Article ▸ A Non-Ideal Vision Therapy Case that Provokes Thought About the Reasons Behind Patient Refusal of Treatment

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ABSTRACT

Background: Saccadic eye movements and visual information processing play an important role in reading success. Vision therapy can be a successful tool in the treatment of these conditions, but there is a variety of reasons why patients chose not to continue with this recommended treatment.

Case Report: A nine-year-old male presented due to poor language arts performance on the ISTEP standardized test. He was diagnosed with saccadic dysfunction and reduced figure-ground, which made reading on the computer difficult. The patient was given educational accommodations based on the findings. Vision therapy was recommended, but his mother declined the treatment.

Conclusion: This non-ideal case outlines the testing and assessment for oculomotor dysfunction and visual information processing and draws attention to issues surrounding vision therapy that may contribute to increased patient drop-out. By providing flexible office hours, increasing insurance coverage, and working with other eye care professionals to change the professional opinion regarding vision therapy, optometrists can increase the capture rate of patients in need of vision therapy services.

Keywords: computer vision, Developmental Eye Movement test, figure-ground, ISTEP, saccadic dysfunction, visual information processing, Visagraph, vision therapy

DW, a nine-year-old white male attending third grade, presented after receiving the results of the Indiana ISTEP standardized testing assessment. Third graders are tested for competence in mathematics and language arts. In all mathematics categories, the patient scored above the 95th percentile; however, in those pertaining to reading or language arts, his scores were significantly reduced. His lowest score in verbal reasoning words had scores of 39 in the grade percentile rank and 40 in the age percentile rank. The ISTEP is performed on a computer platform,[1] which for this patient may have made all the difference. Despite poor test scores, the patient was a part of the Advanced Learning Program for Students (ALPS), a program for talented and gifted students.

The chief complaint at the initial visit was concern from the patient's mother that her son's reading ability decreased when he used the computer. Since much of the standardized and reading evaluation testing at the school was performed on a computer, this was concerning to her. The patient's history was positive for motion sickness and reading difficulty that worsened during computer use. The mother reported that her son often used his finger to mark his place when reading. He did not have any complaints regarding his vision at distance or near, and he did not get headaches after reading or computer work. The patient had no history of corrective lenses, and there was no pertinent medical history. His examination showed normal external and internal ocular

health. Accommodation and binocular function were within normal limits, with the exception of a potential oculomotor muscle dysfunction. The patient was referred to the pediatric optometry department for further testing and a visual information processing (VIP) evaluation.

Table 1: Accommodation and Binocular Vision Testing

Testing	Results	Conclusion
Distance Phoria	Orthophoria	Normal
Near Phoria	4 Exophoria	Normal
MEM	+0.50	Normal
Worth 4 Dot	4 dots at all distances	Normal No diplopia or suppression
Randot Stereopsis	30" ARC + RDS	Normal
Cycloplegic Refraction	+0.50 OU	Normal
Maples NSUCO Saccadic Testing	Ability: 2 Accuracy: 2 Head Movement: 2 Body Movement: 3	Reduced Saccadic Function
Maples NSUCO Pursuit Testing	Ability: 3 Accuracy: 3 Head Movement: 3 Body Movement: 3	Reduced Pursuit Function

Table 2: Visual Information Processing Testing

Test	Result	Conclusions
DTVP-2	All testing above normal to normal; 5th percentile Figure-Ground	Reduced figure-ground ability
DEM	Significant number additions V/H ratio 1.62	Saccadic Dysfunction
Children's Color Trails Test	Normal	Normal
Woodcock Johnson Test	Reading Level 2.2	Reduced reading capability
Visagraph (computer)	170 WPM, 62% comprehension High number of saccades and regressions	Reduced reading ability on computer
Visagraph (paper)	222 WPM, 90% comprehension	Above average

The patient's mother insisted that her child be evaluated as soon as possible because he was scheduled to take another ISTEP assessment within the month. His binocular vision and accommodation were re-assessed, with the only abnormal finding being a low score on the NSUCO Maples test for saccades (Table 1). DW underwent a full VIP assessment using the Developmental Test of Visual Perception – Second Edition (DTVP-2), Developmental Eye Movement Test (DEM), Children's Color Trails Test, and the Visagraph eye movement recording unit (Table 2).

The results showed that he tested in the high average level or better for all of the tests, with the exception of visual figure-ground, in which he received a raw score of three, giving him a scaled score within the 1% rank. The DEM revealed a significant amount of number additions, giving him a V/H ratio of 1.62, with the normal for his age being 1.21 with a standard deviation of 0.19.[2] The DEM test for oculomotor dysfunction has a consistent inter-test reliability when performed at an in-office assessment, and low scores on the test correspond to symptoms in 90% of patients,[3] making it a reliable part of oculomotor dysfunction testing.

The Visagraph is a tool used increasingly in the diagnosis and management of saccadic dysfunction and reading complaints in children and adults. It measures the number of fixations and regressions, mean fixation duration, fixation duration distribution, reading speed (words per minute), grade level equivalent, non-coordinated eye movements, and cross correlation between the right and left eyes.[4]

The patient's performance on the Visagraph was one of the most telling data sets collected. DW achieved 222 words per minute and 90% comprehension. He was well above the average 138 words per minute for his grade level.[5] When a similar paragraph was presented on the Ace Reader, a computer program, the patient's results dropped significantly to a reading rate

of 170 wpm with only 62% comprehension. He showed a significantly higher number of saccades and regressions than normal for his age group.

The patient and his mother were informed that his saccadic dysfunction and decreased figure-ground ability were related to the computer problems, and they were urged to return for vision therapy to improve his tracking and to increase his visual processing efficiency on the computer. As a result of his testing, a letter was submitted to the school recommending section 504 accommodations for the patient. His plan included the following accommodations:

1. A paper format should be used in place of computerized in all testing, including ISTEP
2. Maintain any computer workstations at 16 inches from the patient's eyes
3. Trial large monitor to enable enlarged font size
4. Allow extended time for any assessments or activities involving a computer
5. Use enlarged font for reading material to reduce figure-ground

The patient and his mother returned two weeks after the initial 504 plan was sent to the school for a follow-up visit. At this time, the mother stated that the school had not received the letter, and she was given a copy to take directly to the school. The importance of vision therapy to reduce or to remove the source of his visual irregularity was impressed on her, but the patient's mother refused the treatment because the family's insurance carrier did not cover the therapy. The patient has not been seen in the office since receiving his 504.

Discussion

The patient's chief complaint was the discrepancy between reading skill with a computer versus that with printed material. Tasks performed on paper versus a computer are not equivalent visually or mentally. Reading speed on the computer is significantly reduced compared to paper.[6,7] Reading comprehension and production of information were also reduced on computer assessments.[8] Evidence suggests that the drop in skill may be due to an increased physical and mental demand during computer work. Subjects felt more tired and had an increased level of stress after using the computer when compared to the same tasks on paper due to an increased cognitive demand.[8]

In addition to normally reduced efficiency levels using a computer versus paper and his saccadic dysfunction, this patient also struggled with low figure-ground ability. Figure-ground assessment tests the patient's ability to recognize an object within a busy background. Success at this skill represents an ability to register an object as more important than background noise and to devote a higher level of processing and visual memory to the object. This skill is also tied to changes in contrast and orientation. Experiments have shown that a patient with successful figure-ground skills will subconsciously increase the contrast of the object over the background.[9] Patients who struggle with figure-ground related problems may experience any of the following symptoms:[10]

- Difficulty recognizing unformed letters or errors in spacing
- Difficulty sorting and organizing personal belongings
- Hyper-attention to detail, causing a tendency to miss the "big picture"
- Difficulty filtering out visual distractions
- Difficulty when copying from the board, often tends to miss or skip words or letters

A patient with this specific deficiency would likely be distracted by the flickering screen,

colors, and general medium of material. A pencil and white paper with large letters and few available distractions would allow the student to concentrate more fully on the task at hand. The general surroundings should also be kept as free from clutter and distractions as possible.

The patient's saccadic dysfunction contributes to inefficient reading processing in any medium, a problem that is likely to worsen as the font size and spacing continue to decrease and the reading demand increases. Patients who show deficiencies in oculomotor control may present with the following symptoms:[11]

- Moves head excessively when reading
- Frequently loses place when reading or copying
- Omits words when reading or copying
- Skips lines when reading
- Uses finger or marker to maintain place
- Lacks comprehension when reading
- Rereads lines unknowingly

There is a strong correlation between the success of saccadic oculomotor movements and reading. While approximately 90% of reading involves fixation, saccadic accuracy plays an important role in lining up the fovea to perceive correct visual information. Reading consists of a succession of 2- to 4-degree saccades followed by a large saccade to the subsequent line, often with a small corrective saccade.[12] If a patient is a successful reader, they will have a minimal number of regressions and fixations and shorter saccades.[7] Therapy for saccadic dysfunction is effective. Performing saccadic therapy on elementary school students increases their performance in reading fluency.[13] Activities such as the Wayne Saccadic Fixator, Hart chart saccades, wall fixations, multiple Brock string saccades, and computer saccadic therapy can be used to remediate saccadic dysfunction.[14]

The diagnosis and treatment of this patient were relatively straightforward. The saccadic dysfunction served as a barrier to the patient reaching his full aptitude for reading and language arts skills, which were especially pronounced on the computer due to the addition of his very low figure-ground ability and the inherent difficulties of using a computer medium rather than paper. The ideal form of treatment for this patient would have been to undergo vision therapy. Unfortunately, this case was not an ideal situation. After the patient received his 504 plan, he did not return to begin therapy. While the accommodations given to him may improve his testing levels, the source of the problem has not been addressed, and he may continue to struggle without the proper intervention.

Reasons for dropout from vision therapy vary. Sessions are not covered by most insurances, so cost can be a major prohibiting factor. Working closely with insurance companies to improve coverage for vision therapy services should be a priority. Studies such as the Convergence Insufficiency Treatment Trial (CITT)[15] should be performed to evaluate definitively the success of vision therapy for all binocular vision and visual information processing disorders. This may encourage coverage for these therapies, enabling vision therapy to become a more widely recognized and accepted option.

Another barrier to treatment is the time commitment. A patient undergoing intensive therapy is often seen biweekly or weekly to ensure compliance. Patients/parents may not be able to commit to a time that will force them to miss work or school. A vision therapy-based practice should offer a more flexible schedule so that patients and parents are able to attend sessions without unnecessary inconvenience. It may also be helpful to defer the start of therapy for a student until the summer months to avoid pulling them out of school.

Parents and patients may also not understand the treatment and the benefits

that it can provide. Optometrists should be educating their patients about the option of VT and VIP therapy and should be able to refer patients to a nearby office for treatment if they do not offer such services. Awareness of vision therapy is limited due to a lack of practitioners who choose to specialize in pediatrics and vision therapy. In South Dakota, my home state, there is only one member of the Optometric Extension Program Foundation performing vision therapy.[16] The treatment of binocular vision conditions with VT is severely hindered by a lack of optometrists and information dissemination about the types of conditions that can be helped with vision therapy.

One of the most obvious barriers to a patient undergoing vision therapy is patient and parent perception. There are few optometrists with vision therapy practices, and information about the benefits has not become mainstream public knowledge. It still remains a controversial topic between ophthalmologists and optometrists, and even within optometry itself. The American Association of Pediatric Ophthalmology and Strabismus states on its website that "vision therapy is considered scientifically unproven" and goes on to recommend that if vision therapy has been recommended by a teacher, the parent should demand scientific evidence of the success of the specific treatment from an optometrist and then consult an ophthalmologist for a second opinion.[17] The openly confrontational language describing vision therapy reveals the antagonistic relationship between optometry and ophthalmology, two groups of eye care professionals that should be collaborating. It is concerning that opinions such as these are found in prominent eye care societies today, when optometrists have been treating binocular vision disorders with vision therapy successfully for decades. The internal conflict regarding vision therapy in the eye care world prohibits its advancement to a first-line therapy in the treatment of binocular disorders.

Conclusion

This case highlights an all-too-common occurrence in the optometric practice. Patients who would benefit from VT and VIP services may not have access to them, and those who do are not well informed of their effectiveness. It is important that children with a suspected learning or behavioral problem receive a comprehensive binocular vision examination to rule out visual conditions that may be barriers to reaching their full potential. For those patients who are found to have binocular vision deficiencies, vision therapy can often be beneficial. Unfortunately, for any number of reasons, patients are not getting the help they need, and many are not reaching their best visual capability. The reasons behind the low capture rate for vision therapy are numerous, but it is imperative that the climate surrounding vision therapy change. Optometry needs to focus on providing reputable clinical studies in the treatment of all binocular disorders and increasing cooperation with pediatric ophthalmology. Additionally, optometry needs to ensure that the services are affordable and available. Advancements in the fields of binocular vision and behavioral optometry continue to support the use of vision therapy; however, optometry needs to make a concerted effort to inform other medical professionals and the public of the findings. Vision therapy continues to change lives.

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