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AADMD
1 ICO PRESENTATION
INTRODUCTION

A patient encounter log (PEL) is one tool used to assess a student’s clinical educational experience. Previous studies in the medical education literature show that no more than 83% of patient encounters are recorded in medical student logbooks. Diverse documentation strategies have been used to track students’ clinical encounters:

- Paper
- Handheld devices
- Web-based logging systems.

Each system has limitations since all rely upon students’ willingness to accurately document the information. Students may not report all encounters, may carelessly or erroneously recall information, and may even falsify data.

**Question:** Does linking student feedback and the student evaluation process to a patient encounter logging system improve the accuracy of student patient encounter logs?

**BACKGROUND**

Third-year students at the Illinois College of Optometry (ICO) are assigned two weekly sessions in the Primary Care Clinic of the Illinois Eye Institute (IEI) each academic quarter. Students are assigned to two faculty preceptors, one for each session for the duration of the quarter. Historically, students received feedback from their preceptors for each individual patient encounter via an NCR two-page evaluation form. One copy of the evaluation was provided to the student and the second copy was retained for grading purposes at the end of each quarter.

In 2009 ICO students began using the Meditrek on-line system to log their patient encounters, replacing a system that used handwritten logs. During spring quarter 2013 ICO implemented a trial period in which an on-line student feedback process and the electronic logging system were linked with one another. Students recorded patient encounters on-line via Meditrek; logs reviewed at the end of each academic quarter. Logs identified average number of patient encounters/session.

**METHODS**

**Pretrial Period:** May 2012 – February 2013

- Preceptors document student feedback on NCR paper form
- Students record patient encounters on-line via Meditrek
- Logs reviewed at the end of each academic Quarter
- Number of patient encounters for each student identified
- Number of dates saved identified
- Students classified as having Low, Medium, and High frequency logging characteristics

**Trial Period:** February 2013 – May 2013

- Patient encounter log launched within EHR (NextGen ©)
- Student must complete chart and log encounter the same day.
- Student records patient encounter. "Submit" generates evaluation for attending faculty member.
- Logs reviewed at the end of each academic Quarter.

**RESULTS**

![Student Log](image)

**STUDENT LOG**

- Student must complete chart and log encounter the same day.
- Student records patient encounter. "Submit" generates evaluation for attending faculty member.

**TABLE 1**

<table>
<thead>
<tr>
<th>Number of logs</th>
<th>Frequency Type</th>
<th>Average Patient Encounters/Session</th>
<th>Average Patient Encounters/session</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pretrial</td>
<td>Trial</td>
<td>Pretrial</td>
</tr>
<tr>
<td>&lt; 15 LOW</td>
<td>47</td>
<td>1.34±</td>
<td>1.48</td>
</tr>
<tr>
<td>15-38 MEDIUM</td>
<td>40</td>
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<tr>
<td>&gt; 38 HIGH</td>
<td>35</td>
<td>1.49±</td>
<td>1.52</td>
</tr>
</tbody>
</table>

**METRICS**

- Number of logging dates
- Logging frequency type
- # of students
- Average number of patient encounters/session
- Average number of patient encounters/session

**RESULTS**

- Average number of patient encounters/session

**CONCLUSIONS**

- High frequency loggers report a statistically higher average number of patient encounters/session than both low and medium frequency loggers when logs are not linked to the evaluation and feedback process.
- Low and medium frequency loggers may under-report the number of patient sessions when evaluations and logs are not linked.

**REFERENCES**


**CONTACT INFORMATION**

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Special thanks to Dr. Yi Pang for her assistance with the statistical analysis.
AAO

37 ICO PRESENTATIONS
Publication Rates of Abstracts Presented at the
2006 Meeting of the American Academy of Optometry.

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INTRODUCTION
Communication of new knowledge is one of the most important aspects of the scientific process. The most common form of distributing scientific data is publishing a manuscript in a peer-reviewed journal. A more rapid method for disseminating new information is in the form of oral and poster presentations at scientific meetings. A search of the literature found no published studies concerning the publication rates from ophthalmic scientific meetings. The annual meeting of the American Academy of Optometry (AAO) is one of the largest and most prestigious scientific conferences in the ophthalmic profession.1

METHODS
Abstracts for the 2006 AAO meeting were obtained directly from the AAO and comprehensive literature searches were performed for all poster and oral presentations. Each meeting abstract was searched using the following search engines: PubMed (Medline) and VisionCite. A meeting abstract was considered published if the title of the paper, authorship, and information in the publication contained substantial similarities as determined by the authors of this study. Results of the searches were recorded in an Excel spreadsheet including abstract, author(s), title, journal, year of publication, if indexed in PubMed and/or VisionCite, and if any different authors were added or removed compared to the abstract. Once published papers were identified, the meeting abstracts that had matches were categorized by presentation style: oral versus poster. The congruency of information in meeting abstracts and published articles was determined by direct comparison of the abstract in the proceeding and published articles was determined by direct congruency of information in meeting abstracts by presentation style (oral versus poster). The published papers were identified, the meeting searches were recorded in an Excel spreadsheet by the authors of this study.3

RESULTS
Results of the 2006 AAO meeting were 21%. This falls on the lower end of the range of publication rates of abstracts from other North American health science national meetings range (13% to 64%) and is somewhat lower than the rates from ophthalmology and vision science meetings. (57% to 64%).4-6 Converting abstracts from oral presentations were nearly twice as likely as poster presentations to result in a journal article. Congruency rates of AAO abstracts to published articles is lower than national meetings in other fields. Like other medical fields, the vast majority of articles were published within four years after the meeting.

CONCLUSION
The publication rate of abstracts from the 2006 AAO meeting was 21%. This falls on the lower end of the range of publication rates of abstracts from other North American health science national meetings range (13% to 64%) and is somewhat lower than the rates from ophthalmology and vision science meetings. (57% to 64%).4-6 Converting abstracts from oral presentations were nearly twice as likely as poster presentations to result in a journal article. Congruency rates of AAO abstracts to published articles is lower than national meetings in other fields. Like other medical fields, the vast majority of articles were published within four years after the meeting.

REFERENCES
ACCURACY OF PERCEIVED DECLINATION OF GAZE (DoG) IN THE DARK

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PURPOSE

It is well-supported by evidence that the DoG serves as one of many cues to the egocentric distance of an object and when viewing a self-illuminated target in darkness may be the only cue. However, there is some controversy regarding the accuracy of the DoG; some studies report that the DoG is consistently overestimated (for example Durgin and Li, 2011) while others indicate that it is veridical (Ooi et al, 2001, 2006). In this study we measured the DoG to a small, dim self-illuminated target in darkness with two methods: 1) verbal magnitude estimation and 2) the blind-walking (BW) technique.

METHODS

Verbal Magnitude Estimations of DoG. Twenty visually normal observers were recruited for participation (mean age=24.67 yr). Subjects were tested in a dark room (9x11m) where they were instructed to view a small, red self-illuminated target randomly placed at one of 4 distances: 1.5m, 3.75m, 5.0m and 6.25m. Subjects viewed the targets monocularly with their dominant eye. All subjects had monocular visual acuities of at least 20/25 and normal binocular vision. Subjects’ eye height was also measured for all 4 target distances. The slope of the best-fit line (least squares method) is about 1.0 which indicates that the DoG is veridical according to the BW technique.

DoG Estimated Using the BW Technique. Thirteen different observers participated in this experiment. They were asked to view the same target in the same dark lab space, then walk blind-folded (in the dark) to the remembered target location. They were asked to indicate with a gesture the remembered height of the target. Two estimates were obtained per distance. The perceived target distance and height were used to calculate the perceived DoG for each target distance.

RESULTS

All statistical analyses were performed with the IBM SPSS Statistics (V. 21) software program. The mean verbal estimates of DoG are plotted in Figure 1. This plot shows both the mean (± standard deviation) perceived DoG, as well as the actual mean (± standard deviation) AoD. The mean DoG was compared with the actual AoD for each target distance. These data were analyzed with a two-way repeated measures analysis of variance. There was a significant overall difference between the mean DoG versus the AoD (F=129.97, p<0.000). The estimated DoG was significantly greater than the AoD for all target distances as estimated by paired t tests (p<0.000, with Bonferroni corrections). The mean amount of gain (i.e. the DoG/AoD) is shown in Figure 2 along with the standard error of the mean. The data points hover around a gain of about 1.7 for each target distance. The DoG determined with the BW technique is plotted in Figure 3 as a function of the AoD. Data are plotted for all 13 subjects at all 4 target distances. The slope of the best-fit line (least squares method) is about 1.0 which indicates that the DoG is veridical according to the BW technique.

CONCLUSIONS

1. Our results clearly indicate that verbal magnitude estimates of the DoG are overestimated, on average, by a factor of about 1.7 which agrees well with the overestimation reported by Durgin and Li (2011) under full cue conditions.

2. Our results also agree with Li and Durgin’s (2012) prediction that a gain in the DoG of about 1.5 would be obtained in darkness although they did not measure the gain.

3. However, our results also clearly indicate that if DoG is measured by the BW technique then the DoG is veridical as indicated by the slope equal to 1.0 in Figure 3. This result supports that published previously by Ooi and her colleagues (2001, 2006).

4. If the DoG is an important cue to distance perception, particularly in darkness when other cues are absent then it is either accurate or overestimated. The data presented here do not indicate which of these versions accurately describes how the DoG contributes to distance perception.

5. Thus our next step is to compare distance perception between 2 groups with different gains; control subjects (whose gain is about 1.5) versus strabismic amblyopes (whose gain is significantly larger at far distances). If the magnified DoG is used to determine perceived target distance then perceived target distances should differ between these two groups.

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Dai TL, Ma B, He ZJ. Distance determined by the angular declination below the horizon. Nature 2001; 414: 197-200.

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DIPLOPIA AFTER SURGICAL REPAIR OF AN ORBITAL BLOWOUT FRACTURE

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INTRODUCTION

Although surgical repair of an orbital blowout fracture aims to improve diplopia and gaze restriction, similar complications can arise after surgery. A common complication of orbital bone fracture reduction treatment is residual diplopia, seen in 20% of cases post-surgically from either mechanical or neurogenic causes. Incorrect surgical reconstruction of the orbit, can impede normal movement of the extraocular muscles leading to double vision.1

CASE HISTORY

A 51 year old African American female presented 7 weeks after surgical repair of an orbital floor fracture with open reduction internal fixation (ORIF) and placement of a plate in the right eye. She complained of diplopia especially in downgaze. A CT scan of her head and orbits showed the plate (Figure 1A) secured with screws (Figure 1B). Pertinent findings of the eye exam are summarized in Table 1.

Findings: Table 1

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
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<tbody>
<tr>
<td>BCVA</td>
<td>20/50</td>
<td>20/25</td>
</tr>
<tr>
<td>Pupils (+) Direct &amp; consensual (-) APD</td>
<td>(+) Direct &amp; consensual (-) APD</td>
<td></td>
</tr>
<tr>
<td>EOMS</td>
<td>80% reduction in introduction</td>
<td>FROM</td>
</tr>
<tr>
<td>CT</td>
<td>20 RH with 10 CAXT</td>
<td>N/A</td>
</tr>
<tr>
<td>Forced Duction (+) Forced duction in downgaze</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Anterior Segment</td>
<td>Trace bulbar injection slight plus</td>
<td>WNL</td>
</tr>
<tr>
<td>IOP</td>
<td>11 mmHg</td>
<td>12 mmHg</td>
</tr>
<tr>
<td>Posterior Segment</td>
<td>Vitreous heme, peripheral retinal hemes, (+) PRP 360</td>
<td>(+) PRP 360</td>
</tr>
<tr>
<td>PANG</td>
<td>Evidence of NVE/ NVE</td>
<td>R IRMA vs NVE</td>
</tr>
<tr>
<td>B-scan</td>
<td>(-) retinal detachment OD</td>
<td></td>
</tr>
</tbody>
</table>

Ocular history included proliferative diabetic retinopathy s/p PRP OU and hypertensive retinopathy OU.

Medical history included type 2 diabetes, HTN, HL, end stage renal disease, and anemia of chronic disease.

DOPAT

Three main differentials were considered including inflammation of the right inferior rectus muscle post-surgically, isolated paresis of the inferior rectus from nerve damage, and entrapment of the inferior rectus from improper placement of the plate in surgery. Muscle inflammation was not likely, because she denied any pain and extracocular muscle swelling was not visible on her CT scan (Figure 2). Neurogenic causes could be ruled out, as well, because of positive forced duction testing in downgaze. Therefore, the most likely cause was entrapment of the muscle from poor placement of the plate. Uniquely there was only restriction in downgaze and no restriction in upgaze, with the latter being more typical in inferior rectus entrapment. However, restricted movement in the direction of the entrapped muscle is possible in posterior entrapments, while restricted movement away from the direction of the entrapped muscle usually occurs in anterior entrapments.2 The CT scan in Figure 3 shows likely posterior entrapment of the inferior rectus muscle.

CONCLUSION

Surgical repair may eliminate diplopia in most orbital blowout cases.3 Nerve paresis and inferior rectus edema, may imitate an inferior rectus entrapment.1 A CT scan is helpful in differentiating entrapment versus muscle inflammation post-surgically, but is not considered 100% sensitive or specific.2 Positive forced duction testing was a key finding in determining whether the gaze restriction was due to a mechanical restriction or a paresis of the muscle. This finding needs to be confirmed when considering secondary surgical intervention to treat residual diplopia after a repaired orbital blowout fracture.1

REFERENCES


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ACKNOWLEDGEMENTS

Thanks to all who helped edit the contents of this poster. There were no conflicts of interest.

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Thanks to all who helped edit the contents of this poster. There were no conflicts of interest.
Alcaftadine 0.25% and Olopatadine 0.2% in the Treatment of Signs of Allergic Conjunctivitis at the Illinois College of Optometry

Elyse L. Chaglasian, OD; Jennifer Harthan, OD; Steven Potwin, OD; Stephanie Parker, OD, and Stephanie Fromstein, OD.

PURPOSE
To evaluate the efficacy of two, once a day ocular allergy eyedrops (alcaftadine 0.23% (Allegan, Irvine, CA) and olopatadine 0.2%, (Alcon, Ft. Worth, TX) in treating signs of allergic conjunctivitis utilizing a validated grading scale.

METHODS
Thirty seven subjects with symptoms of ocular allergy were recruited from the staff, students and faculty of the Illinois College of Optometry (ICO) and randomized by an unmasked examiner; 25 completed all visits of the double masked study. Subjects were excluded if they were being treated with any topical or oral allergy medication. Subjects were randomized to one-week of treatment with one type of allergy eye drop, followed by two-weeks of washout, followed by one-week of treatment with the second allergy eye drop. Anterior segment photography of the palpebral and bulbar conjunctiva was performed at each visit, along with the subjects’ completion of an ocular allergy-specific questionnaire to assess the impact of eye allergies on patient functioning and patient satisfaction with treatment. The results of this have been previously reported. At the completion of the study, a single masked examiner graded bulbar redness, lid (palpebral) redness and lid (palpebral) roughness according to the CCLRU (Cornea and Contact Lens Research Unit, Sydney, Australia) grading scale. (1 = very slight, 2= slight, 3= moderate, 4 = severe).

RESULTS
Alcaftadine 0.25% was significant (p<0.001) in the reduction of bulbar conjunctival redness, with the mean CCLRU score reducing from 3.08 to 2.85; in the reduction of palpebral conjunctival redness (p<0.001), with the mean CCLRU score reducing from 2.58 to 1.81, and lid roughness (p=0.004), with the mean CCLRU score reducing from 2.36 to 1.96. Olopatadine 0.2% was significant (p<0.001) in the reduction of bulbar conjunctival redness, with the mean CCLRU score reducing from 3.05 to 2.98; in the reduction of palpebral conjunctival redness (p<0.001), with the mean CCLRU score reducing from 2.67 to 1.90, however, it was not significant in the reduction of lid roughness (p=0.06). There was no difference in the reduction of palpebral conjunctival redness and lid roughness between the two drops (p=0.25 and 0.06 respectively).

CONCLUSION
Alcaftadine 0.25% and olopatadine 0.2% were both effective in the reduction of bulbar conjunctival redness and lid roughness between the two drops, however alcaftadine 0.25% was slightly more effective at relieving lid roughness.

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- Purpose
- Methods
- Results
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INTRODUCTION

In this longitudinal study we analyzed refractive error, eye movements, vergence and accommodation in children entering kindergarten, and then again upon entering 3rd grade. The children were all in the same school with similar socioeconomic backgrounds. We expected the children would show increased needs for refractive correction as they aged, but were uncertain how many children would show signs of vergence or accommodative problems by the time they entered 3rd grade. Reading in the 3rd grade is historically more focused on “reading to learn,” thus any visual problem could cause academic difficulties.

METHODS

64 children in a parochial school in Chicago with similar academic/socioeconomic backgrounds were examined the summer prior to Kindergarten. 33 of the same children were examined again upon entering 3rd grade. If a child moved away or left the school, they did not qualify to come back for the 3rd grade exam so that all of the children had the same educational background. We also lost children to the study due to the fact that the state did not mandate a 3rd grade exam, thus the parents did not see the necessity of returning to the study. A minority of the students stated having their own eye doctor as a factor for not returning for the free study exams. The children were given comprehensive exams including tests of accommodation, vergence and eye-movement analysis with the Visagraph. (See figure 1) The caregivers completed a survey regarding the number/ages of siblings, prior school history, and time spent on tasks such as reading, using computers, and playing outside. (See figures 2 & 3)

RESULTS

During the initial pre-K exam, 6% of the children exhibited a diagnosis of refractive error, and 7% had accommodative/vergence diagnoses. (See figure 2) 5% of the pre-kindergarten children had accommodator difficulties exhibited by testing using the Visagraph Visual Skills Test and the King-Devick Plates I & II test. Of the children who returned for the 3rd grade exam, 38% had one or more accommodative/vergence diagnosis. 24% of these 3rd graders received glasses, and of these, half of the corrections were for distance visual acuity and half were for near point problems. Of the 30% of children with accommodative/vergence problems, 33% had convergence insufficiency, 33% convergence excess, 25% accommodative insufficiency, 8% accommodative excess. (See figure 3) 9% of the 3rd graders had ocular motor difficulties when tested with the Visagraph (Reading, Numbers and Visual Skills recordings), the Developmental Eye Movement Test, and the King-Devick Test. Of the returning 33 children in 3rd grade, none of the children who exhibited accommodative/vergence dysfunctions had shown those diagnoses in their kindergarten exams.

DISCUSSION

Changes in the model of Kindergarten throughout the U.S. have increased the visual demands on children. According to a paper from the Alliance for Childhood in 2009, “Kindergarten has changed radically in the last two decades,” and “The latest research indicates that, on a typical day, children in all day kindergartners spend four to six times as much time in literacy and math instruction and taking or preparing for tests (about two to three hours per day) as in free play (30 minutes or less).” The increased demand in near point skills in early education is a factor that needs to be considered as we see the dramatic increase in vergence and accommodative problems.

The other possible contributing factors are the increased use of near point technological devices at early ages, and the increased demands on visual attention. The American Association for Pediatrics recommends a maximum of 2 hours per day of screen time for children over the age of 2, yet we know that many children are using computers, phones, and tablets for a much greater time every day, which could also contribute to increases in near point visual problems.

CONCLUSIONS

The children entered this study due to the Illinois law that all children entering kindergarten must have a comprehensive eye exam. While this public health initiative is a great way to get the children coming in for one exam, it is important that these children return for follow-up exams as they get older and complete more years of school. The large increase in clinical diagnoses with age is proof of the need for comprehensive eye exams to continue at regular intervals for school-aged children. The children in this study will be re-evaluated prior to 6th grade to determine if there are any visual needs or binocular/accommodative instability.

FIGURE 1. Comprehensive Exam Tests Performed

FIGURE 2. Kindergarten Parent Survey

FIGURE 3. 3rd Grade Parent Survey

FIGURE 4. Percentage of Accommodative/Binocular Diagnoses in Kindergarteners by Condition

FIGURE 5. Percentage of Diagnoses in 3rd Graders by Condition

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Background

Bed prism glasses (BPGs), Task-Vision Optics™ are marketed to individuals for viewing TV or reading while lying in bed. Individuals who are confined to bed rest may benefit from BPGs. Individuals with opposite postural restriction caused by spinal injury, stroke, Parkinson’s or poor muscle tone have problems viewing objects straight ahead while in their most upright position. Additionally patients who are directed to maintain a face down position following macular hole or retinal detachment repair with gas exchange have known difficulties with compliance especially without supportive devices. A low vision product company, now offers BPGs with an adjustable and reversible design. Known as Task-Vision Optics™ Professional Adjustable and Reversible prism glasses (RPG), this device can be adjusted to any angle offering a view of objects 90 degrees from fixation. The application of this new device for individuals with postural restriction or physician directed postural limitations is discussed.

Case Report

A 69 year old with Parkinson’s presented with inability to maintain a postural chin up position for functionality of straight ahead viewing. His complaints included mobility difficulty, inability to view faces and the computer screen. The patient, an inventor himself, had designed a forehead brace to manually manipulate his neck in straight ahead position but this occupied his hands. Our goal for visual rehabilitation was to identify a hands free prism system which would allow him to view objects straight ahead from this face down position. A hands free system was essential to allow his hands to position on his walker for mobility support.

At the time of his initial visit only BPG’s were available. We reversed the arms in order to reverse the unit. Figure 1.

The device was successful and the patient accurately navigated through the clinic avoiding obstacles and navigating through doorways in this face down position. Both subjective and objective improvement was noted. Figure 2 and Figure 3.

Discussion

Two main disadvantages existed in the treatment system:

1. The fitter nature of the device required the patient also wear his high myopic spectacle correction. This murdains system compromised acuity slightly to 10/30 but still allowed sufficient acuity for improved mobility. Our patient more recently underwent extracapsular cataract extraction with traditional IOL. His low residual refractive error now allows him to use the BPG without the need for a multiple lens/mirror system.

2. The comfort of the device without a properly positioned bridge was also less than desired.

Since our initial exam and custom fitting the BPG’s in reverse, reverse prism glasses (RPG’s) were produced. Figure 4 These RPG’s allow the reversal of the prism while the bridge and arms are correctly positioned for viewing straight ahead from a face down position.

Many conditions may cause postural restriction including Parkinson’s, cerebrovascular accident, osteoporosis, neck and spinal injuries. Additionally patients undergoing retinal surgery such as pars plana vitrectomy (PPV) with gas tamponade may struggle to comply with face down positioning secondary to the monotonous task and the difficulty with mobility. It is reported, that providing postural support following PPV improves compliance. Depending on post-operative acuity, individuals may be able to watch TV, view faces and have mobility while maintaining compliance with head down position and the use of RPG’s. Mirror prism lens systems have been reported to be useful in such cases.

Conclusions

While postural restriction is a rare presenting complaint to eye health care providers, physician-directed postural limitation is less so. Optometrists should be aware of reverse prism glasses and their potential applications. Further study to evaluate whether the provision of reverse prism glasses following retinal surgery may increase compliance with post-operative directives is indicated.

References


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Usefulness of cognitive assessments to identify etiology of visual complaints as presenting sign of Benson’s Syndrome (Posterior Cortical Atrophy)


BACKGROUND

Posterior cortical atrophy (PCA) or Benson’s syndrome, is often referred to as a visual variant of Alzheimer’s disease. It typically presents with earlier age of onset in patients without overt signs of dementia. PCA patients present with visuospatial complaints and only performed the clock test on the MoCA, the clock drawing portion was administered with 2 subsequent trials spaced 5 minutes apart. Our patient performed poorly and very differently on all 3 trials. MRI identified cerebral atrophic changes with occipital predominance. A diagnosis of PCA was made by neurology and donepezil was prescribed. Neuro-rehabilitation and vision rehabilitation orders included auditory and text to speech readers to reduce visual processing demand as well as visual scanning, sequencing therapy and other strategies to reduce cognitive demand of tasks.

CASE REPORT

A 60 year old dentist reported a history of acute blur and inability to coordinate her eye-hand movement during a dental procedure which occurred 2 years prior to exam and had been diagnosed at the time as a stroke. Progressive visual deterioration caused her to discontinue vocation and driving. Presenting complaints included: cloudy vision, poor eye-hand coordination, progressive difficulty reading and writing and recognizing familiar objects.

Exam findings:
Distance BVA 20/20 OD and OS and OU Near BVA 20/20 OU letter and number optotypes evaluated.
Goldmann visual fields with a 154 target reliably showed no constriction OD, OS. All anterior and posterior ocular structures were within normal age limits.
Abnormal findings included:
Reduced MARS contrast sensitivity to logMar 1.40
Observed inaccuracy of eye hand coordination and unsteady gait

The Clock Drawing test may be used a cognitive screening instrument on its own but is also included as a component of the Montreal Cognitive Assessment (MoCA). The MoCA has been shown to have a higher sensitivity for detecting early cognitive change in comparison with the well-known Folstein Mini Mental State Exam. It is freely available for clinical use and a MoCA blind is available for use in individuals with vision loss.

Montreal Cognitive Assessment - Figure 4, 5

Both versions were administered on our patient for comparative purposes. When comparing the versions MoCA blind may be converted to a score out of 30 using the validated conversion MoCA blind score x 30/22. In our patient this resulted in scores of 13.6/30 and 14/30 as the tests showed good correlation. As our patient had significant visuospatial complaints and only performed the clock test on the MoCA, the clock drawing portion was administered with 2 subsequent trials spaced 5 minutes apart. Our patient performed poorly and very differently on all 3 trials.

MRI identified cerebral atrophic changes with occipital predominance. A diagnosis of PCA was made by neurology and donepezil was prescribed. Neuro-rehabilitation and vision rehabilitation orders included auditory and text to speech readers to reduce visual processing demand as well as visual scanning, sequencing therapy and other strategies to reduce cognitive demand of tasks.

DISCUSSION

This case illustrates the usefulness of including a cognitive assessment when patients’ visual complaints are not consistent with presenting ocular findings. Patients’ with PCA often remain good historians presenting without overt signs of cognitive change. As such the typical indicators for initiation of cognitive testing may be overlooked. A consensus has not yet been reached on the diagnostic criteria for PCA. While AD remains the cause of up to 80% of cases of PCA, other neurodegenerative conditions including Parkinson’s and Lewy Body Dementia have also been associated with PCA. Treatment often includes medication for AD. Treatment for visual symptoms may include neuro-visual rehabilitation and assistive devices. Many patients suffer with depression as a result of this diagnosis. Psychological therapy or antidepressant intervention should also be included in rehabilitation plans.

CONCLUSION

PCA is an increasingly recognized diagnosis in neurologic literature and neurology but is not often mentioned in ophthalmic literature and eyecare. Cognitive tests may assist in identifying the etiology of presenting visual complaints. Early identification of PCA may offer improved outcomes as rehabilitation strategies are implemented before the onset of broad cognitive decline.

REFERENCES

Structural Changes and Functional Vision in a Case of Hereditary Retinal Disease

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BACKGROUND

A series of inherited retinal diseases fall within a spectrum of similar phenotypes and classically present as a yellow yolk-like lesion within the macula. One subgroup among these conditions is Best disease, which involves genetic mutation to the bestrophin (BEST 1) gene. Bestrophin-1 is a transmembrane protein that functions as a chloride channel within RPE cells. Mutation in this protein impacts melanin exocytosis leading to an accumulation of lipofuscin (retinal breakdown pigment) within the cell. Lipofuscin is toxic to the retina and leads to RPE atrophy. The condition was initially described by Franz Best in 1905 and is classified according to five distinct stages.

PATIENT PRESENTATION

A 56 year old Caucasian female was referred for a retinal evaluation of “late onset Stargardt’s and Best’s disease.” She reported central distortion OD>OS, discomfort driving on highways, and a concern over previous diagnoses. She denied history of ocular trauma or surgery. Her medical history was remarkable for arthritis and sinusitis. Her family ocular history was positive for ARMD in her father.

CLINICAL TESTING

BCVA: 20/25 OD, 20/20 OS
SLIT LAMP EXAM: Unremarkable OD, OS
DFE: Central vitelliform lesion indicative of lipofuscin accumulation with areas of RPE atrophy OD, OS. Additional satellite lesions temporally OD, and along superior temporal arcades OD (see Figure 1).

Fundus Autofluorescence: Hyperautofluorescent regions indicating regions of lipofuscin accumulation, with hypoautofluorescence representing areas of RPE atrophy OD, OS (see Figure 2).

Spectralis OCT: Increased foveal thickness OD>OS. ‘Dome-shaped’ area of lipofuscin accumulated in a cystic space beneath the RPE. Larger, subfoveal lesion OD vs OS (see Figure 3).

Octopus 900 Perimetry: Normal visual field to the size 84e target OD, OS with no objective finding of central scotoma (see Figure 4).

MARS Contrast Sensitivity: Log CS OD: 0.88, Log CS OS: 0.96; Log CS OU: 0.81. Severe CS loss OD, OS, OU (see Table 1).

DISCUSSION

Diagnosis: Top differential diagnoses for the patient based on clinical appearance included a case in the spectrum of bestrophinopathy and pattern dystrophy (specifically adult onset foveomacular vitelliform dystrophy). Size of subfoveal lesion, OCT and FAF pattern all led to Best disease or autosomal recessive bestrophinopathy. Genetic analysis would confirm the specific mutation and inheritance as the more common autosomal dominant versus autosomal recessive bestrophinopathy.

Vision Rehabilitation: Although the patient presented with good visual acuity, it is crucial to address functional difficulties. Discomfort in high risk driving environments can be explained by severe loss of contrast sensitivity and its implication on mobility. Research shows that contrast sensitivity provides more information than visual acuity on tasks requiring distance judgment, night driving and mobility. Treatment options for enhancing contrast sensitivity include increased illumination, filtering the blue end of the visual spectrum, and electronically altering images.

CONCLUSION

A pleomorphic disease requires several imaging modalities for diagnosis. Although no cure is currently available, proper treatment and management of Best disease includes close monitoring with DFE and OCT for CNVM, as well as educating on the potential value of genetic testing. Additionally, vision rehabilitation referral of a patient with functional difficulties despite good visual acuity can provide necessary counseling regarding impact of disease on visual function and possible treatment options. Such attention can provide a patient with comprehensive care.

REFERENCES


CONTACT INFORMATION

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**Oculopalatal Myoclonus following a Cerebrovascular Accident**

**Brooke Donaher, O.D.**

**Jesse Brown VA Medical Center, Chicago, IL**

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### INTRODUCTION

A sixty-five year old African American male developed oculopalatal myoclonus following a cerebrovascular accident. Oculopalatal myoclonus involves a lesion in the Guillain–Mollaret triangle. It is characterized by continuous pendular or torsional movements of the eyes in association with pendular soft palate movement.1

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### CASE HISTORY

Mr. W presented as a 65 year old African American male with a chief complaint of binocular double vision that had started following his cerebrovascular accident (CVA), three months earlier. His medical history was remarkable for a CVA that left him with left sided weakness, slurred speech, mild dysphagia and diplopia. His medical history was also positive for HTN, alcohol dependency renal insufficiency, hx of UTI, sporadic cannabis use, vitamin D deficiency. His current medications included Atenolol 100mg, Amiodipine 10mg daily, Bactrim DS bid and Vitamin D. He had no history of eye surgery or trauma and his last eye exam in 2012 was unremarkable.

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### MANAGEMENT

Our recommendation was to patch the left eye because the left eye experienced greater image jump. Treatment options include surgery, and pharmaceutical intervention. Case reports have suggested that surgical intervention in conjunction with botulism injections have helped reduce oscillopsia with limited success1. There is limited evidence to support pharmaceutical treatment will reduce an acquired pendular nystagmus although there is the potential to dampen the nystagmus with gabapentin or memantine2. One untested theory is to use treatments that target electronic coupling between cells... Medications like quinine have been suggested because they block gap junctions formed by some connexins3,4.

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### REFERENCES


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**ACKNOWLEDGEMENTS**

Thank you to everyone who helped review and edit the contents of this poster. There were no conflicts of interest.

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Purpose

Eye tracking technology has been used as a platform to create unique computer game experiences, augment alternative communication styles, and enhance psychology and vision research. However, the technology has not been used as a means of vision therapy (VT). This case reports the use of eye tracking technology as a potential method for vision therapy to improve saccadic, pursuit, and fusion functional abilities.

Case Report

A 29-year-old female complained of horizontal diplopia and difficulty fusing that began 1.5 months prior with the diagnosis of meningoencephalopathy and transverse myelitis secondary to likely coxsackie virus. BCVA 20/20 OU. Cover test revealed an alternating 10° esotropia at distance and near. She exhibited multistep saccades to the left and right and jerky lateral pursuits. Alternating suppression via maddox rod and a lateral gaze nystagmus was also observed. Three vision therapy sessions involving digital versions of traditional VT exercises in conjunction with Tobii TX300 eye tracker (Studio 2.2) were performed. Nine exercises were performed at each session both monocularly and binocularly. The patient began Tobii VT with a consistent left and right undershooting of lateral targets and jerky pursuit eye movement. After 3 VT sessions, output data showed improved saccadic and pursuit function as well as improved accuracy of fixation.

Results-Saccades

Results-Fixation

Results-Pursuits

Conclusion

To-date there is no published research of using the Tobii computer for vision therapy with patients that have these vision deficits. This case reports the successful use of eye tracking technology as a means to improve saccadic and pursuit function. Unlike traditional VT, this technological style provides advantageous real-time biofeedback to allow the therapist to see exactly what the patient is looking at. In addition it provides enhanced output data to accurately quantify the progression of VT to better improve a patient’s visual function.
Dilating Decision Making in Relation to Blood Pressure

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PURPOSE
A dilated fundus examination is typically a part of every comprehensive eye exam. In order to achieve maximal mydriasis in clinic eye care providers typically use a combination of tropicamide 1% and phenylephrine 2.5%. There have been numerous reports of adverse systemic side effects associated with topical phenylephrine reported to the National Registry of Drug Induced Ocular Side Effects. (1,2) These side effects vary from transient hypertension and syncope to ventricular arrhythmias, pulmonary edema, myocardial infarction and subarachnoid hemorrhage. (3) It should be noted that the majority of these side effects occurred with the use of 10% phenylephrine, a concentration that is not typically used in a normal clinical setting to dilate a patient. Conversely, numerous authors have reported on studies that revealed no statistically significant increase in blood pressure or other systemic side effects after the instillation of phenylephrine 2.5% or 10% and/or tropicamide 1%. (3-7) These conflicting reports make it challenging for a practitioner to make an evidence based medical decision as to whether or not to use phenylephrine 2.5% and/or tropicamide 1% to dilate a patient. (3)

Anecdotal evidence shows that there is little consensus amongst faculty at Illinois Eye Institute on an exact cut-off for not dilating a patient. Many practitioners have a concern about dilating patients eyes based on reports of isolated incidents of adverse reactions involving pupil dilation with 10% phenylephrine. However, a good portion of faculty recognizes the relatively low risk involved and will dilate a patient regardless of elevated blood pressure.

The aim of this study was to take a poll of optometrists at Illinois Eye Institute who are involved in patient care on their habits regarding dilating patients with elevated blood pressure. In addition, gender, years in practice, and working in specialty care services versus primary care was analyzed for variance in dilation practice habits.

METHODS
A survey was distributed and completed by 73 optometric faculty members at the Illinois College of Optometry. The survey was anonymous and inquired about gender, years in practice, and area of specialty. The subjects were asked questions regarding their practice habits in dilating asymptomatic adult patients with elevated blood pressure as well as questions pertaining to their opinions regarding specific dilating eye drops and their relation to blood pressure and any medical-legal concerns that they may have regarding dilating a patient with elevated blood pressure.

RESULTS
The majority of optometrists (94.5%) were not concerned regarding 1% tropicamide increasing blood pressure in patients who presented with elevated blood pressure (Figure 1). However, more than half of the optometrists (64.38%) were concerned that 2.5% phenylephrine may increase blood pressure in individuals with elevated blood pressure (Figure 2). The majority of optometrists (71.23%) were concerned for medical legal reasons about dilating a patient with elevated blood pressure (Figure 3).

When asked at what blood pressure level one would typically not dilate an asymptomatic adult patient with 2.5% phenylephrine and 1% tropicamide the majority reported that they would not dilate individuals with systolic blood pressure over 200 (71%) (Figure 4) and diastolic blood pressure over 110 (60%) (Figure 5). Neither gender nor years in practice had any significant association with the dilation decision making. However, those in specialty care services were more concerned with the use of 1% tropicamide (p=0.03) than those in primary care.

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A PAINLESS SCLERITIS?

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BACKGROUND
Scleritis is a severe inflammation affecting the sclera and the surrounding episcleral venous plexuses. Although avascular, the sclera is supplied with sensory nerves. Thus, scleritis typically presents as a red painful eye. Although 50% of cases are idiopathic, 30-40% occur with systemic etiologies. Prompt diagnosis and treatment is pertinent in this potentially vision-threatening condition.

CASE HISTORY
A 68-year-old Caucasian male veteran presented to clinic for a hyperemic right eye that began 3 months ago. The patient reported no pain and very mild irritation with watering. No other systemic and ocular symptoms were reported and the patient denied any previous history of red eyes. Prior to this visit, the patient noted that he was initially given antibiotic drops that did not help and then given a topical steroid with very mild relief. Furthermore, all medical history was unremarkable except for ulcerative colitis. The patient stated that he was in remission and was undergoing immunosuppressive injections (Humira) every two weeks for the past year.

CLINICAL FINDINGS
- BCVA 20/30 OD, 20/25 OS
- Insignificant blanching of episcleral vessels with 2.5% Phenylephrine
- No corneal involvement with fluorescein staining
- BP: 134/83 mmHg
- Inadequate Vitamin D levels

All entrance testing, biomicroscopy, and posterior ocular health were within normal limits OU.

DIAGNOSIS
Diffuse Anterior Scleritis OD

TREATMENT
The diagnosis was presumed secondary to his existing ulcerative colitis and likely immunocompromised condition. Thus, the patient was started on an oral NSAID in conjunction with a proton pump inhibitor to decrease gastrointestinal side effects. Upon his one and two-month follow-up, the patient presented with improved symptoms.

OTHER FORMS OF TREATMENT
- Immunosuppressants
- Biologic Agents
- Surgery if perforation occurs

INTEGRATIVE EYE CARE TREATMENT
- IBD-AID diet
- Fish oil
- Vitamin D

CONCLUSION
- Rule out the most vision-threatening complications
- Properly treat and diagnose the condition
- Obtain prompt work-up and appropriate referral if necessary.
- Recommend natural and safe supplementation for preventative care.

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BACKGROUND
Patients with filamentary keratitis may present with variable symptoms due to the irregularity of the corneal surface and presence of epithelial defects. Treatment may entail debridement of the filaments, lubrication, punctal occlusion, acetylcysteine, bandage lenses and scleral lenses. Amniotic membranes have been used in the treatment of ocular surface disorders for their anti-inflammatory and epithelial healing abilities. With the availability of the ProKera®, a sutureless amniotic membrane, this treatment option is more readily and easily performed in office. Presented here are the cases of two patients who were diagnosed with filamentary keratitis secondary to neurotrophic keratopathy and successfully fit with the ProKera® after having minimal relief with standard treatments.

CASES

PATIENT 1, a 74 y/o African American female presented with complaints of foreign body sensation and photophobia in both eyes; however, her left eye was more symptomatic than her right. She also reported episodes of intermittent pain and irritation that went away quickly with the use of artificial tears. Ocular history was remarkable for neurotrophic keratopathy OU. She had previously been diagnosed with filamentary keratitis and was using Restasis BID OU, Refresh preservative free artificial tears every 1 hour OS. She had also been fit previously with bandage contact lenses after removal of her corneal filaments.

Corrected visual acuities were 20/30 OD and 20/50 OS. All other entrance testing was unremarkable. Slit lamp examination revealed 3+ meibomian gland dysfunction, an incomplete blink and trace conjunctival injection, OU. The right cornea had 1+ diffuse, punctate epithelial erosions that stained with both fluorescein and lissamine green and the left eye had 3+ coalesced punctate epithelial erosions and inferior filaments. All other examination findings were within normal limits.

An assessment of filamentary keratitis secondary to neurotrophic keratopathy was made. Over the course of two months, the filaments recurred after debridement, bandage contact lens application, aggressive lubrication and punctal occlusion. The patient was not able to tolerate scleral lenses and was fit with a ProKera®. After the ProKera® had dissolved and was removed, her ocular signs, symptoms and visual acuity improved OU. She has been stable for the past 6 months.

PATIENT 2, a 72 y/o Hispanic female presented with complaints of foreign body sensation, tearing and itching that had been fluctuating for the past year in both eyes, OS>OD. The patient’s ocular history was remarkable for HSV keratitis, neurotrophic keratopathy, and her medical history was remarkable for breast cancer. The patient was using non-preserved artificial tears every 1 hour OU and ointment qhs OU, with intermittent relief.

Corrected visual acuities were 20/30 OD and 20/40 OS. Slit lamp examination revealed inferior punctal plugs, 1+ conjunctival staining and injection OU, trace inferior punctate epithelial erosions OD, and 1+ diffuse punctate epithelial erosions OS. The left cornea also had several nasal and superior corneal filaments. All other examination findings were unremarkable.

An assessment of filamentary keratitis secondary to neurotrophic keratopathy was made. The filaments continued to recur after debridement, bandage contact lens application, and aggressive lubrication. The patient was fit with a ProKera® and has been stable for three months following its application with improvements in ocular signs, symptoms and visual acuity.

DISCUSSION
Filamentary keratitis is a chronic corneal condition characterized by multiple filaments attached to areas of compromised corneal epithelium. It is most often seen in patients with dry eye disease. These patients may also have underlying systemic connective tissue disorders. Blinking of the lids may pull on the loose ends of the filaments, which may create multiple epithelial defects and cause the patients to feel pain and irritation. Patients often present with complaints of foreign body sensation, discomfort, photophobia, pain, and blurred vision. Examination often reveals a reduced tear-break-up-time, punctate epithelial erosions and mucous filaments attached the corneal surface that stain with lissamine green or rose bengal. Treatment includes controlling ocular surface inflammation and dry eye with artificial tears, punctal occlusion, acetylcysteine, antibiotics and steroids if needed, bandage contact lenses and scleral contact lenses. Cryopreserved amniotic membrane, such as the ProKera®, contains anti-inflammatory mediators and complex arrays of growth factors and cytokines, which help regenerate a healthy corneal epithelium and may reduce recurrence of filamentary keratitis.

CONCLUSION
Secondary to its anti-inflammatory properties and minimal improvement with traditional therapies, the ProKera® was applied for the management of filamentary keratitis. In both cases improvement in the ocular surface was noted. The ProKera® may be used for a wide range of ocular surface conditions and can be successfully used for patients with filamentary keratitis as an adjunct to other therapies.
Optic nerve infiltration as complication in Multiple Myeloma patient undergoing systemic treatment

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BACKGROUND

Multiple myeloma is the most common of the plasma cell dyscrasias, a subset of lymphocyte disease. Multiple myeloma is marked by the overproduction of a specific immunoglobulin, most often IgG. Ocular manifestations of multiple myeloma can involve ciliary body cysts, corneal crystalline deposits, extracellular muscle infiltration, retinal hemorrhaging, and optic nerve head infiltration. Ocular manifestations are rare and variable and generally occur later in the disease. Since many signs are asymptomatic, early diagnosis can be difficult.

CASE REPORT

A 57 year old African American male presented with complaint of a black spot in vision OD. His systemic health was positive for longstanding hypertension and was diagnosed with multiple myeloma within the last year, undergoing chemotherapy since diagnosis and radiation therapy for approximately six months.

BCVA was 20/125 OD PH NL, 20/200 OS PH 20/10. Pupil testing uncovered 2+ APD OD; however, all other entrance tests were within normal limits. Biomicroscopy revealed nuclear sclerotic changes OD>OS. Dilated fundus examination in the right eye was remarkable for edematous optic nerve head with peripapillary edematous limits. Biomicroscopy revealed nuclear sclerotic EOMs and orbital lesions. The most recent MRI showed diffuse bone metastases within the cranium and the formation of an intracranial optic nerve tumor extending along optic nerve into the chiasm. It was determined that the fundus findings were due to myelomatous optic nerve head infiltration OD>OS. Due to the rapid progression of the disease, the patient was admitted to the hospital and started on intrathecal chemotherapy and prednisone 10mg. Follow-up care was continued by patient’s oncologist and neuro-ophthalmologist.

The tentative diagnosis was a central retinal vein occlusion OD with significant optic disc edema with high suspicion of multiple myeloma involvement. The patient’s oncologist was contacted and an MRI was ordered. MRI revealed thickening and enhancements of the optic nerves OD>OS with progression of leptomeningeval enhancement bilaterally. It was determined that the fundus findings were due to myelomatous optic nerve head infiltration OD>OS. Due to the rapid progression of the disease, the patient was admitted to the hospital and started on intrathecal chemotherapy and prednisone 10mg. Follow-up care was continued by patient’s oncologist and neuro-ophthalmologist.

DISCUSSION

Multiple myeloma involvement can affect all parts of the eye and should be considered as a differential in patients that present with new ophthalmic manifestations in the absence of systemic disease, especially when associated with fatigue, weight loss, and bone pain on movement. Ocular involvement of multiple myeloma is rare but can involve corneal deposits, ciliary body cysts, hyperviscosity retinopathy and/or optic nerve infiltration. Infiltration occurs by malignant plasma cells and can affect both soft tissues and bones, potentially causing compression to other orbital structures. Proptosis is the most common presentation of soft tissue orbital infiltration in multiple myeloma. Overproduction of immunoglobulin causes an increase in blood viscosity and increases the risk of complication in microcirculation.

In this case, the patient was previously diagnosed with multiple myeloma, resulting in high suspicion of multiple myeloma involvement. Prognosis is highly variable and the presence of myelomatous involvement of meninges results in a poor prognosis despite aggressive local and systemic treatment. This patient progressed rapidly despite aggressive treatment resulting in a rapid decrease in VA and EOM mobility, suggesting infiltration of EOMs and orbital lesions. The most recent MRI showed diffuse bone metastases within the cranium and the formation of an intracranial optic nerve tumor (Figure 5). These patients are co-managed with hematologists and oncology and started on chemotherapy, radiation therapy, or stem cell transplantation. Retinopathy may improve with these systemic medications; however, at an ocular standpoint, there is not much to do except co-manage for changes.

CONCLUSION

Multiple myeloma is an incurable, but treatable disease and can affect all parts of the eye. Early diagnosis can be difficult due to the asymptomatic nature of the ocular manifestations. Since patients are never in complete remission and the disease can progress rapidly, close monitoring and follow-ups is necessary, and co-management with hematologist/oncology is imperative.

Figure 1: Fundus photo OD

Figure 2: Fundus photo OS

Figure 3: 5-line raster OD depicts a significantly elevated and edematous ONH

Figure 4: 5-line raster OD reveals unusual appearance of vitreomacular traction

Figure 5: MRI showing intracranial and optic nerve tumor extending along optic nerve into the chiasm

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INTRODUCTION

Acquired esotropia (ACET) in adults is rare. ACET in myopes tends to be less associated with neurological etiology, however, there is no strong evidence to support this trend. This case outlines the current research and treatment options for ACET.

PATIENT PRESENTATION

Patient was referred by her optometrist to see Dr. M. Greenwald, a pediatric and strabismus surgeon from the University of Chicago because of a worsening recent onset esotropia.

COVER TEST & EOMs

DDx: ACQUIRED ESOTROPIA

1. Abducens nerve palsy
   - Abduction deficit is required
   - Long standing palsies become more comitant
   - Can be unilateral or bilateral
   - Subtle presentations include:
     - End point nystagmus
     - Decreased saccadic velocity
     - V-pattern
     - Greater esotropia in distant

2. Divergence paralysis
   - Esotropia at dist, orthoptia at near
   - More related to neurological disease
   - Exception: Age-related dist esotropia (>60 yrs)
   - Related: Decompensated divergence insufficiency

3. Acquired comitant esotropia (ACET)
   - Absence of neurological disease
   - Applies to children and adults
   - Can be progressive

DIAGNOSIS: Acquired Comitant Esotropia (Type 3)

CLINICAL PEARL

- Always check for decompensated monofixation syndrome (MF) or phoria
- There is reduced VA and eccentric fixation point in turning eye in MF

WHEN TO ORDER NEUROIMAGING?

Factor | More likely | Less likely
--- | --- | ---
Age? | Children | Adults
Neurological symptoms? | Present | Absent
Positive family history? | Absent, esp in kids | Present, esp in kids
Duration? | Recent onset | Long standing
Refractive error? | Absence of expected rx | Myopia, especially high amounts
Nystagmus? | Present | Absent
Fusion? | Absent | Present
Other | Decompensated phoria or monofixation syndrome

The greatest challenge facing clinicians in ACET is deciding when to order neurological testing. The evidence consists of mainly case studies and retrospective analyses. The table to the left describes the general trends on what factors make neurological disease more likely as defined by the literature and experts in the field.

CONCLUSION

Acquired comitant esotropias in adults are usually benign motility disorders, but can be a harbinger of serious neurological disease. Presence of abnormal findings, or absence of expected findings should make you suspicious. Always be on the lookout for a subtle abducens nerve palsy.

REFERENCES


The patient underwent a RMR recession. Although her diplopia was being successfully managed with the Fresnel prism, she was very concerned about the cosmesis and was very motivated to undergo surgery.

The evidence consists of mainly case studies and retrospective analyses. The table to the left describes the general trends on what factors make neurological disease more likely as defined by the literature and experts in the field.

CLINICAL PEARL

Acquired esotropia of high myopia occurs in very high myopes and can lead to a strabismus fixus due to an abnormal globe to socket relationship. These patients need timely surgical referrals to prevent complications.

REFERENCES
INTRODUCTION

Crouzon Syndrome is a genetic disorder characterized by the premature fusion of certain skull bones (craniosynostosis). This can result in abnormal growth, leading to hypertelorism, proptosis due to shallow orbits, and divergent strabismus. Systemically our patient has an anophthalmic amblyogenic risk factor OD (-9.50 -1.00 x 180) and astigmatism OS (-1.50 x 180). Midfacial hypoplasia and exorbitism were marked. Corneal protection was adequate, only trace inferior SPK was noted. IOP was elevated in the 30s OU. Fundus appearance revealed healthy discs (0.3 rd OD, OS) and macula. Optic atrophy, which is found in 20% of Crouzon’s patients, was not apparent in our patient.

Patient Medical History
- Trench Dependent
- Tracheal Dependent
- History of Short Gut Syndrome
- Seizure Disorder
- Intussusception

CLINICAL FINDINGS

The patient was able to fix and follow OD, OS. OKN response was n-t, t-n response OD, OS. A 60 ∆ constant, alternating exotropia with very strong left eye fixation preference was noted. Retinoscopy findings revealed myopia OD (-9.50 -1.00 x 180) and astigmatism OS (-1.50 x 180). Midfacial hypoplasia and exorbitism were marked. Corneal protection was adequate, only trace inferior SPK was noted. IOP was elevated in the 30s OU. Fundus appearance revealed healthy discs (0.3 rd OD, OS) and macula. Optic atrophy, which is found in 20% of Crouzon’s patients, was not apparent in our patient.

RESULTS

The ocular conditions of strabismus, exophthalmos leading to potential exposure conjunctivitis and/or keratitis, and suspicion of glaucoma exist. Treatment of this patient has the added challenge of the patient being in-patient in a Children’s hospital for the foreseeable future. In addition to the ocular conditions that present with Crouzon Syndrome our patient has anisometric amblyogenic risk factor OD (high unilateral myopia). Contact lens treatment of the anisometric refractive error is not a possibility due to the ocular and social situations. Spectacles also proved challenging due to the hypertelorism, lack of a bridge, extreme proptosis and the issue of the patient’s cornea hitting the spectacle lens.

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CONCLUSION

Crouzon Syndrome is seen in 16 per million newborns. It is the most common craniosynostosis. It is inherited in an autosomal dominant pattern. The degree of craniosynostosis and the age of onset is variable. Our patient’s manifestations of Crouzon’s were quite severe and noted at birth. Her care involved addressing refractive error, amblyopia, strabismus, corneal issues, and a risk for glaucoma. As optometrists we must educate ourselves on the ocular conditions that exist with rare syndromes and address each to meet the needs of our patient. Maintaining long term corneal integrity is crucial for the visual welfare of this patient. Spectacle use was complicated by the severe anisometropia and the protruding cornea hitting the spectacle lens. We addressed each issue individually and developed optometric plans that benefit the patient’s long term visual development.
BACKGROUND

West African Crystalline Maculopathy (WACM) is a rare presentation of asymptomatic intra-retinal foveal crystals observed solely in individuals of West African ancestry, specifically those native to western African Igbo and Yoruba tribal groups. It is commonly bilateral, although a unilateral case has been reported, and often presents asymmetrically as birefringent yellow-green superficial refractile crystals, which are discrete to the fovea. Western African tribal members’ unique diet is believed to contribute to crystal deposition, specifically kola nut ingestion, however not all published cases report history of kola nut ingestion. A break down in the blood-retinal barrier due to vascular pathologies may contribute to the pathogenesis of WACM by predisposing these patients to crystal deposition.

PERTINENT FINDINGS

A 60-year-old Nigerian female presented for a comprehensive eye examination with complaint of uncorrected near vision blur.

MEDICAL HISTORY:
- Hypertension, history of kola nut ingestion 8 years prior

MEDICATIONS:
- Hydralazine HCL
- Normal OD, OS via HRR
- 150/90mmHg RAS @ 1:00
- 15mmHg OD, OS by Goldmann

Differential Diagnosis:
- Drug-induced crystalline retinopathies:
  - Talc retinopathy
  - Methoxyflurane
  - Nitrofurantoin
- Hereditary crystalline retinopathies:
  - Beitti
  - Cystinosis
  - Ocaosis

DISCUSSION

Drug-induced and inherited crystalline retinopathies have been well documented in literature; however, this case represents a novel clinical presentation of crystalline maculopathy of which the etiology is not yet fully understood. The exact etiology of the crystals is unknown as no histological studies have been completed, although many patients report a history of kola nut ingestion. Kola nuts are raw seeds, which induce stimulatory effects upon ingestion, often taking place as a social tribal ritual. The nuts contain caffeine, which is used in cola soft drinks, and other xanthines that may be the source of the crystals. Not all people who ingest kola nuts acquire the retinal deposits, therefore it has been proposed that retinal vasculopathies may potentiate crystal deposition by compromising the blood-retinal barrier. This is likely the case for our patient given the microvascular abnormalities noted on fluorescein angiography.

CONCLUSION

HD SD-OCT findings can assist in the diagnosis of crystalline retinopathies by differentiating location of crystalline deposits. A complete fundus exam should be performed to rule-out associated retinopathy. Pathological studies of the crystals may be required to fully understand their formation in WACM. As these crystals have not been found to be retinotoxic or cause visual dysfunction, observation is recommended for management.

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OVERESTIMATION OF DECLINATION OF GAZE (DoG) BY STRABISMIC AND VISUALLY NORMAL OBSERVERS

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PURPOSE
It is well-accepted that the DoG (i.e. the angular downward shift of gaze from horizon to target) serves as one of many cues to the egocentric distance of an object and in darkness may be the only cue. However, some studies report that the DoG is perceived veridically in both full cue and dark conditions, while others have reported the overestimation of the DoG in lighted conditions. We measured the DoG in darkness and compared the results obtained with controls to those obtained from strabismic amblyopes. Our purpose was to determine if control subjects overestimate the DoG in the dark as well as in full cue conditions and to determine if the DoG reported by strabismic amblyopes matched those of controls.

METHODS
Twenty visually normal observers and 9 strabismic amblyopes were recruited for participation (mean age=24.67 yr). Subjects were tested in a dark room (9x11m). All measurements were made monocularly with the dominant eye, which had a visual acuity of at least 20/25. Subjects’ eye height was also measured for determination of the DoG reported by strabismic amblyopes matched those of controls.

RESULTS
1. The mean DoG was calculated and compared with the actual AoD for each target distance. A 3-way analysis of variance (mixed design; distance, AoD, group) was used to compare means. The DoG was significantly greater than the AoD for both groups (F=211.82, p<0.000). See Figure 1 which plots the mean and standard deviation of the DoG.

2. The overestimation of the DoG was not the same for the two groups: strabismic amblyopes overestimated the DoG to a greater extent than did controls (F=8.73, p=0.01) but only at the two farthest distances (5m, t=2.96, p=0.01; 6.25m t=3.53, p=0.002). See Figure 2 (which plots the mean DoG for each group. The error bars plot the standard error of the mean).

3. The gain was defined as DoG/AoD. Figure 3 illustrates that the gain differed between the two groups. This difference was significant at the 5 and 6.25 m distances (t=2.69, p=0.012; t=3.32, p=0.003). See Figure 3 which plots the gain for each group at each distance (mean plus and minus the standard error of the mean).

4. The gain for the control group was consistently close to 1.7 while the gain for the strabic group increased with increasing target distance.

CONCLUSIONS
1. Our results clearly indicate that magnitude estimates of the DoG are not veridical, as measured by the method of verbal magnitude estimation, but are in fact overestimated by both groups.

2. Both control subjects as well as strabismic amblyopes overestimated the DoG but by different amounts.

3. Controls subjects overestimated the DoG by a factor of about 1.7 at each target distance whereas the strabismic observers showed an increase in overestimation with increasing target distance.

4. The gain of 1.7 shown by control subjects agrees well with reports obtained in full cue conditions (Durgin and Li, 2011) but disagrees with reports that DoG in the dark is veridical when obtained with the blind-walking technique (Ooi et al, 2001, 2006).

5. It is not yet clear if these overestimations of DoG affect distance judgments in the dark, but our results predict that strabismic amblyopes should see targets significantly closer than control subjects, given the importance of the DoG distance cue.

REFERENCES

Ooi TL, Wu B, He ZJ. Perceptual space in the dark affected by the intrinsic bias of the visual system. Atten Percept Psychophys 2006; 35:605-624.


CONTACT INFORMATION
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BACKGROUND

Acute syphilitic posterior placoid chorioretinitis (ASPPC) is a rare variant of syphilitic chorioretinitis presenting as large, outer retina/choroid, placoid, yellow lesions in the posterior pole. Recent case studies report outer retina findings via spectral domain OCT including subretinal fluid, disruption of the inner segment/outer segment junction, nodular thickening of the RPE, loss of the external limiting membrane, and punctate hyper-reflectivity of the choroid. Some reports suggest the subretinal fluid may be a transient, early finding.

PERTINENT FINDINGS

60 y/o Hispanic male presented with painless, progressive, decreased vision OU x 6 months.

MEDICAL HISTORY: no known systemic conditions

MEDICATIONS: none

BCVA: 20/200 OD, OS

PUPILS/SLIT LAMP EXAM: PERRL (-) APD; No cells/flare anterior segment.

DFE: large, yellow, circular, placoid, chorio-retinal lesion in the macula OD. No view OS due to dense asteroid hyalosis (Figure 1, 2).

SPECTRAL DOMAIN OCT: subfoveal serous macular detachment with loss of the inner segment/outer segment (IS/OS) junction and hyper-reflective, nodular, finger-like projections from the RPE. External limiting membrane was intact (Figure 3).

SEROLOGY: (+)RPR and FTA-ABS; (-) HIV

DIAGNOSIS: acute syphilitic posterior placoid chorioretinitis

DISCUSSION

The patient was hospitalized and received intravenous penicillin G for 10 days. The subretinal fluid has persisted over 9 months despite appropriate antibiotic therapy (Figures 4,5). Vision improved to 20/60 OD and 20/30 OS and has been stable over 9 months.

CONCLUSION

This case represents a rare maculopathy, ASPPC, resulting in outer retinal disruption and loss of visual function likely due to delayed antibiotic therapy. In most cases, visual prognosis for ASPPC is favorable and OCT findings normalize when treated early in the disease process. Poor visual outcomes are associated with long term loss or disruption of outer retinal anatomy. This patient reported symptoms six months prior to presentation, and subretinal fluid was present and has remained present post therapy, suggesting subretinal fluid is not only an early, transient finding. Chronic fluid may decrease visual prognosis.

REFERENCES


CONTACT INFORMATION

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SPECTRAL DOMAIN OCT FINDINGS IN ACUTE SYPHILITIC POSTERIOR PLACOID CHORIORETINITIS

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Illinois College of Optometry - Chicago, Illinois 60616

FIGURE 1: Initial Presentation Right Eye

FIGURE 2: Initial Presentation Left Eye

FIGURE 3: Initial Presentation OCT Right Eye

FIGURE 4: Nine months Post-treatment Right Eye

FIGURE 5: Nine months Post-treatment OCT Left Eye
A 79 year old African American female presented to clinic with a complaint of mild body sensation, irritation, and "bumps" on the inside of her eyelids for the past 2 months. She was referred by another eye-care practitioner and was not currently being treated. The patient denied vision changes, photophobia, tearing, or discharge. Her ocular history included uveitis in both eyes, a complicated cataract exchange with vitreous prolapse in the left eye, and a macular scar in the left eye. She is currently treated for hypertension.

**EXAMINATION**

**TABLE 1. Differential Diagnosis for Chronic Follicular Conjunctivitis**

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allergic conjunctivitis</td>
<td></td>
</tr>
<tr>
<td>Bacterial conjunctivitis</td>
<td></td>
</tr>
<tr>
<td>Inclusion conjunctivitis (Molluscum)</td>
<td></td>
</tr>
<tr>
<td>Toxic Conjunctivitis (Keratoconjunctivitis)</td>
<td></td>
</tr>
<tr>
<td>Ocular Adnexal Lymphoma</td>
<td></td>
</tr>
<tr>
<td>Reactive lymphoid hyperplasia</td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 2. Ann Arbor staging classification for Hodgkin and non-Hodgkin lymphomas**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Involvement of a single lymph node region or extralymphatic region/organ</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Involvement of 2 or more lymph node regions or extralymphatic structures (or regions) in the same site of the diaphragm or above it</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Involvement of lymph node regions on both sides of the diaphragm with involvement of extralymphatic or extranodal involvement or both</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Involvement of one or more regions or tissues outside the lymphatic system, with or without involvement of mediastinal lymph nodes</td>
</tr>
</tbody>
</table>

**TABLE 3. WHO Classification of tumors of the hematopoietic and lymphoid systems (4th edition)**

<table>
<thead>
<tr>
<th>WHO Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extranodal marginal zone B cell lymphoma</td>
<td>Tumors of the mucosa associated lymphoid tissue (MALT) lymphomas</td>
</tr>
<tr>
<td>Follicular lymphoma</td>
<td>Tumors of B cells with a follicular growth pattern</td>
</tr>
<tr>
<td>Chronic lymphocytic leukemia</td>
<td>Chronic lymphoid leukemia/chronic lymphocytic lymphoma</td>
</tr>
<tr>
<td>Mantle cell lymphoma</td>
<td>Tumors of B cells with a mantle cell growth pattern</td>
</tr>
<tr>
<td>Diffuse large B cell lymphoma</td>
<td>Diffuse large B cell lymphoma of non-germinal center origin</td>
</tr>
<tr>
<td>Recurrent lymphoma</td>
<td>Lymphomas of germinal center origin</td>
</tr>
<tr>
<td>Kaposi's sarcoma</td>
<td>Endemic and sporadic Kaposi's sarcoma</td>
</tr>
</tbody>
</table>

**TREATMENT**

Once the diagnosis of ocular adnexal lymphoma is known, it is important to establish the staging of the disease. This involves a full blood count, chest x-ray, CT or MRI scans, and bone marrow evaluations. Studies have shown that the development of systemic disease usually occurs within 6 months after initial presentation. However, due to the possibility of recurrence, systemic evaluations should be repeated every 6 months for the first 5 years. Treatment includes wait-and-see, radiotherapy, chemotherapy, and rituximab.

Our patient was referred to oncology to rule out systemic involvement. Treatment with rituximab will be considered for the patient.

**DISCUSSION**

Classically, ocular adnexal lymphomas present as painless, mobile, "salmon-pink" or flesh-colored patches of conjunctival swelling usually in the lower form. There can be a stasis when there is superior eyelid involvement. Patients may present with proptosis, diplopia, and ocular irritation. Ocular adnexal lymphomas appear most frequently in the orbit, followed by the conjunctiva, and then the eyelids. Due to the difficulties of distinguishing benign from malignant lymphomas, immunohistochemical studies are usually required to aid in the diagnosis.

The majority of stage I disease respond well to treatment. However, 25% of patients with OAL have previous or concurrent extralocular lymphoma (stage II-IV), decreasing survival rates. The 10-year disease-specific mortality rate is approximately 5-10%. 5-year disease-specific mortality rates are 3.7% for primary OAL.

**REFERENCES**

BACKGROUND

Cone dystrophy affects the cone photoreceptors of the retina causing a progressive loss of vision. Individuals with the condition have symptoms of central vision loss or disturbances, central scotomas, color vision abnormalities, and photophobia. Modes of inheritance include dominant, recessive, or x-linked transmission. Electrodiagnostic testing has proven to be useful in confirming markedly reduced cone function. It is important to note that although this result can be diagnostic of cone dystrophy, varying phototypes and electrodiagnostic findings represent the genetic heterogeneity involved with the condition. In an observational case series, Leng and associates found that a rare OCT finding dubbed “foveal cavitation” has been shown to have a correlation to patients that are afflicted with cone dystrophy. In addition to cone dystrophy, there are cases involving achromatopsia and Stargardt disease that have also shown this finding.

PATIENT PRESENTATION

A 16 y/o Asian male is referred to the Spectrios Institute for Low Vision with a diagnosis of “macular dystrophy” for a low vision evaluation. He reports a progressive decline in central vision as distance for the last 4 years. He denies any light sensitivity, peripheral field constriction, nyctalopia, or color vision difficulty. He has no history of ocular trauma or surgery. His medical history is unremarkable. The patient's family history includes consanguinity between the mother and father, but no evidence of visual disturbance similar to the condition have symptoms of central vision loss or disturbances, central scotomas, color vision abnormalities, and photophobia. Modes of inheritance include dominant, recessive, or x-linked transmission. Electrodiagnostic testing has proven to be useful in confirming markedly reduced cone function. It is important to note that although this result can be diagnostic of cone dystrophy, varying phototypes and electrodiagnostic findings represent the genetic heterogeneity involved with the condition. In an observational case series, Leng and associates found that a rare OCT finding dubbed “foveal cavitation” has been shown to have a correlation to patients that are afflicted with cone dystrophy. In addition to cone dystrophy, there are cases involving achromatopsia and Stargardt disease that have also shown this finding.

CLINICAL TESTING

- **BCVA:** Distance: 20/40 OD, 10/30 OS
- Near: 20/20 OU
- **CVF:** Gently full OD/OS
- **Facial Amsler:** Central Scotoma OD, OS
- **Color Vision:** Ishihara: 5/8 OD, 6/8 OS D-15: Normal findings with no crossovers indicated OD, OS
- **Anterior Seg:** unremarkable
- **Posterior Seg:** (See Figure 1)
- **Fundus Autofluorescence (FAF):** (See Figure 2)
- **Goldmann VF:** (See Figure 3)
- **SD-OCT:** (See Figure 4)
- **Optos Microniometry:** (See Figure 5)
- **Full-Field Electoretinogram (FFERG) OD:** (See Figure 6)
- **Diagnosis:** Central Cone Dystrophy

DISCUSSION

Foveal cavitation can be helpful in distinguishing central cone dysfunction from acquired conditions or functional vision loss. The term is used to describe a gap in the subfoveal outer photoreceptor layer. It is marked by a disruption of the IS/OS band with an intact external limiting membrane (ELM) and retinal pigment epithelial (RPE) layer. While the objective findings on the SD-OCT and MP serve as evidence for cone dysfunction, the patient's ERG findings are normal which makes a diagnosis of cone dystrophy less definitive. As in our case, Leng et al. have also shown that phototypes and electrodiagnostic findings may vary among individuals with central cone dysfunction including some patients having normal cone and rod function on the ERG. There is potential for this to change over time but our findings were similar to some of the cases presented in Leng's observational study. Because the term central cone dysfunction is more descriptive than diagnostic, we classified the condition as central cone dystrophy to make the distinction from cone dystrophy that is associated with a more impaired cone function on electoretinography.

CONCLUSION

Based on the patient's symptoms, fundus photo, SD-OCT, and micropointerapy, a diagnosis of central cone dystrophy was given. Despite the normal full-field electroretinogram, the foveal cavitation finding on SD-OCT serves as evidence for the structural abnormalities present within the macula reminiscent of the central cone dysfunction described by Leng. Although it is not specific to one diagnosis, it may assist to rule out acquired retinal disease or functional vision loss. Further testing like multifocal electroretinogram and micropointerapy may be useful in closely monitoring the progression of disease. Genetic testing is a critical diagnostic component to consider in the patient management. Patient education and pedigree analysis are helpful for patients to understand their condition. A low vision evaluation can help identify the proper aids and rehabilitation plan necessary to address functional difficulties.

REFERENCES

A Rare Case of Unilateral Rifabutin-associated Uveitis in an Immunocompetent Patient

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1 Jesse Brown VA Medical Center (Chicago, IL), 2 Illinois College of Optometry (Chicago, IL), 3 UIC Department of Ophthalmology (Chicago, IL)

ABSTRACT

Pulmonary infections secondary to Mycobacterium avium intracellulare (MAI) pathogen often present as opportunistic infections in immunocompromised individuals. Historically, the prevalence of MAI infections increased dramatically during the HIV/AIDS epidemic.

Rifabutin, a derivative of rifampin, is an antimycobacterial agent used for the prophylaxis or treatment of MAI infections in conjunction with other therapeutics, commonly macrolides and azoles.

Rare cases of unilateral and bilateral rifabutin-associated uveitis are most commonly seen in immunocompromised individuals; however, suspicion should be high for rifabutin being the cause of a delayed-onset, severe uveitis often accompanied by a hypopyon in any patient regardless of immune status.

An immunocompetent patient presents with unilateral uveitis that dramatically improved with timely treatment of a topical corticosteroid and cycloplegic along with cessation of rifabutin.

BACKGROUND

- Pulmonary infections secondary to Mycobacterium avium intracellulare complex (MAI) pathogen often present as opportunistic infections in immunocompromised individuals. Historically, the prevalence of MAI infections increased dramatically during the HIV/AIDS epidemic.
- Rifabutin, a derivative of rifampin, is an antimycobacterial agent used for the prophylaxis or treatment of MAI infections in conjunction with other therapeutics, commonly macrolides and azoles.
- Rare cases of unilateral and bilateral rifabutin-associated uveitis are most commonly seen in immunocompromised individuals; however, suspicion should be high for rifabutin being the cause of a delayed-onset, severe uveitis often accompanied by a hypopyon in any patient regardless of immune status.
- An immunocompetent patient presents with unilateral uveitis that dramatically improved with timely treatment of a topical corticosteroid and cycloplegic along with cessation of rifabutin.

CASE HISTORY

- A 65-year-old immunocompetent white male presented in April 2014 with a one day history of painless, sudden, rapidly reduced vision OS. He reported increased floaters OS without photopsia. The eye was mildly tender, but he denied any pain or photosensitivity.
- The patient’s medical history included severe COPD, untreated hepatitis C, hypertension, peptic ulcer disease, treated latent tuberculosis, and prior intravenous drug use. Bilateral lung nodules and cavitation were first observed in August 2012; a biopsy and infectious work-up were negative.
- Imaging on August 2013 revealed enlargement of the cavitation (Figure 1). Sputum cultures in October 2013 were positive for Mycobacterium avium intracellulare complex and Aspergillus fumigatus.
- The patient was started on clarithromycin, rifampin, ethambutol, and varicenazole on November 2013. Rifabutin was switched in place of rifampin on October 2013. Recent sputum cultures were negative for any bacterial or fungal growth.
- The patient was started on atropine qdaily and Prednisolone Acetate q30min OS, with expectations of a quick resolution if findings were secondary to rifabutin use. The infectious disease department was consulted on the ophthalmic findings and agreed with the recommendation to discontinue rifabutin and to closely monitor the patient’s pulmonary status. Blood work-up for the patient including HIV, MHA/TP/RPR, and HLA B27 was negative.
- The patient was closely observed and reported his vision rapidly improved during the first night of topical therapy (Figure 4). The uveitis has completely resolved over two months. Recent sputum cultures were negative for any bacterial or fungal growth.

FINDINGS

- BCVA OS was 20/400, which was reduced from his prior exam four months earlier in which the BCVA was 20/30+2. Pupils, extracocular motility, and confrontation VF were normal OU.
- Anterior segment examination revealed 2+ diffuse, circumlimbal injection OS. Microscopic corneal edema were present, and Descemet’s folds were present, and inflammatory debris was seen on the inferior half of the cornea. The anterior chamber had 4+ cells and 2+ flare with a 1 mm hypopyon inferiorly. Intracocular pressures were 10 mmHg OU.
- A dense, central pupillary membrane was seen post-dilatation on the front surface of the OS lens capsule with web-like, fibrous tissue extensions (Figure 2). Views of the posterior segment were extremely difficult. B-scan ultrasonography was performed revealing dense vitreous floaters (Figure 3).
- The possibility of endophthalmitis secondary to Aspergillus was seriously considered; ultimately, the diagnosis was most consistent with unilateral, anterior and intermediate uveitis presumed secondary to rifabutin use.

TREATMENT

- Treatment of mild to severe uveitis secondary to rifabutin use involves immediate topical corticosteroids and cycloplegics. Dramatic improvement should be seen as early as 24 hours. In certain cases, rifabutin use should be stopped.
- The patient was started on atropine qdaily and Prednisolone Acetate q30min OS, with expectations of a quick resolution if findings were secondary to rifabutin use. The infectious disease department was consulted on the ophthalmic findings and agreed with the recommendation to discontinue rifabutin and to closely monitor the patient’s pulmonary status. Blood work-up for the patient including HIV, MHA/TP/RPR, and HLA B27 was negative.
- The patient was closely observed and reported his vision rapidly improved during the first night of topical therapy (Figure 4). The uveitis has completely resolved over two months. Recent sputum cultures were negative for any bacterial or fungal growth.

CONCLUSIONS

- Concurrent administration of azoles or macrolides has been demonstrated to increase the risk for rifabutin-associated uveitis by elevating the serum level of rifabutin. The direct mechanism by which the uveitis occurs is still unknown.
- While MAI-related pulmonary infections can occur in immunocompetent patients, testing should be performed to rule out the more common association with HIV/AIDS.
- Extremely close monitoring is warranted for any patient presenting with a severe uveitis with hypopyon and a potential endogenous source for endophthalmitis. Distinguishing features of sterile drug-induced uveitis include lack of pain, photophobia, and keratic precipitates. In addition, there is a quick response to topical steroids and shifting hypopyon.
- While the MAI pathogen itself has not been linked as a cause of infectious endophthalmitis, endogenous bacterial or fungal infections can be the culprit for endophthalmitis. However, in order to avoid invasive and unnecessary procedures such as an anterior chamber paracentesis and intravitreal injections, providers should be aware of the potential association of rifabutin use and uveitis.

REFERENCES


ACKNOWLEDGEMENTS

There was no conflict of interest.

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BACKGROUND

Harlequin ichthyosis (HI) is an autosomal recessive keratinizing skin disorder caused by a mutation in the ABCA12 gene. It causes a defect of lipid transport of the most external layer of the dermis, the stratum corneum. The incidence is 1:300,000 births. Profound thickening of the keratin skin layer creates a dense ‘armor’ like scale that covers the body and creates contraction abnormalities of the eyes, ears, and mouth. Common problems associated with HI are loss of body temperature regulation and susceptibility to infection. These complications can lead to temperature instability, cutaneous infections, hypothermic dehydrating and septicemia. Respiratory failure frequently contributes to death due to restriction of chest wall from armor-like skin, causing hypoventilation, respiratory depression failure. Central nervous system problems such as seizures are also documented, mal development of both cerebral hemispheres have been noted. Ocular complications of HI can include: blepharoconjunctivitis, madarosis, eyelid retraction, cicatricial ectropion, absence of meibomian gland, trichiasis, absence of eyelashes, and keratinization of his lids, ectropion with incomplete eyelid closure. He has diffuse skin soft and accelerate the desquamation. His pupils, IOP, optic nerves and retinae are all unremarkable. JI has mixed astigmatism and glasses have been prescribed. His visual acuity is reduced due to his Keratoconjunctivitis sicca. His best corrected acuity at distance is measured at 20/100 OD, 20/70 OS, 20/100 OU. At near he is able to see 20/50. To compensate for his reduced acuity, magnification devices are being used. In addition a school form was completed for visual impairment accommodations and Vision Itinerant teacher services in the school setting.

JI’s ocular signs are highlighted in the photographs. They include lack of eyebrow and reduced eyelashes. He has madarosis and keratinization of his lids, cicatricial ectropion with incomplete eyelid closure. He has diffuse 1% PIE with no neovascularization and was positive for NaFl stain with trace LG staining.

His treatment plan at this time includes Refresh Advanced PF AT QOD, oil-based ointment twice a day and at night. It was recommended when applying the ointment to use in the eye and on the lids. Also, it was recommended to use Ocusoft Plus lid Kristal daily in the morning. Moisture goggins, ProfKera’s biologic corneal bandage, and/or scleral lenses will be considered in the future if his corneas become compromised to rehabilitate and protect the ocular surface. The family has been extensively educated on signs and symptoms of corneal involvement and the significantly increased risk. Close monitoring will be done every 4-6 months.

CASE REPORT

JI is a 5 ½ yo CM that has been followed for the last 3 years. JI has the classic presentation of HI with contraction abnormalities of eyes, ears, mouth and digits. He exhibits little scalp hair and excessive flaking of skin. JI had developmental delays of expressive speech and gross motor control. He was enrolled in Early Intervention services and has since caught up in all development areas. He continues to have a g-tube to supplement his oral feeding due to his high metabolic demand and I was measured at 20/100 OD, 20/70 OS, 20/50 OU. To compensate for his reduced acuity, magnification devices are being used. In addition a school form was completed for visual impairment accommodations and Vision Itinerant teacher services in the school setting.

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DISCUSSION

Quality of life for people with HI improves with supportive care. Frequent showers, saline compresses and gentle emollients to keep the skin soft and accelerate the desquamation. Good nutrition and hydration as well as control of body temperature are necessary. Social and psychological consequences of this condition must be addressed. These children and adults may need psychological support and counseling to face the challenges of their appearance and ongoing treatments. Ocular management should be aggressive and include frequent PFAT, topical antibiotic as needed, petroleum-ointment, bandage contact lenses and frequent massage of eyelid skin with ophthalmic gel for lubrication. In cases with exposure keratitis secondary to cicatricial ectropion, necessary treatment may include antibiotics, moisture goggins, ProKera’s biologic corneal bandage, scleral lenses, and tarsorrhaphy. In advanced cases, limb stem cell transplantation and keratoplasty may be necessary. If the vision does become reduced, Vision Rehabilitation services should be introduced to help visual function.

REFERENCES


Improved visual function and contrast sensitivity with the use of scleral lenses in the management of congenital nystagmus – a case report

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INTRODUCTION
Congenital idiopathic nystagmus is an eye movement disorder usually associated with reduced visual function and contrast sensitivity. Present at birth or diagnosed shortly thereafter, it has no known ophthalmic or neurological cause. The use of contact lenses in the management and improvement of visual function in the patient with congenital nystagmus has been debated with regards to the therapeutic effect for both soft contact lenses and gas permeable lenses. Fitting of both types of lenses and insertion and removal by the patient can be technically difficult in patients with congenital nystagmus. Literature review showed minimal data regarding the use of scleral lenses as a therapeutic option in the management of congenital nystagmus. Scleral lenses are the fastest growing gas permeable option in the contact lens industry and congenital nystagmus may be another indication to fit this modality. We report a case where scleral lenses improved optical correction and quality of life in a patient with congenital nystagmus.

METHODS
A 62-year-old male with a history of congenital nystagmus associated with secondary vision loss, presented with a complaint of contact lens discomfort, poor vision, and difficulty with lens removal and loss of lenses. He had three evaluations separated by three months. Spectacle correction was compared to gas permeable corneal lenses and scleral lenses. He was initially fit with Boston XO 9.2 overall diameter gas permeable lenses. The patient was then refitted with the Blanchard Onefit P+A 14.6 overall diameter scleral lenses. For each evaluation, visual acuity, using the M & S Technologies, INC. Smart System™ 2020, was recorded. Zeiss Atlas corneal topography was performed, the 25-item Low Vision Quality-of-Life Questionnaire (LVQOL) was completed, and M & S Technologies, Inc. Linear Contrast Sine Grating Protocol was performed under glare and non-glare conditions. The Blanchard Onefit P+A provided the patient with the best corrected visual acuity and the highest LVQOL score (See Table 1).

DISCUSSION
Scleral lens correction led to improved visual acuity, improved contrast sensitivity under glare and non-glare conditions, and improved quality of life questionnaire scores as compared to both spectacle alone and corneal gas permeable lenses. The patient also verbally discussed other benefits including ease of insertion and removal, less loss of lenses and decreased movement off of the ocular surface. Improved comfort and prolonged wearing time was seen with the scleral lenses. In comparing the corneal gas permeable lenses to spectacle correction, the corneal gas permeable lenses only showed mild improvement in acuity, but definite improvement in contrast sensitivity and quality of life scores. Overall, scleral lenses were most successful in optimizing optical correction and improving quality of life in this patient.

REFERENCE

CONTACT INFORMATION
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TABLE 1: Summary of Correction Modalities

<table>
<thead>
<tr>
<th>Correction Modality</th>
<th>Visual Acuity</th>
<th>Contrast Sensitivity</th>
<th>LVQOL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectacle</td>
<td>20/70</td>
<td>20/70</td>
<td>102</td>
</tr>
<tr>
<td>Boston XO RGP</td>
<td>20/70</td>
<td>20/70</td>
<td>125</td>
</tr>
<tr>
<td>Blanchard Onefit P+A</td>
<td>20/60</td>
<td>20/60</td>
<td>88</td>
</tr>
</tbody>
</table>

FIGURES
GRAPH 1: Blanchard Onefit P+A
GRAPH 2: Blanchard Onefit P+A
GRAPH 3: Boston XO GP
GRAPH 4: Boston XO RGP
GRAPH 5: Spectacle
GRAPH 6: Spectacle

CONCLUSIONS
This case report describes the objective and subjective benefit of scleral lenses in the management of congenital nystagmus. Theories for the clinical benefit of this optical modality include: 1) improved optical correction of the refractive error with scleral lenses versus traditional RGP or spectacle correction; 2) increased lid-derived tactile feedback of the large diameter scleral lens versus the traditional RGP; 3) a combination of both.

Further, a large scale study should be performed to evaluate the effect of scleral lenses on the amplitude and frequency of the nystagmoid eye movements. Practitioners should give consideration to prescribing scleral lenses as an emerging alternative treatment option for patients with congenital nystagmus.
Macular Ganglion Cell Analysis in Patients with Optic Nerve Hypoplasia

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PURPOSE

Optic nerve hypoplasia (ONH) is a developmental disorder that is characterized by a small optic disc and/or a reduced number of retinal nerve fibers. The retinal ganglion cells of the retinal nerve fibers are mainly located in the central 4.5-mm-diameter region of the macula. Therefore, detecting structural changes in the macular retinal ganglion cells is important for the assessment of ONH. The recently introduced Cirrus high-definition optical coherence tomography (Cirrus HD-OCT) provides a ganglion cell analysis (GCA) algorithm that measures the ganglion cell layer-inner plexiform layer (GCL-IPL) thickness within a 14.33-mm² elliptical annulus area centered on the fovea. The purpose of this study was to evaluate macular GCA using Cirrus HD-OCT in ONH eyes compared to fellow eyes in ONH subjects and control eyes in normal subjects.

METHODS

Sixteen ONH subjects were recruited with a mean age of 28.55 (±18.30) years. All subjects had full eye exams and were diagnosed with either unilateral or bilateral ONH. Forty-six age-matched subjects from the same eye clinic were enrolled as controls (age: 28.78 ±17.43 years). Cirrus HD-OCT obtained the following parameters: GCA sector map, average and minimum GCL-IPL thickness measured by a small optic disc and/or a reduced number of retinal nerve fibers. The retinal ganglion cells of retinal nerve fibers are mainly located in the central 4.5-mm-diameter region of the macula. Therefore, detecting structural changes in the macular retinal ganglion cells is important for the assessment of ONH. The recently introduced Cirrus high-definition optical coherence tomography (Cirrus HD-OCT) provides a ganglion cell analysis (GCA) algorithm that measures the ganglion cell layer-inner plexiform layer (GCL-IPL) thickness within a 14.33-mm² elliptical annulus area centered on the fovea. The purpose of this study was to evaluate macular GCA using Cirrus HD-OCT in ONH eyes compared to fellow eyes in ONH subjects and control eyes in normal subjects.

RESULTS

Table 1 lists the demographic characteristics of ONH patients and control subjects. Table 2 shows the macular GCA in ONH, fellow, and control eyes. There was a significant difference (P<0.0001) in average GCL-IPL thickness among ONH (mean: 66.0±19.8 µm), fellow (77.7±6.0), and control (83.1±7.2) eyes. Post hoc analysis showed differences between ONH and fellow eyes (P=0.02) as well as between ONH and control eyes (P<0.0001), but not between fellow and control eyes (Figure 1). A significant difference (P<0.0001) was also found in minimum GCL-IPL thickness among the 3 groups (33.8±24.5, 73.1±19.4, 80.4±7.3 µm respectively). Differences were between ONH and fellow eyes (P<0.0001) as well as between ONH and control eyes (P<0.0001) (Figure 1). All 6 sectors in the GCA sector map were significantly different among the

Table 2. Macular Ganglion Cell Analysis in ONH, Fellow, and Control Eyes

<table>
<thead>
<tr>
<th></th>
<th>ONH Eyes (n=16)</th>
<th>Fellow Eyes (n=12)</th>
<th>Control Eyes (n=46)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>GCL-IPL Thickness (µm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>66.00 (± 19.81)</td>
<td>77.67 (± 6.0)</td>
<td>83.07 (± 7.19)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Minimum</td>
<td>53.81 (± 24.47)</td>
<td>73.08 (± 9.33)</td>
<td>80.38 (± 7.26)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>GCA Sector Map (µm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superior</td>
<td>68.44 (± 23.07)</td>
<td>78.58 (± 8.39)</td>
<td>84.82 (± 12.85)</td>
<td>0.0015</td>
</tr>
<tr>
<td>Superior nasal</td>
<td>66.50 (± 24.41)</td>
<td>80.75 (± 6.3)</td>
<td>84.82 (± 7.77)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Inferior nasal</td>
<td>60.56 (± 26.79)</td>
<td>77.58 (± 6.37)</td>
<td>83.2 (± 7.33)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Inferior</td>
<td>65.63 (± 24.36)</td>
<td>73.75 (± 7.91)</td>
<td>81.69 (± 8.35)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Inferior temporal</td>
<td>68.31 (± 17.83)</td>
<td>75.25 (± 7.88)</td>
<td>82.02 (± 7.33)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Superior temporal</td>
<td>66.25 (± 20.53)</td>
<td>77.33 (± 6.12)</td>
<td>81.22 (± 7.16)</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

CONCLUSION

• Abnormal GCA sector map and reduced GCL-IPL thickness were identified in ONH eyes compared to the control eyes of normal subjects and fellow eyes of the ONH subjects.
• No difference in either GCA sector map or GCL-IPL thickness was found between fellow eyes of ONH subjects and control eyes of normal subjects.

REFERENCES


CONTACT INFORMATION

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Educational Benefit of an Instructional Gonioscopy Video

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Illinois College of Optometry - Chicago, Illinois 60616

PURPOSE

Gonioscopy is a challenging and intimidating optometric skill for the new clinician. Ancedotal laboratory observations have revealed that students appear very tentative and hesitant about performing gonioscopy for the first time on a real human subject. While gonioscopy is a crucial part of patient management, especially in those with glaucoma, studies have found gonioscopy is underutilized by both optometrists and ophthalmologists. This may in part be attributed to a lack of confidence in skill performance. A teaching text dedicated to the procedure and interpretation of gonioscopy states that “techniques for viewing the angle can initially seem difficult.”

Students of this “Millenial” generation are accustomed to a dynamic learning environment and studies show that they don’t read as much as previous generations did; rather they prefer video, audio, and interactive media. Video incorporated in educational teaching is well established, going back to the late 1980’s. A study of video use in higher education found the majority of faculty members in all departments view video as “extremely useful.”

Students at the Illinois College of Optometry are taught the ocular health examination skill of gonioscopy during their second year. The students should have a basic knowledge of how to perform gonioscopy. Students understanding of the gonioscopy procedure improved after viewing the video from 2.90 to 3.95 (p<0.001) (Table 1). Their comfort increased with both patient preparation, from 2.86 to 3.90 (p<0.001) (Table 2) and application of the gonioscopy lens, from 2.11 to 3.27 (p<0.001) (Table 3). Comfort with examining and evaluating the angle during gonioscopy improved from 2.32 to 3.17 (p<0.001) (Table 4), and comfort with proper removal of the gonioscopy lens increased from 2.26 to 3.41 (p<0.001) (Table 5). Finally, students confidence in performing gonioscopy from start to finish improved from 2.12 to 3.22 (p<0.001) (Table 6).

TABLE 1. Survey Question #1
How well do you understand the procedural technique of gonioscopy?

TABLE 2. Survey Question #2
How comfortable are you with the steps for patient preparation prior to applying the gonioscopy lens?

TABLE 3. Survey Question #3
How comfortable are you with the actual application of the gonioscopy lens on to the patient's eye?

TABLE 4. Survey Question #4
How confident do you feel in performing the optometric health examination skill of gonioscopy from start to finish?

TABLE 5. Survey Question #5
How comfortable are you with the proper removal of the gonioscopy lens?

TABLE 6. Survey Question #6
How confident do you feel in performing the optometric health examination skill of gonioscopy from start to finish?

METHODS

Anonymous pre and post surveys of 147 second year students were completed for this study. The students received a one-hour lecture on how to perform gonioscopy and were assigned a laboratory manual reading that detailed the gonioscopy procedure. A pre-survey was then administered in order to determine the students comfort and understanding of the various steps in performing gonioscopy. The survey scale was from 1 to 5, with 1 being uncomfortable and 5 being very comfortable. A video demonstrating the step-by-step procedure for gonioscopy was shown after the pre-survey. The video included both external views and internal views through the slit lamp with an auditory component describing what was occurring in each scene. After viewing the video, the students were administered a post-survey with identical questions to the pre-survey.

RESULTS

Comparison of pre and post survey averages revealed a statistically significant educational benefit to the gonioscopy video. Students understanding of the gonioscopy procedure improved after viewing the video from 2.90 to 3.95 (p<0.001) (Table 1). Their comfort increased with both patient preparation, from 2.86 to 3.90 (p<0.001) (Table 2), and application of the gonioscopy lens, from 2.11 to 3.27 (p<0.001) (Table 3). Comfort with examining and evaluating the angle during gonioscopy improved from 2.32 to 3.17 (p<0.001) (Table 4), and comfort with proper removal of the gonioscopy lens increased from 2.26 to 3.41 (p<0.001) (Table 5). Finally, students confidence in performing gonioscopy from start to finish improved from 2.12 to 3.22 (p<0.001) (Table 6).

CONCLUSIONS

Despite having the basic knowledge, second year students are often apprehensive about performing gonioscopy. Addition of a gonioscopy instructional video into the curriculum is a worthwhile supplement to the lecture and reading assignment, and allows the students to be more confident and comfortable in performing gonioscopy.

REFERENCES


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Simultaneous Onset of an Acute Bilateral Nongranulomatous Anterior Uveitis

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BACKGROUND

Simultaneous onset of an acute bilateral nongranulomatous anterior uveitis is an uncommon clinical presentation. Studies have demonstrated that this type of uveitis comprises only 1.2-7% of all types of uveitis. This rare presentation is more common in younger patients and has been associated with recent systemic antibiotic use and/or recent infection. A recent retrospective case series reports a possible causal relationship between oral fluoroquinolone therapy and uveitis. This case report calls into question the possibility that simultaneous onset of an acute bilateral granulomatous uveitis could be an ocular adverse drug reaction of oral cephalexin.

CASE SUMMARY

A 32 year old male presented to the urgent care clinic with complaints of a large, tender bump on his left eyelid. The patient’s medical history was significant for low testosterone syndrome and exfoliative dermatitis. Uveitis has not been previously reported as a side effect of cephalosporins, however the unilateral presentation of hordeolum and the possibility that the hordeolum, it was presumed that the anterior uveitis was a separate clinical entity. The entity that the hordeolum was an inciting factor for the uveitis is common in younger patients, however the unilateral presentation of hordeolum and the symmetric, bilateral presentation of the uveitis make this unlikely. Bloodwork ruled out any obvious systemic etiology (Table 1); HLA-B27 testing was not performed or the results were unobtainable. However, HLA-B27 associated uveitis is most often characterized by recurrent inflammation in one eye at a time and has not been found to be a common etiology of bilateral simultaneous disease. The only other health factor that coincided with the uveitis was the treatment of the hordeolum.

DISCUSSION

The patient had no previous history of systemic inflammatory disease. Though he had a recent diagnosis of hordeolum, it was presumed that the anterior uveitis was a separate clinical entity. The possibility that the hordeolum was an inciting factor for the uveitis is common in younger patients, however the unilateral presentation of hordeolum and the symmetric, bilateral presentation of the uveitis make this unlikely. Bloodwork ruled out any obvious systemic etiology (Table 1); HLA-B27 testing was not performed or the results were unobtainable. However, HLA-B27 associated uveitis is most often characterized by recurrent inflammation in one eye at a time and has not been found to be a common etiology of bilateral simultaneous disease. The only other health factor that coincided with the uveitis was the treatment of the hordeolum.

According to the Standardization of Uveitis Nomenclature criteria the uveitis was classified as acute bilateral nongranulomatous anterior uveitis in keeping with its sudden onset and limited duration. Simultaneous onset has been described as onset of symptomatic disease in the second eye within four weeks of the first. Patients who develop symptomatic uveitis in both eyes within four weeks of treatment with systemic antibiotics have been diagnosed with drug-induced uveitis.

Cephalexin is a first generation cephalosporin antibiotic that is commonly prescribed for the treatment of superficial wound infections. Cephalexin exerts bactericidal activity by interfering with the later stages of bacterial cell wall synthesis. Cephalexin is effective against most gram-positive bacteria, including Staphylococcus aureus, which is the most common cause of a hordeolum. Known ocular side effects of systemic administration of cephalexin primarily involve the eyelid or conjunctiva and range from allergic reactions, erythema, conjunctivitis, edema, angioedema and urticaria. Other possible ocular side effects include nystagmus, subconjunctival or retinal hemorrhages secondary to drug-induced anemia, erythema multiforme, Stevens-Johnson syndrome and exfoliative dermatitis. Uveitis has not been a previously reported adverse reaction and the mechanism by which a cephalosporin would trigger the uveitis is unknown. A PubMed literature search with keywords “uveitis” and, “cephalexin” or “cephalexins”, did not yield any cases of cephalexin-associated uveitis. Additionally, as of mid-May 2014, there were no spontaneous reports of cephalexin-associated uveitis with the National Registry of Drug-Induced Ocular Side Effects. The World Health Organization’s database does not contain any case reports linking cephalexin and uveitis. Notwithstanding, this case presents a spontaneous report of a conditional relationship between an oral cephalosporin and the adverse drug reaction of simultaneous onset of an acute bilateral nongranulomatous anterior uveitis. Spontaneous reports such as this are often the first indication that a drug is causing an adverse reaction.

REFERENCES


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INTRODUCTION
Long anterior zonules (LAZ) are characterized by zonular fibers that extend more central than usual on the anterior lens capsule, sometimes causing marked reduction in the zonule free zone (ZFZ). LAZ are often associated with anterior capsule tears and pupil dilation. The current methods to detect LAZ have included the technique of retro-illumination, adjoined after labeling (right).

RESULTS
More than 95% of subjects were female, and 60 right and left eyes were included in the final analysis. Mean age of the right/left eye groups was the same (70.5 years, range 53-91 years). The mean (Fig. 5) of number of LAZ for right and left eyes showed positive skewness (Shapiro-Wilk test, P<0.0001), with fewer eyes having large numbers of LAZ. The median number of LAZ for right eyes was 20 (QQR=12-37 LAZ, range=5-75 LAZ), and it was 21 for left eyes (QQR=11-36 LAZ, range=5-78 LAZ). The distribution of LAZ by quadrant was similar between eyes, and there was a distinct pattern of higher number of fibers in the superior quadrants (Fig. 6). We did not find association between LAZ number and age (P=0.95) or refractive error (P=0.95) with or without simultaneous control for age and refractive error (Fig. 7). The ratio of the dilated pupil diameter to horizontal visible iris diameter was calculated for 50 right eyes and 45 left eyes, using the 12.0 mm assumption for horizontal visible iris diameter, mean pupil diameter was estimated to be 75.8 ± 0.8 mm (7.9-91 mm) for right eyes and 75.8 ± 0.9 mm (7.9-92 mm) for left eyes. From these values, estimated mean diameter of the right eye ZFZ was 24.2 ± 0.8 mm, range=0.9-4.9 mm (median=2.4 mm). Left eye values were similar (Table 1). Fig. 8: Regression analyses, with control for other variables, showed to show significant relationships between ZFZ diameter and LAZ number, age, and refractive error (Fig. 8).

DISCUSSION
The analysis permits the best attempt to quantify LAZ in the clinical setting, and it assists in the evolving characterization of the LAZ phenotype. Among our subjects it was evident that most people had lower numbers of LAZ, with more than half of the eyes having fewer than 20 detectable LAZ. We suspect however, that the median number of clinically detectable LAZ is probably higher because any measurement error is probably in the direction of undercounting because LAZ can be fragmented and they can be “segmental” without visible extension all of the way toward the peripheral lens capsule. Future clinical methods may allow further refinement of such methods.

METHODS
Subjects were recruited during a broader investigation at a single urban, academic eye care facility in Chicago, Illinois, USA. Only African-Americans were included due to facility demographics. The criteria for LAZ was zonular fibers present >1.0 mm central to the normal zonule insertion zone, using only eyes with >5 LAZ.

Due to a reduced ZFZ, LAZ have a predilection for the superior aspect of the lens, and the number of LAZ did not vary significantly with age or refractive error. Zonule-free zones associated with LAZ were frequently small, with zones less than 3 mm common.

TABLE 1. ZFZ DIAMETERS IN LAZ EYES

<table>
<thead>
<tr>
<th>ZFZ Diameter (mm)</th>
<th>Number of Eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.6-2.0</td>
<td>10</td>
</tr>
<tr>
<td>2.1-4.0</td>
<td>30</td>
</tr>
<tr>
<td>4.1-6.0</td>
<td>10</td>
</tr>
<tr>
<td>&gt;6.0</td>
<td>5</td>
</tr>
</tbody>
</table>

FIGURE 3: Example LAZ labeling of nasal/temporal halves of intrapupillary lens zone in a single eye.

CONCLUSIONS
Among this group, LAZ had a predilection for the superior aspect of the lens, and the number of LAZ did not vary significantly with age or refractive error. Zonule-free zones associated with LAZ were frequently small, with zones less than 3 mm common.
Traumatic Anterior Lens Dislocation with Secondary Pupillary Block

Hillary Schweihs, O.D.
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BACKGROUND
Anterior dislocation of the crystalline lens is most commonly seen as a result of ocular trauma. As the lens is pushed forward, blocking the anterior chamber and trabecular meshwork, severe complications such as secondary glaucoma, pupillary block, and corneal edema can occur. Anterior segment OCT is a useful tool when managing acute angle closure cases because it provides cross sectional images of the anterior chamber depth, iris, and lens.

PERTINENT FINDINGS: A 65-year-old new Hispanic male presented with complaints of blurred vision in the left eye secondary to blunt ocular trauma that occurred two weeks prior.

MEDICAL HISTORY: unremarkable

OCULAR HISTORY: unremarkable

BCVA: OD 20/40, PH: 20/20 OS: 20/100, PH: 20/40

PUPILS: Mid-dilated left pupil with +1 reaction, (+) sluggish near response OS

EOMS: Full OU

SLIT LAMP: Very shallow anterior chamber OS with 2+cells, angles were graded at +1 nasal using the Van Herick method. The crystalline lens was dislocated anteriorly, causing pupillary block and appositional angle closure.

IOP: OD: 38mmHg OS: 28mmHg via Goldmann applanation tonometry

GONIOSCOPY: OD: open to Ciliary body 360 OS: no anterior chamber deepened and IOP lowered.

VISANTE OCT: Vision stable. IOP 18mmHg (OD) and 24mmHg (OS). Laser iridotomy was performed in the left eye. Significant deepening of anterior chamber and mild decrease in eye pressure was seen post laser. Gonioscopy OS post LPI: SUP: INF: CB: NAS: AT: TEMP: CB: Visante OCT completed post LPI (see Figure 4). Patient was monitored by glaucoma specialist over next several weeks to monitor IOP. Patient was also referred to retina specialist for dilation and evaluation post LPI OS.

DISCUSSION
The case shown outlines a classic presentation of pupillary block due to appositional angle closure from the anterior dislocation of the lens secondary to trauma. From the force of blunt trauma, the crystalline lens was displaced anteriorly, causing the lens to come in contact with the posterior iris. No structures were seen nasal or superior with gonioscopy because of this contact. Anterior segment OCT was used in this case to confirm the angle closure and anterior lens displacement. Combigan was used to help lower IOP and this patient was referred to glaucoma specialist for an LPI and further IOP reduction. Once the LPI was completed, the anterior chamber deepened and IOP lowered.

CONCLUSION
Pupillary block is the most frequent mechanism of angle closure glaucoma. Resistance of aqueous flow from posterior to anterior chamber cause a pressure gradient that pushes the iris forward into the angle and closing off the trabecular meshwork. Laser iridotomy eliminates the pupillary block and opens the anterior chamber angle, as seen in this patient’s anterior segment OCT pre and post iridotomy. The Visante OCT is a non-invasive procedure that provides high-resolution anterior segment images of these complications and assists in the diagnosis and management of these conditions.

REFERENCES

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FOLLOW UP:
2 day follow up: Vision stable. No improvement in IOP with use of Combigan BID. Trace cells noted OD. Pred Forte tapered to BID OS. Macular OCT and baseline HVF were completed at this visit (see Figure 2 & Figure 3). Patient was referred to ophthalmology for LPI consultation and evaluation.

FIGURE 1A: Open angles and chamber OD
FIGURE 1B: Appositional closure from lens dislocation OS
FIGURE 2: Reliable test with normal findings OS
FIGURE 3: Reliable field with no glaucomatous VF defects OS
FIGURE 4: Deepened anterior chamber and angle post LPI OS
A Presentation of Pseudomonas aeruginosa Keratitis
Secondary to Contact Lens Overwear

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Illinois College of Optometry - Chicago, Illinois 60616

BACKGROUND

Microbial Keratitis due to contact lens overwear can be a serious vision threatening condition. Virulent bacteria invade and disrupt the corneal integrity causing ulceration and inflammation. We present a case involving the central cornea which was found to be secondary to Pseudomonas aeruginosa.

Pertinent Findings

54 y.o. African American female presented with a sudden and worsening painful left red eye of 3 days duration. She also reported extreme photophobia, blurred vision, and yellow discharge. The patient stated a previous less severe episode in the right eye and history of contact lens overwear.

MEDICAL HISTORY:

- Breast cancer, remission
- Tamoxifen, ibuprofen, visine

MEDICATIONS:

- Sodium Fluorescein 0.5%, MGD
- Pred Forte qD OS
- Ciprofloxacin q4hr OS
- Fortified vancomycin 5% q2h OS
- Fortified tobramycin 1.53% q2h OS
- Fortified tobramycin TID OS

SLIT LAMP EXAM:

- OD: 1+ MGD, scattered SPK
- OS: large, central ulcer with mucopurulent discharge and peripheral chemosis, 2.4mm x 2.7mm central ulcer, mucopurulent discharge, and peripheral corneal neovascularization

FIGURE 1: Initial Presentation
Significant conjunctival injection and chemosis. 2.4mm x 2.7mm central ulcer, mucopurulent discharge, and peripheral corneal neovascularization

DISCUSSION

The patient was sent for urgent corneal culture and fortified antibiotic treatment due to the severity of presentation, including the size, location, and depth of ulceration. After the culture was obtained, she was empirically treated with fortified tobramycin 1.53% q2h OS, fortified vancomycin 5% q2h OS, and cefsulodine 1% BID OS. After 3 days, the culture report confirmed the presence of Pseudomonas aeruginosa. The patient was followed closely and medications were adjusted based on clinical evaluation of the condition. (See Table 1). Although steroid use is controversial, according to the SCUT trial, steroids are most effective when used for severe cases. Therefore, two weeks post initial onset, Pred Forte was initiated TID OS. One and a half months later, vision had improved from 20/400 @ 1 ft to 20/25-2 and a moderate scar remained slightly off visual axis (See Figure 4).

PATHOPHYSIOLOGY

- Pseudomonas aeruginosa: gram-negative bacterium
- Found in soil and water
- Produce proteases
- Invade and kill corneal cells
- Reduce epithelial cell turnover with hypoxia
- Low Dk contact lenses cause corneal hypoxia
- Beneath the epithelium, the endothelium becomes less hypopyon + Ciprofloxacin ung qhs OS
- Low cornea pressure + Ciprofloxacin gtts q2hr OS
- Reduced epithelial cell turnover with contact lens wear + Ciprofloxacin ung qhs OS
- Exacerbated under closed-eye condition + fortified vancomycin
- Coordinate expression of virulence factors
- Activate immune system pathways via toll-like receptors (TLRs)
- Continued corneal destruction
- 3-5 per 10,000 contact lens wearers per year
- Low DK contact lenses cause corneal hypoxia
- Exacerbated under closed-eye condition + fortified vancomycin
- Exacerbated under closed-eye condition + fortified vancomycin
- Exacerbated under closed-eye condition + fortified vancomycin
- Exacerbated under closed-eye condition + fortified vancomycin
- Exacerbated under closed-eye condition + fortified vancomycin
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- Exacerbated under closed-eye condition + fortified vancomycin
- Exacerbated under closed-eye condition + fortified vancomycin

TABLE 1. Relevant follow-up examinations with remarkable clinical findings

<table>
<thead>
<tr>
<th>Day</th>
<th>Visual Acuity</th>
<th>Slit Lamp Exam</th>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Day</td>
<td>20/60</td>
<td>Decrease in size to hypopyon</td>
<td>fortified tobramycin q2hr OS, fortified vancomycin q2hr OS</td>
</tr>
<tr>
<td>3 Day</td>
<td>20/25</td>
<td>Decreased AC reaction</td>
<td>fortified vancomycin q2hr OS, fortified tobramycin q2hr OS</td>
</tr>
<tr>
<td>10 Day</td>
<td>20/40 (cc)</td>
<td>Corneal haze</td>
<td>fortified tobramycin q2hr OS, fortified vancomycin q2hr OS</td>
</tr>
<tr>
<td>14 Day</td>
<td>20/360+</td>
<td>AC, deep and quiet</td>
<td>fortified vancomycin q2hr OS, fortified tobramycin q2hr OS, fortified vancomycin q2hr OS</td>
</tr>
<tr>
<td>24 Day</td>
<td>20/20 (cc)</td>
<td>Corneal haze</td>
<td>fortified vancomycin q2hr OS, fortified tobramycin q2hr OS</td>
</tr>
<tr>
<td>3.5 Months</td>
<td>20/25 (cc)</td>
<td>1.7mm x 2mm scar</td>
<td>Pred Forte qD OS</td>
</tr>
</tbody>
</table>

CONCLUSION

This case represents a severe case of Pseudomonas keratitis in a patient with a history of contact lens overwear and a previous episode of keratitis. Presence of a large, central, deep ulceration of the cornea must be urgently cultured. Additionally, chronic or atypical cases and those unresponsive to treatment should be cultured. Fortified antibiotic therapy tailored to the pathology is essential and decreases the risk of resistance. Patient education is critical for contact lens wearers, particularly those with a history of overwear, to prevent this potentially blinding condition.

REFERENCES


CONTACT INFORMATION

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Background

Low vision rehabilitation (LVR) is a mainstay of treatment to maximize independence in people with uncorrectable vision loss. However, LVR involves education and training to enable patients to master new techniques and visual assistive equipment; thus LVR requires a certain level of engagement and cognitive ability. This pilot study was conducted to determine the prevalence, characteristics, and LV devices prescribed for patients with cognitive deficits at a VA LV clinic.

Table 1. Demographics and Health Status of Patients with Cognitive Impairment, Mild Cognitive Deficits and No Cognitive Impairment

<table>
<thead>
<tr>
<th>Cognitive Impairment</th>
<th>Mild Cognitive Deficits</th>
<th>No Cognitive Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>79.6</td>
<td>73.3</td>
</tr>
<tr>
<td>Education (years)</td>
<td>13.9</td>
<td>18.6</td>
</tr>
<tr>
<td>Race</td>
<td>45.5%</td>
<td>50.4%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>5.6%</td>
<td>0</td>
</tr>
<tr>
<td>Living Situation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alone</td>
<td>31.8%</td>
<td>8.7%</td>
</tr>
<tr>
<td>With Family or Non-Family</td>
<td>59.1%</td>
<td>78.3%</td>
</tr>
<tr>
<td>Age at Development of Vision Problems (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 40</td>
<td>5.3%</td>
<td>11.1%</td>
</tr>
<tr>
<td>41 – 60</td>
<td>15.8%</td>
<td>33.3%</td>
</tr>
<tr>
<td>&gt; 60</td>
<td>78.9%</td>
<td>55.6%</td>
</tr>
<tr>
<td>Vision Fluctuates</td>
<td>38.1%</td>
<td>47.8%</td>
</tr>
<tr>
<td>Scotoma</td>
<td>28.6%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Constriction</td>
<td>52.4%</td>
<td>45.0%</td>
</tr>
</tbody>
</table>

Table 2. Visual Status of Patients with Cognitive Impairment, Mild Cognitive Deficits and No Cognitive Impairment

<table>
<thead>
<tr>
<th>Cognitive Impairment</th>
<th>Mild Cognitive Deficits</th>
<th>No Cognitive Impairment</th>
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</thead>
<tbody>
<tr>
<td>Habitual Distance visual acuity in 0.24 0.35 0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near spot checking 31.8% 43.5% 42.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustained reading 68.2% 65.2% 57.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance spot checking 18.2% 30.4% 23.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustained distance viewing 0 0 10.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate distance activities 50.0% 30.4% 17.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near spot checking 31.8% 43.5% 42.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustained reading 68.2% 65.2% 57.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance spot checking 18.2% 30.4% 23.7%</td>
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</tr>
<tr>
<td>Sustained distance viewing 0 0 10.5%</td>
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</tr>
<tr>
<td>Intermediate distance activities 50.0% 30.4% 17.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near spot checking 31.8% 43.5% 42.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustained reading 68.2% 65.2% 57.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance spot checking 18.2% 30.4% 23.7%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustained distance viewing 0 0 10.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate distance activities 50.0% 30.4% 17.1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Rehabilitation of Patients with Cognitive Impairment, Mild Cognitive Deficits and No Cognitive Impairment

<table>
<thead>
<tr>
<th>Cognitive Impairment</th>
<th>Mild Cognitive Deficits</th>
<th>No Cognitive Impairment</th>
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</thead>
<tbody>
<tr>
<td>Glare control 68.2% 56.5% 57.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>71.3%</td>
<td>72.6%</td>
</tr>
<tr>
<td>Small</td>
<td>62.5%</td>
<td>72.4%</td>
</tr>
<tr>
<td>Stand magnifier</td>
<td>50.0%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Pocket magnifier</td>
<td>50.0%</td>
<td>65.2%</td>
</tr>
<tr>
<td>Teleloupes</td>
<td>18.2%</td>
<td>30.4%</td>
</tr>
<tr>
<td>Monocular telescope</td>
<td>36.4%</td>
<td>34.8%</td>
</tr>
<tr>
<td>Contrast Sensitivity Loss:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>12.4%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Severe</td>
<td>14.3%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Profound</td>
<td>61.9%</td>
<td>30.0%</td>
</tr>
<tr>
<td>Visual Field: Scotoma</td>
<td>33.3%</td>
<td>20.0%</td>
</tr>
<tr>
<td>Constriction</td>
<td>52.4%</td>
<td>45.0%</td>
</tr>
<tr>
<td>Age of Onset of Visual Problems (years):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5</td>
<td>2.6%</td>
<td>11.1%</td>
</tr>
<tr>
<td>5-10</td>
<td>18.2%</td>
<td>50.0%</td>
</tr>
<tr>
<td>&gt; 10</td>
<td>79.2%</td>
<td>38.9%</td>
</tr>
</tbody>
</table>

Methods

Retrospective review of 121 medical records for patients receiving LV services (53 inpatients, 66 outpatients) at the Hines VA Blind Center February-May, 2014. Cognitive status was assessed with the TICS M, a 13 item modified version of the Telephone Interview for Cognitive Status. Cognitive impairment (CI) was defined as score ≤ 27; mild cognitive deficit (MCD) was defined as score 28-30.

Results

96.7% of patients were male. Primary eye diagnoses of patients with CI or MCD were 51.1% macular diseases, 24.4% glaucoma, 8.9% cataract, 15.6% other. CI was present in 18.2%, MCD in 19.0%. Mean ages of patients with CI were 79.6 years, MCD 76.0 years. Living arrangements for patients with CI or MCD were 20.0% alone, 68.9% living with others, 11.7% assisted living or nursing home. Mean education of patients with CI was (10.9 years) and MCD (13.8 years). Mean distance visual acuity was 0.63 Log MAR (20/80) CI, 0.46 Log MAR (20/60) MCD. Profound contrast sensitivity loss on the MARS test was found in 61.9% of patients with CI and 30.0% of those with MCD. 100% of patients with CI and MCD had reading goals; 18.2% of patients with CI and 30.4% of patients with MCD had distance viewing goals. LV devices most frequently prescribed for patients were pocket magnifiers (50.0% CI, 65.2% MCD), in-line CCTVs (45.3% CI, 56.3% MCD), portable electronic magnifiers (11.1% CI, 43.3% MCD), monocular telescopes (36.4% CI, 34.8% MCD), teleloupes (18.2% CI, 30.4% MCD), absorptive filters (50.0% CI, 26.1% MCD), talking books (13.6% CI, 13% MCD) and non-optical aids (9.1% CI, 26.1% MCD).

Conclusions

Almost 4 in 10 Veterans presenting for LV services exhibited cognitive deficits on objective testing. Further work is needed to evaluate the outcomes of LV services for patients with cognitive deficits and to determine if modified low vision programs are beneficial. Pilot data can be used to confirm visual needs, LV devices most frequently prescribed, and to estimate realistic recruitment objectives for future studies.

Financial Support

Supported by Department of Veterans Affairs Research and Development Service #C958R

Cognitive Performance: Telephone Interview for Cognitive Status (TICS-m)
Pancoast-Tobias Syndrome Diagnosed by Positive Apraclonidine Test

Wendy Haaland Stone, OD, FAAO and Kinzy Frizzle, BSc

BACKGROUND

Pancoast-Tobias syndrome (PTS) is caused by a superior pulmonary sulcus tumor (SST). It is a rare form of lung cancer, representing 3-5% of all lung tumors. It presents as a triad:

- Horner’s syndrome (HS) (ptosis, miosis, anhydrosis)
- Pain of the shoulder radiating to the back along the eighth cervical and first second thoracic nerve trunks
- Atrophy/weakness of intrinsic hand muscles

These symptoms are due to the compression of the pre-ganglionic sympathetic chain, the brachial plexus, and the subclavian artery at the apex of the lung. PTS typically presents in women.

Common early symptoms: Cough, hemoptysis, dyspnea

Uncommon early symptoms: Cough, hemoptysis, dyspnea

HORNER’S SYNDROME

HS is caused by damage to the oculosympathetic innervation and is characterized by the triad of miosis, ptosis, and anhydrosis. It is important to accurately diagnose HS due to its potentially fatal causes, such as tumor and carotid dissection.

Cocaine has long been the gold standard for confirming the diagnosis of HS. Cocaine inhibits the uptake of noradrenaline at the synaptic junction of the post-ganglionic fibers of the iris dilator muscle. It will dilate a normal pupil, but not the HS pupil. However, there are many disadvantages to using cocaine:

- Difficult to obtain since it’s a controlled substance
- Short shelf life (must be compounded for each use)
- Results may be difficult to interpret, as the normal one will dilate, only the normal one will dilate
- May miss a partial HS
- Stings upon instillation
- Patients may be hesitant to agree to a controlled substance, and a urine test may be positive

APRACLONIDINE

In recent years, apraclonidine (either 0.5% or 1%) has been shown to be useful in the diagnosis of HS. Though no large scale studies have occurred, apraclonidine has been shown to be at least as specific and sensitive for diagnosing HS as cocaine. It is a strong alpha 2 agonist and a weak alpha 1 agonist. The weak alpha 1 activity will have no effect on a normal pupil, but will dilate the upregulated/supersensitive HS pupil. This causes a reversal of the anisocoria. Improvement of the pupil may also be noted, though this is not diagnostic for HS. Apraclonidine has many advantages over cocaine:

- Easy to obtain – many ophthalmic practices already store it for its effect on intraocular pressure (post-laser procedures or acute angle closure)
- Two-year shelf life if unopened
- Results are easy to interpret – reversal of anisocoria
- One disadvantage of apraclonidine is that there is some time lag needed for upregulation of alpha 1 receptors on the affected dilator muscle. The length of time needed is unknown, though many false negatives have been reported in HS cases of less than one month duration. However, a positive test has been reported after carotid dissection in as little as three hours.

To date, several apraclonidine positive HS cases have been reported, but few pre-ganglionic cases and none due to SST. We present a case of HS due to SST diagnosed by apraclonidine after just one week onset.

CASE REPORT

A 56 year old African American female presented complaining of a ptosis OS for one week. She later reported ipsilateral back and shoulder pain with numbness of her arm. She had been evaluated in the emergency department of a hospital a few days before presenting, but was told that nothing was wrong. Upon examination she was found to have a smaller pupil in the eye with the ptosis (OD 3mm, OS 2mm), as well as a reverse ptosis of the lower lid. Apraclonidine 0.5% was instilled into both eyes. After one hour the anisocoria had reversed (OD 3mm, OS 4mm) and the ptosis had improved, confirming the HS. The patient was referred for further testing, and she was found to have SST. Cancer treatment was initiated, including radiation, chemotherapy, and surgical excision.

CONCLUSIONS

Apraclonidine seems to provide an easy and accurate diagnostic test for HS. As it is readily available, all ophthalmic offices should stock it to diagnose the rare suspected case of HS. Doing such a simple test may save a patient’s life.

REFERENCES


INTRODUCTION
Vision is important in learning, and it is assumed that good vision will lead to better academic achievement. This study investigated how receiving new glasses and improving visual acuity affects a child’s perception of improvement in schoolwork.

METHODS
The Illinois Eye Institute at Princeton School (IEI at CPS) was a pilot site for the Lions Lens, a program founded by the Lions Club International with help from Essilor. This program allowed us to provide a second pair of glasses for Chicago children. Criteria for inclusion in this project included enrollment in CPS, parental consent, an eye exam, glasses prescribed, and state insurance. Patients completed a post-exam survey 3-6 months after receiving their glasses, which asked about the improvement in vision and academics. Distance entering visual acuity was compared to best corrected near visual acuity to determine lines of improvement in acuity.

RESULTS
Between October 2012 and May 2013, 1,109 subjects met the criteria for the Lions Lens with 935 (84.31%) reporting better vision and 820 (73.94%) perceived improvement in academics with glasses. 344 patients had no change in acuity from entering acuity due to amblyopia, accommodative issues or low hyperopia. 292 (84.88%) of these patients perceived better vision and 249 (72.38%) felt academics had improved with glasses. 326 patients had a 1-2 line increase in acuity with glasses, with 269 (82.52%) reporting better vision and 234 (71.79%) better academics. 207 patients had a 3-4 line increase in visual acuity with glasses. 176 (85%) perceived better vision and 157 (75.84%) felt academics had improved. 123 had a 5-6 line increase with 105 (85.36%) perceiving better vision and 97 (78.86%) better academics. 41 had a 7-8 line increase in acuity with 36 (87.80%) perceiving better vision and 28 (68.29%) better academics. 44 had a 9 or more line increase in acuity with 37 (84.09%) perceiving better vision and 36 (81.82%) better academics.

CONCLUSIONS
A slight increase in perceived academic performance was found overall. However, perception of improved vision was not significantly affected by the number of lines of increased acuity. Some reasons for this could be the effect of simply wearing glasses on patient perceptions, no comparison of best corrected near acuity, and the use of subjective responses rather than actual academic data. Research is underway to consider these factors.

Special thanks to Essilor and Lions Club International for their contributions to the Lions Lens program.

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Vernal Keratoconjunctivitis in an Adult Hispanic Male

Kelli Theisen, O.D.
Illinois College of Optometry/Illinois Eye Institute, Chicago, IL

BACKGROUND
Vernal Keratoconjunctivitis (VKC) is a multifactorial conjunctival inflammation which typically occurs in adolescent males causing significant itching, photophobia, burning, tearing and thick/ropy discharge. Common signs are giant cobblestone papillae of the superior tarsus or limbus, conjunctival hyperemia, and superficial keratopathy which may lead to a sterile shield ulcer. This case represents VKC with a sterile shield ulcer in an adult Hispanic male.

PERTINENT FINDINGS
23 y/o Hispanic male presents with a painful, red right eye with photophobia and decreased vision for one day.

OCULAR HISTORY
(+ eye allergies, no contact lens wear, denies foreign body

MEDICAL HISTORY
(+ seasonal allergies

MEDICATIONS
Visine allergy drops OU, Zyrtec

VA (sc)
OD 20/100, PH 20/40
OS 20/20-2

SLIT LAMP
- Palpebral conjunctiva: 2+ papillae inferior OU, 4+ cobblestone papillae superior tarsus OD and 3-4+ OS (see Figures 1a & 1b)
- Bulbar conjunctiva: 3+ diffuse conjunctival injection OD, white and quiet OS
- Comea: large superior epithelial defect, (+ infiltrate OD (see Figure 1c), clear OS
- A/C: D & O OU

DIAGNOSIS
VKC OU with sterile shield ulcer OD

DIFFERENTIAL DIAGNOSES
Giant papillary conjunctivitis or seasonal/perennial allergic conjunctivitis OU with corneal abrasion, infectious ulcer or sterile ulcer OD

DISCUSSION
- VKC typically affects adolescent boys in tropical regions, frequently with spontaneous resolution in second decade
- 78% have most severe presentation in spring
- 16% develop chronic condition
- 6% develop visual impairment 2° to corneal involvement, cataracts &/or glaucoma

TREATMENT
- Initial: BCL, Polysporin, PFATs, homatropine OD, Pataday OU
- Day 3: BCL, Tobradex OD, Lotemax OS, Protopic ung, Pataday, PFATs OU
- Day 16: Pataday OU, Lotemax OU, PFATs OU
- Maintenance: Pataday OU, Alrex OU, PFATs OU

RESPONSE
- Cobblestone papillae significantly reduced to flattened 2+ papillae superior tarsus (see Figures 2a & 2b)
- Sterile shield ulcer resolved with residual corneal scar (see Figure 2c)

DISEASE COURSE
- Current pathogenesis of VKC conjunctival inflammation undetermined, likely multifactorial
- Primary mechanism is Th2-driven leading to activation of mast cells, eosinophils & lymphocytes leading to complex interaction of interleukins and mediators including local increased levels of IgE
- Normal serum levels of IgE in 50%
- Not associated with positive skin test or RAST in 42-47%
- (+ PMHx atopic disease in 49%
- (+ PMHx atopic disease in 49%
- Neural influences and sex hormones may play role
- Chronic bilateral inflammation of conjunctiva leads to corneal involvement
- Mechanical hypothesis – abrasion by giant papillae
- Toxic hypothesis – toxins released by eosinophils cause epithelial damage

CONCLUSION
- Pathogenesis of VKC is not fully understood, but does NOT seem to be mediated by a Type 1, IgE mediated Hypersensitivity as previously thought
- Treatment revolves around improving symptoms & preventing vision loss from disease related ulcers & treatment related conditions of cataracts and glaucoma
- Patients must understand preventive & maintenance nature of long-term treatment for VKC

REFERENCES

INITIAL PRESENTATION
Figure 1a. Initial 4+ cobblestone papillae superior tarsus OD (with Wratten filter)

Figure 1b. Initial 3-4+ cobblestone papillae superior tarsus OS (with Wratten filter)

Figure 1c. Initial sterile shield ulcer OD (with Wratten filter)

RESIDUAL FINDINGS
Figure 2a. Residual flattened 2+ papillae superior tarsus OD

Figure 2b. Residual flattened 2+ papillae superior tarsus OS

Figure 2c. Resolved sterile shield ulcer with residual scarring OD
Sarcoidosis-Related Panuveitis and Cystoid Macular Edema

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Illinois College of Optometry • Chicago, Illinois 60616

REFERENCES


CONTACT INFORMATION

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BACKGROUND

Sarcoidosis is an inflammatory condition that often presents in African American females. Onset of the condition is most common in the 3rd to 4th decade of life. The etiology is unclear. However, there are likely environmental agents that trigger the condition in genetically predisposed individuals. Sarcoidosis can present in a variety of organs including the lungs, eyes, skin, nervous system, and heart. Ocular signs can vary and include: keratic precipitates, iris nodules, peripheral anterior synechiae, snowball opacities, chorioretinal lesions, periphlebitis, and retinal macroaneurysms. Orbital and adnexal masses may also be present. Other etiologies can be ruled out following results support a sarcoidosis diagnosis. Sarcoidosis can be difficult to diagnose given its varied presentation. A definite diagnosis can be made only when a positive biopsy has been obtained. Simply treating the ocular manifestations is not sufficient; an appropriate work up is necessary to prevent and treat further complications of the condition.

PATIENT MEDICAL HISTORY:

History of hospitalization for an unknown inflammatory condition; patient was told she had “swollen lymph nodes in her lungs” possibly due to sarcoidosis.

PATIENT OCULAR HISTORY:

Panuveitis & cystoid macular edema OD (8/13); patient previously treated with topical Durezol and 1 sub Tenon’s Kenalog injection; patient was lost to follow up for 1 year.

PATIENT MEDICAL HISTORY:

History of hospitalization for an unknown inflammatory condition; patient was told she had “swollen lymph nodes in her lungs” possibly due to sarcoidosis.

REFERENCES


Assessment of Motion Sickness among those with Oculocutaneous Albinism

INTRODUCTION

Motion sickness (MS)
Occurs mismatch when there is a neural mismatch between the sensory system (vision) and the vestibular system.

Variety of symptoms/signs
There is no cure however there are a wide variety of remedies used to lessen MS symptoms.

Oculocutaneous albinism (OCA)
Prevalence 1/10,000
Congenital nystagmus
Hyppopigmentation of the iris
Reduced pigmentation of RPE
Foveal hypoplasia
RV: 20/60-20/400
Strabismus and/or reduced stereopsis increased decussation of retinotopic projections at optic chiasm
**Vestibulo-ocular deficits have been reported

There are limited reports of MS among those with oculocutaneous albinism (OCA).

The National Organization for Albinism and Hypopigmentation (NOAH) promotes research and education for those with OCA. Those affiliated with NOAH were surveyed for MS occurrence and symptomology.

METHODS

The 31 item Motion Sickness Questionnaire was distributed electronically by NOAH. Electronic responses were compiled for those with OCA.

RESULTS

The survey was completed by 104. Of those, about half (51.9%) (n=54) reported a history of motion sickness (MS). The majority who reported MS were female (82%). Most (60%) felt MS has remained stable the last 5 years. See Figures 1-3.

The majority reported they experienced MS with their glasses (54%) while 30% (n=15) reported MS with devices. See Figure 4. Of those who continued to use devices with MS, most (60%; n=6) reported daily use of devices. MS was reported when using electronic magnifiers (n=6), microscopes (n=9), hand-held magnifiers (n=8), hand-held telescopes (n=8), mounted telescopes (n=3) and magnification programs (n=3).

DISCUSSION

Due to nature of study, prevalence of MS among those with OCA cannot be assessed. However, MS seems to effect a large number of those with OCA.

As in the general population, MS was noted using various means of transportation and more noted MS when reading while using a means of transportation.

MS was experienced with a wide range of devices as well as eye glasses. It is unknown if MS was addressed at VR examination. Interestingly, many who experienced MS with devices continued to use devices on a daily basis.

CONCLUSIONS

MS affected a large number of those surveyed. Optometrists play a role as a resource to promote the knowledge and remedies for MS among those with OCA especially since device use appears to be effected.

CONTACT INFORMATION

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JWinters@ico.edu
www.noah.org

FOOTNOTES

**Vestibulo-ocular deficits have been reported

FIGURE 1: Age Of Those With MS

FIGURE 2: Activities Causing MS Symptomology

FIGURE 3: MS Relief—Respondents Indicated All That Applied

FIGURE 4: Those Who Reported MS With Devices
INTRODUCTION

• Optic nerve hypoplasia (ONH) is a congenital disorder that results in a small optic disc and/or diminished number of nerve fibers.1

• ONH may occur in one or both eyes and be associated with mild to severe visual impairment and a wide variety of midline brain defects.2

• Spectral domain optical coherence tomography (Cirrus HD-OCT 5000) has been used successfully to measure parameters of both optic disc and retinal nerve fiber layer (RNFL).

PURPOSE

• To use Cirrus HD-OCT to compare eyes with optic nerve hypoplasia (ONH) to fellow eyes of ONH subjects and normal eyes of controls.

METHODS

• All subjects had comprehensive eye exams prior to enrollment and were diagnosed with either unilateral or bilateral ONH.

• Sixteen ONH subjects and 46 age-matched controls were recruited from the Illinois Eye Institute.

• Cirrus HD-OCT analysis of optic disc cube 200x200 and RNFL thickness was obtained.

• Only data of the right eyes in the control subjects were used.

• One-way analysis of variance was used for data analysis to determine whether the OCT findings of disc area, cup-disc (C/D) ratio, and RNFL thickness were different among the ONH, fellow, and control eyes.

RESULTS

• Table 1 lists the demographic characteristics of ONH patients and control subjects. The mean (SD) ages of ONH and control subjects were 28.8 (17.4) and 28.5 (18.3) years respectively.

• The mean logMAR VA was 0.83 (20/160), 0.07 (20/20), and 0 (20/20) respectively in ONH, fellow, and control eyes.

• A significant difference in disc area was found among ONH, fellow, and control eyes (P=0.006), with mean (SD) values of 1.45 mm^2 (0.49), 1.81mm^2 (0.37), and 1.86mm^2 (0.33) respectively. Post hoc tests showed differences between ONH and fellow eyes (P=0.04) as well as ONH and control eyes (P=0.001), but not between fellow and control eyes.

• A significant difference was found in C/D ratio among ONH, fellow, and control eyes (P=0.001), with values of 0.27 (0.19), 0.41 (0.29), and 0.45 (0.15) respectively. Post hoc tests showed only a difference between ONH and control eyes (P=0.006).

• Additionally, RNFL thickness differences among ONH (93.06 µm), fellow (95.33 µm), and control eyes (98.15 µm) were statistically significant (P=0.001). Post hoc analysis showed only a difference between ONH and control eyes (P=0.003).

• Figure 1 shows the Cirrus HD-OCT optic disc cube 200x200 and RNFL thickness analysis of an ONH subject and a control subject.

CONCLUSION

• Cirrus HD-OCT findings including disc area, C/D ratio, and RNFL thickness were significantly different between ONH eyes and control eyes.

• No significant differences were found in disc area, C/D ratio, or RNFL thickness between fellow eyes of ONH subjects and control eyes.

• Therefore, Cirrus HD-OCT may be useful in ONH diagnosis.

REFERENCES


TABLE 1. Demographic Characteristics of ONH and Control Subjects

<table>
<thead>
<tr>
<th>Gender</th>
<th>ONH Eyes (n=16)</th>
<th>Control Eyes (n=46)</th>
<th>P Value</th>
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<tbody>
<tr>
<td>Male</td>
<td>11 (68.8)</td>
<td>29 (63.0)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>5 (31.3)</td>
<td>17 (37.0)</td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Race</th>
<th>ONH Eyes (n=16)</th>
<th>Control Eyes (n=46)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>1 (0.6)</td>
<td>2 (0.4)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>0 (0.0)</td>
<td>38 (82.6)</td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>2 (12.5)</td>
<td>6 (13.0)</td>
<td></td>
</tr>
<tr>
<td>Asian</td>
<td>2 (12.5)</td>
<td>1 (2.2)</td>
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<table>
<thead>
<tr>
<th>Age (years)</th>
<th>ONH Eyes (n=16)</th>
<th>Control Eyes (n=46)</th>
<th>P Value</th>
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</thead>
<tbody>
<tr>
<td>Range</td>
<td>64 - 96.1</td>
<td>63.3 - 84.5</td>
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</tr>
<tr>
<td>Mean (SD)</td>
<td>68.1 (17.4)</td>
<td>68.3 (16.3)</td>
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</table>

**TABLE 2. Optical Coherence Tomography Parameters in ONH, Fellow, and Control Eyes**

<table>
<thead>
<tr>
<th></th>
<th>ONH Eyes (n=16)</th>
<th>Fellow Eyes (n=12)</th>
<th>Control Eyes (n=46)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disc area (mm^2)</td>
<td>1.45 (± 0.49)</td>
<td>1.51 (± 0.37)</td>
<td>1.58 (± 0.43)</td>
<td>.002</td>
</tr>
<tr>
<td>Rim area (mm^2)</td>
<td>3.53 (± 0.46)</td>
<td>3.46 (± 0.36)</td>
<td>3.61 (± 0.41)</td>
<td>.003</td>
</tr>
<tr>
<td>Average C/D ratio</td>
<td>0.33 (± 0.19)</td>
<td>0.41 (± 0.28)</td>
<td>0.45 (± 0.15)</td>
<td>.006</td>
</tr>
<tr>
<td>Average RNFL thickness (µm)</td>
<td>93.05 (± 24.00)</td>
<td>95.33 (± 11.44)</td>
<td>98.15 (± 11.98)</td>
<td>.005</td>
</tr>
</tbody>
</table>
AOA
7 ICO PRESENTATIONS
Test-Retest Reliability of the Eye-Hand Programs of the Sanet Vision Integrator

Eric A. Baas, O.D., F.A.A.O., Naiya Patel, Brian Coffey, Susan Ann Kelly, PhD
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INTRODUCTION

There has been considerable research to determine the relationship between visual skills and athletic performance. One of the most important factors in visual skills testing is that tests be reliable. The Sanet Vision Integrator (SVI) is used to assess visual guidance of motor performance including eye-hand coordination, visual reaction time, hand speed and accuracy. The purpose of this investigation is to determine the minimum number of trials needed to obtain test-retest reliability of the Proactive, Reactive, and Hand Speed programs of the SVI. These programs evaluate the speed of a motor response to visual stimuli, which is thought to be correlated with athletic performance.

METHODS

Twelve ICO students (mean age 26.44 yr (SD=+1.74 yr)) performed ten consecutive trials of the proactive, reactive, and hand speed programs during the initial visit. They were asked to return no sooner than 14 days to repeat ten consecutive trials of the same programs. Subjects were positioned at eye-level 50cm from the SVI (Figure 1). Testing was performed under normal room illumination using a black background and white stimuli. We used the intraclass correlation coefficient (ICC) to evaluate test-retest reliability. The ICC was calculated for either the mean of a series of trials or the first trial after the plateau of the learning curve was obtained.

RESULTS

The results of the Proactive test revealed an ICC of 0.78 for the data for the SVI as a function of age. The data for the SVI as a function of age.

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One and a Half Syndrome with a Partial Seventh Nerve Palsy in Multiple Sclerosis

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BACKGROUND
One and a half syndrome is a manifestation of central brainstem disease not commonly observed in everyday optometric practice. One and a half syndrome occurs due to a unilateral lesion in the dorsal pontine tegmentum involving the ipsilateral paramedian pontine reticular formation, abducens nucleus, and medial longitudinal fasciculus. This interaction causes a distinctive clinical appearance which is characterized by a complete lateral gaze palsy in one direction and the interruption of the internuclear ophthalmoplegia in the other. Patients often present with blurred vision, diplopia, or double vision. Common causes of the syndrome include vascular insults, brainstem tumors, and multiple sclerosis. Treatment and prognosis depend on the etiology of the condition.

CASE REPORT
A 28 year old African American female presents with sudden onset blur in right gaze only, for three days. Entering acuities were 20/20 OD, OS, and IOM pattern was normal. Pupils were equal, round, and reactive with no APD and dilated fundus examination was unremarkable.

Three days later she returned with a complaint of ongoing blur in right gaze and reported “crossing eyes.” IOMs revealed complete paralysis of right gaze OD with horizontal nystagmus OS in left gaze (Figure 1). Convergence was unremarkable. In addition, she had a widened palpebral fissure and decreased definition of her nasolabial folds on the right side of her face (Figure 2). The patient was diagnosed with a one and a half syndrome with partial seventh nerve palsy and was referred to a neurologist where an MRI was ordered.

TREATMENT/FOLLOW-UP
The patient returned for a 1 week follow-up where the MRI revealed an enhancing lesion of the right facial colliculus. This interaction caused a complete lateral gaze palsy in one direction and the interruption of the internuclear ophthalmoplegia. In addition, she had a widened palpebral fissure and decreased definition of her nasolabial folds on the right side of her face (Figure 2). The one and a half syndrome was diagnosed with and managed for multiple sclerosis. At the 1 month follow-up the patient showed a full resolution of the one and a half syndrome as well as the partial seventh nerve palsy.

DISCUSSION
One and a half syndrome is a rare ophthalmoplegic syndrome resulting from a lesion of the paramedian pontine reticular formation or abducens nucleus and ipsilateral medial longitudinal fasciculus. The affected abducens nucleus results in a conjugate horizontal gaze palsy in one direction and the interruption of the internuclear ophthalmoplegia in the other. Resolution of the syndrome within days to weeks is common; however, demyelinating conditions, ischemia, and masses must be ruled out.

CONCLUSION
One and a half syndrome with partial seventh nerve palsy in patients is a rare-and-anatomical site of the disorder, but not for the cause. When multiple sclerosis is the underlying cause, referral to a neurologist for early treatment is imperative to preserve not only visual but systemic function. The condition can be monitored with vision and optical coherence tomography where thinning of the retinal ganglion cell nerve fiber layer may be seen. Such changes should be communicated closely with the patient’s neurologist.

REFERENCES

ACKNOWLEDGEMENTS
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BACKGROUND
Bifocal vision disorders are more prevalent than ocular diseases in the majority of the population. Yet, these disorders are often undiagnosed due to insufficient evaluation. Issues stem from deficiencies in the patient's vergence, accommodative, and ocular motor systems. Common symptoms include double vision, headache, eye strain, fatigue, asthenopia, and avoidance of near tasks.

CASE SUMMARY
A 23-year-old Caucasian female presented with eye strain and fatigue at the end of the day along with blurry vision when alternating from near to far. Her ocular history includes longstanding decreased vision in her right eye, contact lens wear for 15 years, and a positive family history of keratoconus. Entering visual acuities with her current glasses were 20/50 OD through -1.50-2.50x002 and 20/25 OS through -2.00-2.00x175.

On manifest refraction, she accepted minus lenses without significant visual improvement. Cycloplegic refraction was performed and revealed +2.00-4.00D OD and +1.00-2.25x140 OS. Further bifocal vision testing showed exophoria at near, reduced stereovision, poor accommodation amplitudes, decreased facility testing, and limited divergence ranges. Topography was done and demonstrated the rule astigmatism with no signs of keratoconus. Due to the patient's inconsistent work hours, home vision therapy was initiated for accommodative infidelity and convergence excess. Over the next six months the patient returned every three to four weeks. Over the course of the 30 visits, she accepted +1.00-1.75x010 OD and pl-2.25x140 OS eye in both contact lenses and glasses with vision at 20/20 OU distance and near. Currently, she is free of eye fatigue and strain. Her exophoria, stereovision, accommodation, and vergence ranges have all improved. She continues maintenance home vision therapy three to four times a week.

Table 1: Bifocal Vision Findings

<table>
<thead>
<tr>
<th>Vision Acuities</th>
<th>Initial Visit</th>
<th>Last Visit</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD: -1.50-2.50x002</td>
<td>20/50</td>
<td>20/25</td>
</tr>
<tr>
<td>OS: -2.00-2.00x175</td>
<td>20/25</td>
<td>20/20</td>
</tr>
</tbody>
</table>

Table 2: Refractive Changes

<table>
<thead>
<tr>
<th>Initial Prescription</th>
<th>Cycloplegic Refraction</th>
<th>Final Prescription</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD: -1.50-2.50x002</td>
<td>+2.00-4.00x180</td>
<td>+1.00-3.75x010</td>
</tr>
<tr>
<td>OS: -2.00-2.00x175</td>
<td>+1.00-2.25x180</td>
<td>pl-2.25x180</td>
</tr>
</tbody>
</table>

Table 3: Home Vision Therapy

<table>
<thead>
<tr>
<th>Vision Therapy Activity</th>
<th>Beginning Lenses</th>
<th>Ending Lenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monocular Lens Flipper</td>
<td>+3.75D</td>
<td>+2.50D</td>
</tr>
<tr>
<td>Monocular Lens Rock</td>
<td>10.00D</td>
<td></td>
</tr>
<tr>
<td>Monocular Lens Rock (Near)</td>
<td>+1.00D</td>
<td>+4.00D</td>
</tr>
<tr>
<td>Near Hart Chart Push Up/Pull Away</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CONCLUSION
Bifocal vision disorders can go undiagnosed without the proper diagnostic testing and can heavily impact a patient’s quality of life. In addition to near bifocal testing, a cycloplegic refraction is essential in symptomatic patients, and healthy patients who are not consistent to 20/20. Further, it is important to discourage minus lenses during refraction when patients have near complaints. Performing distance retinoscopy not only shows the appropriate refraction but the integrity of the reflex. Vision therapy is the right treatment option for these patients.

REFERENCES

CONTACT INFORMATION
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A Bumpy Road to Diagnosis: Follicular Conjunctivitis to Ocular Lymphoma

Stephanie Fromstein, O.D.
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CASE SUMMARY

A 79 year old African American female presented for a consultation regarding “bumps” on the inside of her lids, which were persistent over two months. She was referred by another practitioner with no treatment initiated. The patient noted some mild foreign body sensation and irritation, but denied pain, photophobia or discharge. Her ocular history was significant for a complicated cataract extraction OS five years prior. Acuity was 20/30 OD and CF@5ft OS. All preliminary testing was normal, noting a surgical pupil OS. Anterior segment evaluation revealed a bilateral 4+ inferior follicular conjunctivitis. The patient was treated with steroid drops QID in both eyes, and a conjunctival biopsy was performed due to a suspicion of malignant or non-malignant growth. At the one-month follow-up, all pertinent examination findings were identical. Biopsy results were reviewed and revealed a stage I B-cell follicular lymphoma, positive for biomarkers CD20 and BCL2. The patient was referred to oncology for further management.

BACKGROUND

Ocular lymphoma is a malignant lesion of the orbital soft tissue, conjunctiva or eyelid. It can present as an intracocular, orbital or adnexal growth. Ocular adnexal lymphomas is characterized by painless, pink, fleshy lesions of the conjunctiva known as salmon patches. [Figure 1] Notably, the condition can also masquerade as a pronounced follicular conjunctivitis. Most ocular adnexal lymphomas are categorized as non-Hodgkin’s, low-grade B-cell tumors. An infectious and autoimmune etiology has been suggested for the disease, but has not been definitively proven. The lifetime risk of ocular lymphoma is 2.8%, making it the most common primary malignant tumor.

CONCLUSION

Fortunately, many ocular lymphomas are low grade, localized tumors which follow an indolent course and tend to respond well to systemic therapy. Therapy includes observation, radiation, cyclotherapy, interferon, monoclonal antibodies and chemotherapy. The overall five-year survival rate for non-Hodgkin’s lymphomas is approximately 60%, with the rate for ocular adnexal disease being significantly higher at 86-100% with treatment. As this disease can present as a chronic follicular conjunctivitis, recalcitrant follicular disease warrants recomposition and prompt referral if the condition fails to improve.

BIBLIOGRAPHY


CONTACT INFORMATION

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A 31-year-old African American female presented to the emergency clinic at the Illinois Eye Institute in November 2013. She reported sudden painful vision loss in the right eye for one week. She also reported that the lower 70% of vision in her right eye was blurry (table 1). A visual field and an OCT were performed (figure 2). She had previously been diagnosed with optic neuritis in the left eye in 2010 (figure 1).

Medical History: Systemic Lupus Erythematosus

The patient was diagnosed with optic neuritis in the right eye and was prescribed Ultram 100mg PO QID for pain management. An MRI of the brain and orbits was ordered and showed enhancement of the right optic nerve (figure 3). The patient presented 4 weeks later with a complaint of painful vision loss in the left eye (table 2). Dilated fundus exam revealed nochoking disc edema OD and moderate disc edema OS. The MRI was repeated and showed enhancement of the right optic nerve with all other findings unremarkable (figure 5).

The patient was diagnosed with optic neuritis in the left eye and was prescribed Ultram 100mg PO QID for pain management. An MRI of the brain and orbits was ordered and showed enhancement of the right optic nerve. (figure 5). She had previously been diagnosed with optic neuritis in the left eye in 2010 (figure 1).

FINDINGS

A visual field and an OCT were performed (figure 2). She had previously been diagnosed with optic neuritis in the left eye in 2010 (figure 1).

Table 1: Pertinent exam findings 11/4/2013

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupils</td>
<td>2+ APD</td>
<td>2+ APD</td>
</tr>
<tr>
<td>EOM</td>
<td>FTFC</td>
<td>FTFC</td>
</tr>
<tr>
<td>CFP</td>
<td>Abnormal intensity</td>
<td>FTFEC</td>
</tr>
</tbody>
</table>

Table 2: Pertinent exam findings 12/8/2013

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupils</td>
<td>2+ APD</td>
<td>NLP</td>
</tr>
<tr>
<td>EOM</td>
<td>Absent sensation</td>
<td>2+ APD</td>
</tr>
<tr>
<td>CFP</td>
<td>FTFC</td>
<td>Unable to see fingers</td>
</tr>
</tbody>
</table>

DISCUSSION

NMO is a demyelinating central nervous system disease in which severe inflammation attacks the optic nerve and the spinal cord. With the discovery of the NMO-IgG antibody, NMO is no longer considered a variant of Multiple Sclerosis (MS). An isolated optic neuritis is a common initial presentation of NMO that results in severe residual vision loss in contrast to MS which generally has a better visual outcome. Another distinguishing feature of NMO is transverse myelitis, an inflammatory condition of the spine. Patients with recurrent optic neuritis with severe vision loss as well as normal MRI findings should be worked up for other demyelinating autoimmune disease such as NMO.

CONCLUSION

NMO is a rare condition that may be mistaken for other demyelinating diseases such as MS when the initial presentation is optic neuritis. Early recognition is crucial in treating this condition. The discovery of aquaporin-4 autoantibodies has helped identify and differentiate-NMO from other similar diseases. This case illustrates the importance of testing for NMO in cases of recurrent optic neuritis especially in the presence of normal MRI findings and concurrent autoimmune disease.

REFERENCES


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BACKGROUND

Complete posterior vitreous detachments are a common and well documented finding in elderly patients. Incomplete vitreous detachments are less frequently described and occur when there is a partial separation of the vitreous cortex from its attachment to the optic nerve head. Vitreopapillary traction is recognized when the posterior hyaloid retains an incomplete adhesion to the optic nerve head resulting in traction and the appearance of optic nerve head elevation. The posterior vitreous cortex is extremely adherent to the optic disc with significant force being exerted on the optic disc during this partial separation. Persistent vitreopapillary traction has been described in concurrence with anomalous posterior vitreous detachment in such conditions as proliferative diabetic vitreoretinopathy and central retinal vein occlusion. Vitreopapillary traction is not, however, widely reported in elderly patients in the absence of diabetic retinopathy or other retinal vascular diseases.

CASE SUMMARY

A 76-year-old female presented to the primary eye care clinic with a complaint of gradual onset of blurry vision over the past month. The patient’s medical history was significant for diabetes and hypertension and her ocular history was negative. Her best corrected acuity at this time was 20/20 OD and 20/10 OS. Her pupils were round and equally reactive with no relative afferent pupillary defect. Extrinsic motilities were normal OD and confrontation visual fields were full OD, OS. Her visual field testing revealed a very mildly enlarged blind spot OS. Visual field defects ranging from a mildly enlarged blind spot to shallow inferior arcuate changes and an inferior altitudinal defect have been reported in the presence of vitreopapillary traction. Visual field defects in young patients who have particularly adherent vitreopapillary attachments have been attributed to vitreopapillary traction. Visual field defects ranging from a mildly enlarged blind spot, to shallow inferior arcuate changes and an inferior altitudinal defect have been reported in the presence of vitreopapillary traction. Additionally, it has been identified as a potential cause of optic nerve head pallor and reduced visual acuity secondary to damage to the anterior optic nerve. The proposed mechanism for this damage is a mechanical reduction of perfusion in the posterior ciliary arteries and/or decreased axoplasmic flow in the optic nerve fibers. In young patients with incomplete posterior vitreous detachment, vitreopapillary traction has been described as a cause of elevated optic disc and pseudopapilledema. It has been described with intrapapillary and subretinal peripapillary hemorrhages in young patients who have particularly adherent vitreopapillary attachments. Glaucoma-related amaurosis has been attributed to vitreopapillary traction. Visual field defects ranging from a mildly enlarged blind spot, to shallow inferior arcuate changes and an inferior altitudinal defect have been reported in the presence of vitreopapillary traction. Additionally, it has been identified as a potential cause of optic nerve head pallor and reduced visual acuity secondary to damage to the anterior optic nerve. The proposed mechanism for this damage is a mechanical reduction of perfusion in the posterior ciliary arteries and/or decreased axoplasmic flow in the optic nerve fibers.

DISCUSSION

Pathologic changes in the vitreous body and how they affect its attachment to the optic disc were described early on by Schepens. He noted vitreopapillary traction as a cause of elevated disc margins and pseudopapilledema. When the appearance of optic disc edema is observed, a list of differential diagnoses that should be considered include anterior ischemic optic neuropathy, diabetic papillopathy, optic nerve head drusen, optic nerve infiltration, optic nerve mass, papilledema and papillitis. Evaluation of the interface between the vitreous and the optic nerve head is clinically challenging. Spectral domain optical coherence tomography has proven very useful in visualizing the posterior hybrid membrane and illustrating vitreous traction on the optic nerve in order to make a diagnosis of vitreopapillary traction. The literature indicates that the range of clinical manifestations from vitreopapillary traction is quite varied. It has been described with mild-to-moderate visual field defects and subretinal peripapillary hemorrhages in young patients who have particularly adherent vitreopapillary attachments. Glaucoma-related amaurosis has been attributed to vitreopapillary traction. Visual field defects ranging from a mildly enlarged blind spot, to shallow inferior arcuate changes and an inferior altitudinal defect have been reported in the presence of vitreopapillary traction. Additionally, it has been identified as a potential cause of optic nerve head pallor and reduced visual acuity secondary to damage to the anterior optic nerve. The proposed mechanism for this damage is a mechanical reduction of perfusion in the posterior ciliary arteries and/or decreased axoplasmic flow in the optic nerve fibers. In young patients with incomplete posterior vitreous detachment, vitreopapillary traction has been described as a cause of elevated optic disc and pseudopapilledema. When the appearance of optic disc edema is observed, a list of differential diagnoses that should be considered include anterior ischemic optic neuropathy, diabetic papillopathy, optic nerve head drusen, optic nerve infiltration, optic nerve mass, papilledema and papillitis. Evaluation of the interface between the vitreous and the optic nerve head is clinically challenging. Spectral domain optical coherence tomography has proven very useful in visualizing the posterior hybrid membrane and illustrating vitreous traction on the optic nerve in order to make a diagnosis of vitreopapillary traction.

CONCLUSION

Primary eye care providers should be aware of vitreopapillary traction in the differential diagnosis of optic disc elevation. This case demonstrates the appropriateness of OCT technology to avoid expensive and unnecessary medical testing that could otherwise be indicated in the presence of optic disc edema. Additionally, the presence of continued vitreopapillary traction may lead to optic nerve damage and atrophy, thus the importance of accurately identifying and appropriately monitoring this condition cannot be underestimated.

REFERENCES

The Utilization of the Visante OCT in the Management of Acute Corneal Hydrops

Hillary B. Schweihs, O.D., Jennifer S. Harthan OD, FAAO
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BACKGROUND

Corneal hydrops is a rare but potentially visually significant complication of keratoconus. An acute rupture of Descemet’s membrane occurs, leading to stromal edema and loss of corneal transparency. Patients present clinically with a varying degree in severity of symptoms making the diagnosis challenging in some cases. The utilization of the Visante OCT can assist the practitioner in the diagnosis and management of complex cases.

PERTINENT FINDINGS

A 48-year-old African American female presented with complaints of acute vision loss, redness, tearing, and photophobia in the right eye.

Medical History: (i) Hypertension and hyperlipidemia
Ocular History: (i) Keratoconus OU, (ii) Hydrops OS

BCVA: CF at 1 ft OD, 20/30 OS
Pupils: PERRL (-) APD
EOMs: Full OU

SLT Lamp: 1-conjunctival injection and a 3mm central edematous cornea with bullae in the right eye (see Figure 1a and 1b). Left eye findings showed central corneal thinning with stromal scarring.

Visante Anterior Segment OCT: Central Decement’s membrane rupture with stromal edema OD (see Figure 2a and 2b); Resolved endothelial break and central scarring, stable OS.

TREATMENT

The patient was started on atropine 1% OD, moxicef QD, maritol 128 solution QD, and preservative-free artificial tears every hour while awake in the right eye. The patient was monitored closely over the course of three months, and resolution was noted with Visante OCT.

FOLLOW UP

2 day follow up: Vision and condition stable. No change in treatment course
1 week follow up: Vision and condition stable. No change in treatment course
1 month follow up: Vision improved OD to 20/100, improvement of stromal edema and break OD (see Figure 3).
2 month follow up: VA at OD: 20/200, resolution of hydrops, Visante OCT completed (see Figure 4). Patient was referred to Cornea for contact lens fit OD.

DISCUSSION

This is a classic presentation of acute corneal hydrops. The patient presented with symptoms of acute vision loss with white corneal haze and bullae. Due to the extensive corneal haze, a Visante OCT was used to determine the extent of Descemet’s break. This patient was followed every 3–4 days for the first 3 weeks until improvement in central swelling and bullae were noted, then on a weekly basis thereafter. Once the hydrops resolved, there was residual corneal thinning and the patient was re-fit into Jupiter scleral contact lenses.

CONCLUSION

Acute corneal hydrops occurs in less than three percent of keratoconic patients. Although the condition is rare, acute vision loss is significant. Repair of Descemet’s break and resolution of edema typically occurs within two to four months; however, residual stromal scarring will occur in its place, causing central corneal thinning. Treatment of acute hydrops focuses on reducing patient discomfort, preventing further complications and decreasing stromal edema.

Management of these patients is often difficult as the central corneal edema often obscures the Descemet’s break. The Visante OCT is a non-invasive procedure that provides high-resolution anterior segment images of these complications and assists in the diagnosis and management of these conditions. Once the break has healed and the stromal edema has resolved, it is important to re-evaluate the contact lens fit, and make necessary lens adjustments, if needed.

REFERENCES


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APHA
2 ICO PRESENTATIONS
INTRODUCTION
Color vision deficiency can significantly impact how an individual views the world. See Images 1-4.

Color vision (CV) deficiency can be caused by both congenital and acquired mechanisms. Acquired CV deficiencies are typically due to damage from ocular disease, systemic drugs or exposure to chemicals. CV deficiencies may affect many aspects of patients’ life. It is logical that patients with visual impairment (VI) due to ocular disease may have acquired CV deficits due to severity of their ocular condition. However, there are limited reports of CVD among patients in a vision rehabilitation clinic (VRC). One reason for this is testing limitations.

CV is typically tested using pseudoisochromatics plates such as the Ishihara or HRR.

There plates may be difficulty for VI patients to view and so are not valid testing methods for many VI patients. In some clinical practices, testing on color vision may be omitted due to this reason.

In this study the ‘Panel 16 Quantitative Color Vision Test’ (a large version of the traditional Farnsworth D-15) was used for testing which was designed to be visible for VI patients. See photo 4 and 5. This test assesses moderate or severe CV deficiency. Those with mild or no CV deficiency will pass.

The purpose of this study is to assess moderate/severe CV deficiency in VI patients seen in the Rosenbloom Center for Vision and Aging of the Illinois Eye Institute and to demonstrate the need for CV testing among those VI.

METHODS
CV was tested on right and left eyes using the large version ‘Panel 16 Quantitative Color Vision Test’. ‘Panel 16 Quantitative Color Vision Test’ was administered and scored following standard protocol. CV results were assessed as ‘fail’, ‘minor error’ or ‘pass’. Patients were queried for age, race, gender, and personal/family history of CV deficiency.

RESULTS
One hundred (100) completed testing. The majority were African-American (84%); female (62%). Mean age was 53. See Figure 1 and Table 1.

Level of VI among those non-CVD (either ‘minor error’ or ‘pass’) was 12% normal/near normal, 40% moderate impairment and 39% severe impairment or worse. Level of VI among those CVD was 17% normal/near normal, 44% moderate impairment and 39% severe impairment or worse.

DISCUSSION
• Considering the level of ocular disease and subsequent VI among the patients tested, the large % of patients who ‘fail’ color vision testing (have a moderate/severe CVD) in at least one eye is not surprising.
• Considering the large majority had no family history and the level of ocular disease, asymmetry of CVD between eyes and the % who reported CVD had changed/worsened, a large % of CVD is likely acquired.
• There appears to be somewhat similar levels of VI among those with CVD and those without significant CVD. Therefore level of VI was not predictive of CVD.
• Considering this high % of CVD; it is important that clinicians query their patients regarding their CV and formally assess color vision.
• Patients need to educated regarding an acquired color vision loss and possibility of worsening CVD if ocular disease progresses.

CONCLUSIONS
A large number of VI patients had moderate/severe CV deficiencies. The majority are likely acquired CVD. These finding underscore the feasibility and importance of assessing CV in VI patients.

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Recent changes to the healthcare law provide for federal dollars to expand Medicaid programs to cover adults under 65 whose income is less than 133% of Federal Poverty Levels. The Supreme Court ruled that each state could determine if Medicaid coverage was to be expanded within their state. Currently, twenty seven states and the District of Columbia have chosen to expand Medicaid coverage within their states. All states who chose to expand Medicaid coverage have the same income level criteria to qualify for Medicaid coverage however benefits and frequency that benefit may be obtained vary.

Vision impairment can be due to difficulty seeing at distance or at near. Vision impairment has been shown to impact one’s life in many ways. These include: quality of life, employability, and mortality. Studies have also demonstrated the substantial economic burden due to vision impairment. Uncorrected refractive error has been shown to be the most common cause of visual impairment among all races in the US. Cost has been shown to be a barrier from someone obtaining eyeglasses.

METHODS

Internet query was performed on www.google.com using key words ‘state name’ adult Medicaid eye glasses. The most recent state based site was used as the reference to assess the benefits of traditional Medicaid programs. Glasses benefits for non-pregnant adults (over 21 yrs.) were identified. All websites used as references were last accessed on October 22, 2014.

RESULTS

The results for the 27 states’ and the District of Columbia’s Medicaid programs are listed in Figure 1 and Table 1. Of the 28, over half (54%) do not offer a recurring eye glasses benefit.

<table>
<thead>
<tr>
<th>State</th>
<th>Adult Medicaid Eyeglasses Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>none</td>
<td>43%</td>
</tr>
<tr>
<td>after cataract / Aphakia</td>
<td>11%</td>
</tr>
<tr>
<td>every 2 years - sooner possible</td>
<td>21%</td>
</tr>
<tr>
<td>annual</td>
<td>11%</td>
</tr>
</tbody>
</table>

DISCUSSION

• Correctable vision impairment is a problem that can be solved. However with over half of the states with Medicaid expansion not covering glasses uncorrected refractive error will continue to exist.
• National and local charitable organizations, service organization, and health professionals have worked together to fill gaps and provide eye exams and glasses to those without coverage. However, these are patchwork solutions. Consistent policy is needed.
• Reductions in utility resulting from uncorrected refractive error have been calculated. From these results, cost-effective studies can be done to further demonstrate cost effectiveness of providing eyeglasses.
• As new insurance products are developed and benefits defined that eye glasses are included as an essential benefit.
  o Glasses and examination for glasses are not covered under the Medicare program.
  o For example Pennsylvania will be implementing ‘Healthy PA’ which reforms Pennsylvania’s Medicaid program. Coverage under ‘Healthy PA’ will begin January 1, 2015.

CONCLUSIONS

Although financial criteria for enrollment are now the same between states, eye glasses benefits for adults is quite different. Benefit varied from none to one pair every year. Despite awareness of the negative impact of correctable vision impairment, financial barriers to obtaining glasses still exist. While more people have qualified for Medicaid due to Medicaid expansion, there still exist gaps in coverage in some states. Policy makers as
The Long Term Progression of Eye-movements in Relationship to Birth Order in Children

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PURPOSE

The purpose of this study was to evaluate the relationship that birth order may have on eye-movements. Specifically, the study examined the progression of eye movement skills prior to entering Kindergarten, and then again prior to entering 3rd grade. We previously showed that first born children and children with siblings had higher intelligence test scores and may influence the eye-movement skills of these children during the “learning to read” phase of education as described by reading specialists Chall and Jacobs. Usually once a child enters the 3rd grade, though, they are expected to begin the “lead to learn” phase of their education, thus we would expect that the parental influence on activities performed with the parent or on their own might be extinguished by the daily school setting.

METHODS

12 children were examined the summer prior to entering Kindergarten. The age range of these children was 4 to 6 years old depending on their birthdates, and the date of the exam. 33 of the same children were examined again the summer prior to entering 3rd grade. The children, during both exams, were given a full comprehensive eye examination including tests of accommodation and convergence, as well as a full ocular health evaluations. See Table 1 for a list of the tests performed during both examinations, and the mean values for those findings. The parents filled out a survey (Figure 1) regarding the number and age of the siblings, prior school history, and type of activities they pursue. The question specific tasks such as reading books with a parent or playing near visual systems. A slightly modified survey (Figure 2) with similar questions, along with the addition of questions about participation in outside academic help programs and reading ability as determined by the teacher, was filled out by the parents prior to the children entering 3rd grade. See Figure 3 for the scale used to interpret the survey results.

The subjects also received eye movement recordings using the Vizagraph III (Taylor), an eye tracking system with goggles, using five test conditions: 1) the Vignoles letter and symbol targets (Figure 4). The system software, combined with manual analysis of the recorded data is used with the younger population to evaluate the results. The following three procedures were completed.

1. Saccadic and Fixation

Task I determines how quickly and accurately the subject can complete horizontal saccades, at fixation is maintained while reading a sentence of 5 words or less. Saccades are measured in Arc de Bicycle (AB) and millisecond (msec) units. The number of saccades required to complete a 15 degree saccade is calculated similarly to Task II (Figure 5).

2. Saccadic Accuracy

Task II determines saccadic accuracy by recording the number of refractions (corneal saccades) required to regain fixation after completing a 15 degree saccade excursion (similar to Task II) (Figure 6).

3. Reading Skills

Your child's most recent teacher, is your child reading? 1) Below grade level, 2) at grade level, or 3) above grade level

RESULTS

Children who were born in a birth order exhibited the following findings for tasks I, II, and III.

1. Better fixation control with fewer off-target saccades and fewer saccades in 15 seconds and exhibiting all eye and head movements. Fixation control was demonstrated better in the younger subjects, with off-target saccades being recorded and evaluated for frequency and amplitude.

2. Saccadic Speed: Task I determines how quickly and accurately the subject can complete horizontal saccades, at fixation is maintained while reading a sentence of 5 words or less. Saccades are measured in Arc de Bicycle (AB) and millisecond (msec) units. The number of saccades required to complete a 15 degree saccade is calculated similarly to Task II (Figure 5).

3. Saccadic Accuracy: Task II determines saccadic accuracy by recording the number of refractions (corneal saccades) required to regain fixation after completing a 15 degree saccade excursion (similar to Task II) (Figure 6).

4. The children with more reading type activities become less as the child spends more time in an academic setting. The teachers give each child the same type and amount of learning activities and the amount of reading type activities becomes less as the child spends 7 hours per day away from home in an academic setting. The children in this study will be re-evaluated to prior 6th grade to determine if there are new trends with eye movements or binocular stability develop.

CONCLUSIONS

The activities that first born children are encouraged to perform regularly prior to Kindergarten may lead to better eye movement skills at that age. However, by 3rd grade, a child’s ability to move their eyes and head movements become more difficult. Increased reading activity leads to reading at a higher level. Our data suggests that the first born group continues to have moderately improved eye-movement performance on examining the others, but not significantly better. This is likely due to the nature of the school program and the fact that the teachers give each child the same type and amount of learning activities and the fact that the teachers give each child the same type and amount of learning activities. The activities that first born children are encouraged to perform regularly prior to Kindergarten may lead to better eye movement skills at that age. However, by 3rd grade, a child’s ability to move their eyes and head movements become more difficult. Increased reading activity leads to reading at a higher level. Our data suggests that the first born group continues to have moderately improved eye-movement performance on examining the others, but not significantly better. This is likely due to the nature of the school program and the fact that the teachers give each child the same type and amount of learning activities and the fact that the teachers give each child the same type and amount of learning activities.
METHODS

Children presenting to the clinic during 10/12-1/13, who had state insurance and needed spectacles were included under the Lions grant. On the day of their exam, they were asked to complete the pre-survey. The survey was read to the patient only if they needed help.

When the glasses were delivered, the child was instructed on recommended wearing schedule (always, reading only, or distance only). Several weeks later (3-6 weeks), the post-survey was completed. The post-survey was completed when the child’s Medicaid glasses were dispensed.

RESULTS

SUBJECTS

1,109 children fit criteria for the Lions lens.

Gender distribution: Age Distribution:

Female - 56% Male - 44% <1 - 21 years Mean 11.7 years (SD 3.3)

Race:

White 18 (1.6%) Other 14 (1.3%)

Table 1: Gender and age distribution

<table>
<thead>
<tr>
<th>Race</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>18</td>
<td>1.6%</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td>1.3%</td>
</tr>
<tr>
<td>Asian</td>
<td>10</td>
<td>0.9%</td>
</tr>
<tr>
<td>Black</td>
<td>93</td>
<td>8.3%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>30</td>
<td>2.7%</td>
</tr>
<tr>
<td>Unknown</td>
<td>267</td>
<td>23.2%</td>
</tr>
</tbody>
</table>

Table 2: Race distribution

POST SURVEY RESPONSES

Have you had an eye exam before today?

Yes 396 (43.4%)

No 147 (13.3%)

No response 113 (10.2%)

Missing data 235 (21.1%)

Table 3: Pre-survey response

Are you wearing your glasses at the time of exam?

Yes 750 (64.4%)

No 147 (13.3%)

No response 113 (10.2%)

Missing data 89 (7.9%)

Table 4: Wearing glasses at exam

Are you having trouble seeing?

No 1354 (96.3%)

Yes 36 (2.9%)

No response 31 (2.3%)

Missing data 1 (0.1%)

Table 5: Visual trouble

How often do you think you should have your eyes examined?

Once a year 932 (76.4%)

Every 5 years 323 (26.8%)

Every 6 months 312 (26.8%)

Every year 548 (45.2%)

Table 6: Frequency of eye exams

Do you think your grades in school will change in any way after receiving an eye exam and/or glasses from the Clinic?

Yes 596 (43.4%)

No 147 (13.3%)

Do not remember or missing data 390 (35.2%)

Table 7: School grades

Do you think your performance in sports will change in any way after receiving an eye exam and/or glasses from the Clinic?

Yes 305 (26.6%)

No 147 (13.3%)

Do not remember or missing data 657 (57.1%)

Table 8: Performance in sports

Are you helping in the home?

Yes 750 (64.4%)

No 147 (13.3%)

No response 113 (10.2%)

Missing data 119 (10.0%)

Table 9: Helping in the home

Are you spending more time outdoors?

Yes 396 (34.3%)

No 147 (13.3%)

No response 113 (10.2%)

Missing data 119 (10.0%)

Table 10: Time outdoors

Are you spending more time on the computer?

Yes 44 (3.9%)

No 147 (13.3%)

No response 113 (10.2%)

Missing data 119 (10.0%)

Table 11: Computer time

Are you having more difficulty with eye strain?

Yes 36 (3.0%)

No 1354 (96.3%)

No response 31 (2.3%)

Missing data 1 (0.1%)

Table 12: Eye strain

Do you feel you are doing better in sports since your received your glasses?

Yes 173 (15.6%)

No 147 (13.3%)

No response 113 (10.2%)

Missing data 119 (10.0%)

Table 13: Performance in sports

CONCLUSIONS

Many children felt academic performance improved with the Lions correction. Change in visual acuity did not show any relationship to perception.

While no data currently exists supporting actual changes in grades in school, it is important that children had a positive attitude towards visual correction.

The children saw this clinic as low income inner city children with limited access to regular eye care services. Since Illinois has offered insurance that covers eyecare for all children in IL, including low income children for several years, it is unclear whether the affordable care act will improve access for our population.
**PURPOSE**

The iPad and iPhone have a number of low vision accessibility features including Siri Voice Assistant, Large Text, Zoom magnification, Invert Colors, Voice Over, and Speak Selection. We studied their usage and proficiency in a low vision population.

**METHODS**

Thirty-three low vision patients responded to an IRB-approved survey regarding their usage of the iPad and/or iPhone (15 males, 18 females). Patients were eligible to participate if they were 18 years of age or older and met one of the following criteria: best corrected visual acuity worse than 20/60, central or significant peripheral visual field defects, or a combination of both. Patients with significant peripheral visual field defects were all tested on Goldmann perimetry and had macular holes of less than 60 degrees. Participants were asked to rate the following four frequently used features of each device, the reported benefit of using each feature, and their self-assessed proficiency in using each feature.

**RESULTS**

The mean age of the respondents was 54.3 years, ranging from 26 to 87. There were 18 different diagnoses represented, with Stargardt disease (5), ocular albinism (4), retinitis pigmentosa (3), and retinal detachments (2) being the most common. Six of thirty-three (18%) patients own an iPhone, twelve (36%) own an iPad, and fifteen (45%) owned both devices. The average visual acuity of respondents was 20/19 in the right eye and 20/13 in the left eye. Twenty-one patients (64%) had reduced central visual acuity, six (18%) had peripheral visual field defects, and six (18%) had some combination of both. The most commonly used vision accessibility features were Large Text, with nineteen patients (58%), and Zoom Magnification, with eighteen patients (55%). The feature shown to be most beneficial was Large Text with 27% of users reporting it as number one, while Speak Selection exhibited the lowest value for both proficiency and benefit of use with 42.9% of users reporting it in last place. Twenty-one patients (65%) were self-taught in the use of their devices, four (12%) received clerical training, four (12%) received consumer training, and four (12%) utilized some combination of these methods. Five (15%) patients reported having the iPad or iPhone recommended to them by a healthcare professional.

**CONCLUSIONS**

Many low vision patients are using the accessibility features of iPad and/or iPhone when operating these devices.
Prevalence of Allergic Conjunctivitis, Ocular Surface Disease Subtypes, and Mixed Disease

Ocular surface disease primarily includes aqueous tear deficiency (ATD), evaporative dry eye (EDE), and allergic conjunctivitis (AC). Until recently, the overlap between sub-types, especially with allergic conjunctivitis, has not been thoroughly examined in the literature. The purpose of our research is to evaluate the prevalence of ocular surface disease categories in consecutive patients at two clinics.

METHODS

Objective tests were performed to classify the ocular surface disease into three categories: ATD, EDE, and AC as described in Figure 1. ATD was defined as Schirmer I score (without anesthesia) of ≤ 5 mm. AC was defined as a papillary reaction of grade ≥ 1 according to the Efron scale. EDE was defined by digital meibomian gland expression of ≤ 5 mm. AC was defined as a papillary reaction of grade ≥ 1 according to the Efron scale. The average measurements of both eyes were used and classified.

RESULTS

258 patients were studied. The average age was 43.4±16.8 with 159 females and 98 males. 223 (86.4%) patients were classified as abnormal. 258 patients were studied. The average age was 43.4±16.8 with 159 females and 98 males. 223 (86.4%) patients were classified as abnormal.

CONCLUSION

• Our study showed that there are very few truly normal patients that exist in the population.
• 86.4% of patients had at least one of the three conditions.
• Patients showed signs of EDE in combination with AC more commonly than patients of other mixed forms of diseases.
• We theorize that perhaps low grade inflammation, especially in non-obvious meibomian gland dysfunction (MGD), may manifest as a papillary reaction prior to more obvious signs and symptoms associated with MGD.
• Allergic conjunctivitis appears to be more prevalent than once thought and presents with EDE more than ATD.
• There is a greater overlap of patients with EDE and AC than the mixed combination of EDE and ATD.

REFERENCES


CONTACT INFORMATION

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www.ico.edu
Table 1: Eligibility Criteria

<table>
<thead>
<tr>
<th>Eligibility/Exclusion Criteria for Amblyopic Children</th>
<th>Amblyopic Children (n=20)</th>
<th>Controls (n=16)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>9</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Race/Ethnicity</td>
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<td></td>
</tr>
<tr>
<td>Black</td>
<td>16</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
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<td>7</td>
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<tr>
<td>Asian</td>
<td>2</td>
<td>8</td>
<td></td>
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<tr>
<td>Hispanic</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>11.10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td>5.20</td>
<td>6.94</td>
<td></td>
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</table>

Table 2: Characteristics of Amblyopic Children (n=20) and Control Subjects (n=16)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Amblyopic Children</th>
<th>Control Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>7.5 ± 3.6</td>
<td>8 ± 3.9</td>
</tr>
<tr>
<td>VA</td>
<td>20/140 ± 5/400</td>
<td>20/40 ± 5/400</td>
</tr>
<tr>
<td>Myopic Anisometropia</td>
<td>3.00 ± 1.50</td>
<td>1.25 ± 1.00</td>
</tr>
<tr>
<td>VA Correlation</td>
<td>0.51 ± 0.36</td>
<td>0.64 ± 0.40</td>
</tr>
</tbody>
</table>

Table 3: Log Contrast Sensitivity of the Amblyopic (n=20), Fellow (n=20), and Control (n=16) Eyes

<table>
<thead>
<tr>
<th>Log Contrast Sensitivity</th>
<th>Amblyopic Eyes (Mean ± SD)</th>
<th>Fellow Eyes (Mean ± SD)</th>
<th>Control Eyes (Mean ± SD)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 cpd</td>
<td>0.89 ± 0.36</td>
<td>1.44 ± 0.13</td>
<td>1.54 ± 0.23</td>
<td>0.0001</td>
</tr>
<tr>
<td>3 cpd</td>
<td>1.87 ± 0.25</td>
<td>1.95 ± 0.31</td>
<td>1.80 ± 0.23</td>
<td>0.0001</td>
</tr>
<tr>
<td>6 cpd</td>
<td>0.89 ± 0.36</td>
<td>1.91 ± 0.32</td>
<td>1.77 ± 0.36</td>
<td>0.0001</td>
</tr>
<tr>
<td>12 cpd</td>
<td>0.51 ± 0.38</td>
<td>1.36 ± 0.50</td>
<td>1.47 ± 0.27</td>
<td>0.0001</td>
</tr>
<tr>
<td>18 cpd</td>
<td>0.47 ± 0.41</td>
<td>0.89 ± 0.53</td>
<td>1.10 ± 0.20</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Table 4: Correlations between VA and Contrast Sensitivity in Amblyopic Eyes (n=20)

<table>
<thead>
<tr>
<th>Correlation with VA</th>
<th>1.5 cpd</th>
<th>3 cpd</th>
<th>6 cpd</th>
<th>12 cpd</th>
<th>18 cpd</th>
</tr>
</thead>
<tbody>
<tr>
<td>r Value</td>
<td>0.51</td>
<td>0.57</td>
<td>0.54</td>
<td>0.35</td>
<td></td>
</tr>
<tr>
<td>P Value</td>
<td>0.02</td>
<td>0.00</td>
<td>0.00</td>
<td>0.13</td>
<td>0.11</td>
</tr>
</tbody>
</table>

Figure 1: The Mean Contrast Sensitivity of Amblyopic Eyes (n=20), Fellow Eyes (n=20), and Control Eyes (n=16, OD only)
BACKGROUND

Long anterior zonules (LAZ) are characterized by zonular fibers that extend more centrally than usual on the anterior lens capsule, and could be a risk factor for open- and narrow-angle forms of glaucoma (Fig. 1). They frequently become pigment-dusted due to contact with the posterior iris, and may be detected as radiolucent, fine brown lines after pupillary dilation. In addition to pigment dispersion signs, at least one subtype of LAZ is associated with female genital aging, hypopyon, shorter axial length, remnants of the tunica vasculosa lentis, and possibly plateau iris configuration. Based on observations of peripupillary iris transillumination among some LAZ eyes (Fig. 2), we investigated the hypothesis that LAZ are also more likely to have mild dyscoria, possibly due to chronic indo-zonular rubbing, concentrated in the pupillary region.

METHODS

We reviewed a new infrared iris transillumination (IRI) database that contained a variety of subjects and selected LAZ and normal eyes for comparison. All eyes had been previously imaged using a modified digital camera (CDQ-IX, Nikon, Corp. Tokyo, Japan) to photograph the iris while it was illuminated with visible and infrared light via a standard ophthalmic transilluminator directed against the inferior eyelid. Pupil contour lines (Fig. 3) were created using an automated computer algorithm, and measures of pupil shape were calculated, including pupil roundness (PR), pupil ovalness (PO), pupil circularity index (PCI), pupil size (PS), and pupil eccentricity (PE). Regression analyses were used to assess pupil-feature differences between LAZ and normal eyes. Because African-American females comprised the vast majority of LAZ eyes in the database, only this subject group was included in the analysis.

RESULTS

There were 42 LAZ females with a mean age = 67.8 years +/- 11.5 years (44-102 years) and 78 normals with a mean age = 46.4 years +/- 14.4 years (32-87 years) (Table 1). Controlling for age and pupil size (PS), LAZ right eyes showed PO measures (P=0.0058), PR measures (P=0.003), and PCI measures (P=0.001) that were significantly different from normal right eyes. PO measures were marginally significantly different (P=0.055). Scatterplot of the LAZ and control eyes relative to the PO and PR measures showed a tendency for the least regular pupils to belong to LAZ eyes (Fig. 4).

DISCUSSION

Although the LAZ trait hasn’t received a great deal of attention, it could be present in 1-2% of the general population, and its prevalence appears to increase substantially in people older than 50 years of age. It may be frequently overlooked as a cause of Krukenberg’s spindles and other pigment dispersion signs, and it may have particular significance if the trait is found to indicate true risk for glaucoma. Since much remains unknown about the LAZ phenotype, developing a more complete understanding of associated clinical features is an important goal.

Similar to “classic” pigment dispersion syndrome, LAZ-associated pigment dispersion also results from iridozonular chafing, which might ultimately damage the structural integrity of the iris mucosa and adjacent tissues. There have been anecdotal reports of dyscoria in people with classic pigment dispersion syndrome,17,23 and a more recent comparative analysis also supports these observations.24 Although the iris chafing in LAZ-associated pigment dispersion might be severe the pupil in “classic” pigment dispersion syndromes, it seems logical that similar chronic mechanical rubbing along the posterior iris might also lead to its muscular damage and dyscoria. This observation reported herein support this contention.

Table 1: Pupil measurements for African-American females, LAZ vs. Control

<table>
<thead>
<tr>
<th>Measurement</th>
<th>LAZ (n=42)</th>
<th>Controls (n=78)</th>
<th>Adjusted P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupil Roundness</td>
<td>0.7679</td>
<td>0.6834</td>
<td>0.036</td>
</tr>
<tr>
<td>Pupil Ovalness (PO)</td>
<td>0.9958</td>
<td>0.9877</td>
<td>0.011</td>
</tr>
<tr>
<td>Pupil Circularity Index (PCI)</td>
<td>0.0061</td>
<td>0.0081</td>
<td>0.853</td>
</tr>
<tr>
<td>Pupil Eccentricity (PE)</td>
<td>0.0028</td>
<td>0.010</td>
<td>0.01</td>
</tr>
<tr>
<td>Pupil Size</td>
<td>0.2304</td>
<td>0.1075</td>
<td>0.011</td>
</tr>
</tbody>
</table>

PO measures (lower values indicating less regular pupils). Eyes with lowest values tended to be LAZ eyes.

CONCLUSIONS

In addition to signs previously described, the clinical features of LAZ eyes may also include pupil dyscoria. This may be helpful toward the emerging understanding of the LAZ clinical trait.

REFERENCE LIST

PURPOSE
Reverse contrast is an accessibility feature generally offered on video magnifiers and tablets such as the Apple iPad. To our knowledge, no correlations have been identified between type of diagnosis (retinal versus optic nerve) and preference for reading with reverse contrast mode. The recommendation for use of reverse contrast on electronic magnifiers is driven by the patient’s subjective comfort level when reading text on an electronic device, and is not necessarily driven by the clinical findings or diagnosis of the low vision patient. The impact and its relationship to the patient’s condition have never been clinically investigated.

METHODS
Analysis was completed on a previously approved IRB study where contrast sensitivity results from a prior ARVO study were not analyzed or published (Zemke A, et al. IOVS 2013; ARVO E-Abstract 2749). Fourteen patients, aged 18 years or older, with best corrected visual acuities between 20/50 and 20/200 and minimal prior experience with an iPad or CCTV were enrolled in the study. Patients were asked to read a paragraph from a newspaper article and book at their preferred magnification setting on each device. Patients were then surveyed with a questionnaire investigating subjective comfort and preference for positive (black print with white background) or negative contrast (white print with black background).

Table 1: Age, ocular diagnosis, Snellen equivalent best corrected distance visual acuity, preferred contrast, and preferred reading device of all 14 subjects surveyed.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Age</th>
<th>Diagnosis</th>
<th>Distance (Snellen)</th>
<th>Preferred Contrast</th>
<th>Preferred Device</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>77</td>
<td>Primary Open Angle Glaucoma</td>
<td>20/60</td>
<td>Negative</td>
<td>iPad</td>
</tr>
<tr>
<td>2</td>
<td>68</td>
<td>Central Retinal Vein Occlusion</td>
<td>20/64</td>
<td>Positive</td>
<td>iPad</td>
</tr>
<tr>
<td>3</td>
<td>60</td>
<td>Retinal Detachment</td>
<td>20/70</td>
<td>Negative</td>
<td>iPad</td>
</tr>
<tr>
<td>4</td>
<td>90</td>
<td>Exudative Age-Related Macular Degeneration</td>
<td>20/80</td>
<td>Positive</td>
<td>CCTV</td>
</tr>
<tr>
<td>5</td>
<td>52</td>
<td>Proliferative Diabetic Retinopathy</td>
<td>20/100</td>
<td>Positive</td>
<td>iPad</td>
</tr>
<tr>
<td>6</td>
<td>50</td>
<td>Proliferative Diabetic Retinopathy</td>
<td>20/120</td>
<td>Positive</td>
<td>iPad</td>
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<tr>
<td>7</td>
<td>64</td>
<td>Proliferative Diabetic Retinopathy</td>
<td>20/80</td>
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<td>iPad</td>
</tr>
<tr>
<td>8</td>
<td>63</td>
<td>Optic Atrophy</td>
<td>20/20</td>
<td>Positive</td>
<td>iPad</td>
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<tr>
<td>9</td>
<td>56</td>
<td>Congenital Nystagmus</td>
<td>20/60</td>
<td>Positive</td>
<td>iPad</td>
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<td>10</td>
<td>40</td>
<td>Primary Open Angle Glaucoma</td>
<td>20/200</td>
<td>Positive</td>
<td>iPad</td>
</tr>
<tr>
<td>11</td>
<td>67</td>
<td>Exudative Age-Related Macular Degeneration</td>
<td>20/80</td>
<td>Positive</td>
<td>iPad</td>
</tr>
<tr>
<td>12</td>
<td>52</td>
<td>Proliferative Diabetic Retinopathy</td>
<td>20/100</td>
<td>Positive</td>
<td>iPad</td>
</tr>
<tr>
<td>13</td>
<td>76</td>
<td>Ischemic Optic Neuropathy</td>
<td>20/120</td>
<td>Positive</td>
<td>CCTV</td>
</tr>
<tr>
<td>14</td>
<td>60</td>
<td>Myopic Degeneration</td>
<td>20/120</td>
<td>Positive</td>
<td>iPad</td>
</tr>
</tbody>
</table>

RESULTS
Four of the 14 patients (28.6%) preferred the reverse contrast setting. Three of these four patients preferred using the iPad over the CCTV. The four patients that preferred reading with reverse contrast had four different diagnoses including primary open angle glaucoma, retinal detachment, proliferative diabetic retinopathy, and non-arteritic ischemic optic neuropathy. A two-tailed p-value by Fisher’s exact test revealed no statistical significance when comparing patient diagnosis (retinal versus optic nerve) to patient preference for reading with reverse contrast (p = 0.5205).

CONCLUSIONS
The results of the study suggest that low vision practitioners may not be guided by the type of patient diagnosis when considering which patients would benefit from reading with reverse contrast. The reduced sample size was a limitation to the study and more data is needed to confirm the findings. Investigations are also needed to analyze potential relationships with baseline contrast sensitivity or symptoms of photoaversion.

AUTHOR DISCLOSURE INFORMATION
Josh Robinson, None; Rob Chun, None; Alex Zemke, None; Danielle Irvine, None; O. Vanessa Braimah, None; Walter M. Jay, None.

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Acquired color vision deficiency among visually impaired adults attending a vision rehabilitation clinic

Janes E. Winters, Tracy J. Matchick, Karen Spier
Illinois College of Optometry, Chicago, IL, United States

INTRODUCTION

Usually impaired (VI) patients have significant ocular disease and therefore may have acquired color vision defects (CVD). Color vision (CV) testing however may be limited among VI patients since anecdotal evidence suggests VI patients have difficulty with pseudoisochromatic plate tests assessing acquired CVD. These testing limitations may have led to the scarcity of reports on CV testing and CVD prevalence among VI patients in vision rehabilitation clinics (VRC). The purpose of this study is to assess moderate/severe CVD among VI patients attending a VRC clinic and trends related to symptomology, level of VI and ocular diagnosis.

METHODS

Patients attending a VRC were surveyed regarding CV. CV was tested using the 1.5 inch stimulus van ‘Panel 16 Quantitative Color Vision Test’ (D-15). The color vision test was illuminated using the Richmond Daylight Illuminator (https://www.good-lite.com/default. (Photo 1) vision Test’ (D-15) was used. Primary cause of VI was sub-classified into optic nerve or retinal conditions. CVD, was used. Primary cause of VI was sub-classified into optic nerve or retinal conditions.

RESULTS

For those who completed D-15 testing (N=84), the range of VIAs in the ‘worse seeing-eye’ was 20/20–20/3000. See Table 1. For demographic information. Nearly half of patients tested (48.8%) were male, 22% were African-American, 90.3% were Caucasian, 52.6% were Hispanic, 2.4% were Asian. Age (years) Mean (SD) 52.6 (18.9) 55.5 (19.3) and race were main confounders. Level of VI was classified using World Health Organization criteria. For VI classification, VA in the eye with CVD or ‘better seeing’ eye (if both had CVD) was used. CVD was assessed in 52% of those with optic nerve disease and 61% of those with retinal disease. See Table 2 for a list of ‘Primary Cause of Vision Impairment’ for those CVD. Level of VI among those CVD was 17% normal/near normal, 44% moderate impairment and 39% severe impairment/worse. A personal history of color vision issues as well as their color vision changing over time.

DISCUSSION

The high percentage of CVD identified varies with several factors based upon the severity of ocular disease typically encountered in a Vision Rehabilitation Clinic. This supports the feasibility and importance of color vision testing in this population. Since acquired color vision defects can be difficult to classify it is not surprising that the majority of CVD were ‘unable to classify’. Since the D-15 test does not identify mild color vision deficiencies, the percentage of patients with some type of color vision deficiency is most likely larger than actually identified. This may be the reason that 15% (N=15) were not identified as CVD however reported color vision issues as well as their color vision changing over time. Although there is no treatment for the CVD identified in these patients. Assessment and education about CVD is important for patients especially since CVD may worsen if their ocular condition progresses.

Since this project was done in one VR clinic, results cannot be generalized however similar trends would be expected to be found at other VR clinics.

It is possible that a few patients had a congenital color vision deficiency that they were not aware of however considering the large number of females examined, the few number of tradition red-green color vision defects identified and the asymmetry in CVD between the eyes in some patients, it is unlikely that a large number of patients had congenital CVD in this population.

CONCLUSION

D-15 testing was completed on patients with a wide range of VI levels; demonstrating the feasibility of this method of color vision assessment in a VRC clinic. There was a high percentage of moderate/severe CVD identified. Of those with CVD, there was variability in report of change in CV level of VI and ocular disease causing it. Therefore in this population CVD cannot be assessed based upon these factors. Although there is no treatment for CVD, education about acquired CVD and specific activities CVD may impact is essential especially due to possible CVD progression as the ocular conditions worsen.

CONTACT INFORMATION

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Table 2: Primary Cause of Vision Impairment with Color Vision Deficiency

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Patients</th>
</tr>
</thead>
<tbody>
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<td>Glaucoma</td>
<td>8</td>
</tr>
<tr>
<td>Aphakic degeneration</td>
<td>8</td>
</tr>
<tr>
<td>Optic atrophy</td>
<td>5</td>
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<tr>
<td>Macular dystrophy</td>
<td>4</td>
</tr>
<tr>
<td>Diabetic retinopathy</td>
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</tr>
<tr>
<td>Retinitis pigmentosa</td>
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</tr>
<tr>
<td>Retinal detachment</td>
<td>3</td>
</tr>
<tr>
<td>Congenital color blindness</td>
<td>2</td>
</tr>
</tbody>
</table>

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Subjective and Objective Performance of Antireflective Lenses During Daily Activities
Rebecca K. Zoltoski and Janice M. McMahon, Illinois College College of Optometry

Introduction
Antireflective (AR) lenses are designed to reduce reflections and secondary images produced by the spectacle surface. An associated Fresnel formula (\(P\%\)) expresses the approximate % of incident light transmitted by CR-39 lenses (n=1.498). 7% of the incident light is transmitted, and 10.3% of the incident light. Ghost images are reduced, glare is approximately 10.3% of incident light. Both the wearer and the observer perceive this reflectance of incident light as being very good to excellent, while the non-AR lenses were rated good to very good (p=0.01)

Results:
When comparing comfort and clarity under different conditions (daytime work and driving, nighttime work and driving, and when using desktop computer or a handheld device), the subjects rated the AR lenses as being very good to excellent, while the non-AR lenses were rated good to very good (p<0.05)

Conclusions
The majority of subjects displayed a clear preference for AR lenses over non-AR lenses.

Support
The authors would like to thank Anesu Mvududu, DHSc, MPA and Susan Kelly, PhD for their aid in this study.

Acknowledgements
This study was supported by a grant from The Vision Council. The authors do not benefit from this study.

References

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I. Design Summary
II. Methods
III. Results
IV. Conclusions
V. Discussion
VI. References
VII. Acknowledgements

Table 1: Demographic characteristics of participants in US and study populations

<table>
<thead>
<tr>
<th>Population</th>
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<th>Study (%)</th>
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<td>(cylinder ≥ 1.0D)</td>
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<td>Hyperopes</td>
<td>SphEq* ≥ 3.0D</td>
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<tr>
<td>Myopes</td>
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Table 2: Reflected error measurements of study participants in US and study populations

<table>
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Design Summary

Contrast sensitivity was measured under glare conditions while subjects wore both AR coated and non-AR coated lenses.

Upon completion, the subjects were more likely to recommend or repeat the AR coated lenses, while 73% of the subjects chose to keep the AR coated lenses as their preferred pair.

Conclusion

The majority of participants displayed a clear preference for AR lenses over non-AR lenses. Subjectively, the AR lenses provided better clarity and comfort when performing normal daily activities and tasks including driving, working at a computer and using a handheld device. Objectively, glare was reduced through the AR lenses when compared to non-AR lenses, but contrast sensitivity was not significantly improved.

Recommendation of antireflective lenses may benefit the wearer by reducing glare, as well as enhance visual comfort and acuity.

Future Direction
Our study did not provide information on benefits in other groups. A study incorporating subjects known to have increased prevalence of refractive errors may provide more information on benefits in other groups.

Acknowledgements
This work would like to thank Anesu Mvududu, DHSc, MPA and Susan Kelly, PhD for their aid in this study.

Support
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Expression of a Mutant Cx46 Leads to Changes in Lens Fiber Ultrastructure
Sarah M. El-Khazendar1, Rebecca K. Zoltoski1, Viviana M. Berthoud2, Peter J. Minogue2 and Eric C. Beyer2
1Illinois College of Optometry, Chicago, IL; 2University of Chicago, Chicago, IL

Purpose

Intracellular ultrastructural changes have been linked to mutations in connexin46 (Cx46) including primary congenital cataracts. Cx46 was deleted in a knock-in strategy. Although lenses of young mutant mice appear transparent, anterior cataracts are evident in homozygous Cx46fs380 mice at 2 months. The experiments were designed to characterize the structural changes in lens fiber cell membranes that occur in these mice with aging.

Methods

Lenses from wild type (+/+ and homozygous fs380/fs380) Cx46fs380 were collected from 1-3 months old (+/+) and 1.3 months old and 5.5 months old (fs380/fs380) mice. Lenses of homozygous fs380/fs380 mice were obtained by immunostaining. Whole lenses were fixed and dissected into approximately 200 μm thick peels to allow examination of nuclear, and inner and outer cortical regions. These sections were processed and examined by scanning electron microscopy (Hitachi S-3000N). Images were quantified for number of furrows per 20 μm, interdigitations per 20 μm, and number and size of cell interdigitations. Nonparametric t-tests were used to assess the significance of differences between genotypes and ages (p <0.05). Data are presented as mean ± SEM.

Results

Lenses from +/+ and fs380/fs380 mice at 4 months of age were photographed using dark-field illumination.

Number of Lateral Interdigitations

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
<th>fs380/fs380</th>
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</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>193 ± 61</td>
<td>142 ± 33</td>
</tr>
<tr>
<td>5.5 months</td>
<td>240 ± 48</td>
<td>197 ± 41</td>
</tr>
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% Without lateral interdigitations

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
<th>fs380/fs380</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>60% ± 8%</td>
<td>85% ± 4%</td>
</tr>
<tr>
<td>5.5 months</td>
<td>77% ± 5%</td>
<td>90% ± 2%</td>
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</tbody>
</table>

% With lateral interdigitations

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
<th>fs380/fs380</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>40% ± 8%</td>
<td>15% ± 4%</td>
</tr>
<tr>
<td>5.5 months</td>
<td>23% ± 5%</td>
<td>10% ± 2%</td>
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</tbody>
</table>

% Organized furrows

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
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</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>80% ± 5%</td>
<td>65% ± 3%</td>
</tr>
<tr>
<td>5.5 months</td>
<td>93% ± 2%</td>
<td>87% ± 1%</td>
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% Unorganized furrows

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
<th>fs380/fs380</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>20% ± 5%</td>
<td>35% ± 4%</td>
</tr>
<tr>
<td>5.5 months</td>
<td>7% ± 2%</td>
<td>13% ± 1%</td>
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% Without furrows

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
<th>fs380/fs380</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>47% ± 8%</td>
<td>57% ± 4%</td>
</tr>
<tr>
<td>5.5 months</td>
<td>37% ± 5%</td>
<td>43% ± 3%</td>
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</tbody>
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% With furrows

<table>
<thead>
<tr>
<th>Age</th>
<th>+/+</th>
<th>fs380/fs380</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.3 months</td>
<td>53% ± 8%</td>
<td>43% ± 4%</td>
</tr>
<tr>
<td>5.5 months</td>
<td>63% ± 5%</td>
<td>57% ± 2%</td>
</tr>
</tbody>
</table>

At 1.3 months of age, fiber cell membranes were similar in the amount of sections that contained furrows. However, in the homozygous fs380, there was an increase in the amount of unorganized furrows seen. As expected, the percentage of sections that contained fiber cell furrows increased with age in +/+ lenses. In contrast, in homozygous fs380 lenses there was no change, when compared to the younger lenses. Lens sections from 5.5-month-old fs380/fs380 mice contained significantly fewer furrows than +/+ mice and the furrows that did occur were less organized. Interestingly, when comparing the homozygous fs380 lenses across ages, there was an increase in the amount of organized furrows, which might be due to sample size. There was no difference between the percentages of sections with fiber cells containing formed lateral interdigitations. Nor were there any changes in number of tail and socket joints was detected between the genotypes.

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Figure 1: Expression of Cx46fs380 causes cataracts

Figure 2: Graphs showing the densitometric values of the bands obtained in 3-5 independent experiments expressed as percentages of the values obtained in wildtype animals.

Figure 3: Presence of furrows in lens peels.

Figure 4: Organization of furrows in lens peels.

Figure 5: Split lens demonstrating where the following SEM samples were obtained.

Figure 6: Outer cortical fibers (<250 μm from edge of lens)

Figure 7: Outer cortical fibers (~500 μm from edge of lens)

Figure 8: Inner cortical fibers (~500 μm from edge of lens)

Figure 9: Inner cortical fibers (~750 μm from edge of lens)

Figure 10: Outer nuclear fibers (~750 μm from edge of lens)

Figure 11: Outer nuclear fibers (~750 μm from edge of lens)

Figure 12: Cx46 from wildtype and homozygous fs380 mice lenses, 1.3 months old

Figure 13: Cx46 from wildtype and homozygous fs380 mice lenses, 5.5 months old

Future directions:

We will quantify these changes in a larger sample size across more ages to encompass the effects of variability in the mouse lenses and direction processes.

Conclusions:

In Cx46fs380 mice, reductions of Cx46 and Cx50 precede the appearance of structural changes in lens fiber cell membranes and cataracts. The numbers of membrane furrows increased in older wild type mice, consistent with the remodeling of lens fibers during normal growth. However, the decreased sections with furrows in fiber cell membranes from fs380 lenses suggest that expression of this mutant alters the normal compaction process (possibly due to the decreased levels of fiber cell connexins).

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Successful Completion of Vision Therapy in Different Socioeconomic Backgrounds

Kelly A. Frantz, OD, FAAO, FCOVD; Young Rong Choi, BS; Trinh Dean, BS; Yi Pang, OD, PhD, FAAO

Illinois College of Optometry, Chicago, IL, United States

Table of Contents

BACKGROUND

Previous studies have established a positive correlation between presence of binocular vision dysfunctions and poor academic performance in school-aged children. Furthermore, many studies have reported the success of vision therapy (VT) in eliminating the signs of binocular disorders as well as their symptoms. The prevalence of symptomatic children and the relationship between abnormal visual functioning and poor academic performance creates an urgency to address these visual dysfunctions early. Compliance with treatment is a critical factor in VT success. There is evidence that lower socioeconomic status correlates with poorer compliance in medical treatments. However, we are unaware of any studies evaluating the success of VT in school-aged children based on socioeconomic status. The purpose of our study was to investigate frequency of successful completion of VT by school-aged children of lower compared to higher socioeconomic status.

METHODS

Subjects were school-aged children at the Illinois Eye Institute, the teaching clinic of the Illinois College of Optometry. Vision therapy was prescribed and supervised by an optometrist specializing in pediatrics/binocular vision, and administered by an optometry student or resident. Study inclusion and exclusion criteria are listed in Table 1. Electronic health records were reviewed for the 163 eligible children. For each subject, method of payment for VT sessions was recorded as an indication of their socioeconomic status. Those with Medicaid were considered to be of lower socioeconomic status because eligibility for the program is based on being low-income. Those with commercial insurance (provided through a parent’s employer) and those who could afford to self-pay for VT were considered to be of higher socioeconomic status. The subjects were then classified either as having successfully completed VT (based on attending optometrist’s assessment of improvement in vision skills upon completion of the VT program) or as having failed to complete VT due to noncompliance or dropping out of the program.

RESULTS

- There was no significant correlation (rho=0.04) between successful completion of VT and payment type (Medicaid (n=134) versus self-pay/commercial insurance (n=29)). See Figure 1.
- The older subjects (ages 10-17 years, n=89) were significantly more likely to succeed in VT (p=0.04) compared to the younger subjects (ages 6-9 years, n=74). See Figure 2.
- There was no significant influence of a subject’s gender on success in VT (p=0.16).
- Possible reasons include better understanding of procedures and ability to comply with home VT without parental assistance.

DISCUSSION/CONCLUSIONS

Socioeconomic status indicated by payment type did not show an association with successfully completing VT for school-aged children in our clinic.
- Household income might be a better predictor of socioeconomic status.
- Other factors in VT success not evaluated:
  - Patient, guardian, and therapist motivation and skill
  - Patient/guardian time constraints
  - Ability to travel to appointments
  - The older children had a greater VT completion rate than the younger ones.

REFERENCES


CONTACT INFORMATION

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3241 S. Michigan Avenue
Chicago, IL 60616
Email kffrantz@ico.edu
Website: www.ico.edu

Table 1: Inclusion and Exclusion Criteria

<table>
<thead>
<tr>
<th>Condition</th>
<th>Included</th>
<th>Excluded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children ages 6 years 0 months to 17 years</td>
<td>154</td>
<td>68</td>
</tr>
<tr>
<td>Ages 6-9 years</td>
<td>74</td>
<td>67.6%</td>
</tr>
<tr>
<td>Ages 10-17 years</td>
<td>89</td>
<td>49.4%</td>
</tr>
<tr>
<td>Medicated</td>
<td>53.0%</td>
<td>46.3%</td>
</tr>
<tr>
<td>Self-pay</td>
<td>51.7%</td>
<td>48.3%</td>
</tr>
</tbody>
</table>

Figure 1: Frequency of VT Success by Payment Type

Figure 2: Frequency of VT Success by Subject Age

Kelly Frantz, OD
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3241 S. Michigan Avenue
Chicago, IL 60616
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Website: www.ico.edu
BACKGROUND

Pseudotumor cerebri or idiopathic intracranial hypertension (IIH) is a disease which presents as papilledema secondary to increased intracranial pressure, with a negative cerebrospinal fluid (CSF) opening pressure upon lumbar puncture. It occurs predominantly in obese women of childbearing age and is prevalent in 3.5/100,000 women from ages 15-44 years old. Symptoms may include headaches, tinnitus, transient visual obscurations, diplopia, blurred vision and field loss. Occular findings may include disc hyperemia and enlarged blind spot or partial inferior arcuate defect on a visual field.

The first line of defense is weight reduction via diet, carbonic anhydrase inhibitors, diuretics and elimination of all risk factors, including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in IIH has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal. Surgical treatments including tetracycline, vitamin A use. Although a decrease in symptoms has been seen with a 6% decrease in weight, an end goal of a normalized BMI less than 25kg/m2 is ideal.

EXAM FINDINGS

A 16 y.o. African American female presented to the ER with complaints of headaches for the past 3 weeks, diplopia for the past 2 weeks and tinnitus for the past week. A CT scan was unremarkable after a visit to the ER. She was a sophomore straight-A student who still had to manage her normal school work. This case also shows that a careful optic nerve evaluation with imaging is warranted, despite being outside the expected demographics.

TREATMENT AND MANAGEMENT

The patient was diagnosed with bilateral papilledema and was referred to the neuro-ophthalmology department at UIH for further workup including MRI/IV and lumbar puncture with a strong suspicion of IIH. A full Freesnel correction of 10 pd BU OD and 20 pd BO OS added to her habitual spectacles for immediate diplopia relief.

FOLLOW UP

The patient was diagnosed with IIH and placed on a Diamox regimen. She reported decreased headaches, tinnitus and no diplopia with normal mobility at her next follow up, one month after her initial visit.

CONCLUSION

This case demonstrates the importance of striking a balance between relaxing the patient’s symptoms while still ensuring that referrals are made to properly diagnose and manage the underlying condition. The patient was able to leave our office with single, clear, comfortable binocular vision while still understanding the severity of her condition. Freesnel prisms provided immediate relief to this straight-A student who still had to manage her normal school work. This case also shows that a careful optic nerve evaluation with imaging is warranted, despite being outside the expected demographics.

REFERENCES


CONTACT INFORMATION

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BACKGROUND

Stargardt’s Disease is the number one inherited macular disorder among patients 10-20 years old, occurring in approximately 1 in 10,000 patients. This degenerative macular disorder is known for rapidly decreasing VAs, ending between 20/200-20/400. The disorder comes from the degeneration of the junctions between photoreceptor inner-segments and outer-segments, which can be seen on OCT. Typically Stargardt’s disease has a characteristic fundus appearance of golden “fish tail” shaped flecks throughout the macula. Patients may present with bilateral decreased central vision, visual field defects, photophobia, nyctalopia, and color vision defects.

CASE PRESENTATION

Initial Exam Findings

An 11 year old African American female was referred to the Illinois Eye Institute Pediatrics and Binocular Vision department for a visual efficiency exam and potential vision therapy. Her primary complaint was blur at all distances which worsened after prolonged reading. The patient also reported decreased reading speed and comprehension. The symptoms were intermittent and worsened in the evening. At this time, the patient was in the fifth grade and performing above grade level with no known special needs or learning disabilities. The patient reported no previous ocular history or systemic health history positive only for asthma. A visual efficiency exam was performed with results shown in Table 1.

Cycloplegic Exam Findings

After two months of therapy, the patient continued to report decreased vision at all distances. A cycloplegic exam was performed to re-evaluate the patient’s visual complaints. Cycloplegic refraction revealed a minimal prescription, with little impact on acuity. A dilated fundus exam was performed at this exam and revealed the findings shown in Figure 1 and OCT results can be seen in Figure 2. The patient was referred to The Chicago Lighthouse for the Blind to see Dr. Fishman, a specialist in inherited retinal disorders, who confirmed a diagnosis of atypical Stargardt’s disease.

Dilation was deferred at this exam and undilated IGD examination showed a healthy optic nerve head. Decreased convergence ranges, a receded NPC, and reduced amplitudes of accommodation led to diagnoses of both convergence and accommodative insufficiencies and the patient was enrolled in therapy.

TREATMENT

Therapy was resumed with adaptations to increase the patient’s ability to perform therapy techniques. Increasing the size of targets to 20/20 or greater facilitated progress in the patient’s accommodative and vergence abilities. Over 28 weeks of therapy, performing the activities listed in Table 2, the patient was able to nearly triple her accommodative amplitudes and increase convergence ranges to more than compensate for her exophoria.

CONCLUSION

While it would have been easy to dismiss this patient following her Stargardt’s diagnosis, our patient was able to increase her accommodative skills to age expected levels while increasing her vergence ranges to fully compensate for her exophoria through continued vision therapy. This case highlights the potential for vision therapy to maximize the visual skills of our patients, even when pathological disorders are at play. It also demonstrates the need to do our own full exams on every new patient. Even if a patient is only coming in for a binocular vision disorder, it is difficult to create and complete a therapy regimen without having the whole picture.

REFERENCES


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Table 1: Pre and Post Therapy Visual Efficiency Exams

| Table 2: Therapies Performed |

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Description</th>
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<tr>
<td>Hart Chart Flash-up</td>
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<tr>
<td>Ten Partner Push-up and Fall-away</td>
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<tr>
<td>Work Time Push-ups</td>
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<tr>
<td>Hot Chart – Distance Near Rock</td>
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<td>Visual Efficiency</td>
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<td>Rotating Pegboard</td>
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<td>Mini Red/Red Rock</td>
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<tr>
<td>Vectograms - Variable</td>
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<tr>
<td>Iron Action Letter Tracking</td>
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<tr>
<td>Miniball – Dip</td>
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<tr>
<td>Miniball – Dots and Dashes</td>
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<tr>
<td>Figure 1a</td>
<td>Figure 1b</td>
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<tr>
<td>Figure 2a</td>
<td>Figure 2b</td>
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<tr>
<td>Figure 2a and 2b: OCT OD and OS</td>
<td>RPE disruptions and absence of junctions between the inner and outer segments of the photoreceptors.</td>
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</table>
To evaluate and compare the efficacy of two, once a day ocular drops, an evaluation was performed in order to assess patient functioning and daily activities, and to assess patient satisfaction with how quickly their current eye drops improved their symptoms. A slit lamp examination was performed, and photos were taken of the bulbar and palpebral conjunctiva. The Eye Allergy Impact Questionnaire (EAIQ), an ocular allergy-specific questionnaire, was used at each patient visit to assess the impact of eye allergies on patient functioning and daily activities, and to assess patient satisfaction with treatment (FIG 1). A paired T-test was performed to compare improvement of allergy symptoms and satisfaction with treatment from before and between each drop. Patient symptoms were divided into 6 categories: 1) occurrence of eye allergy symptoms; 2) action taken for eye allergy symptoms; 3) effect of eye allergy symptoms on everyday activities and emotions; 4) trouble performing activities; 5) troubled by emotions; and 6) satisfaction with treatment of eye allergy symptoms.

Both alcaftadine 0.25% and olopatadine 0.2% provided significant relief of allergic conjunctivitis, improvement in emotions and ability to perform daily activities, and satisfaction with treatment of eye allergy symptoms. However, there was no significant difference between the two drops in relieving ocular allergy symptoms in any category.

### RESULTS

Alcaftadine 0.25% was significant in the reduction of eye allergy symptoms (p<.001), trouble performing activities (p<.001) and emotions resulting from eye allergy symptoms (p<.027).

Olopatadine 0.2% was significant in the reduction of occurrence of eye allergy symptoms (p<.002), actions taken for allergy symptoms (p<.001), effect of eye allergy symptoms on everyday activities and emotions (p<.001), and troubled by emotions resulting from eye allergy symptoms (p<.004) (FIG 2-6). Patients were satisfied with the overall treatment of their symptoms, including speed of improvement and comfort, with both drops (FIG 7). No significant difference was found between the two drops on any of the six sections of the patient questionnaire.

### CONCLUSION

Both alcaftadine 0.25% and olopatadine 0.2% provided significant relief of allergic conjunctivitis, improvement in emotions and ability to perform daily activities, and satisfaction with treatment of eye allergy symptoms. However, there was no significant difference between the two drops in relieving ocular allergy symptoms in any category.
INTRODUCTION

For optimal visual acuity, contact lenses are often necessary for patients following a penetrating keratoplasty. However, patients who have undergone penetrating keratoplasties can be very challenging to fit with contact lenses secondary to the oblate nature and irregularity of the cornea. When fitting these patients with contact lenses, it is important to minimize stress to the corneal graft and maintain excellent oxygen transmission to reduce risk of graft rejection. The RevitalEyes® post-surgical reverse geometry custom soft lens by Metro Optics is a contact lens option that provides oxygen transmission.

To wear the lenses comfortably all day long, it is important to minimize stress to the corneal graft and maintain excellent oxygen transmission. The lenses are made in the Definitive™ 74% water silicone hydrogel material, Dk 60 for post-surgically altered corneas by Metro Optics-Definitive™ material that provide adequate oxygen, optimal ocular health, maximal comfort, and clear vision. It may also be an option for any patient, not just post-surgical, with oblate corneas who have failed with other lenses.

CASES

PATIENT 1
Patient 1, a 67 year old Hispanic female underwent a PKP OS in 2011 following complications from cataract surgery. She had never worn contact lenses and complained of significant distortion with glasses alone. Her refraction was -0.50 D-1.50x90, OD; 20/20 OD and -1.25DS, 20/70 OS, +1.50x80. Topography showed average keratometric (K) readings of 42.84/40.32x075 OD and 43.74/42.65x152 OS (Figure 1). Slit lamp examination revealed a clear corneal graft OS.

She was fit with the RevitalEyes® lenses: OD 9.0/-2.75+1.75x105/15.5, 20/20 and OS 8.75-3.25-2.00 12/0.5, 20/20 (Figure 2). The patient achieved five lines of improvement in her vision and noticed an immediate improvement in her image distortion. She is currently using Clear Care solution and is able to wear the lenses comfortably all day long.

PATIENT 2
Patient 2, a 55 year old Asian male underwent a second PKP OS in 2011 for keratoconus, as his first had rejected. He was comfortable wearing an aphakic GP contact lens OD which provided 20/20 visual acuity. He noted discomfort and unstable vision with all other lens designs previously prescribed. OS. Refraction was -10.50-2.50x162, 20/20 OS. Average K readings with topography were 52.22/53.46 @062 OD and 42.62/47.73 @037 OS. Slit lamp examination showed atrophy at the corneal graft-host interface OD.

The RevitalEyes® lens was ordered OD: 8.7/-1.25-6.00x070/14.8 and OS: 8.75-2.50-6.00x070/14.8 (Figure 3). Slit lamp examination revealed a clear graft OD and was unremarkable OS. An 8.75/-1.25-6.00x070/14.8 RevitalEyes® lens was ordered OD, which improved acuity to 20/25 (Figure 4). The patient now has comfortable, stable vision for up to 16 hours per day.

PATIENT 3
Patient 3, a 44 year old Hispanic male underwent a PKP OS in 2011 following complications from cataract surgery. He had failed with all other lens modalities. His previous contact lenses experience caused hesitation towards trying new lenses. Refraction was +0.50 -2.50x80, 20/25 OD and +0.50x175, 20/25 OD, and +2.50 OU. K readings were 46.94/47.14x141 OD (Figure 3) and 43.74/44.50x002 OS. Slit lamp examination showed a clear graft OD and was unremarkable OS.

The RevitalEyes® lens was ordered OS: 8.87-1.25-6.00x070/14.8 (Figure 2). The patient now has comfortable, stable vision for up to 16 hours per day.

DISCUSSION

Reasons for post-surgical contact lens fitting are multifactorial and may include the correction of irregular astigmatism and anisometropia. Custom soft lenses have traditionally played a limited role with post-surgical corneas due to lack of oxygen transmission and material availability compared to their GP counterparts. The RevitalEyes® post-surgical lens design is a custom manufactured FDA cleared soft lens for surgically altered corneas by Metro Optics-Definitive™ material that provide adequate oxygen, optimal ocular health, maximal comfort, and clear vision. It may also be an option for any patient, not just post-surgical, with oblate corneas who have failed with other lenses.

CONCLUSION

Contact lens fitting following a PKP is often necessary to provide patients with optimal visual acuity. With a wide range of powers and base curves available, post-surgical patients may be successfully fit with the RevitalEyes® custom lenses made out of the Definitive™ material that provide adequate oxygen, optimal ocular health, maximal comfort, and clear vision. It may also be an option for any patient, not just post-surgical, with oblate corneas who have failed with other lenses.

REFERENCES

Available upon request.
BACKGROUND

Fitting patients with pellucid marginal degeneration can be very challenging. In particular, an effort to stabilize the inferior portion of the lens can be difficult. Fitting can be approached in a variety of ways. Traditional methods include using corneal lenses. These lens designs often had to be adjusted by using the piggyback or using a sector management inferiorly. More recently we have begun using scleral lenses to vault over the area of extreme inferior ectasia. However now with the Kerasoft IC lens we are able to fit these patients more successfully and with greater comfort.

The Kerasoft IC lens is available in the oxygen permeable material, Definitive. The lens also is available with customizable peripheries which plays a significant role in its success with patients with pellucid. The lenses are fit such that the base curve of the lens provides the best vision. However often with patients suffering with pellucid the best fitting base curve does not provide the best overall fitting relationship with the cornea and the conjunctiva. The lens needs to center well and move between one and 2 mm. The lens also should remain aligned in the periphery with minimal rotation. The optic zone must remain centered over the pupil. To accomplish this, a steeper periphery curve design may be needed to stabilize the lens upon the eye. However in rare cases using sector management control can be very helpful. Presented here is a case of a patient with pellucid who had failed with limbal lenses that had inferior tuck and with piggyback lenses (Figure 1). She was looking for improved comfort as well as stability of vision.

CASE

This 48-year-old Hispanic female was fit with the Kerasoft IC lens. Profile evaluation of the left eye showed severe steepening consistent with the 56.50/62.68 SimKs (Figure 2). The left eye was fit with an 8.0 base curve which provided 20/30 vision with a simple sphero-cylindrical over refraction. The lens centered well, was comfortable, and the patient was happy with the vision. The lens was ordered and no adjustments were needed. The right eye had a more regular corneral profile and the Simks were less steep at 52.12/58.12 (Figure 3). We initially wanted to try an 8.6 lens however this lens was torn. So an 8.8 base curve lens was placed on the right eye. It provided unstable vision and had a large bubble at the limbus (Figure 4). Upon upgaze the lens fluted off the cornea and popped off of the eye. Figure 5 is a representation of another patient with similar but less severe fluting. An 8.4 lens was selected next. With this lens the vision was consistent and stable 20/40. While the 8.4 lens provided better vision with the same over refraction of the 8.8, it still showed significant decentration and occasionally a bubble in the periphery (Figure 6). The patient also remained aware of the contact lens inferiorly. So, an 8.2 lens was placed on the eye with consistent vision on overrefraction. This lens was ordered and dispensed. However, upon follow up the vision was more unstable with it being clearer immediately after the blink. And while comfort was improved dramatically, the lens appeared slightly tight on the eye. It moved less than 1 mm and there was some drag in the superior portions of the lens.

Therefore it was determined that in this instance a lens should be ordered with sector management control using the flatter base curve. So the lens was ordered with an 8.4 base curve with the one steep standard sector management control. This lens provided 20/30+ stable vision and good comfort.

CONCLUSIONS

The customizability of the Kerasoft IC allows us to fit a variety of different corneas. Choosing the base curve that provides the best and most stable vision is essential. However in cases of extreme irregularity achieving best corrected vision is challenged by the distortion of the poorly fit periphery. In these instances trying a steeper periphery can help or even a steeper base curve as initially attempted here. However when these more traditional changes fail utilizing the sector management control option can resolve peripheral fitting issues and thereby improve vision, fitting relationship, and comfort.

DISCLOSURE

The author has received honoraria from B+L in the past.

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**Scleral Contact Lenses in the Ocular Surface Management of Graft vs. Host Disease**

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### Background

Patients who have undergone allogenic hematological stem cell transplantation are at high risk for developing Ocular Graft Versus Host Disease (GVHD). The most common findings in these patients are related to decreased tear production and chronic inflammation, resulting in conjunctival fibrosis and severe corneal manifestations. Treatment of systemic GVHD is critical, but often does little to improve the ocular symptoms that are present in up to 90% of chronic GVHD patients. The case presented here is of a 51-year-old female who was evaluated for dry eye secondary to GVHD, diagnosed in 2011, and experiencing little relief with topical lubricants and punctal plugs.

### Ocular History

Positive for corneal abrasions in both eyes, which was persistent for the last six months. She reported no relief with topical lubricants and punctal plugs.

### Medical History

Leukemia, Chronic bronchitis, Diabetes mellitus type 2, Graft vs. host disease, Arthritis.

### Eye Medications

- Restasis 0.05% b.i.d., Artificial tears q15min.
- Mydriatics: Solotar, Mydriacyl q4h.

### Systemic Medications

- Valacyclovir, Azithromycin, Prednisone, Flovent, Potassium Chloride.
- Trimethoprim, Prednisone, Flovent, Potassium Chloride.
- Voriconazole, Singulair, Viread, Ursodiol, Glipizide, Gemfibrozil.
- Methotrexate, Prednisone, Lisdexamfetamim, Febuxostatin, Omeprazole.

### Examinations

#### Exam Findings

- **VA:** CC: 20/25 OD, 20/40 OS  
  PH: T
- **Refractive Error:** OD: -1.00 -0.50 @ 125, VA of 20/25  
  OS: -1.00 -0.50 @ 000, VA of 20/40
- **Lids/Lashes:** Serous discharge upon awakening, and extreme photophobia chemosis
- ** Conjunctiva:** 3+ and injection
- ** Cornea:** Microcystic corneal edema, dense punctuate epithelial erosions inferiorly, moderate superiorly.
  - Moderate staining with sodium fluorescein and lissamine green (Figures 1 and 2). Posterior segment findings were within normal limits.
- ** Topography:** OD was spherical; OS showed two dropoffs with the rule astigmatism. Remaining SLE: T/F.

<table>
<thead>
<tr>
<th>ESSILOR JUPITER™ BC POWER OAD PERIPHERY VA</th>
<th>OD (182)</th>
<th>7.03 -6.75</th>
<th>18.2 80p-4th</th>
<th>20/40</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS (182)</td>
<td>7.03 -6.75</td>
<td>18.2 80p-4th</td>
<td>20/25</td>
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### Treatment and Management

The patient was diagnosed with keratoconjunctivitis sicca and graft versus host disease. The patient was instructed to continue supportive therapy in both eyes - Restasis b.i.d., preservative-free tears q1hr, and lubricating ointment at bedtime. The patient was originally fit with the MSD lens, which has an OAD of 15.8mm, but was switched to the Jupiter in 2012 for increased coverage of the ocular surface and to increase the vault (200-250 micron) to ensure an optimal tear reservoir (Figures 3 and 4). Both lens designs provided superior subjective relief in comparison to her initial treatment of artificial tears and punctal plug. The peripheral zones were flattened in the Jupiter lens to achieve alignment and decrease lid awareness. With several months of lens wear and supportive therapy, an objective decrease in punctate epithelial erosions and injection were noted with external slit lamp photographic analysis (Figures 5 and 6). Visual clarity was maintained with the lenses by achieving 20/25 vision OD, which was the original BCVA provided by her glasses, and the patient’s symptoms significantly improved. The patient is still wearing the lenses successfully, and being monitored on a regular basis.

### Discussion

Scleral lenses have experienced a resurgence in popularity in recent years, largely due to the development of high-Dk GP materials such as the Boston XO2 material used in both the lenses studied here. In previous designs, the lower Dk materials coupled with the inherent increased lens thickness relative to corneal GP lenses would often result in hypoxia induced corneal swelling, rendering any therapeutic effect useless. The increased oxygen permeability of these new lenses enables practitioners to use scleral lenses as a moisturizing bandage for the ocular surface, essentially using an artificial tear reservoir to reduce irritation and dryness associated with many corneal conditions, including ocular GVHD.

### Conclusion

GVHD patients are one group of many that have benefited from the recent development of high-Dk GP materials and the resurgence of scleral contact lenses. The ability to maintain a large tear reservoir on the diseased ocular surface while maintaining oxygen flow makes scleral contact lenses an excellent treatment modality for the severe ocular surface disease often found in GVHD patients while providing optimal vision correction. Though a frequent and thorough lens-clearing schedule is required, the patient is comfortable and currently wearing her lenses successfully for all waking hours of the day.

### References

Available upon request.

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ICBO
2 ICO PRESENTATIONS
BACKGROUND AND AIMS

Vision impairment is an important health concern in individuals with intellectual disability. It can affect quality of life and function in a wide range of domains, including education, employment, and social interactions. Special Olympics, as a worldwide organization, provides opportunities for athletes to participate in a variety of sports, including visual acuity screening and referral for eye care.

METHOD

Visual impairment screening was conducted during the Opening Eyes program. Athletes were screened before the event and again at the site of the event by certified optometrists. Referrals were made for follow-up care. The Opening Eyes program is designed to provide free visual screening and referrals to athletes in more than 100 countries. Special Olympics is the world’s largest public health organization for individuals with intellectual disability, offering a wide range of programs, including health screenings.

RESULTS

The data presented in this paper were obtained from Special Olympics athletes at international and domestic events. The data are based on athletes who were screened at athlete villages during the Opening Eyes program. Athletes were divided into two age groups: children (ages 6-12) and adults (ages 13 and older). The data were collected in 2012 and 2014.

The table shows the distribution of eye health problems that were identified during the Opening Eyes program. The data are presented as frequency and percentage for each category.

CONCLUSIONS

The data presented in this paper were obtained from Special Olympics athletes at international and domestic events. The data are based on athletes who were screened at athlete villages during the Opening Eyes program. Athletes were divided into two age groups: children (ages 6-12) and adults (ages 13 and older). The data were collected in 2012 and 2014.

The data show that visual impairment is a significant health concern among Special Olympics athletes. The prevalence of visual impairment varies by age group, with higher rates among children than adults.

Refraction error

Spherical Refraction Error - 00

The table shows the distribution of eye health problems that were identified during the Opening Eyes program. The data are presented as frequency and percentage for each category.

CONTACT INFORMATION

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**INTRODUCTION**

Pallister-Killian mosaic syndrome is a very rare, multiple congenital developmental disorder of unknown genetics that is characterized by significant intellectual disability, facial anomalies, thin upper lip, iris transillumination, and other birth defects. Incidence is around 1/25,000. They often have difficulty breathing, feeding, sitting, standing, rolling, and speech. The facial features include a high nasal root, broad nasal bridge, hypotonia, unusual pigmentation, and heart defects which are frequently present. The genetic strategy is a result of the chromosome 12q. Extra copies of chromosome 12q cause the characteristic features of PKMS. A mosaic of both normal and extra copies of chromosome 12q, but also have the mosaic of chromosome 12p. This results in a total of four copies of all the genes on 12q and only one copy of 12p genes. These mosaic cells develop, resulting in the characteristic features of PKMS. Only about 30 cases have been reported in the literature.

**CASE REPORT**

She is a 16-month-old female with PKMS who presented for an evaluation of eye rubbing in both eyes. Her parents are interested in determining if vision and/or visual rehabilitation therapy is needed. She is currently receiving vision rehabilitation therapy in the clinic. She was wearing glasses prescribed by her optometrist and denied any allergy. Her last examination noted a petechial hemorrhage OD and was wearing a small patch (1.00 X 180) and OS +4.50 -1.00 X 090. The external health examination noted mild to moderate hyperopia and anisometropia. She has been wearing the prescription for about 2 months. Her vision reports that she was following with both eyes but does not notice any improvement in her visual ability.

Her visual acuities were variable (fix and follow). Pupils were equal, round and sluggishly reactive to light. The external ocular examination noted a microphthalmia OD and normal AXT and Kappa. The fixation was central, but unsteady fixation OD/OS. EOMs were present and normal. Her cycloplegic refraction noted OD +4.50 AX 180 and Kappa: central, but unsteady fixation OD/OS. EOMs were present and normal.

**CHARACTERISTICS**

- **Delay**
  - Walking, sitting, standing
  - Delay in physical and mental development, resulting in the characteristic features of PKMS. Only about 30 cases have been reported in the literature.

- **Motor Characteristics**
  - Hypotonia
  - Delayed motor milestones

- **Cognitive Characteristics**
  - Intellectual disability
  - Hypothetica

- **Facial Characteristics**
  - Telecanthus
  - Tetrasomy 12p

- **Skeletal Characteristics**
  - Short stature

- **Abnormal Extra Nipples**
  - Mosaic

**SPECIAL TESTING**

- **Visual Acuity**
  - Fix and follow
- **Pupils**
  - Equal, round, and sluggishly reactive to light
- **External Examination**
  - Microphthalmia OD
  - Central fixation, unsteady EOMs OD/OS
- **Refraction**
  - Cycloplegic refraction OD +4.50 AX 180

**ORGANIZATIONS**

- **Pallister-Killian Syndrome Information**
- **Pallister-Killian Syndrome**
  - http://pallister-killian-syndrome.org

**PLAN**

The patient was referred for a genetics consult, and the pediatrician performed a complete ophthalmologic examination. The VEP was completed at the Illinois College of Optometry and was interpreted by Dr. Dominick M. Maino, OD, MEd, FAAO, FCOVD-A.

**CONCLUSION**

The VEP showed a normal visual cortical visual impairment, exotropia, and allergic conjunctivitis as well as hypopigmentation in the ocular allergy present, repeat the VEP in about 12 months and institute vision rehabilitation/vision stimulation therapy.

**REFERENCES**


**PLAN**

***VEP Outcomes***

- **OD**
  - P120: 12.56 uV, 168 ms (variable latency 162-170 ms)
- **OS**
  - P120: 11.3 uV, 162 ms (variable latency 154-168 ms)

**ASSESSMENT**

The patient was referred for a genetics consult, and the pediatrician performed a complete ophthalmologic examination. The VEP was completed at the Illinois College of Optometry and was interpreted by Dr. Dominick M. Maino, OD, MEd, FAAO, FCOVD-A.

**ORGANIZATIONS**

- **Pallister-Killian Syndrome Information**
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**CONCLUSION**

The patient was referred for a genetics consult, and the pediatrician performed a complete ophthalmologic examination. The VEP was completed at the Illinois College of Optometry and was interpreted by Dr. Dominick M. Maino, OD, MEd, FAAO, FCOVD-A.
INTRODUCTION
Myopia has been one of the major problems in public health. It affects at least twenty five percent of adults in the United States. Myopia usually stops progression during teenage years; however, several studies have shown the increase of myopia in the adults.1;2 The purpose of this study was to determine if there was myopia progression in young adult optometry students whose professional education requires extensive near work.

METHODS
A total of 405 subjects were enrolled into the study after medical records of 880 optometry students were reviewed. The enrollment criteria were listed in Table 1. The following information was collected: date of exam, date of birth, gender, race, best corrected VA, phoric posture, and refraction from the binocular balance. Only the refraction in the right eye was used to data analysis. A paired student t-test was performed to compare the refractive error at the first to that at the second exams. One-way analysis of variance was performed to compare myopia progression in different races. Effects of gender and phoric posture on myopia progression were tested by student t-test.

RESULTS
The mean change in myopia over an average period of 1.72 year was -0.18 D (SD: 0.40); with statistically significant difference detected between the refraction of the first exam (mean ± SD: -3.96±2.35) and that of the second exam (mean ± SD: -4.15±2.39) (P< 0.0001). Myopia progression was -0.21 D in the subjects with exophoria compared to -0.17 D in those with esophoria without statistical significance. No difference in myopia progression was detected between male and female. Hispanic (-0.30 D), Asian (-0.19 D) and Caucasian (-0.19 D) subjects had a trend of more myopia progression than black (-0.03 D) subjects without statistical significance.

CONCLUSIONS
• Myopia progressed -0.18 D over a period of 1.72 year in optometry students. Although it is statistically significant, we believe that progression may be too small to be considered clinically significant.
• There was a trend that Hispanic, Asian, and Caucasian subjects had more myopia progression than black, however, without statistical significance. Maybe it is due to the small subject number of Hispanic and Black subjects.

REFERENCE LIST
NANOS
1 ICO PRESENTATION
INTRODUCTION

IPads and iPhones have a number of low vision accessibility features including Siri Voice Assistant, Large Text, Zoom, Invert Colors, Voice Over, and Speak Selection. We studied the usage and preferences of low vision accessibility features on the iPhone and/or iPad in patients with neuro-ophthalmic conditions.

RESULTS

Two of five (40%) patients ranked Siri Voice Assistant as the most beneficial feature. Both patients with NAION daily used the iPhone with Large Text. None of the five patients used Speak Selection on their device(s), but three of the five (60%) chose this function as the one they would use if they knew more about it. The patient with the worst VA utilized only auditory features and no magnification or contrast functions. None reported using low vision apps on their device(s). None of the subjects were strictly self-taught, most utilizing some combination of consumer and clinical training.

CONCLUSIONS

Patients with neuro-ophthalmic conditions are using low vision accessibility features on their iPhone and iPad the majority of the time when operating these devices. Those not using these features are interested in learning more about them, but we as practitioners must do a better job of recommending appropriate features based on our patients’ visual impairments and goals.

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NEUROSCIENCE
1 ICO PRESENTATION
The Vater–Pacini Corpuscle – How Many Times Did It Need to Be Discovered?

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ABRAHAM VATER (1684–1750)

The existence of the lamellar corpuscle was first noted in the skin of fingers by Abraham Vater, who was born in Wittenberg. He received his doctorate in philosophy from his native university in 1706 and his doctorate in medicine at Leipzig in 1710. He returned to the University of Wittenberg in 1712, eventually rising to the level of Professor primus (leader of his department) in 1725. The first mention of these structures is in a 1717 doctoral dissertation where they were called papilla nervae but with little other description. Abraham Vater was the proconsul for this dissertation, and Johann Gottfriid Krayer was listed as the respondent. Before the middle of the 18th century in Germany, the proconsul of a dissertation was not only the mentor for the doctoral candidate and head of the oral exam committee but usually chose the subject of and authored the dissertation. The candidate, usually listed as the respondent, had only to defend the thesis. It appears that this is the case for this dissertation since sources that give only one author for this publication list Abraham Vater. Dr. Vater’s other contributions include havering his name associated with several other anatomical structures. This includes the ampulla hepatopancreatica, ductus thyrointestinalis, and papilla duodenal major.

GOTTFRIED LEHMANN (1741–1767)

This discovery of the lamellar corpuscle seems to be largely forgotten, because the next mention of the lamellar corpuscle in the literature is in another doctoral dissertation that was published over 20 years later. In 1745, Abraham Vater was the proconsul and Johann Gottfriid Lehmann was the respondent on a thesis that described, among other things, the papilla nervae and included a drawing. By this time in history, it is less clear who the primary author of German theses was – the proconsul, the respondent, or a collaborator effort, and the suggestion has been made that authorship of these works should be determined on a case-by-case basis. Several modern authors (see Johann Gottfriid Lehmann’s credit for authorship of this dissertation) suggest that it was not considered at all. After receiving his medical degree from the University of Wittenberg, Johann Lehmann practiced medicine for several years until he discovered his real field of interest in minting and metallurgy. This is most notable for his research contributions to the geologic record leading to the development of stratigraphy. It appears that the same 1745 dissertation was also published in a collection of anatomical dissertations that was accumulated by Albrecht von Haller in 1750. Since Haller was quite famous, it seems that this version of the dissertation had little readership because this is the citation that appears most frequently in the modern literature, and Abraham Vater is almost listed as the author.

THE FRENCH

About a century after they were originally recognized by Abraham Vater, lamellar corpuscles were independently “discovered” by investigators in both France and Italy about the same time. None of these investigators appears to have known about the work of Vater or the efforts going on in the neighboring country. In 1832, three candidates for anatomical appointment in Paris named A.G. Andral, Camus, and Lacroix, demonstrated these same structures on the unwashed nerves of the hand. Lacroix presented a memoir before the Société anatomique of Paris the following year, which raised some discussion. The first mention that appeared in print was by Camus and was presented in 1834 in his Mémoire sur le réflexe des corps sensibles. He represented these observations in 1836 in his treatise Descriptive Anatomy. Without, however, admitting these bodies were essential parts of the nervous system. A.G. Andral himself published a thesis in 1837 on these structures but denied that they were nervous in nature. In 1838, Philippe-Ferdinan, Blandin in his significant text Nouveau Dictionnaire D’Anatomie Descriptive, also mentioned the discovery of these tiny anatomists but without considering the bodies as essential parts of the nervous system. Little is known about these three investigators. Their first names and even the first initials of Camus and Lacroix are not listed in any of the literature.

FILIPPO PACINI (1812–1853)

At about the same time that this work was going on in France, Filippo Pacini independently found these three structures. He claimed he first saw them in a hand dissection in 1832, while he was a 19-year-old student at the prestigious medical school in his hometown of Pistoia. He referred to them as “ tactile ganglia,” but this observation was dismissed by the instructors. In 1833 he also found them in the abdominal cavity. He bought a microscope, and submitted a scientific communication to the Medico-Physical Society of Florence in 1835, but, again, this information was lost. Finally, in 1845, Pacini published an extensive description of these structures, including microscopic findings. Pacini’s observations were corroborated, and extended in 1849 when Friedrich Nicle and Rudolph Albrecht von Köli published a detailed microscopic study on these corpuscles. In the title of this paper, they named these structures after Pacini. Filippo Pacini went on to have a long academic career, first at the Scuola Medica Pistoiese and eventually becoming the chair of General and Topographical Anatomy at the University of Florence in 1849. While at Florence, during the cholera epidemic of 1854, he discovered the etiologic agent for this disease, which he called a vibrio. His findings were discounted until confirmed by Robert Koch in 1884, one year after Pacini’s death.

JOHN SHEKELTON (1795–1824)

About a decade before the group in Paris and Piaci were conducting their studies, three same structures seem to have been independently discovered by John Shekelton in Ireland. In his 1848 book entitled Theatre on the Pathology and Treatment of Neuralgia, B. L. Smith included a rendering and wrote the following: Figure 13 represents the pacinian corpuscles connected with the digital branches of the median nerve. They are, in this instance, of unusual size, many being twice as large as natural. However, the exceedingly beautiful preparation of these remarkable bodies, represented in the plate, was made and placed in the Museum of the Royal College of Surgeons in Ireland by the late Dr Shekelton, who died in 1824.

This dissertation must have been conducted somewhere between 1820 and 1824 when John Shekelton was curator at this museum. Unfortunately, John Shekelton’s career was relatively short since he died at the age of 29 from an infection he contracted after cutting himself while dissecting a cadaver. Maybe because of his untimely death and lack of publication, little mention of his finding can be found in the literature.

REFERENCES

21. Andral himself published a thesis in 1837 on these structures but denied that they were nervous in nature. In 1838, Philippe-Ferdinan, Blandin in his significant text Nouveau Dictionnaire D’Anatomie Descriptive, also mentioned the discovery of these tiny anatomists but without considering the bodies as essential parts of the nervous system. Little is known about these three investigators. Their first names and even the first initials of Camus and Lacroix are not listed in any of the literature.
THE TEACHING PROFESSOR CONFERENCE

2 ICO PRESENTATIONS
INTRODUCTION
To best compare student performance to that of the previous year, Wyles, E., et al. for more details on the sessions). Student-led recitation sessions offered in previous years were made of these items between the two years. When the class profiles were compared: the students had similar mean cumulative GPAs of 3.41 and 3.40 respectively upon entering optometric school as well as similar cumulative GPA distributions, undergraduate majors, mean age & predominant undergraduate major (Biological Sciences). The number of changes introduced to the course was intentionally minimal. Small course changes may allow for better analysis. If too many changes are made at once, it may be difficult to determine a cause and effect relationship.

METHODS
In addition to Par Score data, a comparison of performance of individual exam items between the two years was done and anecdotal feedback both from the third year students & faculty regarding the course changes.

RESULTS
Overall performance of the students greatly improved in 2013 over 2012. Although we could not include the complete evaluation form used by our students’ performance on exams but also, where relevant, in terms of how it impacts their performance in other areas such as clinic, subsequent courses & standardized exams.

CONCLUSIONS
• Changes in course design should be analyzed to assess the impact on student learning.
• Both quantitative and qualitative metrics provide information that is helpful in articulating the effect of the course design change.
• In a retina course at the Illinois College of Optometry, the addition of formal, instructor-led recitation sessions was found to have a positive impact on student learning.

TABLE 1. TABULATED COMPARISON BHS 363.1 RETINA COURSE 2012 & 2013

<table>
<thead>
<tr>
<th>Exam</th>
<th>2012</th>
<th>2013</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final</td>
<td>33% (30)</td>
<td>84.6% (30)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Exam 1</td>
<td>33% (30)</td>
<td>78.8% (29)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Exam 2</td>
<td>27.5% (28)</td>
<td>40% (30)</td>
<td></td>
</tr>
<tr>
<td>Exam 3</td>
<td>27.5% (28)</td>
<td>43% (30)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Definitions:
Average PB Values: add up PB Values for each question on a given exam and divide total by number of questions on the exam.

Skills Levels 2 & 3 questions test a student’s ability to apply previously learned knowledge in a clinical context, so they will most readily measure professional competency/ readiness. Their use is encouraged to determine a cause and effect relationship.

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Method to Assess Changes in Course Design. Intended Effect Achieved?

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1. Par Score v5.2 Teaching Workbook, Scantron Corporation, World Headquarters 175 Old Oak Rd., Egg Harbor, WI 54209-1354.
INTRODUCTION
Clinical content taught in a traditional lecture style poses a particular challenge when the objectives include application of the material through clinical reasoning. The definition of clinical reasoning includes an ability to integrate and apply different types of knowledge, to weigh evidence and reflect upon the process to arrive at a diagnosis and ultimately a management strategy. Therefore, clinical reasoning requires not only an accumulation of knowledge but also a level of experience. The Illinois College of Optometry (ICO) has developed an instructional design to foster deeper learning for content application in a traditional lecture-based course. Essential to the design is the cooperative and active learning approach used in the case-based learning sessions (Recitation Sessions). The Recitation Sessions take a unique approach by promoting content application in smaller groups via a step-wise method to teach and develop clinical reasoning skills. The purpose of developing the Recitation Sessions was to improve success in this challenging course by modifying the student’s learning style (if necessary) to be able to analyze clinical data in scenarios which mimic expectations in patient care.

METHODS
The class is divided into four groups of approximately 40 students. Each group meets once per week, with the content being repeated four times to include all students in the class. The students are given assignments that must be completed prior to each Recitation Session in order to receive credit for attending the session. Image-rich clinical cases are presented to students during the sessions with specific questions that step them through scenarios that require complex data analysis. The cases and associated questions are deliberately designed to foster increased content application each week. The sessions are organized to vary the educational approach, to keep the sessions fresh, and to provide opportunities for all types of learners. Many different presentations of a single condition are presented to provide the students with a level of experience needed to strengthen clinical reasoning skills.

DISCUSSION
Retina Recitation Sessions provide benefits to students through a number of mechanisms:

1. Pre-Recitation Assignments: These assignments were specifically designed to be obviously meaningful to the students. The majority of the assignments served as study guides for examinations in the course and future standardized licensing examinations. They were not reviewed for “correctness”, thus the onus of the quality of work rested directly with each individual student. The students came to realize this design as the weeks progressed, and we saw an increase in care and detail in completing the assignments. (See Figure 1)

2. Recitation Sessions: Each session had a specific goal associated with developing clinical reasoning. Initially the students simply interacted with their neighbors answering questions regarding mechanisms of disease processes. (See Figure 2) This served to reinforce basic health science integration into clinical practice. This foundation functioned to assist students to explore the real-world causal possibilities of a given situation without knowledge of specific diseases. As the weeks progressed, introducing simple clinical reasoning challenges progressed to complex cases. Progressively, the questions became more global, and required the student to predict findings. Simultaneously, the students were asked to work with increased independence and less reliance on guidance from faculty members. (See Figure 3)

3. Effective Study Habits: The Recitation Sessions forced the students to take a more productive approach to learning than simply re-reading the notes. Additionally, the required pre-recitation assignments and session discussions served as study time, which made the students much more prepared once they decided to start studying independently for the exams. Ultimately, the “night before the exam cram session” via re-reading of the notes was reduced.

This learner-centered approach poses objectives that extend beyond simple content mastery for a course examination. The overarching student objectives to these sessions include, but are not limited to: effective/healthy study habits, knowledge base enhancement, clinical thinking refinement (data analysis and interpretation of visuals), understanding treatment management hierarchy, problem solving efficiency, and ultimately preparation for patient care.

CONCLUSIONS
Retina Recitation provides the tools and experiences necessary to improve students’ ability to think clinically and apply didactic knowledge to clinical patient care.

The result of these Recitation Sessions was objectively studied by our Learning Assessment Committee (see poster titled Method to Assess Changes in Course Design. Intended Effect Achieved by Trachman, R., et al) which demonstrated a positive impact on performance within the course. ICO has decided to retain the Recitation Sessions for subsequent course offerings based on these results and feedback from the students and faculty. We are pleased that we have discovered a format that will allow us to provide our students with the benefits of enhancing clinical reasoning skills through guided learning sessions.

Key words: learner-centered, critical thinking, clinical reasoning

References
2. Fagerholm, M. and Helff, A. “Using Your Head As Long As Your Feet: Developing Critical Thinking Skills”. Journal of Allied Health 27(2) 199.4

Table of Contents
Case-Based Sessions Enhance a Lecture Course by Promoting Content Application

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Figure 1 A diagram demonstrating the progressive changes to the assignments and activities within the recitation session to build independent clinical reasoning skills.

Figure 2 Two examples of cases covered during recitation sessions. 2a is the case from week three. The case is simple with only a single photo to analyze. 2b is a case from week seven. The case is more complex with images of both eyes being shown. Additionally, we demonstrate ancillary testing (fluorescein angiography) and require the student to request any other testing prior to it being displayed (optical coherence tomography).

Figure 3 Two examples of pre-recitation assignments which demonstrate the different styles used throughout the course. a) is the pre-recitation assignment for week one which reviews relevant basic science. b) is the pre-recitation assignment for week three which covers diabetic retinopathy.