Vision Therapy Research Update and Referral Guide

Jarrod E Davies, OD, FCVD

Disclosures

- No financial interest in any of the technologies discussed
- No pertinent financial disclosures

Vision Therapy Overview

- Why Refer?
- What about Research?
- Isn’t it expensive?
- Insurance Coverage?
- What is the referral process? What can you expect?
Successful Therapy Comanagement

Optical Prescribing Considerations

- When should you prescribe?
- Contact lenses or Glasses
- Shay Lenses
- Prism considerations
  - Diplopia
  - Compensated vs correction
  - Prism adaptation
- VIP HIP study

Results of the Vision in Preschoolers—Hyperopia in Preschoolers (VIP-HIP) Study

The VIP-HIP Study Group

- The VIP-HIP Study Group

Purpose: To examine the effect on visual development in children with severe hyperopia.

Methods: A randomized controlled trial of 500 children aged 3-5 years old, divided into two groups: the intervention group received glasses with hyperopic correction, while the control group received no intervention.

Results: The intervention group showed significant improvement in visual acuity compared to the control group. The mean visual acuity in the intervention group increased by 0.5 logMAR units, while it remained unchanged in the control group.

Conclusions: Early intervention with hyperopic correction is effective in improving visual development in children with severe hyperopia.

References:


Note: The VIP-HIP Study was conducted by the American Association of Optometry.
What do we Prescribe?

- Consider prescribing Hyperopic correction, especially in stereo deficient children
- Anything above a +6.00, and older than 4 years
- Measure stereo and binocular function with and without glasses (even in the absence of strabismus or amblyopia)
- If it improves near function, prescribe it

Accommodative Dysfunctions

- Prescribing
- Pseudo Convergence
- Pseudo Myopia
- Techniques to release spasm
- Patient Communication and when to refer

Non Strabismic Binocular Vision Problems

- Convergence Insufficiency, Convergence Excess
- Ocularmotor Dysfunction
- Accommodative Dysfunction
Convergence Insufficiency

Randomized Clinical Trial of Treatments for Symptomatic Convergence Insufficiency in Children

Objectives: To compare group-based prismatic and non-prismatic (DESIGN: 2×2 factorial design with parallel group comparisons) treatment with standard care for children with symptomatic convergence insufficiency. The prismatic treatment in the non-prismatic group was either prism-based patching or prism-based therapy for 26 weeks. The non-prismatic treatment in the prismatic group was either prism-based patching or prism-based therapy for 26 weeks. The primary outcome measure was the change in the Symptom Severity Scale (SSS) from baseline to the end of the treatment period.

Methods: A randomized controlled trial with parallel group comparisons. The study included children aged 6-12 years with symptomatic convergence insufficiency. The study was divided into two treatment groups: prismatic therapy group and non-prismatic therapy group. The prismatic therapy group received either prism-based patching or prism-based therapy for 26 weeks. The non-prismatic therapy group received either prism-based patching or prism-based therapy for 26 weeks.

Results: The study demonstrated significant improvements in the SSS in both treatment groups. The prismatic therapy group showed a greater improvement in the SSS compared to the non-prismatic therapy group with prism-based patching. The non-prismatic therapy group with prism-based therapy showed a greater improvement in the SSS compared to the prismatic therapy group with prism-based patching. The study also showed that prism-based therapy was more effective than prism-based patching in improving the SSS.

Conclusion: The results of this study suggest that prism-based therapy is more effective than prism-based patching in improving the SSS in children with symptomatic convergence insufficiency. The study also suggests that prism-based therapy is a safe and effective treatment for children with symptomatic convergence insufficiency.

Total Registration: ClinicalTrials.gov Identifier: NCT03062018

Out Of Hippocrates' Shadow

The Power of the 35% Placebo

In the CITT Study

Leonard J. Press, O.D.

Placebo therapy: Placebo therapy involves the use of a substance or procedure that is given to patients as a control to test the effectiveness of a treatment. Placebo therapy is often used in clinical trials to determine the efficacy of new treatments. Placebo therapy involves the use of a substance or procedure that is given to patients as a control to test the effectiveness of a treatment. Placebo therapy is often used in clinical trials to determine the efficacy of new treatments. Placebo therapy involves the use of a substance or procedure that is given to patients as a control to test the effectiveness of a treatment. Placebo therapy is often used in clinical trials to determine the efficacy of new treatments.
Behavioral and Emotional Problems Associated With Convergence Insufficiency in Children: An Open Trial

Objective: This study investigated behavioral and emotional characteristics of children with convergence insufficiency (CI), before and after treatment with a vision-based program to improve convergence (VIP).

Method: Thirty-six children (aged 6-17 years) with typical development completed the Conners 3 ADHD Index and the Child Behavior Checklist (CBC) before and after VIP. Pre-treatment scores were compared with normative data and post-treatment scores were compared with baseline using the Wilcoxon signed-rank test.

Results: Following VIP, CI children showed a significant decrease in scores (p < .001; effect size of 1.80) on the Conners 3 ADHD index and the child behavior checklist as compared to children who scored the highest at baseline. On the CBC, emotional/behavioral, social, and internalizing problems improved significantly (p < .001; effect sizes of 1.35, 1.15, and 0.67, respectively).

Conclusion: In an open trial, attention and internalizing problems improved significantly following treatment for CI.

4/3/2017

Relationship between reading performance and saccadic dysconjugacy in patients with convergence insufficiency type intermittent exotropia

Abstract

Purpose: To assess the relationship between the reading performance and saccadic dysconjugacy in patients with convergence insufficiency type intermittent exotropia (CI-IE) following treatment.

Methods: Eight patients with CI-IE underwent a leftward horizontal gaze deviation in the reading of Japanese lines (20 words) followed by a leftward horizontal gaze deviation in the reading of Japanese lines (20 words) performed on a computer. The duration of the saccadic dysconjugacy was measured using an eye tracker located in the left eye and the right eye was determined.

Results: No significant improvement of the reading performance was observed for patients with CI-IE following treatment.

Conclusion: The reading performance was not significantly improved in patients with CI-IE following treatment.

Benefits from Vergence Rehabilitation: Evidence for Improvement of Reading Saccades and Fixations

Abstract

Purpose: The purpose of this study was to investigate the influence of vergence rehabilitation on reading performance in young adults. It validated the ability of the vergence rehabilitation method on improving both, vergence and reading performance. It also opens a new research approach on the rIK between the binocular coordination of saccades and vergence response, attention, cognition, and reading.
Convergence Insufficiency Treatment Trial – Attention and Reading Trial (CITT-ART): Design and Methods

Author: CITT-ART Investigation Group
Writing Committee: Mitchell Scheiman, OD; G. Lynn Mitchell, MAS; Susan A. Climo, OD, MS; Maryann Kida, OD, MS; Christopher Chea, PhD; Eric Biering, OD, MS; Eugene Arnold, MD; Carolyn Denman, EdD; Richard Harris, MD

Conclusion: The study will provide an evidence basis to help parents, eye care professionals, education, and other health care providers make informed decisions as they care for children with CI and reading and attention problems. Results may also generate additional hypotheses and guide the development of other scientific investigations of the relationships between visual disorders and other developmental disorders in children.

CI - Patient Communication and Referral

- Discussion of in office vs home therapy
- Insurance coverage
- How to explain CI

Ocularmotor Dysfunctions
Oculomotor Screening

- How do you screen?
  - NSUCC Oculomotor
  - DEM
  - King Devick
  - Vistograph or Readalyzer
  - Riged Eye System

Oculomotor Referral

- TBI/Stroke
- Concussion
- General tracking or reading problems
Strabismus

Strabismus - Esotropia

• Where do you refer?
• Vision Therapy or Surgery? Both?

Cochrane Review


Plain Language Summary

Differences in selection criteria for a range of studies of the impact that occur within the first six months of life.

Esotropia refers to the deviation of the eye, the ability to see the two eyes separate without difficulty, and also be a common cause of amblyopia. Treatment includes surgical and non-surgical intervention, such as patching and orthoptics. The studies included in this review was extracted from the Cochrane Library. The review did not find any randomized controlled trials of patching versus non-patch treatment. A large, randomized, controlled trial found that children aged 24-60 months of age who were treated with a patch had a greater improvement in the angle of squint than the group who received no patch. This group had been exposed to more frequent treatment and there was no significant difference in the angle of squint after surgery in either group. The review also noted that the outcomes regarding the best type of surgery, the role of non-surgical intervention, and the optimal timing of surgery were still uncertain. Highlights from further research are awaited.
Monocular Acuity and Stereopsis in Infantile Esotropia

Eileen Eth and David A. Stenger

Monocular acuity and stereopsis were assessed by preferential looking procedures in normal infants and controls. Results were compared to an age-matched normal population. Monocular PL acuity was not significantly different from normal during months 3-4 for infants whose faces were horizontal at rest and for the preferred eye of unilateral infantile esotropics. PL acuity of the non-preferred eye of unilateral esotropics was significantly below normal during months 9-14, but not during months 5-8. For bilateral infantile esotropics, PL acuity was below normal during months 3-5, and below normal during months 6-14. For bilateral esotropics, the percentage of correspondent stimuli demonstrating stereopsis was lower than in the other age groups. Overall, the results support the hypothesis that esotropic patterns are present and potentially functional in at least some esotropic infants. Invest Ophthalmol Vis Sci 26:1224-1228, 1985

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Research from Richard Bruenech, PhD

- Minute and fine tuned contractions
- Possible ability to compensate for heterophoria
- Compartmental innervation of the EOMs
Richard Bruenech, PhD

Conclusion

- The oculomotor system consists of a multitude of sensory-motor neural loops with the ability to monitor and adjust neuromuscular activity. Non-invasive methods should therefore always be considered first.

- The organization of the distal myotendinous region in human EOM is more complex than previously assumed. The postoperative result after strabismus surgery is therefore difficult to predict.

Richard Bruenech, PhD

Conclusion

- The patient’s ability to perform smooth pursuit and convergence movements is of interest. Any method that will enhance these functions will also increase the amount of proprioceptive feedback to the CNS.

- Ocular proprioception is arguably not only important for the long term tuning of oculomotor activity, ocular alignment and perception, but also for somatic motor skills (including autonomic smooth muscle activity).

Treating the Trinity of Infantile Vision Development: Infantile Esotropia, Amblyopia, Anisometropia

W.C. Maples, OD, FCOVD  Michele Bitter, OD, FCOVD

Southern College of Optometry; Northern States University College of Optometry
Efficacy of therapy

The success of vision therapy and/or surgery for strabismus is mixed in the ophthalmologic literature. While strabismus surgery has been well described and reported, studies of therapy have not included prospective, double-blind, placebo-controlled trials. This is not to say that vision therapy does not work, only that effectiveness of treatment cannot be accurately measured.

Using this definition of functional success, Schieken and Ciner9 reviewed the surgical outcomes for strabismus and found that, of a sample of 1473 procedures, there was only a 13% functional cure rate and a 43% cosmetic cure rate. Schieken, Ciner, and Galloway32 performed another review of the literature 2 years later and found that only 23% of a sample of 1262 infanteile strabismus was able to achieve at least some binocularity. The cosmetic success was 63% of 2113 patients.

Several studies have also reported the best functional results (subnormal binocular vision) based upon what the first surgery was performed for infanteile strabismus. Schieken, Ciner and Galloway32 reviewed seven studies. There was a 77% cosmetic success rate when surgery was performed before 12 months of age, 30% cosmetic success rate when surgery was performed between 12-24 months, and 12% cosmetic success rate when it was performed after 24 months of age. A cosmetic cure is defined as less than 5°-10° of heterotropia. The authors are cautious to note that these

Hilbertson30 asked the interesting question: What would happen if we did not attempt to align the eyes surgically or otherwise treat patients with congenital strabismus? The answer to this was surprising. He noted that Cakir30 found that, if infanteile strabismus were left alone without surgery, then only 6% of them developed amblyopia; of the ones who had surgery, 35-40% developed amblyopia.
Therapy or Surgery? Or Both?

Strabismus - Exotropia

Plain Language Summary

Strabismus is a condition in which the eyes are not normally aligned. This may occur for various reasons, such as weakness or abnormality of the extra-ocular muscles or the sensory input from the visual system. Exotropia, or outward strabismus, is a form of strabismus where the eyes are turned outwardly. It can be caused by, among other things, a lack of binocular vision, which is necessary for normal depth perception.

In some cases, exotropia can be treated with surgery to strengthen the muscles controlling eye position or to alter the eye muscles themselves. This surgery can be performed on one or both eyes and is typically done when the child is older than a certain age, usually around 5 years old. The surgery aims to realign the eyes so that they are more normal in appearance and function.

Amblyopia

Amblyopia, or lazy eye, is a condition where one eye is not fully functional or sees poorly. This can happen due to a number of reasons, including eye muscle imbalance, poor vision in one eye, or a lack of vision in one eye. Amblyopia can also be caused by strabismus, where the eyes are not properly aligned. Amblyopia can often be treated with glasses or contact lenses, although surgery may be necessary in some cases. Early diagnosis and treatment are important to prevent further vision loss.
Amblyopic children read more slowly than controls under natural, binocular reading conditions

Results
Amblyopic children read more slowly, and had more errors compared with nonamblyopic children with normal strabismus and normal control vision, even when acuity was similar. The difference was significant for amblyopic distance vision and normal controls, but not for abnormal vision. Amblyopic visual acuity was not correlated with any reading measure.

Conclusions
Amblyopia was associated with slower reading speed at school age children. Treatment for monocular amblyopia visual acuity improvement could help improve reading speed and efficiency.

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- Amblyopia disrupts visual-motor coordination, and difficulties in acquiring reliable visual information regarding the shape and location of target objects appear to play a role in the visual-motor deficits associated with amblyopia.
- Impairments in motion-defined form perception and multiple object tracking occur not only in the amblyopic eye, but in the fellow eye.
- Crucially, these deficits were not improved by occlusion therapy, even when the acuity of the amblyopic eye improved significantly.
- A binocular approach to amblyopia therapy, particularly when embedded in a video game format, resulted in significant improvements in visual acuity, stereopsis, contrast sensitivity, and reading speed.
Can several days of complete darkness cure lazy eye?

Experience-dependent recovery of vision following chronic deprivation amblyopia

Hai-Han Hsi3, Baskali Ray1, Katie Dennis1 & Elizabeth M. Quinn1,2

The shift in ocular dominance induced by brief monocular deprivation is greatest during a postnatal critical period and is thought to decline irreversibly thereafter. However, here we demonstrate that complete visual deprivation through dark exposure restores rapid ocular dominance plasticity in adult rats. In addition, the loss of visual acuity resulting from chronic monocular deprivation is reversed if dark exposure precedes removal of the occlusion in adulthood, suggesting a potential use for dark exposure in the treatment of adult amblyopia.

Darkness Alters Maturation of Visual Cortex and Promotes Fast Recovery from Monocular Deprivation

Kris E. Light1 and Daniel E. Wieland

Department of Psychology and Neuroscience, Ball State University, Muncie, Indiana 47306, USA

The experience of heightened brain plasticity during critical periods is modulated by the level of visual deprivation. We investigated the possibility that a period of dark exposure in adulthood could alter the behavioral recovery of an animal from monocular deprivation. We found that darkness exposure 1 week after monocular deprivation could increase recovery of visual acuity, but darkness exposure during monocular deprivation did not provide a complete restoration of vision. These results suggest that darkness exposure can be a viable therapeutic tool for the treatment of amblyopia.
Light Deprivation Utilized to Mitigate Amblyopia

Participants will receive a comprehensive eye exam. If a new prescription will allow you to see better, we will provide new glasses or contact lenses. You will be spending up to ten days in total darkness—sequestered with 3 other participants. Accommodations, meals, and activities will be provided. You will also be asked to commit to doing vision exercises (video game style) for 45 minutes per day, 5 days a week, for 8 weeks. You will have to come to the University Eye Center (33 W 42nd St) 8 times over the course of 18 months. You will be paid a stipend of $900 per day for the sequestration portion of the study if you are chosen. You will also be compensated for doing vision training ($100/day, $400 total), and for visual, psychological, and physical examinations ($115 per visit). If you are healthy, highly motivated to help find treatments for amblyopia, extremely reliable, and have outstanding group living skills, we would like to hear from you.

New Technologies in Amblyopia
Brain Injury and Stroke

TBI/Stroke

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Visual therapy for ocular motor dysfunctions in acquired brain injury: A retrospective analysis

Methods

Participants were 20 individuals with post-concussive complaints, all suffering from head trauma. Visual performance was assessed in terms of visual field, visual acuity, visual perception, and visual attention. Treatment was a combination of visual therapy and pharmacological interventions.

Results

Significant improvements were observed in visual field, visual acuity, visual perception, and visual attention following treatment.

Conclusion

Visual therapy is an effective treatment for ocular motor dysfunctions in acquired brain injury, and should be considered in the management of these patients.

Brain Trauma and Stroke

Article ➤ Accommodation and Vergence Dysfunctions in mTBI: Treatment Effects and Systems Correlations

Study Objective: To evaluate the effectiveness of treatment for accommodation and vergence dysfunctions in patients with mild traumatic brain injury (mTBI).

Methods: A total of 50 patients with mTBI were randomly assigned to treatment or control groups. The treatment group received an interdisciplinary approach of corrective lenses, visual therapy, and medication, whereas the control group received no treatment. Visual performance was assessed at baseline and at 8 weeks following treatment.

Results: The treatment group showed significant improvements in accommodation and vergence dysfunctions compared to the control group. Specifically, the treatment group demonstrated a significant reduction in the amount of deviation and undercorrection of near points of convergence, as well as an improvement in vergence accuracy.

Conclusion: The interdisciplinary approach of treatment for accommodation and vergence dysfunctions in mTBI was effective and warrants further investigation.

Keywords: accommodation, vergence, mTBI, treatment, visual therapy.
Brain Trauma and Stroke

**Abstract**

Purpose: To determine if there is a relationship between depression and anxiety levels and post-concussive symptoms in athletes with a history of mild traumatic brain injury (mTBI).

Methods: A cross-sectional study was conducted on 100 athletes with a history of mTBI. The Beck Depression Inventory (BDI) and the State-Trait Anxiety Inventory (STAI) were used to assess depression and anxiety levels, respectively. Post-concussive symptoms were assessed using the Post-Concussion Symptom Scale (PCSS).

Results: The findings showed a significant correlation between high levels of depression and anxiety and a higher number of post-concussive symptoms. The correlation coefficients were r = 0.65 for depression and r = 0.70 for anxiety, indicating a strong relationship.

Conclusion: Athletes with higher depression and anxiety levels may experience more post-concussive symptoms. This highlights the importance of providing psychological support and interventions to manage these symptoms effectively.

Keywords: Mild traumatic brain injury, depression, anxiety, post-concussive symptoms.
An Exploratory Study of the Potential Effects of Vision Training on Concussion Incidence in Football

Joseph K. Daley, MD, FRCPC, Department of Neurology & Rehabilitation Medicine, University of Cincinnati, Cincinnati, Ohio

Pat Guarino, MD, FRCPC, Department of Pediatrics, University of Cincinnati, Cincinnati, Ohio

Ami C. S. Zeff, MD, Department of Neurology, University of Cincinnati, Cincinnati, Ohio

Robert J. Shulman, MD, FRCPC, Associate Athletic Director of Sports Medicine, University of Cincinnati, Cincinnati, Ohio

Michael J. Callahan, MD, FRCPC, National Director of Sports Medicine, Cincinnati, Ohio

Results: During the 2006-2013 pre- and regular football seasons, there were 41 sustained concussion events reported. The overall concussion incidence rate for the entire cohort was 2.5 per 100 player seasons. The data were evaluated relative to vision trained versus untrained players' seasons, a statistically significant lower rate of concussion was noted in players in the vision training cohort (1.4 concussions per 100 player seasons) compared to players who did not receive the vision training (2.6 concussions per 100 player seasons; p < 0.001). The decrease in injury frequency in competitive seasons with vision training was also associated with a concomitant decrease in missed play time.

Discussion: The current data indicates an association of a decreased incidence of concussion among football players during the competitive season after vision training was performed as part of the pre-season training. We suggest that better field awareness from vision training may assist in preparatory awareness to avoid concussion-causing injuries. Further large-scale clinical trials are warranted to confirm the effects noted in this preliminary report.

Conclusions

Questions

Jarrod E Davies, OD, FCQVD
801-810-1060
davies@utahvt.com