

Vision Therapy: Are You Kidding Me? Problems with Current Studies

Sarah Whitecross, O.C.(C.)

ABSTRACT

Background and Purpose: Orthoptic exercises are routinely prescribed to treat symptoms of convergence insufficiency (CI). The type and duration of treatment tends to vary among providers as until recently, few strong randomized control studies have addressed the efficacy of convergence insufficiency management. The aim of this paper is to address these studies and discuss their limitations.

Methods: A review of the literature pertaining to convergence insufficiency was conducted. Articles relevant to the treatment of this disorder were analyzed, and those with adequate studies pertaining to CI treatment methods were included.

Results: There are limited randomized control trials evaluating the effectiveness of vision therapy, and those that do exist have limitations: small patient populations, differing outcome measures, treatment length and intensity, and placebo effects, which are all confounding factors when assessing the validity of the current studies.

Conclusion: Despite the prevalence of convergence insufficiency, the known efficacy of vision therapy remains somewhat questionable. There is evidence to suggest that some form of therapy is effective in reducing symptoms and clinical findings of convergence insufficiency, but there is a lack of equal comparison in order to conclude which forms of treatment are best.

INTRODUCTION

Convergence insufficiency is a common problem of binocular vision, affecting 2.25-8.3% of the population,¹ and its symp-

tomms were first described by von Graefe in 1855.² Clinically, it presents with a reduced near point of convergence, reduced convergence amplitudes, and a near exophoria or intermittent tropia that exceeds that of the distance. Symptoms include any or all of diplopia, asthenopia, headaches, and/or blurred vision while performing near tasks.³ The inevitable goal of treatment is to improve symptoms and fusional convergence by improving clinical signs of convergence insufficiency. Nonsurgical treatment for convergence insufficiency (CI) typically includes (but is not limited to) home-based pencil push-ups, stereograms or vectographs, home-based com-

From the Boston Children's Hospital, Boston, Massachusetts.

Requests for reprints should be addressed to: Sarah Whitecross, O.C.(C.), Boston Children's Hospital, 300 Longwood Avenue, Fegan 4, Boston, MA 02115; e-mail: sarah.whitecross@childrens.harvard.edu

Presented as part of a Symposium of the Joint Meeting of the American Orthoptic Council, the American Association of Certified Orthoptists, and the American Academy of Ophthalmology, Chicago, Illinois, November 11, 2012.

puter orthoptic therapy, and office-based vision therapy.^{1,3} Base-in prisms can also be used to alleviate symptoms of CI.^{4,5} It is thought that use of pencil-push ups is the most commonly prescribed treatment for symptomatic CI,⁶ although many providers recommend supplementing pencil push-ups with other forms of therapy or exercises for maximal results.⁷

Questions arise when addressing the efficacy of these common treatments, and whether some are more effective than others. Despite the notion that pencil push-ups are the most commonly prescribed treatment, the type and duration of treatment still varies among providers. Until recently, there have been few randomized control studies addressing efficacy of the common treatment modalities. These studies are limited, however, as they do not provide equal comparison.

VISION THERAPY VS. ORTHOPTIC THERAPY

Vision therapy has become somewhat of an “umbrella-term” for many treatment types, and often has a negative connotation to pediatric ophthalmologists and orthoptists.⁸ It can include treatment for a wide range of disorders including those of the underachieving child, neurological disorders, learning and reading disabilities, spatial issues, as well as others, with a lack of scientific evidence supporting treatment for these problems.⁹⁻¹¹ However, there is convincing scientific data to support vision therapy for convergence insufficiency, but it is often referred to more commonly as orthoptic or vergence therapy.³ Orthoptic treatment for CI typically consists of a combination of home-based pencil push-ups, stereograms or vectographs, convergence training, and more recently home-based computer orthoptic therapy.^{3,7} For the purpose of this article, vision therapy or orthoptic therapy refers to treatment for convergence insufficiency alone.

LITERATURE RESULTS

The Cochrane Review in 2011 revealed 529 titles/abstracts addressing convergence insufficiency. Of these studies, the review only found six randomized control trials (RCT), looking at 475 patients with symptomatic convergence insufficiency. The remaining titles were largely retrospective and/or case studies, with very small patient populations.¹² Four of the 6 RCTs came from the Convergence Insufficiency Treatment Trial (CITT) group, and only one study had a large patient population of greater than 100.¹³ The studies reviewed addressed both the effectiveness of active nonsurgical treatment for CI,^{1,13-15} as well as passive treatment using base-in prism reading glasses.^{4,5} The results from these RCTs suggest that office-based vision therapy/orthoptics with home reinforcement is more effective than home-based therapy alone at improving both the symptoms and clinical signs in children with symptomatic CI.^{1,13} Similar results were also found in young adults¹⁵ and adults.¹⁴ Base-in prism reading glasses were found to be no more effective than placebo reading glasses for improving symptoms and clinical signs in children;⁴ however, they were more effective in reducing symptoms in presbyopic adults.⁵

PROBLEMS WITH CURRENT STUDIES

As mentioned, of the 529 titles addressing convergence insufficiency, only six were RCTs, and only one of which had a large patient population.

The CITT study in 2008 had 221 participants, while the next two largest studies were the CITT study evaluating the effectiveness of base-in prism glasses,⁴ and the study conducted by Birnbaum in 1999 evaluating the efficacy of vision therapy in adult males,¹⁴ with seventy-two and sixty patients respectively. The remain-

ing studies had patient populations of less than fifty, and 2 of the 6 studies had a high risk for bias.¹² In addition, there was not a consistent primary outcome measure when evaluating success of treatment. The CITT studies all used the convergence insufficiency symptom survey (CISS) as the primary outcome measure, with improvement in clinical findings as the secondary outcome.^{1, 4, 13, 15} The outcome in the study conducted by Birnbaum was not explicitly specified,^{12, 14} and symptom improvement by patient report was the only outcome measure in Teitelbaum's study.⁵ This can be difficult to conclude what "successful" treatment may be when the definition of "success" is not consistent.

Another problem when looking at the CITT studies is the convergence insufficiency symptom survey itself. The CISS is a survey consisting of fifteen questions with answers regarding symptom frequency directed to a five-point scale ranging from "always" to "never".¹⁶ Many of these questions are similar and/or overlap, which may skew the overall score to favor symptomatic convergence insufficiency. What one may consider a "normal" patient may in fact achieve an equivocal score using the CISS as one with "true" convergence insufficiency, as the responses and scores are completely subjective. This survey has shown to be reliable and valid among children,¹⁶ but has not been compared or tested in a group of poor readers. One would suspect that poor readers would also have reduced near skills and by testing the CISS within this group, more validity to the survey may be achieved.¹⁷ Again, as the responses are widely subjective, treatment type may have an effect on patient responses; for example, those who had more patient-provider interaction may feel better about their symptoms following treatment, therefore swaying their symptom score to be more favorable.⁸

Also, the amount of each therapy that

was administered (the "dose") was not equal: home-based therapy groups did not provide an ideal comparison, nor did they receive as much therapy time as the office-based groups.^{7, 18} Equal time distributed over the treatment groups would give a more accurate comparison of treatment modalities. In addition, the total treatment length varied considerably from study to study, from 6 weeks in Teitelbaum's study, to 12 weeks in the CITT studies, to 26 weeks in Birnbaum's study. Despite this discrepancy, each study showed improvement following therapy.^{1, 4, 5, 13-15} The differing treatment lengths do not reveal a maximum treatment effect that could possibly be achieved; therefore, no conclusion can be drawn as to how long treatment is necessary for a successful outcome.

One cannot overlook the placebo effect that may exist within treatment and these studies.¹² Placebo response rates have been reported in the literature between 15-58% with an average placebo effectiveness of 35%.¹⁹ Randomized patients in these studies did not receive equal interaction with their providers, as those who were randomized to the office-based groups received more time. Another important note is that no study included a no-treatment control group for comparison, which may play a role in compliance. Compliance varied among treatment groups, which may compound actual treatment time.⁸ The home-based groups in the CITT studies had a higher rate of noncompliance than those in the office-based therapy groups,^{1, 4, 13, 15} which may be in part due to less patient-provider interaction than with the office-based therapy groups.⁸

Lastly, these studies do not address the underlying epidemiology of convergence insufficiency and its natural history.¹⁷ There was not a no-treatment group and therefore no comparison between treatment groups and those receiving no treatment was made. This then does not ad-

dress why some patients are symptomatic and others are not, and why some patients respond to treatment while others do not. These studies also do not address the incidence of symptoms within those with clinical signs of CI.¹⁷

IS TREATMENT FOR CONVERGENCE INSUFFICIENCY EFFECTIVE?

There is a lot of evidence supporting the role for vision therapy or orthoptic therapy for the treatment of symptomatic CI. There is still limited agreement as to not only which treatments are most effective but also the amount and length that is required for resolution of this condition. The current studies indicate that office-based therapy is more effective at reducing symptoms and clinical finding of CI than home-based therapies alone;^{1, 13, 15} however, these studies are not equally comparative.^{7, 8} The economics of home-based therapies versus office-based treatment must also be considered, especially with a decrease in health care dollars available. Further studies comparing home-based therapies would help to further understand the efficacy of more commonly prescribed therapies for CI, and would help to determine treatment effectiveness versus cost.⁸ Evaluation of the natural history of convergence insufficiency may also help us to further understand this disorder.¹⁷ Until larger, placebo-controlled, multicenter randomized control studies are obtained for further evaluation of the efficacy of more commonly prescribed treatment for symptomatic CI, this question of effectiveness remains unanswered.

REFERENCES

1. Scheiman M, Mitchell GL, Cotter S, et al.: A randomized clinical trial of treatments for convergence insufficiency in children. *Arch Ophthalmol* 2005; 123:14-24.
2. von Graefe A: Über myopia indistans nebst betrachtungen über das sehen jenseits der grenzen unserer accommodation. *Graefes Arch Ophthalmol* 1855; 2:158-186.
3. Lavrich JB: Convergence insufficiency and its current treatment. *Curr Opin Ophthalmol* 2010; 21:356-360.
4. Scheiman M, Cotter S, Rouse M, et al.: Randomised clinical trial of the effectiveness of base-in prism reading glasses versus placebo reading glasses for symptomatic convergence insufficiency in children. *BJO* 2005; 89:1318-1323.
5. Teitelbaum B, Pang Y, Krall J: Effectiveness of base-in prism for presbyopes with convergence insufficiency. *Optom Vis Sci* 2009; 86:153-156.
6. Scheiman M, Cooper J, Mitchell GL, et al.: A survey of treatment modalities for convergence insufficiency. *Optom Vis Sci* 2002; 79:151-157.
7. Kushner BJ: The treatment of convergence insufficiency. *Arch Ophthalmol* 2005; 123:100-101.
8. Wallace D: Treatment options for symptomatic convergence insufficiency (editorial). *Arch Ophthalmol* 2008; 126:1455-1456.
9. Shainberg MJ: Vision therapy and orthoptics. *Am Orthopt J* 2010; 60:28-32.
10. Helveston EM: Visual training: Current status in ophthalmology. *Am J Ophthalmol* 2005; 140:903-910.
11. Barrett B: A critical evaluation of the evidence supporting the practice of behavioral vision therapy. *Ophthal Physiol Opt* 2009; 29:4-25.
12. Scheiman M, Gwiazda J, Li T: Nonsurgical interventions for convergence insufficiency (review). *Cochrane Database Syst Rev* 2011; 3:CD006768.
13. Scheiman M, Cotter S, Mitchell GL, et al.: Randomized clinical trial of treatments for symptomatic convergence insufficiency in children. *Arch Ophthalmol* 2008; 126:1336-1349.
14. Birnbaum MH, Soden R, Cohen AH: Efficacy of vision therapy for convergence insufficiency in an adult male population. *J Am Optom Assoc* 1999; 70:225-232.
15. Scheiman M, Mitchell GL, Cotter S, Kulp MT, Cooper J, Rouse M, et al.: A randomized clinical trial of vision therapy/orthoptics versus pencil pushups for the treatment of convergence insufficiency in young adults. *Optom Vis Sci* 2005; 82:583-595.
16. Borsting EJ, Rouse MW, Mitchell GL, et al.: Validity and reliability of the revised convergence insufficiency symptom survey in children aged 9 to 18 years. *Optom Vis Sci* 2003; 80:832-838.
17. Granet DB: Treatment of convergence insufficiency in childhood: A current perspective (editorial). *Optom Vis Sci* 2009; 86:1015.
18. Jethani J: Convergence insufficiency: Random-

SYMPOSIUM: CONTROVERSIES

ized clinical trial (editorial). *Arch Ophthalmol* 2005; 123:1760.

19. Beecher HK: The powerful placebo. *JAMA* 1955; 159:1602-1606.

Key words: convergence insufficiency, orthoptics, vision therapy

If you value *American Orthoptic Journal*, please tell your librarian!

In this time of tightening budgets, some libraries are not renewing journal subscriptions, unless they hear from YOU. If you find the articles you read in *American Orthoptic Journal* valuable, please take a moment to tell your library. If they don't currently subscribe, please consider filling out the library recommendation form, online at:

http://uwpress.wisc.edu/journals/pdfs/library_rec_form.pdf.

Ed. James Reynolds, M.D., University at Buffalo, SUNY | ISSN: 0065-955X, e-ISSN: 1553-4448, 1/year 2013 Subscription, Institutions: print & online \$140, online only \$120. To subscribe, please contact the University of Wisconsin Press or your subscription agency.

I recommend the library subscribe to *American Orthoptic Journal* because:

- This journal will be an essential resource for myself and my colleagues Other
- I will refer my students to this journal I publish/intend to publish articles within this journal

PROFESSOR

DEPARTMENT

SIGNATURE

DATE



University of Wisconsin Press

1930 Monroe Street, 3rd Floor, Madison, WI 53711 • <http://uwpress.wisc.edu/journals/>

P: 608 263-0668 • F: 608 263-1173 or (U.S. only) 800 258-3632 • journals@uwpress.wisc.edu