/o Italian female presented for a low vision evaluation with complaints of worsening vision OD>OS equal at distance and near. Her main vision rehabilitation goals were to read newsprint, write checks, and learn accessibility features on phone. Her ocular history was significant for Deferoxamine retinal macular toxicity which was reported stable from last ophthalmologic visit. Her systemic history was significant for Thalassemia major which required blood transfusions every four weeks which resulted in transfusional hemochromatosis (treated with Deferoxamine for over 20 years).

TABLE 1
Clinical Findings

Test Completed	OD	OS
Entering Distance VA cc	20/200	20/200
VA at Near cc	0.10/1.0M equivalent of 20/200	
Contrast Sensitivity	0.48 logMAR OU	
EOM	FROM	FROM
CVF	FTFC	FTFC
Pupils	PERRL (-) APD	PERRL (-) APD
Trial Frame Rx	+1.50 DS (20/100)	+2.50 DS (20/70)
SLE	Unremarkable	Unremarkable
Posterior Pole	Central geographic atrophy	Central geographic atrophy, inferior temporal pigmented nevus

IMAGE 1
MAIA OD at LVE – geographic atrophy OD>OS with superior PRL and unsteady fixation

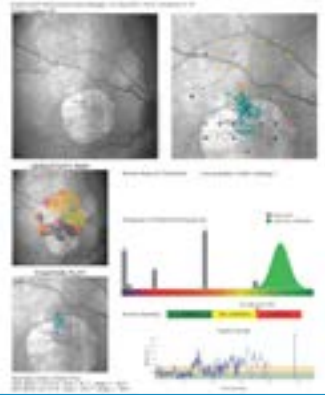


IMAGE 2
MAIA OS at LVE - geographic atrophy with superior PRL and unsteady fixation

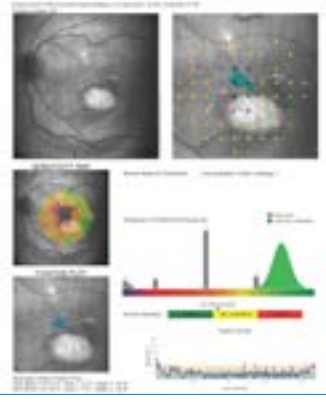


IMAGE 3
OCT OD from 2020 – Outer retinal atrophy with granularity

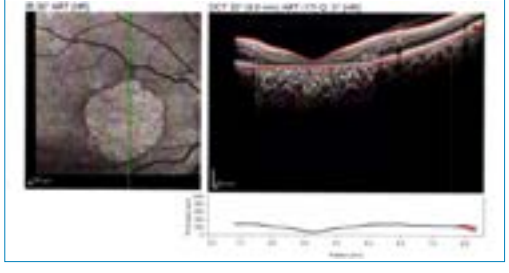
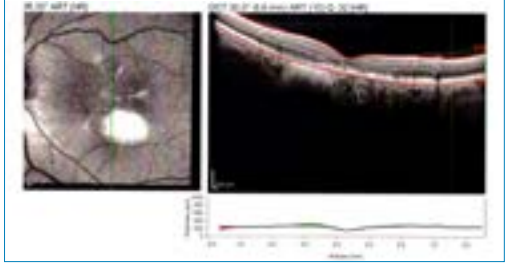


IMAGE 4
OCT OS from 2020 – Outer retinal atrophy with loss of EZ



DIAGNOSIS & DISCUSSION

Deferoxamine is an iron chelating agent widely used in the management of iron overload disorders. The risk of ocular toxicities, encompassing retinopathy, optic neuropathy, visual disturbances, and cataracts, are outweighed by the life-saving systemic benefits gained since its introduction. Management of retinal and optic nerve ocular toxicities is extensive education and low vision rehabilitation as discontinuation of the medication is often not an option.

MANAGEMENT

Baseline testing should include VA, color vision, VF, FAF, OCT, EOG, and ERG. Follow-up intervals of 6-12 months with OCTs and fundus exams are beneficial in catching development and progression of retinopathy. Management is aimed at individualized vision rehabilitation plans on patient specific goals to maximize visual function and keep independence. In this case, polycarbonate protective spectacles, +8.00 half-eyes, 7x illuminated magnifier for reading goal, large print checks, and writing guides were prescribed. Orders for eccentric viewing training with occupational therapy and Assistive Technology for phone accessibility training were made.

CONCLUSION

Recognition of deferoxamine-induced ocular changes is imperative for tailoring individualized care to patients undergoing treatment for iron overload disorders. This case underscores the significance of vision rehabilitation in restoring and maximizing visual function and independence when vision changes are noted, and despite this, medication must be continued.

REFERENCES

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Preoperative Uveitis: Emergency of Acute Endotheliitis Prior to Cataract Surgery

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Ocular Disease

Purpose:

This case report aims to present a compelling instance of acute viral endotheliitis prior to a patient's cataract surgery, while also exploring the clinical manifestations, differential diagnoses, and management strategies associated with this unique case.

Case History:

A 73-year-old male reported to clinic with decreased vision, burning, photophobia, and redness in the left eye, along with sensations of a cold-sore around his lips, over the past two days. Despite using PFAT-tears and naphcon-A for relief, there was only partial alleviation of redness, with limited improvement in other symptoms. Notably, the patient was scheduled for cataract surgery in less than three weeks.

Differential diagnosis:

Primary: Herpes simplex visit (HSV) associated endotheliitis

Others: Herpes zoster virus (HZO) associated endotheliitis, cytomegalovirus (CMV) associated endotheliitis, Fuchs heterochromic iridocyclitis

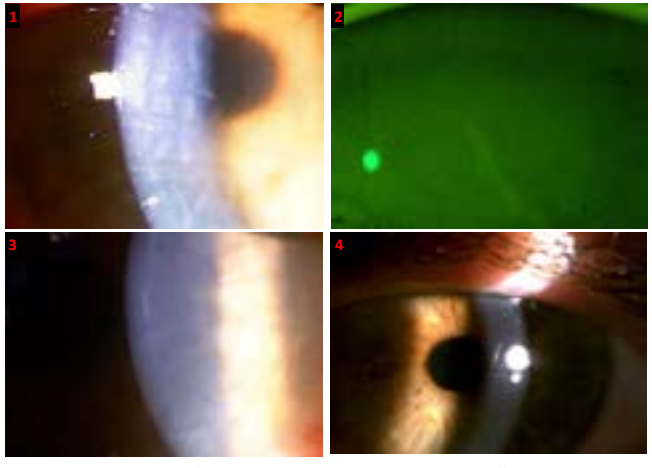
Diagnosis and Discussion:

The patient received a diagnosis of HSV-associated diffuse endotheliitis in the absence of epithelial keratitis. Although IgG serological testing for HSV, HZV, and CMV returned negative results, the identification of cold sore symptoms around the lip area guided the formulation of the diagnosis. Even though keratic precipitates (KPs) were not recorded we suspect KPs were present but due to the significant amount of diffuse edema they were difficult to appreciate.

Endotheliitis is a subtype of keratitis in which the primary site of inflammation is at the endothelium. Patients often present with descemet folds, corneal edema, KPs, and mild anterior chamber reaction. The conditions occurs commonly due to a viral etiology but can also be due to a idiopathic, systemic, fungal, toxic, or iatrogenic cause [2].

Even thought IgG tested for HSV, HZV and CMV were all negative it is important to keep it mind it can take 3-4 weeks for the IgG antibodies to develop post infection. Where IgM antibodies develop in about 1 week [3].

Corneal endotheliitis can manifest in one of four distinct forms: linear, sectoral, disciform, and diffuse . These variations correspond to the distribution patterns of KPs. Endotheliitis induced by CMV typically exhibits linear or circular KPs. HSV is associated with disciform KPs but can also present with diffuse, linear, or sectoral KPs. HZV has been observed to cause disciform endotheliitis [1].



Figures 1 and 2: *Presentation of the initial visit presentation. Figure 1 illustrates diffuse central endothelial folds, while Figure 2 highlights microcystic edema.*
Figures 3 and 4: *Presentation three days later, showcasing resolving endothelial folds and diminishing corneal edema. Vision improved to 20/50.*

Entrance Exam Findings:		
ccVA (glasses)	20/60 (Past VA: 20/60)	20/80 [Past VA: 20/30]
Pupils	PERRL, (-)APD	PERRL, (-)APD
CVF	FTFC	FTFC
EOM	FROM	FROM
Lensometry	-4.25+2.50x160 ADD: +2.50	-4.25+2.00x019 ADD: +2.50
Slit-Lamp Findings and Pachymetry:		
L/L	1+ dermatochalasis, 1+ MGD	1+ dermatochalasis, 1+ MGD
Conj.	WNL	2+ injection
Sclera	White/quite	White/quite
Cornea	1-2+ EBMD, (-)guttata	3-4+ diffuse endothelial folds, 3+ stromal edema, 1+ MCE, 2+ EBMD, (-)KPs?, (-)guttata, (-)dendrite/pseudodendrite
Angle	3-4+	3-4+
A/C	Deep/quite	1+ cell/flare
Iris	Normal	normal
Lens	clear	clear
IOP	13	13
Posterior Segment	Normal	Normal
Central Pachymetry	585um	851um

Table 1: *Clinical findings from initial exam.*

Treatment and Management:

The patient was treated with prednisolone acetate four times a day (qid), muro 128 ointment at bedtime (qhs), and valacyclovir 1g orally twice a day (bid) for a 14-day duration. Concurrently, serum IgG testing for herpes simplex virus (HSV), herpes zoster ophthalmicus (HZO), and cytomegalovirus (CMV) was initiated, alongside a complete blood count (CBC). Upon returning three days later, the patient continued the same treatment regimen. At the 10-day follow-up, prednisolone acetate was tapered to three times a day (tid), while maintaining muro-128 ointment at bedtime (qhs) and reducing valacyclovir to 500mg orally once a day. Subsequently, the patient received clearance for scheduled cataract surgery, commencing with the right eye (OD) first. As a prophylactic measure, 500mg valacyclovir orally once daily (qd) was prescribed, in addition to standard post-surgery eye drops.

Conclusion:

Along with utilizing topical steroids and systemic antivirals, physicians can also utilize systemic steroids and topical antivirals (acyclovir or ganciclovir 5x/day) [1].

In addition to conducting serum IgG antibody testing, the inclusion of IgM antibody testing could have offered valuable information to enhance the diagnostic process. While IgG enables the screening of previous exposure to the pathogen, IgM provides indications of recent exposure. Consideration for testing patients for Epstein-Barr virus and mumps could have been beneficial, as these infections, too, are potential causes of endotheliitis.

Take away points:

- For immunosuppressed patients or those scheduled to undergo surgery (systemic or ocular), the prophylactic use of oral antivirals is recommended.
- Important to order IgG and IgM antibody testing in patients endotheliitis.
- HSV is one of the most common causes of endotheliitis.

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The Optometrist's Role in Identifying and Reporting Child Abuse

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INTRODUCTION

The consequences of child abuse have unfixed boundaries. Abused children come from a variety of socioeconomic and ethnic backgrounds. Child abuse describes physical and/or psychological maltreatment or neglect of a child and is often undetected by general society while prompting a devastating impact on a child's health and future. By law, all doctors are required to report child abuse to authorities when presented with cause for suspicion. This case report and literature review aims to assist the optometrist in differentiating the subcategories of child abuse and identifying noteworthy signs and reviewing mandated reporting protocol. We begin by briefly examining a case of a Shaken Baby Syndrome survivor presenting as a visually impaired patient in order to gain a comprehensive understanding of the optometrist's role in identifying and reporting child abuse. (see Table 1, Figures 1 and 2).

TABLE 1
Case History / Pertinent Findings/ Management

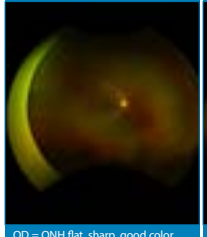
Demographics	18 y/o African American male
Chief complaint	Presents for refractive evaluation
POHx	Partial macula-off retinal detachment with giant tear OS secondary to previous head trauma from Shaken Baby Syndrome
PMHx	History of frontal lobe brain damage and 3rd nerve palsy; previous episodes of epilepsy and seizures
Medications	Clozapine
Distance BCVA	20/25 OD, HM @ 2ft OS
Pupils	PERRL OD, APD 4+ OS
Anterior segment	Unremarkable OD, OS
Posterior segment	See Figures 1 and 2
Patient Management	• The patient's retinal findings remain stable. Stressed the importance of yearly ocular health exams to monitor for complications. Reviewed signs and symptoms of a retinal detachment. Patient to return to clinic immediately if symptoms arise. • Recommended full-time protective eye wear with special emphasis when participating in sports.

DISCUSSION

The presented patient has physically recovered from the abusive head trauma and shaken baby syndrome he endured as a young child before his first encounter at our clinic. However, many emotional and physical scars remain which highlight the importance of understanding the optometrist's role in identifying and reporting child abuse.

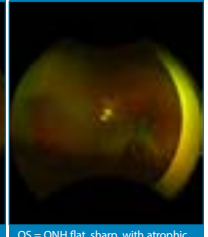
Optometrists are responsible for considering abuse as a differential diagnosis in the presence of childhood ocular trauma. Abuse can take on many forms and manifest differently case by case, making it difficult and sometimes uncomfortable to pinpoint. Optometrists are aware of their legal obligation to report child abuse, however, some may not be familiar with what happens thereafter a report is submitted.

FIGURE 1



OD = ONH flat, sharp, good color. Macula is flat. Normal blood vessels. Focal peripheral chorioretinal scarring, white without pressure, flat 360°. Longstanding findings stable.

FIGURE 2



OS = ONH flat, sharp, with atrophic changes 360. Macula is flat with overlying fibrotic tissue. Attenuated blood vessels. Peripheral scarring with pigmentation inferiorly and focal scaring superiorly, flat 360°. Longstanding findings stable.

TABLE 2
Ocular signs of child abuse arranged in order of frequency

MOST FREQUENTLY SEEN ↓

- Intraocular hemorrhages
  - o Intraretinal
  - o Preretinal
  - o Vitreous
  - o Hyphema
- Periorbital ecchymosis / edema
- Retinal detachment
- Chorioretinal atrophy
- Cataract
- Subluxated lens + traumatic mydriasis
- Papilledema
- Subconjunctival hemorrhage
- Esotropia / strabismus
- Corneal opacity + nystagmus
- Optic atrophy

LEAST FREQUENTLY SEEN ↑

TABLE 3
Non-ocular signs of child abuse arranged in order of frequency.

MOST FREQUENTLY SEEN ↓

- Bite marks
- Bruises / redness
  - o Cheeks
  - o Back
  - o Buttocks
  - o Palms
  - o Arm
- Soreness / fractured bones
- Cuts on forearm
- Burn marks
- Blood stains on clothes
- Head injuries

LEAST FREQUENTLY SEEN ↑

DETECTING AND REPORTING CHILD ABUSE

The World Health Organization (WHO) defines child maltreatment as "all forms of physical and emotional ill-treatment, sexual abuse, neglect, and exploitation that results in actual or potential harm to the child's health, survival, development or dignity." The four subcategories of child abuse include physical, emotional, and sexual abuse, as well as neglect.

Physical Abuse: deliberate intention to inflict pain

Healthcare professionals should proceed with great care and caution in their examination when presented with physical injury that does not align with a given explanation. These are red flags for physical child abuse. A summary of non-ocular and ocular findings are summarized in Table 2 and Table 3.

Emotional Abuse: actions that cause mental anguish

During examination, healthcare professionals should be cognoscente of parental behaviors such as excessively or often shouting at the child, withholding affection, extended periods of silence, and harsh jokes at the child's expense. Children who have suffered emotional abuse will exhibit low self-esteem and social disinterest/withdrawal, with delayed or inappropriate emotional development.

TABLE 4
Types of medical neglect

TYPES OF MEDICAL NEGLECT

- Failure to recognize medical illness/health
- Skipping routine healthcare check ups
- Failing to fill a child's prescription for a chronic/acute condition
- Failing to schedule or keep follow-up appointments
- Self-dosing medications for a child
- Seeking healthcare services once child's health has severely declined

TABLE 5
Timeframes for filing a written report after an initial call

ASAP	CO, HI, MS, NV, RI
36 hours	CA
48 hours	CT, IL, IA, MD, MA, NY, PA, Guam, Puerto Rico
72 hours	MI, MN
5 days	LA
Not specified	AL, NE

Sexual Abuse: any behavior towards the child for sexual stimulation Signs in the child can manifest from those of emotional abuse to pain, itching, bruising, or bleeding in the genital area. Physical trauma from sexual abuse can cause trouble sitting or walking. Perpetrators are often relatives or people close to the child. Inappropriate touching and/or sexual comments toward the child comprise red flag behaviors of the parent or caretaker.

Neglect: an act or failure to act which presents an imminent risk or serious harm

Neglect is the most common form of child abuse. When a pediatric patient exhibits signs of neglect, a report is warranted regardless of subtlety. Signs such as poor hygiene, poor growth, withdrawal, obsessive/compulsive nature, defiance, aggression, and self-harm are all indicators that a child is being neglected in the home. Parental conduct such as a lack of concern for the child, blaming/beratement of child, and speaking on their behalf to severely limit the child's interactions are equally indicative of emotional abuse and/or neglect. There are many forms of neglect; here, we focus on medical neglect.

Medical neglect is a crucial type of child abuse for healthcare providers to recognize, as they may be the only adults to witness such. It is defined as the failure of a parent or caregiver to provide necessary medical care for a child, either intentionally or due to a lack of knowledge or resources. Consider a transparent and well-documented conversation with the parent or legal guardian including a firm timeline informing them what will happen if appropriate corresponding action is not taken. Much of knowing when to report is left to the doctor's judgment, while doing so is obligatory upon conclusive evidence of abuse.

REPORTING

Making the call is the first and most crucial step in reporting child abuse, serving as a potentially pivotal moment toward the child's safety and livelihood. The narrowest timeframe across all states and territories in which a call must be made is 12 hours after cause to suspect.

Four basic criteria are verbalized in a mandated reporter's call in order for a report to be registered, listed by Illinois state law and commonly among other states. Once the report is registered, many states will begin an investigation within a few days or less. The four criteria are as follows:

1. Name and address of child
2. Age of child
3. Status of child's condition
4. Any other important details including person(s) believed responsible

While most jurisdictions require an initial report to be made via telephone hotline, 18 states and 2 territories require a written report following an initial oral report within varying windows of time. Those timeframes are referenced in Table 5

Once a report is made, child-centered services are obligated to act. These services may be known as CPS (Child Protective Services), DCS/DCFS (Department of Children (& Family) Services), or DSS (Department of Social Services) depending on the state/territory. Although the exact process can vary, it is standard practice for the service worker to observe the child and the home for signs of abuse/neglect and to photograph those signs. Arrangements are made for further medical testing (X-ray, etc.) as part of a thorough evaluation. Cooperation between the family and the service worker is encouraged but not lawfully required for an investigation to continue. The result and progress of the report will not involve the reporting medical provider and mandated reporters will not receive an update or information on the outcome of the report. After investigating, if the child's safety cannot be assured, a determination is made as to whether the child should be separated from the family. Criminal charges can ultimately be filed when suspected abuse is reported to law enforcement by child-centered service workers.

CHILD ABUSE HOTLINES

Scan the QR code for state-by-state child abuse hotlines and website links across all 50 states. Illinois and Missouri information provided below.

Illinois
Toll-Free: (800) 252-2873
Local (toll): (217) 524-2606
https://www2.illinois.gov/dcfs/safekids/reporting/Pages/index.aspx
Mandated reporters may use the online child abuse reporting system in non-emergency situations.

Missouri
Toll-Free: (800) 392-3738
https://dss.mo.gov/cd/keeping-kids-safe/can.htm
Online reporting for mandated reporters in non-emergency situations:
https://dss.mo.gov/cd/keeping-kids-safe/can.htm

REFERENCES

Available upon request.

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Management of Bilateral Eyelid Ptosis using oxymetazoline hydrochloride in a Patient with CPEO Following Failed Surgical Ptosis Repair

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INTRODUCTION

Kearn Sayre syndrome (KSS) is a neuromuscular disorder caused by a mutation in mitochondrial DNA leading to chronic, progressive, bilateral, and symmetrical ptosis and ocular motility deficits. Kearn-Sayre usually does not have any involvement of the pupils, proptosis or ocular pain but can have a wide range of systemic involvement including, but not limited to, complete heart block, hearing loss, short stature, diabetes, and impaired cognitive function. Persistent ptosis is a common problem for patients who have undergone surgical correction. This case discusses the use of oxymetazoline hydrochloride 0.1% in the management of post-surgical ptosis repair.

CASE PRESENTATION

SB is a 49-year-old African American female with an established history of the Kearn's Sayer variant of chronic progressive external ophthalmoplegia (CPEO). She was being monitored by cardiology for cardiac complications. Her main complaint was impaired vision owing to bilateral ptosis. She had previously undergone three surgical procedures to correct her ptosis. The remainder of her medical history was significant for type 2 diabetes and normal tension glaucoma.

TABLE 1
Entrance Testing

	OD	OS
VAs	20/25 PHNI	20/60 PHNI
CVF	FTFC	FTFC
Pupils	PERRL (-) RAPD	PERRL (-) RAPD
EOMs	Complete limitation of all movement in all gazes	Complete limitation of all movement in all gazes

TABLE 2
Slit Lamp Examination

	OD	OS
Adnexa	normal	normal
Lids/Lashes	Blepharoptosis, lagophthalmos **MRD 1:** 2mm **MRD 2:** 4mm	Blepharoptosis, lagophthalmos **MRD 1: -1mm** **MRD 2: 3mm**
Conjunctiva/ Sclera	WNL	WNL
Cornea	**2+ inf PEE**	**2+ inf PEE, IN corneal opacification 1x2 mm**
Anterior Chamber/Angle	Deep and quiet 3-4+ open angle	Deep and quiet 3-4+ open angle
Iris	WNL	WNL
Lens	Trace NS	Trace NS
IOP	10 mmHg	12mmHg

The patient was able to maintain single vision with a slight head tilt. An in-office trial of oxymetazoline hydrochloride 0.1% was initiated resulting in significant improvement of her ptosis and subjective improvement of her vision.

DISCUSSION

In this case the patient suffered from Chronic Progressive External Ophthalmoplegia (CPEO) secondary to Kearn Sayre Syndrome. Management of CPEO is dependent on etiology, severity, and stability. Our patient's EOM paralysis had occurred steadily over the past 20 years resulting in an orthophoric, frozen eye position. Strabismus surgery was not indicated in our case as the patient was easily able to elicit single vision with a slight head tilt. Repeat ptosis surgery was not advised owing to concern of corneal exposure.

Oxymetazoline hydrochloride 0.1% was also suggested to the patient as the only FDA-approved, daily eyedrop for acquired blepharoptosis in adults. The drug is an alpha-adrenergic receptor agonist that stimulates the Muller muscle to contract involuntarily, allowing for additional elevation of the upper eyelid. Its success is contingent on its work on an involuntary eyelid muscle when the patient can no longer control the voluntary ones.

An in-office trial of oxymetazoline hydrochloride 0.1% was initiated, yielding significant ptosis improvement (Figures 1 and 2) along with a subjective perception of expanded visual field and "brighter" vision.

FIGURE 1
Before instillation of oxymetazoline

FIGURE 2
20 minutes After instillation of oxymetazoline

CONCLUSION

Persistent, symptomatic ptosis following surgical repair is a common problem for patients with CPEO. Among individuals with concomitant orbicularis weakness, additional surgeries to improve the ptosis may result in corneal exposure. Our case illustrates the therapeutic value of topical oxymetazoline to improve CPEO-related ptosis.

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An Irregular Pattern of Unilateral Choroidal Folds in the Setting of Combined Anterior and Posterior Scleritis

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BACKGROUND

Scleritis, a rare and potentially sight-threatening condition, may be underdiagnosed due to its complexity and varied clinical presentation. In our case, clinical examination and laboratory testing allowed for prompt diagnosis of this ocular condition with numerous systemic associations.

CASE DESCRIPTION

An 80-year-old Black female presented to urgent care clinic with a complaint of severe, intermittent pain in the left eye for the past day, worse on eye movement. She also endorsed an associated frontal headache on the left side. She denied any recent trauma or vision changes and the right eye was uninvolved. Over-the-counter pain medication did not provide any relief.

Her past ocular history was remarkable for primary open angle glaucoma OU treated with latanoprost and dorzolamide-timolol, and allergic conjunctivitis OU treated with olopatadine. Her past medical history and systemic medications were non-contributory. Review of systems was unremarkable.

Corrected entering visual acuity was 20/30-2 OD with no improvement on pinhole, and 20/40+2 OS, improving to 20/25 with pinhole. Pupils were equal, round, and reactive to light with no afferent pupillary defect noted in either eye. Confrontation visual fields were full to finger counting in each eye, and extraocular motility was full with pain OS.

Intraocular pressure with Goldmann applanation tonometry was 15 mm Hg OD and 16 mm Hg OS.

TABLE 1
Anterior segment examination

OD		OS
Normal	**Adnexa**	Normal
1+ MGD	**Lids/Lashes**	1+ MGD
White and quiet	**Conjunctiva**	2+ diffuse bulbar injection, greatest nasally
White and quiet	**Sclera**	2+ injection worse nasal/ superior nasal; (-)blanching with phenylephrine 2.5%
Arcus, 1+ diffuse inferior PEE	**Cornea**	Arcus, 1+ diffuse inferior PEE
Deep and quiet, (-)cells/flare	**AC**	Deep and quiet, (-)cells/flare
Brown and flat	**Iris**	Brown and flat
1+ ACC, 2+ NS	**Lens**	2+ ACC, 2+ NS, scattered vacuoles

TABLE 2
Dilated fundus examination

OD		OS
Clear, (-)cell	**Vitreous**	Clear, (-)cell
Flat, well-perfused with distinct margins, glaucomatous cupping	**Optic Nerve**	Flat, well-perfused with distinct margins, glaucomatous cupping
0.7 H/0.7 V	**C/D**	0.7 H/0.7 V
Flat and intact, (+)FLR	**Macula**	Flat and intact, (+)FLR (+) choroidal folds superior temporal and inferior temporal to macula in diamond shaped pattern
Arteriolar narrowing	**Vessels**	Arteriolar narrowing, (-) nodules
Flat and attached with chorioretinal degeneration 360	**Periphery**	Flat and attached with chorioretinal degeneration 360

Given the presence of choroidal folds throughout the posterior pole OS, further ancillary testing including fundus photography, optical coherence tomography (OCT), and B-scan was performed.

FIGURE 1
Normal posterior pole OD and a diamond shaped pattern of choroidal folds superior temporal and inferior temporal to the macula OS on color fundus photography.

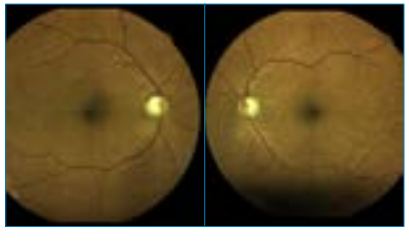


FIGURE 2
Abnormal RPE and choroidal contour on inferior macula OCT raster OS, secondary to choroidal folds.

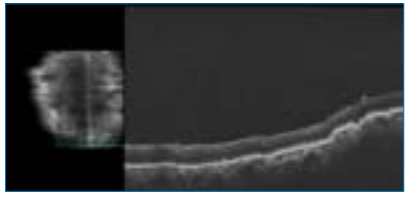
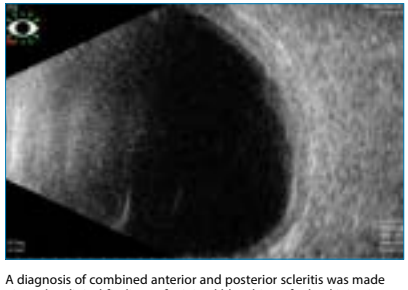


FIGURE 3
Scleral hyperreflectivity and thickening on B-scan OS.



A diagnosis of combined anterior and posterior scleritis was made given the clinical findings of minimal blanching of scleral injection combined with choroidal folds and scleral thickening on B-scan. The patient was referred to ophthalmology for consideration of anti-inflammatory treatment. The patient did not have any known autoimmune or infectious diseases, so a comprehensive laboratory work-up was also recommended.

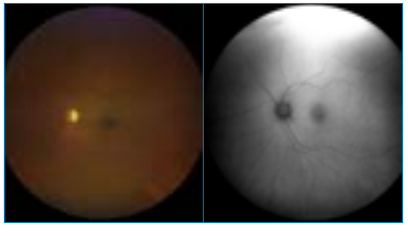
Ophthalmology initiated a 1-month course of oral prednisone with taper, along with a concomitant proton pump inhibitor (omeprazole) to prevent gastric upset. An extensive laboratory work-up was additionally performed; all results were normal.

TABLE 3
Laboratory testing results

Laboratory Test	Indication
CRP, ESR	Generalized inflammation
Myeloperox IgG, ANCA	Vasculitis
ELISA, Western Blot	HIV
ACE, lysozyme	Sarcoidosis
QuantiFERON-TB Gold Plus	Tuberculosis
ANA	SLE, RA
RF, CCP	RA
HLA-B27	UCRAP conditions
FTA-ABS	Syphilis

The patient returned for follow-up 3 months later with complete resolution of symptoms following her oral corticosteroid treatment. Conjunctival and scleral injection OS were each resolved completely, and the appearance of the choroidal folds throughout the posterior pole had improved.

FIGURE 4
Improved choroidal folds throughout the posterior pole OS on color and red-free fundus photography following completion of oral corticosteroid therapy.



DISCUSSION

Scleritis refers to inflammation of the sclera, typically manifesting as a painful and red eye. The more prevalent form is anterior scleritis, where injected scleral vessels do not blanch upon the application of topical phenylephrine—accounting for approximately 90% of all scleritis cases. In contrast, posterior scleritis may exhibit choroidal folds, retinal detachment, or choroidal effusion, often presenting with a quiet anterior sclera. The diagnosis of posterior scleritis is better established through ancillary testing such as B-scan or optical coherence tomography (OCT) and is relatively rare, constituting about 10% of all scleritis cases. Choroidal folds are parallel, horizontal striations seen throughout the posterior pole. Our patient demonstrated a unique presentation of combined anterior and posterior scleritis, featuring an unusual diamond-shaped pattern of choroidal folds temporal to the macula and scleral thickening evident on B-scan.

Approximately 30-40% of individuals with scleritis exhibit an associated autoimmune condition, sometimes undiagnosed during the initial presentation. Rheumatoid arthritis or systemic vasculitic conditions are the most common autoimmune links. In contrast, infectious causes, including viral, bacterial, fungal, or parasitic origins, are less frequent, accounting for 4-10% of reported cases. Some cases of scleritis, as observed in our patient, may also manifest without a discernible infectious or inflammatory cause.

Swift initiation of systemic treatment is crucial because untreated scleritis can lead to severe ocular complications, including the risk of blindness.

The overall prognosis is closely tied to the severity of the initial inflammation. Patients, such as ours, with mild or moderate scleritis typically maintain excellent vision. Despite treatment, scleritis may remain active for extended periods before entering long-term remission.

CONCLUSION

Scleritis is a rare but intricate and diverse condition that typically coexists with a systemic ailment. Due to its potential to jeopardize vision, it is crucial to promptly identify its signs and symptoms, comprehend the significance of relevant laboratory studies, and accurately interpret results. This is essential for effectively addressing symptoms and averting potential complications.

References: Available upon request.

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Optic Perineuritis: The Importance of Radiologic Imaging Studies to Differentiate from Optic Neuritis

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INTRODUCTION

Optic perineuritis is a condition of non-specific inflammation localized to the optic nerve sheath. This inflammation causes fibrosis surrounding the nerve, resulting in compression and varying levels of optic nerve dysfunction. This condition is more commonly found in female patients between the ages of 40-60, but no race predilection has been linked. APD, color vision defects, pain, and reduced acuity represent an expected clinical presentation.

CASE HISTORY

A 49-year-old white male presents to Urgent Care Clinic for pain and cloudy vision OS spanning 4 days. The patient has a history of biopsy proven idiopathic orbital inflammatory syndrome (IOIS) OD and ocular hypertension OU. Pertinent medical history includes diabetes for over 10 years treated by metformin and insulin. Pertinent exam findings in Table 1. Patient was diagnosed with optic perineuritis OS.

TREATMENT & MANAGEMENT

High-dose oral corticosteroids should be initiated immediately. Most patients display rapid improvement. Treatment duration spans months due to slow taper.

Due to this patient's history of treatment-resistant IOIS, he was started on IV solumedrol 500mg bid x 3 days then switched to oral solumedrol 80mg. By the 1 month follow up, the pain and optic nerve edema had resolved. Treatment requires multidisciplinary approach to monitor patient, especially due to the potential for oral steroids to adversely impact diabetic control.

TABLE 1
Exam Pertinent Findings

OD		OS
20/20	BCVA	20/25
WNL	PUPILS	4 sluggish
No pain	EOMS	Pain on movement
FTFC	CVF	FTFC
WNL	COLOR VISION	5/6 Ishihara
Unremarkable	SLE	Trace Sclera: conj. injection, moderate tarsal chemosis, pain on palpation of ET bone
20/20	IOP (GAT)	20/20
Mod NPDR, PVD	DFE	Severe ONH edema 360 w/ disc hemes, mod NPDR
Unremarkable	A-SCAN	1.2 T-sign, 23MM elevation

TABLE 2
Optic Perineuritis vs Optic Neuritis

Perineuritis	Optic Neuritis
Older onset	Younger onset
Slower progression of symptoms	Faster progression of symptoms
Not associated with MS	Associated with MS
MRI: Optic sheath enhancement	MRI: Optic nerve enhancement
Responds well to oral corticosteroids alone	Needs IV and oral corticosteroids
Oral corticosteroids for a period of months	Total treatment duration ~2 weeks
Greater risk of relapse if not treated	Greater risk of relapse if only on oral treatment
Not self-limiting	Can be self-limiting

FIGURE 1
Severe ONH edema 360 with disc hemes and mild NPDR OS

FIGURE 2
ONH OCT showing average RNFL thickness of 441 microns OS

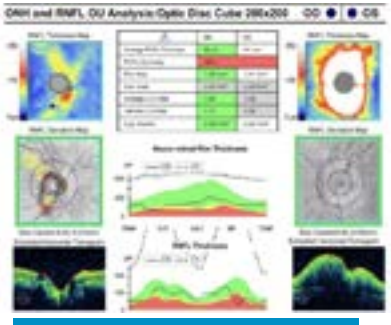


FIGURE 3
24-2 HVF: repeatable superior defect OS

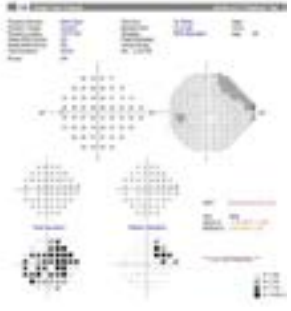


FIGURE 4
T2W Axial MRI - "tram track"

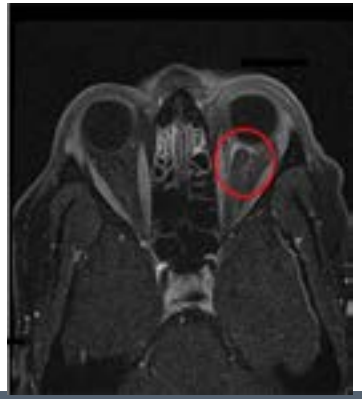
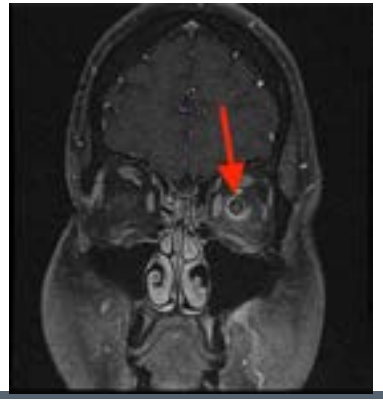


FIGURE 5
T2W Coronal MRI - "doughnut sign"



DISCUSSION

While optic perineuritis and optic neuritis can present with similar signs and symptoms, such as pain on eye movement, APD, reduced acuity, color vision defects, and optic nerve edema, they also have marked differences, as outlined in Table 2. Other differentials include IOIS, ischemic optic neuropathies, optic nerve neoplasms, and posterior scleritis. Blood work can be useful in ruling out these differentials but cannot definitively diagnose optic perineuritis. Therefore, the diagnosis relies on neuroimaging.

T1 and T2 weighted MRIs are crucial for diagnosis. CT scans do not provide enough detail to be useful. On an axial MRI section, thickening of the sheath posterior to the globe indicates sheath edema, called "tram track." This sheath edema is called the "doughnut sign" on a coronal section. There will be no evidence of demyelinating disease on the brain MRI, as would be found with optic neuritis.

Unlike optic neuritis, this condition is not self-limiting. Treatment is required to ensure good visual outcome.

CONCLUSION

Optic perineuritis is a condition that can share a clinical presentation with many other conditions, which can make diagnosis difficult. MRI is necessary for proper diagnosis. Oral corticosteroids are the standard of care, and a slow taper is crucial to prevent recurrence. Visual prognosis is positive but is heavily dependent on speed of diagnosis and proper treatment.

REFERENCES

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WORLD COUNCIL OF OPTOMETRY
Advocacy | Education | Policy Development | Humanitarian Outreach

Sandra S. Block, OD for WCO Education Committee, Dr. Y. Gammoh, Chair

WCO Competency Framework for Optometry

INTRODUCTION

Recognizing the **diverse landscape** of optometric education and practice across the globe, WCO identified the pressing need for a **unified global standard for outcomes of optometric education**.

The **WCO Competency Framework for Optometry** addresses this need by providing a comprehensive set of competency statements, coupled with the core curriculum elements supporting their development through tertiary-level optometry programs.

DESIGN OF FRAMEWORK

The framework defines optometry in terms of the minimum **essential competencies** required to engage effectively in the international eye care agenda and follows the WCO definition of optometry, which is in agreement with WHO and ILO.

WCO'S CONCEPT OF OPTOMETRY

Optometry is a healthcare profession that is autonomous, educated, and regulated (licensed/registered), and optometrists are the primary healthcare practitioners of the eye and visual system who provide comprehensive eye and vision care, which includes refraction and dispensing, detection/diagnosis and management of disease in the eye, and the rehabilitation of conditions of the visual system.

An optometrist has successfully undertaken an advanced level of relevant higher education, with the award of a bachelor's degree or higher from a tertiary-level educational institution.

The framework is divided into **five competency domains** covering competencies expected of optometry graduates. These competencies are aligned with those describing optometry in the World Health Organization's **Eye Care Competency Framework (ECCF)**.

Adaptable to each country's needs, this framework will help **shape the future of optometry education and practice** by guiding curriculum development, informing policymakers, and making it easier to recognize the impact of the profession in the international agenda for eye care.

This framework demonstrates to people who are looking at their health system, what skills optometrists have and can bring to **better delivery of care**.

The competencies described in the framework provide optometry the opportunity to participate in **multiple roles within health systems**, and to work with others in the

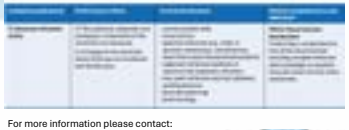
RATIONALE

The UN General Assembly further recognized eye care as essential to achieving the Sustainable Development Goals of no poverty (#1), zero hunger (#2), good health and well-being (#3), quality education (#4), decent work and economic growth (#8) and sustainable cities and communities (#11) (UN, 2015).

Vision impairment due to uncorrected refractive error and the growing prevalence of diabetic retinopathy, glaucoma and AMD call for adequately trained eye care providers. Optometrists are well suited to address the burden of these eye conditions.

The World Council of Optometry (WCO) considers the following when describing optometry as a profession and its education:

- Optometry should be positioned to participate widely in the future of eye care.
- Optometrists work in teams with ophthalmologists, allied ophthalmic personnel, nurses, and other healthcare workers.
- Current and future diseases, technology, and treatments will impact eye care delivery and human resource needs.
- Optometrists should consider their education as a lifelong process.



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View the WCO Competency Framework for Optometry on the WCO website's Resources page at https://worldcouncilofoptometry.info/resources/ **or scan the QR code displayed.**

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NEUROSCIENCE

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Schwann: cell, sheath, and cell theory?

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INTRODUCTION

Neurolemmocytes (sometimes spelled: neurilemmocytes) are almost universally known by their eponymous term: Schwann cells. They are the glial cells that myelinate axons and also support unmyelinated axons in the peripheral nervous system. On the other hand, the eponymous term: sheath of Schwann is less commonly used for the neurilemma (sometimes spelled: neurolemma). This represents the cytoplasm of the Schwann cells (including its organelles, e.g., the nucleus) that is located on the periphery of the Schwann cells and forms the surface of the peripheral nerve fibers. These eponymous terms are to honor the person who was (kind of) the first person to describe them: Theodor Ambrose Hubert Schwann (1810-1882).[1]

THEODOR AMBROSE HUBERT SCHWANN

Theodor Schwann was born in Neuss near Düsseldorf, which at that time was part of Prussia.[1] As a child, he was hard-working but was also excessively shy. Early on, Schwann was drawn toward a vocation associated with the church. Even though he eventually became enamored with reason, he remained a deeply religious Roman Catholic.[2] He eventually got his medical degree from the University of Berlin, where he worked with the chair of the Department of Anatomy and Physiology, Johannes Müller (1801-1858). During this time Dr. Schwann studied about the changing tension of a contracting muscle cell as it varies with its length, isolated the substance responsible for digestion in the stomach which he named, pepsin, and showed that yeast fermentation activated with sugar is an expression of life processes and that yeasts are living organisms. Generally, though, Dr. Schwann was better known among his colleagues for his pioneering work on cell theory.

SCHWANN AND CELL THEORY

Even though the concept of the "cell" had been previously proposed by others, e.g., Jan Evangelista Purkyně (1787-1869) – Körper ("bodies"),[3] it was Schwann that generalized that all tissues are formed of cells in his landmark 1839 monograph: Mikroskopische Untersuchungen über die Übereinstimmung in der Struktur un dem Wachstum der Thiere und Pflanzen,[4] translated in 1847 under the title: Microscopical Researches into the Accordance in the Structure and Growth of Animals and Plants.[5] His conclusion is summed up (English translation):

> … the elementary parts of all living tissues are formed of cells in an analogous, though very diversified manner, so that it may be asserted that there is one universal principle of development for the elementary parts of organisms, however different, and that this principle is the formation of cells.

In this work he also coined the term: cell-theory (English translation):

> The principle of the proposition that there exists one general principle for the formation of all organic productions, and that this principle is the formation of cells, as well as the conclusions which may be drawn from this proposition, may be comprised under the term *cell-theory*…

SCHLEIDEN'S CONTRIBUTION

No scientific work is done in a vacuum. The year before Schwann's seminal paper was published, the botanist Matthais Schleiden (1804-1881), demonstrated that plant tissues are composed of and develop from groups of nucleated cells,[6] although plant cells had been first described in cork by Robert Hooke (1635-1703) over a century before.[7] Schleiden considered the nucleus (or as he called it: cytoblast) to be the most important feature of these cells.

Schwann and Schleiden were friends. As the story goes, it was over dinner that Schleiden told Schwann about his observations and theories:

> Schwann was immediately struck with the similarity between the observations of Schleiden and certain of his own upon animal tissues. Together they went to his laboratory and examined sections of the dorsal [spinal] cord, the particular structure upon which Schwann had been working. Schleiden at once recognized the nuclei in this structure as being similar to those which he had observed in plants, and thus aided Schwann to come to the conclusion that the elements in animal tissues were practically identical with those in plant tissues.

In his paper, Schwann gave full credit to Schleiden for informing him about the presence of nucleated cells in plants, giving him the idea of looking for the same thing in animal tissues. In fact Schwann included an entire section written by Schleiden at the end of his 1839 manuscript. Because of this, some say Schleiden was the co-founder of the cell theory, even though he made no attempt to expand his ideas into a comprehensive cell theory. Therefore, his connection as "co-founder" appears to be mainly in giving the suggestion to Schwann, which the latter went on to elaborate into the generalized theory.[6]

SCHWANN CELL AND THE SHEATH OF SCHWANN

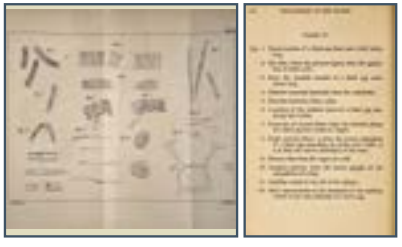
At about this time, several people besides Schwann contributed to the understanding of the microscopic structures of the nervous system. Robert Remak (1815 – 1865), a colleague of Schwann gave an excellent description of nerve fibers.[8] He identified the central core of the myelinated fiber, i.e., the axon, which became known as the band of Remak and unmyelinated sympathetic fibers, which were called the fibers of Remak. Even though Remak was the first to described what he called corpuscles (Köperchen) attached to those fibers,[9] he did not recognize them as nuclei of separate cells.[10] Schwann knew of Remak's work and acknowledged it in his own manuscript.

Even though Schwann gave a very brief reference to the cells and sheath of the axis cylinder of nerves in 1838,[8] a full description of the myelinated nerve fiber appeared in Mikroskopische Untersuchungen[4] [Microscopical Researches].[5]

> We remark … an external pale thin cell-membrane, having a granulated but not a fibrous aspect, the inner surface of which constantly exhibits cell-nuclei in the very early period of the development of nerve; but in the somewhat more advanced stage, when the white substance is developed, they are only occasionally found … The white, fat-like substance to which the peculiar appearance and the distinct outline of the nerves is chiefly referable, is deposited upon the inner surface of this cell-membrane … The rest of the cell cavity appears to be filled up by a firm substance, namely, the band discovered by Remak.

Schwann states quite clearly that the external membrane is that of the separate cell and was not, as believed by many at the time, a part of the neurilemma, which was what the connective tissue of the nerve was called in Schwann's time. We now call this connective tissue the endoneurium and perineurium. It appears that credit for the modern use of the term: neurilemma to denote the sheath of Schwann, should be given to Ernst Reissner (1824-1878) .[11] It was also Reissner who apparently was the first to conclude that Schwann cells would have to be "considered to represent a universal characteristic of the nerve fibers in general" (translated).[9]

Although Remak made important contributions, seemingly according to their peers, Schwann rightly was given credit for their discovery. It did not take long for his name to be associated with structures he so elegantly and insightfully described.[12]



CONCLUSION

Even though the cell and sheath carry Schwann's name, it is undoubtedly his foundational contribution to the idea of the cell theory for which he should probably be remembered.

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1 ICO PRESENTATION

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Remote Learning of Clinical Skills in Healthcare Education

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Introduction

- Remote learning options could aid in diversity and enrollment in healthcare programs
- Difficulty in remote instruction of hands-on skills serves as a potential barrier to implementation
- A small pilot study was designed to investigate feasibility of remote instruction of hands-on healthcare skills

Methods

- 11 local pre-optometry students were contacted and 4 were enrolled
- A remote course was built around 2 clinical skills of asymmetric difficulty - visual acuity (VA - easy) and cover test (CT - difficult)
- Required equipment was supplied to each enrollee (see figure below)
- Enrollees could practice clinical skills at home or at a designated, local clinical site‡
- Proficiency was assessed via student recordings and in-person testing

Learning hands-on clinical **skills remotely** is **feasible and sufficient for proficiency**.

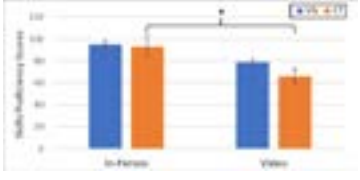
Skills can be **recorded remotely** and **reviewed** for scoring proficiency.

However, technology must be **user-friendly** and video quality (resolution and refresh rate) must capture **sufficient spatial and temporal detail**.

Take a picture to **download** the **full paper**

Results

- Proficiency scores for the easier skill (VA) were not significantly different in-person vs recorded (0.078 p-value for one-tailed, paired t-test)
- Scores for the more difficult skill (CT) were significantly different in-person vs recorded (0.032 p-value for one-tailed, paired t-test)
- Though not significantly different, scores for the easier skill (VA) were consistently higher than for the more difficult skill (CT), both in-person and when recorded



Discussion

- As expected, results suggest visual acuity (VA) is the less complex clinical skill
- Scores for both skills were higher when demonstrated in-person than when recorded
- Given the same practice applied to both in-person and recorded skills assessments, lower scores when recorded are consistent with the impact of the associated technical difficulties on final proficiency scores

Conclusions

Remote instruction for hands-on clinical skills is sufficient for proficiency. The technology for remote assessment of proficiency must be user-friendly and capable of adequately capturing spatial and temporal detail.

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