Treatment Options for Symptomatic Convergence Insufficiency

Convergence insufficiency is a relatively common problem encountered in clinical practice, especially for those specializing in pediatric ophthalmology and strabismus. It affects older children, teenagers, and adults, and typical symptoms are difficulty with reading, eye strain or discomfort with near work (asthenopia), and headaches. The diagnosis is established when patients demonstrate reduced near fusional convergence amplitudes and/or a remote near point of convergence. Older adults in particular may have concurrent accommodative insufficiency. Not all patients with convergence insufficiency are symptomatic, and for those patients, treatment is generally unnecessary. Conversely, many patients with asthenopic symptoms have normal convergence.

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Ophthalmologists and orthoptists typically use a stepwise approach to treating convergence insufficiency, often prescribing pencil push-ups or computer orthoptics at home as the first treatment. If improvement is not sufficient after a few weeks, then the treatment modality or intensity can be modified. For example, base-out prisms may be added to strengthen fusional convergence.[1] Many patients stop doing these treatments on their own when their symptoms improve to a point at which they no longer have difficulty with reading or when they find that treatment is more inconvenient than their symptoms. In my experience, these home-based therapies are sufficient for most patients with convergence insufficiency, most of whom have relatively mild signs and symptoms.

In this issue of the *Archives*, the Convergence Insufficiency Treatment Trial Study Group[2] evaluated a different approach to the treatment of convergence insufficiency used by many optometrists, which includes office-based "vision therapy," which they also refer to as vergence/accommodative therapy. Vision therapy has negative connotations for many ophthalmologists; this term includes many forms of office-based treatment for many different conditions. Its use for some of these conditions, such as reading disabilities in children, is controversial, even among optometrists. However, the type of vision therapy for convergence insufficiency evaluated in the current study could be considered equivalent to intensive orthoptics. Instruments such as computers, loose lenses, prisms, and vectograms (presenting a different polarized image to each eye) were used to improve convergence and/or accommodation in symptomatic patients.

Before this study by the Convergence Insufficiency Treatment Trial Study Group, no adequately powered randomized clinical trial had been done to address whether office-based treatment for convergence insufficiency was more effective than less expensive home-based therapies. The authors randomized 221 children aged 9 to 17 years with symptomatic convergence insufficiency to 1 of 4 groups: home-based pencil push-ups, home-based computer vergence/accommodative therapy and pencil push-ups, office-based vergence/accommodative therapy with home reinforcement, and office-based placebo therapy with home reinforcement. They reported that patients who used office-based vergence/accommodative therapy with home reinforcement had a statistically significantly greater improvement in symptoms after 12 weeks than those in the other therapy groups.

As a prospective, randomized clinical trial, this study had many strengths. By using randomization, the investigators controlled for known and unknown confounding variables and avoided biases like treatment assignment. The researchers included both ophthalmologists and optometrists when planning the study, and they performed a pilot study to test study procedures and obtain standard deviation estimates necessary for calculating a sample size for the larger clinical trial.[3,4] They developed and piloted their primary outcome measure, the Convergence Insufficiency Symptom Survey score, and they defined several secondary outcome measures a priori. Although some might prefer to see the primary outcome measure based on more objective examination findings, they justified their selection of survey results by arguing that abatement of symptoms is more relevant. They had a sufficient sample size to detect a statistically significant difference between groups with 90% power, assuming that the true difference between the office-based therapy and the comparison groups was a symptom score of 10 or more. There was outstanding follow-up, with 99% of patients completing the 12-week outcome examination.

By including a placebo control group as well as 3 active treatment groups (1 office-based and 2 home-based), this study addressed 2 key questions[1]: Is office-based vergence/accommodative therapy effective relative to placebo?[2] How does office-based treatment compare with home-based treatments? The answer to the first question is certainly "yes," as children who received office-based treatment were less symptomatic than those who received placebo office treatment, and the authors provided evidence of a successful masking of treatment group. The answer to the second question is not as clear. It is

true that there were statistically significant differences in symptom scores between the office-based group and the 2 other active treatment groups. However, I remain uncertain that office-based treatment is superior to home-based treatments because I do not think that either of the home-based treatments used in this study provided an ideal comparison group. Patients in an ideal comparison group would have received the same amount of therapy at home that the office-based group received in the office as well as equal contact time with the therapist. The former is important to equalize treatment dosage, and the latter is important to account for the effect that office contact time may have on survey responses (the primary outcome measure). Among the 3 groups that received actual therapy, the weekly treatment time was 135 minutes for the office-based group, 100 minutes for the home-based computer group, and 75 minutes for the home-based pencil push-ups group (I have not included time for telephone calls from therapists, which the authors included in their calculations of total treatment time). The home-based groups also had lower rates of compliance, compounding the differences in actual hours of treatment received. With regard to therapist contact time, weekly face-to-face visits occurred among active treatment groups only for the office-based therapy group, which may have influenced compliance with treatment, amount of improvement, and results of the survey. More therapist contact time could have made children and teenagers feel better about their symptoms or more likely to want to please the therapists with their responses.

Despite these limitations, I do believe that the authors have provided us with valuable data on success rates of various treatments for patients with symptomatic convergence insufficiency. They have shown that intensive office-based treatment was more effective after 12 weeks compared with 2 less intensive home-based therapies and an equally intensive office placebo therapy. They acknowledge that home-based treatments are popular because of their simplicity and cost-effectiveness and that their study was not designed to measure the cost of various treatments. This is an important issue, because in this time of limited health care dollars, caretakers (as well as patients and insurers) want to balance treatment effectiveness with cost. The substantial cost differential between office-based and home-based therapies is important to consider when choosing a patient's treatment. This cost includes not only office visits, but also transportation and time away from work and school.

Is office-based therapy for symptomatic convergence insufficiency worth the additional cost? It may be for a subgroup of patients who do not achieve sufficient benefit from less expensive home-based treatments. Uncertainty remains as to whether office-based treatment would be superior to equally intensive home-based therapy. Perhaps intensive home-based therapies are not feasible for many patients who need positive reinforcement to stick with their treatment routines. Additional studies that include more intensive and flexible home-based regimens and an evaluation of the cost-effectiveness of different treatment options are needed.

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Correction

Error in Author Name in Correspondence. In the Letter titled "Fluctuation of Intraocular Pressure as a Predictor of Visual Field Progression—Reply," published in the August 2008 issue of the *Archives* (2008;126(8): 1169-1170), there was an error in the author's name in the Correspondence address. The name that read Dr S. Hong should have read Dr Y. J. Hong.