

Oral Paper Presentations

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Title of Presentation:

Screening For Lifetime Concussion In Athletes: Importance of Oculomotor Measures

ABSTRACT

Background: In view of apparent insensitivity of traditional and computerized neuropsychological tests to the history of repeated concussion, further research is thus warranted to develop scientifically valid screening protocols for lifetime concussion incidence, which would assist in formulation of better concussion management protocols and return-to-play decisions. The purpose of the present study was to determine the utility of oculomotor-based evaluation protocols in screening for lifetime concussion incidence in elite hockey players.

Methods: 42 Division I collegiate male and female hockey players were evaluated using the guidelines of an overall oculomotor-based diagnostic clinical test protocol for the mTBI population. The sensitivity of the collected measures to lifetime concussion was then compared with the corresponding sensitivity of measures of neuropsychological functioning (ImPACT) often used with athletes for acute concussion diagnosis.

Results: Our model showed that a hockey player with a Near Point of Fixation Disparity (NPDF) break equal to or greater than 15cm, Visagraph comprehension rate less than 85% and the total score on part A of an ADHD questionnaire equal to or greater than 11 was on average 10.72 times more likely to have previously suffered a concussion than an athlete with lower values on the NPDF and ADHD questionnaire and a higher comprehension rate on the Visagraph. None of the IMPACT baseline assessment measures were significantly predictive of the individual's concussion history.

Conclusions: While ImPACT continues to be an important instrument in immediate evaluation of a suspected concussion and in making return-to-play decisions, its utility in screening for a history of previous concussions and associated risks of repeat concussions including permanent neurocognitive decline is rather limited. The present study provides a relatively sensitive screening tool to assess the probability of previous concussion(s) in an athlete. This model may allow athletic personnel to address in a timely manner the risks associated with repeat concussions and to develop individualized concussion management protocols.

Author: Benjamin C. Winters, OD, FCOVD

Title of Presentation:

Oculomotor Training Improves Reading Fluency

ABSTRACT

Background: The purpose of this study was to determine if adding oculomotor training (OMT) to an existing high school reading program would improve reading fluency outcomes.

Methods: In this prospective, single-blinded, cross-over trial, of high school students (n=53) in grades 9 and 10 enrolled in the school's supplemental reading course, all students received reading intervention using Scholastic's Reading180 system (New York, NY). In this 12 week study, students were randomized by classroom into 3 groups based on their initial training condition (+OMT, -OMT & placebo). +OMT used K-D Remediation training (Oakbrook Terrace, IL) with numerical stimuli presented at variable speeds in a left to right fashion to simulate eye movements required during reading. For placebo variable numerical stimuli were presented in a static central position stimulating minimal change in eye movement. After 6 weeks students in +OMT were crossed over to -OMT and vice versa. Students initially in placebo were crossed over into +OMT. The standardized Reading Curriculum-Based Measurement (RCBM) reading fluency test was given at 3 time points: at the start of the reading course, at the cross-over point and at the end of the reading course. The reading fluency test was given by an individual masked to the training conditions of the student and a words correct per minute (WCPM) score was determined.

Results: There was a significantly greater percentage improvement in reading fluency scores (WCPM) with combined OMT compared to reading intervention without OMT (7.54% vs. 3.59%, $p = 0.03$). Over the entire training period there was an average increase of 9.88 WCPM during sessions with OMT, 4.7 WCPM without OMT and 2.78 WCPM during placebo.

Conclusions: Expected improvement of a successful reading program is an increase of 5 WCPM. In this study, reading intervention coupled with OMT, resulted in nearly double the expected reading fluency improvement.

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Foresight Regulatory Strategies

Title of Presentation:

The Eyetronix Flicker Glass Amblyopia Treatment Study: Acuity, Binocularity, Compliance and Satisfaction

ABSTRACT

Purpose: Conventional amblyopia treatment includes refractive correction and penalization by patching or drops, which challenge binocularity and compliance. Current research and emerging clinical treatment of amblyopia are moving beyond simple penalization towards concurrent promotion of both improved binocularity and acuity. However, treatment still requires repetitive tasks and a high level of compliance. This Eyetronix Flicker Glass (EFG) clinical trial evaluates a novel amblyopia therapy that is more adaptable to daily activities, promotes binocularity, improves compliance, and maintains quality of life.

Methods: 24 subjects, ages 6-17 (mean 11 ± 4 years), with mild to moderate anisometric amblyopia (most having been previously and unsuccessfully patched), across 3 clinical sites wore the Eyetronix Flicker Glass (EFG) for near tasks of their choice, e.g., homework, video games, coloring. Eyetronix Flicker Glass (EFG) are glasses with liquid crystal lenses that rapidly alternate occlusion between the two eyes at a prescribed "flicker" frequency. For this study, subjects wore the EFG for 1-2 hours daily over their optical correction. Subjects were asked to wear EFG daily for 1-2 hours daily for a 12-week treatment period. Outcome measures were 1) change in logMAR acuity, 2) change in stereopsis, 3) compliance trackers, and 4) quality of life surveys.

Results: Visual acuity improved -0.12 ± 0.11 logMAR. 92% improved in global and/or local stereopsis. Compliance, ease of use, parent-child relationship, comfort and preference over conventional (often prior) therapies were hugely positive. No adverse events reported.

Conclusions: Binocularity and compliance appear to be significant drivers of successful amblyopia therapy. The integrated design and task-unrestrictive nature of Eyetronix Flicker Glass improved acuity, promoted binocularity and was accepted by children needing therapy, suggesting a promising new treatment that lets kids be kids.

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Title of Presentation:

The Impact of Concussion on the Visual System of Children 11 to 17 Years Old

ABSTRACT

Background: Although there are data describing the prevalence of concussion-related vision disorders in adults, there are currently no data in children

Methods: In a prospective study, a consecutive sample of children 11 to 17 years old with a medical diagnosis of concussion were evaluated in a children's hospital concussion program. Accommodative, vergence, and saccadic testing was performed. Diagnosis of concussion was based on history, physical examination and neurocognitive testing with the ImpACT Test. Vision diagnoses were based on predetermined diagnostic criteria. Symptoms were assessed using the Convergence Insufficiency Symptom Survey (CISS).

Results: One hundred patients were examined, with a mean age of 14.5, 58% were females and 65% had sports-related concussion. 29% were seen within a month of injury, 26% between 1 to 3 months, and 45% > 3 months. 69% had a diagnosis of one or more vision problems. The most common were accommodative disorders (51%), convergence insufficiency (49%), and saccadic dysfunction (29%). 46% of the subjects had more than one disorder with combined convergence and accommodative dysfunction the most common (23%). 70% of subjects had a medical diagnosis of vestibular dysfunction and 54% had both vision and vestibular dysfunction.

The CISS correctly classified 81% of children with a vision disorder diagnosis (63 of 69 with disorder; 18 of 31 without disorder). Patients who were evaluated within 30 days after injury were more likely to have a vision diagnosis. Poor verbal memory ($p=0.002$) and visual motor speed scores ($p=0.005$) on the ImpACT Test were significantly correlated with the presence of a vision problem.

Conclusions: The prevalence of ocular motor disorders in children after concussion is much higher than in a clinical population without a history of concussion. Clinicians should perform appropriate ocular motor testing in children who have had concussion. Further study is needed to determine optimal treatment methods.

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Poster Presentations

Author: Curtis Baxstrom, OD, FCOVD

Adjunct faculty PUCO

Co-Authors: Graham Erickson, OD

Jill Schultz, OD

Title of Presentation:

Pacific University Vision Therapy, Rehabilitation and Pediatric Optometry Residencies

The purpose of this poster is to share with new students and members the three pediatric/VT and Rehabilitation Residencies.

Author: Marc B. Taub, OD, MS

Southern College of Optometry

Associate Professor

Co-Authors: Pamela Schnell, OD

Southern College of Optometry

Title of Presentation:

Optometry & Visual Performance: An International, Peer Reviewed Journal

ABSTRACT

Optometry & Visual Performance (OVP) is an international, peer reviewed journal dedicated to the advancement of the role of optometry in enhancing and rehabilitating visual performance. The mission of OVP is to increase the awareness and availability of clinically relevant information in functional, developmental, behavioral, and vision therapy aspects of optometry through an internet-based, open-access format. OVP, a collaborative effort of the Australasian College of Behavioural Optometry and the Optometric Extension Program Foundation, has an international circulation of more than 6000, including the membership of the representative organizations, optometry students, and residents. OVP covers a wide variety of topics, including clinical and scientific research, case reports and studies, reviews of new or adapted diagnostic or therapeutic methods, and editorials. Enhanced content such as author interviews, video demonstrations, and links to further resources can be found in the digital version.

In addition to the scientific journal, OVP also publishes a regular blog, *Visual Performance Today*, which highlights current topics in behavioral vision, practice management topics, member news for the sponsoring organizations, book reviews, and much more!

Author: Patricia Cisarik

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Title of Presentation:

Vergence Facility: Testing Clinical Utility of 12 Bo / 3 Bi Prism Flipper Test

ABSTRACT

Background: Gall, et al, (1998) found that vergence facility with 12 BO / 3 BI prism flippers differentiated between symptomatic and asymptomatic graduate students and staff at an optometry college (Vision Quality Scale, McKeon, et al., 1997), suggesting that vergence facility could be used to screen for nonstrabismic binocular disorders. This study investigated the relationship between horizontal vergence facility with 12 BO / 3 BI prism flippers and patient visual symptoms in a large clinical population.

Methods: Sixty-five nonstrabismic, nonamblyopic patients between the ages of 12-40 years who consecutively presented for vision exams were included if they were without ocular disease OU and not on medications known to affect ocular motility or accommodation. Symptomatic (score ≥ 27) and asymptomatic/borderline (score ≤ 26) subjects were defined using the Vision Quality Scale survey. Vergence facility with 12 BO/ 3BI at 40 cm was recorded using the subject's habitual near Rx or no near Rx while the patient viewed a high contrast vertical line target.

Results: VQS scores identified 34 "asymptomatic/borderline" (mean VSQ score = 16.6; SD = 5.8) and 31 "symptomatic" patients (mean VSQ score = 37.8; SD = 9). A two-tailed t-test for independent samples showed that the difference in mean VQS score between the two groups was significant ($p < .0001$). Mean horizontal vergence facilities were 13.2 (± 7.8) cpm and 15.2 (± 6.4) cpm respectively for the "asymptomatic/borderline" and "symptomatic" groups. Neither a one-tailed or two-tailed t-test for independent samples indicated a significant difference in horizontal vergence facility between the two groups.

Conclusion: Near horizontal vergence facility measured with 12 BO / 3 BI prism flippers did not correlate with symptoms on the Vision Quality Scale survey in a sample of patients from a large clinic population. Correlation of horizontal vergence facility with other near symptom surveys remains to be tested.

Author: Audra Steiner, OD, FCOVD

Assistant Clinical Professor, SUNY College of Optometry

Title of Presentation:

Subjective Sensory Testing as a Predictor for Successful Surgical Intervention

ABSTRACT

Background: The decision to refer a patient with strabismus for surgical intervention should be made with gravity.

All involved desire a positive outcome. Residual or consecutive strabismus represents surgical failure from the patient's point of view; the optometrist finds this result objectionable as it inhibits development of high-quality binocular vision. Appropriate subjective sensory testing performed before surgical referral can help clarify case prognosis. With better understanding, patients can make informed decisions about their care.

Case Summary: Four patients presented for evaluation of strabismus: two with esotropia and two with exotropia. Each expressed an interest in vision therapy and strabismus surgery.

Results: Three patients were referred for surgery. Two had a positive outcome, with good alignment and binocularity. One was left with constant diplopia. The fourth was deemed a poor surgical candidate. Evaluation of subjective findings was a strong predictor of good alignment and development of binocular vision post-surgically.

Discussion: The major amblyoscope is often considered first for sensory testing in a strabismic patient, but, even in a vision therapy office, not everyone has one, and doctors who do not practice vision therapy also refer patients for strabismus surgery. Presence of sensory fusion is a strong predictor for success in vision therapy and surgery, though patients with very large deviations might not be able to develop the vergence ranges required to maintain fusion. Having a basic battery of tests that can be done in many settings, without highly specialized equipment, and understanding the implications of correspondence patterns allows doctors to better educate patients. Optometrists should partner with surgeons who are receptive to our understanding of the cortical intricacies of binocular vision and who welcome our opinions.

The author of this poster needs report no conflicts of interest.

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Title of Presentation:

Spasm of the Near Reflex: 2 Case Reviews with Psychogenic Factors as Etiology of SNR

ABSTRACT

Background: Spasm of the near reflex (SNR) presents with intermittent and variable esotropia, miosis, and accommodative spasm. The condition is infrequently diagnosed, and often misdiagnosed with differentials including lateral rectus palsy, myasthenia gravis, and latent hyperopia. The etiology of SNR is often a psychogenic factor although organic causes must also be considered. Diagnosis is difficult due to the intermittent nature of the spasm causing fluctuating results on acuities, cover test, retinoscopy, and refraction. The treatment of SNR is prolonged and often very difficult and includes a multi-disciplinary approach.

Case Summary: A 22 year old female presented for a vision therapy evaluation complaining of constant double vision and daily headaches for the last several years. The patient demonstrated cover test results from 8^Δ exophoria to 40^Δ alternating esotropia with -7.00 DS myopia on retinoscopy OU. Humphrey visual fields revealed a constricted field characteristic of psychogenic factors. These findings combined with pre and post-dilation miotic pupils confirmed the diagnosis of SNR. Treatment over the past 3 years has included multiple pharmacologic agents with unsuccessful results, and ophthalmic lenses with yoked vertical prism and low plus lenses ultimately providing resolution of symptoms.

A 13 year old female with a history of juvenile delinquency, bipolar disorder, and emotional outbursts presented complaining of blurred vision and ocular discomfort. Over two examinations, acuity fluctuated from 20/250 to 20/20 with a variable 20^Δ intermittent alternating esotropia coinciding with miotic pupils and -4.00 DS myopia. Plus lenses were prescribed and the patient is to return for follow up in the coming weeks.

Discussion: These cases demonstrate the presence of psychogenic factors as the etiology of SNR. There are multiple proposed treatments for SNR that have shown modest success. Therefore, it is possible that the most important aspect of treatment is psychological and this aspect must not be overlooked.

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Title of Presentation:

Repeatability and Validity Measurements of Associated Phoria Tests: MKH-Haase Charts and Other Commercially Available Tests

ABSTRACT

Background: H.J.-Haase developed a systematic set of tests for evaluating binocular vision called the Pola Test. The Pola test measures associated phoria and stereo acuity at distance and near using a variety of different targets for each. This testing method and interpretation is referred to as MKH-Haase method. The MKH method is more commonly used in Germany and other European countries than English speaking countries.

Purpose: To investigate the test-retest repeatability of near horizontal associated phoria tests using MKH-Haase charts and other common clinical tests.

Methods: Near horizontal associated phorias values were measured for 34 symptomatic and 40 asymptomatic participants using 11 different tests on two different occasions. Symptomatic and asymptomatic was determined by a questionnaire regarding visual symptoms at near.

Results: Except for the Sheedy Disparometer, the mean differences between sessions for the near horizontal associated phoria tests was not statistically significant different from zero based on the 95% confidence interval. The mean between-session difference for the Sheedy Disparometer was significantly more exo at the second session for the asymptomatic group. The 95% limits of agreement for Mallet Unit and AO Card for both groups, and Saladin Card for the asymptomatic group were within ± 1.00 D and for most of the other tests were about ± 2.00 D. The exceptions were the symptomatic groups Disparometer limits, which were -4.25 to 5.75 D. The linear regression (r) between the first and second session results were about 0.7 and significant for most tests. Again the exception was the Sheedy Disparometer where the regression was about 0.3 for both groups.

Discussion & Conclusions: Most of tests showed good repeatability for both subject groups at near, except the Sheedy Disparometer. The reason for the lower repeatability could be the design of the test due to the lack of central fusion locks.

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Title of Presentation:

Measuring Efficacy of Therapeutic Prism Lenses with the Computerized Dynamic Posturography In Patients with TBI and a Learning Related Vision Problem.

ABSTRACT

Background: Computerized Dynamic Posturography (CDP) is a technique used to objectively quantify the variety of sensory, motor and central adaptive impairments involved in balance control. The objective of the case report is to demonstrate the impact of therapeutic prism lenses on posture and perception, measured with CDP, in traumatic brain injury and learning related vision problem patients.

Case Reports: A 16 year old male, who suffered a traumatic brain injury during a football game, initially presented with the following symptoms: headaches with any visual stimulation, photophobia, trouble converging, non-specific eye pain, blurred vision, and postural changes. A series of chair procedures and baseline neuro-sensory testing, including CPD, showed visual spatial disorientation, binocular vision dysfunction, imbalance, ocular motor dysfunction, and convergence insufficiency. Therapeutic lenses (2 base down, with a BPI FL-41 tint) was prescribed for full time wear based on the initial examination results; testing was repeated.

A 9 year boy presented with complaints of holding material close, headaches and eye rubbing associated with desk work, moving print, light sensitivity, loss of reading comprehension, loss of place and skipping lines when reading, and difficulty with concentrating. After a series of chair procedures and the neuro-sensory testing were performed, the data showed binocular vision dysfunction, convergence insufficiency and accommodative dysfunction. Therapeutic lenses (3 base down) were prescribed for full time wear.

The results of both cases show improvement in all areas of testing, especially the CDP results. Looking at the sway velocity when isolating sensory integration function, primary proprioception, primary visual, and primary vestibular, there was a significant improvement in each of these sensory areas with the use of therapeutic prisms.

Discussion: These cases demonstrate the benefit of therapeutic prism lenses. Postural and perceptual changes, which can be quantified by the CDP, will be highlighted.

Author: Susan Evans, OD

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Co-Author: Glen Steele, OD

Southern College of Optometry

Title of Presentation:

Promoting Visual Development in Infants with Hydrocephalus

ABSTRACT

Background: Hydrocephalus is associated with refractive errors, strabismus, increased intraocular pressure, and cortical blindness in children. Visual perceptual problems associated with hydrocephalus include visuospatial performance, material organization, and visual attention deficits. Hydrocephalus can impact the child's visual as well as overall development. This case report serves to review the visual performance and visual perceptual deficits that can occur in hydrocephalic infants.

Case Report: A twelve month old male with a history of hydrocephalus reported to The Eye Center at Southern College of Optometry on February 20th, 2013. Although all ocular health was observed to be normal, the child was unable to fix and follow any lights or objects. He was diagnosed with oculomotor dysfunction, and his grandmother was instructed begin at-home activities to stimulate visual development. Proceeding multiple follow-up examinations and continuous at-home visual stimulation activities for one year, the child was exhibiting excellent visual fixation, oculomotor function, and convergence abilities.

Conclusion: The American Optometric Association recommends visually stimulating activities for all infants to promote appropriate visual development; however, stimulating activities may be especially important in the development of appropriate visual function in hydrocephalic children. This poster will highlight the hydrocephalus, as well as the activities performed to enhance visual development.

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Title of Presentation:

A Comparison of Accommodative Amplitude with Multifocal Contact Lenses to Bifocals

ABSTRACT

Background: Spectacle plus lenses are commonly used to alleviate symptoms of near tasks caused by lack of accommodative ability of the visual system. Multifocal contact lenses offer another treatment option for those not wanting bifocal spectacles. This study compared accommodative lag and amplitude between the Bausch & Lomb Pure Vision low addition multifocal contact lens and +1.25D lenses in bifocal spectacles.

Methods: This study was a randomized cross-over experiment with established spherical soft contact lens wearers ($N=40$; ages 21-35). Subject's accommodative lag (Grand Seiko WR-5100K Auto Refractor) and accommodative amplitude (Push-up method and Minus lens to blur method) was measured on the subject's dominant eye under three conditions: baseline measurement through subject's habitual spherical soft contact lens, after three days of wear through +1.25D bifocal glasses over subject's habitual distance contact lens, and after three days of wear through Bausch & Lomb Pure Vision low addition multifocal contact lens. The order of procedures (multifocal contact lens or spectacle) and testing was randomized. Data were analyzed using repeated measures regression methods.

Results: There were no significant between-condition differences on the Push-up method. There was a significant difference between Baseline and Multifocal conditions for the Minus lens to blur method ($p= .04$). For the Grand Seiko spherical reading, there was a significant overall Condition effect ($p< .001$), and significant differences between Baseline and Multifocal ($p= .003$) and Bifocal and Multifocal ($p< .001$) conditions.

Conclusion: This study confirms a multifocal contact lens produces differences in accommodative lag compared to a traditional flat top bifocal. This study also demonstrates differences in accommodative amplitude between multifocal and no lens. In both cases, the multifocal lenses cause the desired response of increasing accommodative amplitude and decreasing accommodative lag. Further research is needed with various lens designs to determine the most appropriate choice for patient care related to accommodative problems.

Author: Kristen Davis, BS

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Title of Presentation:

Contrast Sensitivity Testing in Normal Vision: Performance with Letter vs. Continuous Text

ABSTRACT

Purpose: Contrast sensitivity is an essential feature of vision that provides information about visual function. There are numerous commercially available tests to measure contrast sensitivity. The present investigation compared contrast sensitivity measured with letter stimuli to contrast sensitivity measured with paragraph stimuli in a non-low vision based population.

Methods: Participants consisted of adults (22-35 yo) with best-corrected vision of 20/32 at near and stereocuity ≥ 30 seconds of arc. The study was conducted using the Adult Near Contrast Test, consisting of both EDTRS format letter charts and continuous text charts at five different contrast levels. The total number of letters (EDTRS chart) and words (continuous text chart) was recorded at each contrast level. Testing proceeded in decreasing order of level of contrast for each chart type. Repeated measures ANOVAs were conducted to examine the effects of contrast level on (a) total letters (EDTRS letters format) and (b) total words (continuous text format).

Results: Significant differences based on contrast level were found for total letters ($p < 0.001$) and for total words ($p < 0.001$). A Pearson correlation was performed between total letters and total words for each contrast level. High and statistically significant correlations between words and letters occurred at all contrast levels ($p < 0.001$), except for the 100% contrast targets ($p = 0.69$).

Conclusion: A positive correlation was found between the two testing formats contained in the Adult Near Contrast Test for measuring contrast sensitivity in adults with normal vision. Further testing will explore this relationship in a low vision patient population.

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Title of Presentation:

Unique Retinoscopy Findings in A-pattern Esotropia

ABSTRACT

Background: The pathophysiology of A-pattern esotropia is not fully understood. Without complete understanding of a condition, it is difficult to determine proper testing necessary to identify accompanying characteristics. Retinoscopy is a critical tool in the examination of the pediatric population and can be used for more than determining refractive error. The purpose of our paper is to report on a patient with A-pattern esotropia and the abnormal retinoscopy findings.

Case Summary: We report a 3-year-old female with a history of congenital nystagmus and esotropia noted by her mother, especially in up-gaze. Upon examination, A-pattern esotropia was observed. Retinoscopy findings showed equal and low plus reflex in right, left and down gaze. Up-gaze revealed inward deviation of the left eye and marked equal darkening of the reflex in both eyes, equal pupil constriction of both eyes and equal against-motion reflex of both eyes of approximately 2 diopters. We prescribed monocular home eye stretches, emphasizing upward and outward directions, and recommended 3-month follow-up evaluation.

Discussion: The cause of the unusual retinoscopy findings associated with the A-pattern esotropia is unknown. We hope that this case report will encourage the use of retinoscopy for other reasons than determination of refractive error and inspire further investigation and monitoring of A and V-pattern strabismus.

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Title of Presentation:

Effect of Partial Fresnel Prisms for Exotropia with Suppression at Distance: Pilot Study

ABSTRACT

Background: Most exotropes have fusion at near, but frequently exhibit suppression at distance. Until now, anaglyphs for fusion training, or patching of the dominant eye, have typically been used for anti-suppression. However, these methods can pose problems, such as limitation of gaze range and/or return of the suppression. We used a novel approach in such patients with good success in a small sample of children.

Methods: 5 patients with exotropia without history of strabismus surgery or ocular disease participated. Ages were 6-10 years. Mean deviation at distance was XT 20+/-3pd (range 18-25pd) and XP 18+/-15pd (range 3-39pd) at near, as assessed by the cover test. Two suppressed in the RE and 3 in the LE at distance as assessed by the Worth-4-Dot test. For vision rehabilitation, all patients wore their distance spectacle prescription in conjunction with sector, base-in Fresnel prisms equivalent to the distance deviation in the upper region of the non-suppressing eye's spectacle lens. In addition, vergence-based vision rehabilitation was added once the suppression reduced/dissipated.

Results: After 3.8 +/- 2.2 (range 1-6 mos.) months of wearing the spectacles, suppression was not present at distance, and fusion was now readily evident. This was followed by conventional fusion training (9+/-3 mos., range 6-12 mos.) to enhance/embed the earlier positive prism effect, with positive results.

Conclusions: This simple, sequential, two-pronged approach to distance suppression and fusion in children with XT/XP resulted in excellent results in this small sample of children. The first phase appears to facilitate the second. This should now be tested in a larger sample of such patients.

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Head Administrator / Visual Intelligence™

Co-Author: Amy Schlessman, PhD

Rose Academies

Title of Presentation:

Vision Development as Innovation at a Public High School

ABSTRACT

Background: The *Educator’s Guide to Classroom Vision Problems* emphasizes the importance of vision development for young children and through elementary school. Almost all traditional high schools do not develop visual intelligence as a fundamental element for academic and life success. We explored how a credit-bearing course on Vision Development might open options for students at a high school serving a high-risk student population.

Methods: A neuro-optometric medicine practice and alternative education campus conducted a pilot research study using a quasi-experimental research design. Data were collected using an extensive pre-post battery of assessments, e.g. TVPS, King Devick, Binocular Vision Assessment Program’s fusional ranges, Woodcock-Johnson visual memory subtests. Purposive sampling assigned students to treatment/control. Treatment group participated in a 3 month high school course with state standard aligned curriculum on “science” of vision plus vision therapy lab sessions featuring base in-out activities, space matching, yoked prism, etc.

Results: Assessment of students at school before sampling showed 82% (80/98) of the student population in need of vision therapy.

Despite attrition, students receiving treatment (n = 13) showed statistically significant improvement on multiple assessments:

TVPS	mean	19.5 pts. higher than control, p < .001
Fusional Ranges, Binocular Vision Assessment Program		
BI Break	mean	6 pts. higher, p < .01
BI Recovery		7 pts higher, p < .01
BO Break		14 pts. higher, p < .05
BO Recovery		17 pts higher, p = .05
King Devick	mean	lower time, 12 sec, p < .05
		less errors, 1.2, p < .05
Woodcock-Johnson Visual Memory, subtest	mean	11 pt. decrease in errors, p < .01

Discussion: Results of this study indicate that offering vision development at a public high school may significantly increase students’ visual capabilities and skills that are fundamental to academic success thereby expanding life options.

Author: Tyler Phan

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Title of Presentation:

Stress Induced Diplopia: A Case Report

ABSTRACT

Background: Emotional stress and increase near work demand are well described triggers for developing a decompensated phoria. One explanation is through the binocular imbalance resulting in psychological and behavioral changes. This case describes the use of Fresnel prism for immediate relief of symptoms, in addition to stress control and vision therapy, and gradual removal of prism dependency.

Case Summary: An 18-year-old Caucasian female college student experienced sudden onset of horizontal binocular diplopia accompanied by mild headache post viral-like upper respiratory illness and one month after starting college. Neuro-ophthalmic testings two months after initial onset revealed 15 diopter of intermittent comitant right esotropia at distance and near. General neurologic exam was otherwise unremarkable, including pupils and oculomotility. MRI of the orbit and brain was negative. All blood work for various systemic diseases were normal. Patient was diagnosed with stress induced decompensated phoria with possible inciting factors of viral-like illness and increase near work demand.

Results: Patient was prescribed 10 diopter of Fresnel prism over right eye for immediate relief of symptoms. Additionally, patient underwent active home therapy to increase fusional vergence reserves. Patient was educated about inciting factors and had special accommodations at school to keep stress level down. At 3, 5 and 6 months follow-up, the amount of prism was reduced to 6, 2 and 0 diopter, respectively, with patient maintaining clear and comfortable single vision.

Discussion: This report demonstrates the importance of a thorough case history with complete work-up to rule out potentially life-threatening etiologies. Equally important is to inquire about associated factors because stress can cause many visual disturbance, which may include diplopia. This case shows that with proper stress management, a motivated patient can regain control of her binocular system. Intermittent prisms and vision therapy are also important treatment modalities to consider in addition to lifestyle changes.

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Title of Presentation:

Longitudinal Study of Vision Screenings of Preschoolers: What Happened to Those Children who Failed Their Screening?

ABSTRACT

Background: In the US more than 12.1 million school-age children have a vision problem; only one in three children receive eye care services before six years. The NEI reports that the most prevalent and significant vision disorders of preschoolers are amblyopia, strabismus, and significant refractive error.¹ Preschool vision screenings identify children who may have a vision disorder which can lead to permanent visual impairment unless treated in early childhood. For vision screenings to be effective, a “follow-up” vision care plan needs to be in place.

Methods: From 1999 to 2013, children who were enrolled in an inner city Head Start program underwent vision screenings. The vision screening was based on the Modified Clinical Technique and included: visual acuity, cover test, non-cycloplegic static retinoscopy, and direct ophthalmoscopy. Children who had reduced visual acuities, strabismus, high phorias or any observable ophthalmic abnormalities were referred for further eye care.

A longitudinal review of encounter records was made, and the following information was recorded: the number of children who had their vision screened, the number who failed the screening, and the number of children who received follow-up care.

Results: Over 15 years, 36,156 Head Start preschoolers had their vision screened, and 5409 were identified as failing their screening. Of those children who failed the screening, only 30.9% received follow-up care. A review of a subset of records from 2010-13, showed 15,484 children were screened and 2344 failed the screening. Of those who failed 22.4% received follow-up care; 55.8% received eyeglasses, 31% were told to return for eye care in 6 months, 20.6% were given no optical treatment, 1.3% had surgery.

Conclusions: As optometrists we need to make a commitment ensuring continuing eye care for preschoolers post screening by improving eye health literacy, and accessibility to comprehensive vision care services.

¹www.HHS.gov

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Title of Presentation:

Private-Practice Residency Program in Pediatric Optometry & Vision Therapy/Neuro-Optometry

ABSTRACT

This residency program is a full-time, formal, supervised program consisting of direct patient care, didactic education, teaching experience, and scholarly activities. It is based at the Center for Vision Development Optometry, the private practice of Dr. Derek Tong located in Pasadena, California. The learning objectives are achieved through patient care, case studies, and seminars which will facilitate the resident's development into an expert clinician in the areas of pediatric optometry, binocular vision, vision development, neuro-optometry, and vision enhancement.

A unique component of this program is equipping the resident with the necessary practice management skills to operate a private practice and successfully market its unique services. The resident will also learn to interact and co-manage patients with other optometrists, child development specialists, educators, and rehabilitation professionals.

This program provides qualified graduate optometrists with advanced clinical experience in the diagnosis and management of pediatric eye diseases, binocular vision disorders, visual-perceptual dysfunctions, acquired brain injury, and other functional vision deficits.

Link to residency website: <http://tinyURL.com/VisionResidency>

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Title of Presentation:

Relationship Between Topographical Orientation and Visual Perception in Young Adults

ABSTRACT

Background: Topographical orientation is the ability to orient and navigate in both familiar and unfamiliar environment (Wang and Spelke 2002). This complex function relies on several perceptual and cognitive processes such as attention, memory, perception and decision-making skills, all of which play important roles in spatial orientation (Lepsien and Nobre, 2006). Topographical orientation is possibly related to basic visual perception such as visual discrimination skill. The present study is aimed at investigating whether visual perception is related to topographical orientation performance in young adults.

Methods: 17 young adults with normal visual acuities and stereopsis served as subjects and divided into two groups; good (GVD) and poor visual discrimination (PVD) groups, by using visual discrimination subtest in Test of Visual Perception Skills (TVPS-3). A immersive virtual reality system, CAVE (Computer Assisted Virtual Environment) was used to assess topographical orientation performance of all subjects. The CAVE is contained a cube-shaped room in which the walls (3m x 3m) are rear-projection screens. 3D images within the CAVE appear to float in mid-air. The subjects, who wears polarization glasses, can walk around in the room for assigned tasks. Sensors within the room track the subject's position to align the perspective correctly and measured subject's walking trajectory. The subjects were asked to find a target as quick as possible in 2, 4, or 8 square poles arranged in the virtual reality room which is randomly rotated around a vertical axis for each trial. The durations to find a target were measured and analyzed to investigate the relationship between topographical orientation and visual perception.

Results: Compared to the GVD group, durations to find a target in the PVD group were significantly longer. Discussion: Our results indicate that visual discrimination skill, one of basic visual perception, was related to topographical orientation performance in young adults.

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Title of Presentation:

Hyperopic Children and the Application of Evidence-Based Optometry

ABSTRACT

Background: Hyperopia is the most common refractive error in children. In the past 10 years, significant research on hyperopia has been conducted. The addition of these studies to the evidence-base should help optometrists make better decisions about when and what to prescribe for hyperopic children.

Case Summary: TJ, a 2 year old girl presented to the Pediatric Service of the University Eye Center with her mother. TJ's mother had no concerns about TJ's vision but thought an eye exam would be a good idea. TJ was in good health. Her overall development was normal. There was no family history of significant visual conditions.

Uncorrected visual acuities at both distance and near, measured with pictures were 20/30 right eye, left eye and both eyes. Pupils and EOMs were normal. Cover testing at both distance and near was ortho. Retinoscopy was +2.00 in each eye. With cycloplegia, retinoscopy was +3.00 in each eye. Ocular health assessment was completely normal.

Results: What would you do?

Discussion: The results of 4 recent studies will be summarized:

Cotter SA, Varma R, Tarczy-Hornoch K, McKean-Cowdin R, et al. Risk factors associated with childhood strabismus. (2011)

Kulp MT, Ying G, Huang J, Maguire M, et al. Associations between hyperopia and other vision and refractive error characteristics. (2014)

Van Rijn LJ, Krijnen JSM, Nefkens-Molster E, Wensing K, et al. Spectacles may improve reading speed in children with hyperopia. (2014)

Ciner EB, Ying GS, Kulp MT, Maguire MG, et al. [Stereoaucuity of preschool children with and without vision disorders. \(2014\)](#)

Conclusion: In the management of hyperopia in young children, evidence-based optometry is focusing on risks associated with uncorrected hyperopia and the potential benefits of intervention. Optometrists are likely to continue to practice with a variety of prescribing philosophies, but incorporating an evidence-based perspective into management strategies will enhance outcomes for these young patients.

Author: Ruth Y. Shoge

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Title of Presentation:

Caring For Invisible Wounds: Vision, The Brain, and Beyond – A Case of an Adolescent Recovering from an mTBI

ABSTRACT

Background: Mild traumatic brain injuries (mTBI) are a common occurrence in children and adolescents. Postconcussive symptoms are complaints that tend to occur more often following TBI and include a range of somatic (e.g., headache, fatigue), cognitive (e.g., inattention, forgetfulness, slowed processing), and affective symptoms (e.g., irritability, disinhibition). Neurological, psychological, and physical factors are seen as interacting in complex ways, and appropriate evaluation allows for selecting individualized treatments for different patients depending on the particular dynamics of their disability. This case reviews the management of one such patient.

Case Summary: A 17 year old female presented with symptoms including reduced vision, diplopia, headaches, and photophobia. Most concerning was her reported inability to read and write. She had plans to sit for the SATs, graduate from high school, and attend college. Subsequent treatment of her visual symptoms with VT, direct and constant communication with her parents, and coordination with her care team resulted in this patient being able to graduate on time, and successfully gain acceptance to several colleges.

Discussion: Vision: Visual problems following an mTBI have been well documented over the years. Many of the common symptoms include oculomotor dysfunction, diplopia, blurry vision, and photophobia.

The Brain: mTBI can affect all aspects of brain function. In this case, we had to confront the patient's visual symptoms, psychosomatic issues, and visual apperceptive agnosia-like symptoms.

Beyond: Compounding these problems were also the social aspects of her recovery – being out of school and away from friends, and the uncertainty of her future.

As professional and media awareness continues to increase, optometrists will find themselves at the forefront of caring for these patients. It is our responsibility to provide vision care, and to be a team-player in the integrated treatment of the mental, emotional, and social health of these patients.

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Judy Tong OD, FAAO

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Title of Presentation:

10 Key Steps to Start a Private Practice Vision Therapy Residency

ABSTRACT

Background: The first private practice vision therapy residency program was launched in 2008. Since then, many new programs have been established. Due to the on-going demand, a huge need for additional program positions is anticipated.

Methods: This article provides an overview of the process involved to start and receive accreditation for such residency programs.

Results: Resources and links are included.

Discussion: The 10 key steps to starting a residency includes goals & intention, feasibility analysis, initial proposal, optometry school affiliation & adjunct faculty appointment, self study preparation, recruitment of initial resident, ACOE site visit, accreditation report, accreditation approval, annual review & next accreditation visit.

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Salus University

Title of Presentation:

The Pediatric/Vision Therapy Residency at Salus University

ABSTRACT

Background: The Pediatric/Vision Therapy Residency at The Eye Institute of the Pennsylvania College of Optometry (PCO) at Salus University, one of the first such residencies in the country, was established in 1977. It is a challenging 54-week educational program that is designed to train entry-level graduate optometrists to provide competent and efficient care to pediatric and infant populations, vision therapy, and neuro-optometric vision rehabilitation.

One of the biggest attractions of PCO is its exceptionally strong clinical program. From day one, residents get invaluable experience with our diverse patient population. The Pediatric/Vision Therapy Residency provides the foundation for the management of binocular disorders, strabismus, amblyopia, traumatic brain injuries, learning-related vision problems, and vision therapy. Additionally, our Pediatric/Vision Therapy residents rotate through our affiliated hospital vision clinics, which specialize in pediatric ocular disease and neuro-optometric vision rehabilitation. Residents also have the opportunity to enhance their skills in the diagnosis and management of ocular disease through our specialty services, such as emergency eye care, neuro-optometry, and retina service. The science-and research-driven atmosphere provides a unique learning and teaching experience for the residents as they work closely with faculty and students in the clinic.

The Pediatric/Vision Therapy Residency at PCO is a comprehensive program that assiduously prepares residents for the fields of pediatrics, vision therapy, and neuro-optometric vision rehabilitation. The residency employs an appropriate level of supervision and support from highly-trained faculty and eventually leads residents to clinical independence. With the recent renovation of The Eye Institute, the introduction of The Brain Injury Clinic, and new affiliated hospital sites, it has never been a more exciting time for residents at this institution.

Author: Helena Tzou

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Title of Presentation:

Vision Therapy for Children With Non-Verbal Autism: Uploading and Downloading for Success

ABSTRACT

Background: Vision therapy for children with non-verbal autism can enhance quality of life. Adaptability during planning and implementing of therapy sessions can allow patients to increase visual ability as well as develop skills that can influence all facets of life.

Case Summary and Results: An eleven-year-old male with non-verbal autism and history of psychological and neurological conditions, learning problems, and refusal to wear glasses was evaluated. Case history revealed that the patient often loses his place while reading, reads slowly, uses his finger as a marker, is bothered by light, experiences difficulty catching or hitting a ball, writes poorly, and has an awkward or immature pencil grip. The child was diagnosed with intermittent exotropia, oculomotor dysfunction, binocular dysfunction, accommodative dysfunction, strabismic amblyopia, and hyperopia astigmatism. Eight weeks of two sessions a week of optometric vision therapy was prescribed. Throughout therapy, various techniques were simplified in order for the patient to understand the task and to enhance visual skills. Additional aspects of the techniques were added when possible. The patient wore glasses more frequently at home and tolerated an eye patch for monocular activities; the patient participated in home vision therapy sessions more willingly and repetitive behaviors decreased. The patient's mother reported greatly improved handwriting, verbal skills, and initiative to attempt new tasks. Mild improvement in ocular motilities, convergence, and binocular ranges were measured at the progress evaluation.

Discussion: Children with non-verbal autism or other significant deficits due to autism can benefit from optometric vision therapy. It is often more effective if patient's ability level is gauged and activities are modified for success.

Author: Eric S. Hussey, OD, FCOVD

Private Practice

Title of Presentation:

Development of Stereopsis Using Eyetronix Flicker Glass to Treat Amblyopia in a Congenital Unilateral Post-Cataract-Surgery Aphake

ABSTRACT

Background: Early or congenital cataract is treated with early surgery, commonly without pseudophakic implants. Surgery is often followed with patching and optical correction, including extended wear contact lenses. Some level of amblyopia is expected to persist depending on how early surgery was performed and what post-surgical therapies are accomplished.

Case Summary: As a parallel case study to the Eyetronix Flicker Glass Amblyopia Treatment Study, a 5-year old white female unilateral (post-surgical) aphake was treated with the novel therapy. Eyetronix Flicker Glass (EFG) are glasses with liquid crystal lenses that rapidly alternate occlusion between the two eyes at a prescribed “flicker” frequency. The patient had been previously fit with an extended wear pediatric aphakic contact lens and had been faithfully patching for 4 hours daily. In this case study, we followed the Eyetronix study protocol of wearing EFG for near activities (e.g., coloring) for 1-2 hours daily for a 12-week treatment period. Given positive results and strong interest in continuing treatment by the patient parents and doctor, therapy has been extended for an additional 12 weeks. At this time (12-weeks as of this abstract), acuity in the amblyopic aphakic eye has improved from LogMAR 0.34 to 0.26. In addition, stereopsis has improved from <500 seconds (no response on stereo tests) to a reliable 63 arcseconds (Random dot 2).

Discussion: In addition to being considered “a treat” compared to 4 hours daily patching, Eyetronix Flicker Glass therapy has improved visual acuity and stereopsis over what had been attained with conventional patching. This novel therapy holds promise in treating early post-surgical aphakic amblyopia by improving binocular vision, improving visual acuity, and being well-accepted during use.

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Title of Presentation:

Idiopathic Intracranial Hypertension in a Teenager with a Complaint of Diplopia

ABSTRACT

Background: Pseudotumor cerebri or idiopathic intracranial hypertension (IIH) is a disease which presents as papilledema secondary to increased intracranial pressure, with a negative cranial MRI/IV and increased opening pressure upon lumbar puncture. It occurs predominately in obese women of child-bearing age and may cause visual field and central visual acuity loss if the underlying cause is not addressed.

Case Summary: A 16 year old African American female presented with sudden onset diplopia, tinnitus and headaches. She was found to have a constant esotropia and hyper deviation that was not present at her last eye exam, one year prior. She also showed dramatic optic disc edema in both eyes. She was prescribed a fresnel prism for temporary, yet immediate, diplopia relief. After ordering a visual field, OCT and posterior pole photos, she was sent to a Neuro-ophthalmologist for a workup including lumbar puncture, MRV and MRI. She was diagnosed with IIH and placed on a regiment of Diamox. When she returned one month later, there was a significant decrease in swelling and her diplopia had disappeared.

Discussion: This case demonstrates the importance of striking a balance between relieving the patient's symptoms while still ensuring that referrals are made to properly diagnose and manage the underlying condition. This patient was able to leave our office with single, clear, comfortable binocular vision while still understanding the severity of her condition. This case also shows that a careful optic nerve evaluation with imaging is warranted, despite being outside the expected demographic.

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Title of Presentation:

Atypical Stargardt's Disease in a Vision Therapy Patient

ABSTRACT

Background: Stargardt's Disease is the number one inherited macular disorder among patients 10-20 years old, occurring in approximately 1 in 8,000 patients. This degenerative maculopathy is known for rapidly decreasing VAs to between 20/200-20/400, central visual field defects, and a characteristic fundus appearance of golden "fish tail" shaped flecks throughout the macula.

Case Summary: An 11 year old African American female was referred to the IEI Pediatrics and Binocular Vision department for a visual efficiency exam. The patient was diagnosed with accommodative insufficiency, convergence insufficiency, and essential emmetropia. After completing two months of therapy, a cycloplegic exam was performed due to continued patient complaints of decreased vision at distance. Upon examining the posterior pole, the macula was found to contain bull's eye maculopathy and pinpoint drusenoid-appearing disruptions concentrically around the fovea. Visual field testing revealed a central vision defect, and a clear disruption between the inner and outer segments of the macular photoreceptors was seen on OCT. The patient was referred to a specialist in inherited retinal disorders and was diagnosed with atypical Stargardt's degenerative maculopathy. Through continued vision therapy, the patient was able to obtain age appropriate accommodative skills and compensating vergence abilities. After two years of maintenance home vision therapy and regular follow-ups, the patient has maintained appropriate binocular vision skills, and the vision is stable.

Discussion: The present case shows the value of auxiliary testing in diagnosing retinal disorders, particularly those with atypical presentations. This case also highlights the importance of dilated fundus exams for all patients, even when referred in for therapy only. Finally, this case demonstrates the ability to use vision therapy to maximize the remaining vision in a patient with pathological vision loss.

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Title of Presentation:

Successful Completion of Vision Therapy in Different Socioeconomic Backgrounds

ABSTRACT

Background: Previous studies have established a positive correlation between binocular vision dysfunctions and poor academic performance in school-aged children. Furthermore, many studies have reported the success of vision therapy (VT) in eliminating binocular disorders. 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 successful completion of VT by school-aged children based on socioeconomic status.

Methods: Electronic health records of all children ages 6 years 0 months to 17 years 11 months who completed VT at the Illinois Eye Institute within the study specified 1-year period were reviewed. There were 163 of these children included in the study, who had been diagnosed with oculomotor, accommodative, and/or binocular dysfunctions (e.g., convergence insufficiency and intermittent but not constant strabismus). For these children, method of payment for VT sessions was recorded as an indication of their socioeconomic status. The children were classified either as having successfully completed VT or as having failed to complete VT due to noncompliance.

Results: There was no significant correlation between whether or not the child successfully completed VT and payment type (Medicaid versus self-pay/commercial insurance) ($p=0.54$). There also was no significant influence of gender of the children on success of VT ($p=0.16$). However, the older (ages 10-17 years) children were more likely to succeed in VT compared to the younger (ages 6-9 years) children ($p = 0.03$).

Discussion: Socioeconomic status indicated by payment type did not show an association with successfully completing VT for school-aged children in our clinic. Possible reasons for the older children having a greater VT completion rate include better understanding of procedures and ability to comply with home VT without parental assistance. Future studies could consider other variables such as household income to better predict socioeconomic status.