Case Report: Vision Training For National Hockey League Goaltender, Rogatien Vachon

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Abstract

This non-strabismic patient had an insignificant refractive error, a small esophoria, low fusional vergences, no fixation disparity and symptoms related to and interfering with his goaltending. Compared to his right eye, his left demonstrated slower motor responses, unsteady fixation and a tendency to overshoot with version, vergence and reading tasks on an Eye Trac instrument. A vision training program was designed to encourage faster and more accurate symmetrical and asymmetrical vergence changes, version and tracking eye movements, and accommodative facility. After three months of daily exercises, binocular coordination and goaltending performance had improved and symptoms were relieved.

Abrégé

Ce patient ne souffre pas de strabisme. Son examen révile une réfraction peu significative, une esophorie minime, aucune disparité de fixation mais des symptones associés à son travail de gardien des buts d'une équipe de la Ligue National de Hockey.

Une analyse photographique des mouvements oculaires par "Eye Trac" démontre une performance inférieure de l'oeil gauche: réponse motrice plus lente, fixation moins stable et une tendence ésophorique sur les versions et vergences et dans la lecture.

Un programme de rehabillitation lui a été préparé pour faciliter la rapidité et efficacité des changements de vergence tant symmetriques qu'asymmetriques; des mouvements de versions et de poursuite, et de l'accommodation.

Trois mois de pratiques quotidiennes ont amelioré la vision binoculaire et amené la disparition des symptomes et restauré sa performance de gardien des buts.

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Case History

Rogatien Vachon, a 34 year old caucasian, was known as the highest paid and the most successful goaltender in the National Hockey League. He had just completed a rather indifferent series when he presented himself for an oculovisual assessment at the University of Waterloo, School of Optometry. The press said long shots were beating him. He complained that his 'vision blurred when concentrating intensely and moving his eyes quickly from place to place'. He felt 'dizzy when the action of the game was fast'. He had no history of spectacle wear, diplopia and ocular surgery or disease. His general health was good. An ophthalmologist diagnosed him as healthy three months before. Twice in the past year puck injuries to his left temple gave him concussions. In response to his symptoms, his physiotherapist gave him many coordination exercises, one of which was to watch his finger moving towards his nose. Ken Dryden, also a goalie in the National Hockey League, had advised him to come to the University of Waterloo, School of Optometry.

Ocular Examination

Examination revealed unaided visual acuities of 6/6+ for both eyes with a subjective refraction of plano O.U. His amplitude of accommodation was 7.75D O.D. and 7.50D O.S. using Sheard's technique. Binocular plus and minus acceptance were +2.50 DS and −1.75 DS respectively. Pupil reflexes responded briskly. Internal and external ophthalmoscopic examination revealed no abnormality. A scar was visible on the left temple. Intra-ocular pressures were within normal limits. Visual fields extended beyond 120° and 150° along the 90 and 0-180 meridians.

Binocularly he had 4^{Δ} esophoria at 6m and .4m by Von Graefe technique. Fusional reserves using rotary prisms were x/8/5^{Δ} B.I. at 6m and 12/18/12^{Δ} B.I. at .4m. Suppression occurred with 24^{Δ} B.O. at 6M and with 21^{Δ} B.O. at .4m. His gradient ACA was 3^{Δ}/1D. He did not report a fixation disparity on Mallet or AOCO vectographic targets either at 6m or .4m. His stereoscopic threshold was 60 sec arc at 6m on the AOCO vectographic slide, 40 sec arc at .4m on Stereofly and Randot tests and 63 sec arc on the Random Dot E. Testing accommodative facility[1a], Rogie was unable to clear a −2.00 DS stimulus to accommodation. Eye Trac traces revealed that the left eye responded more slowly than the right and overshot upon a change in fixation. The left eye fixated unsteadily (Fig.1).

Such small eye movement abnormalities, while not interfering with ordinary visual tasks, did so with the level of performance required for his occupation. As goaltender he was required to make fast and accurate symmetrical and asymmetrical vergence changes, respond quickly to visual stimuli, coordinate vergence, version and tracking eye movements and change accommodation quickly and accurately. He demonstrated problems in all of these areas.

Vision Training Program

A vision training program was designed to treat these specific binocular anomalies. The first two exercises of four originated with the author. The training exercises were designed to stimulate as many of the neurological systems required for

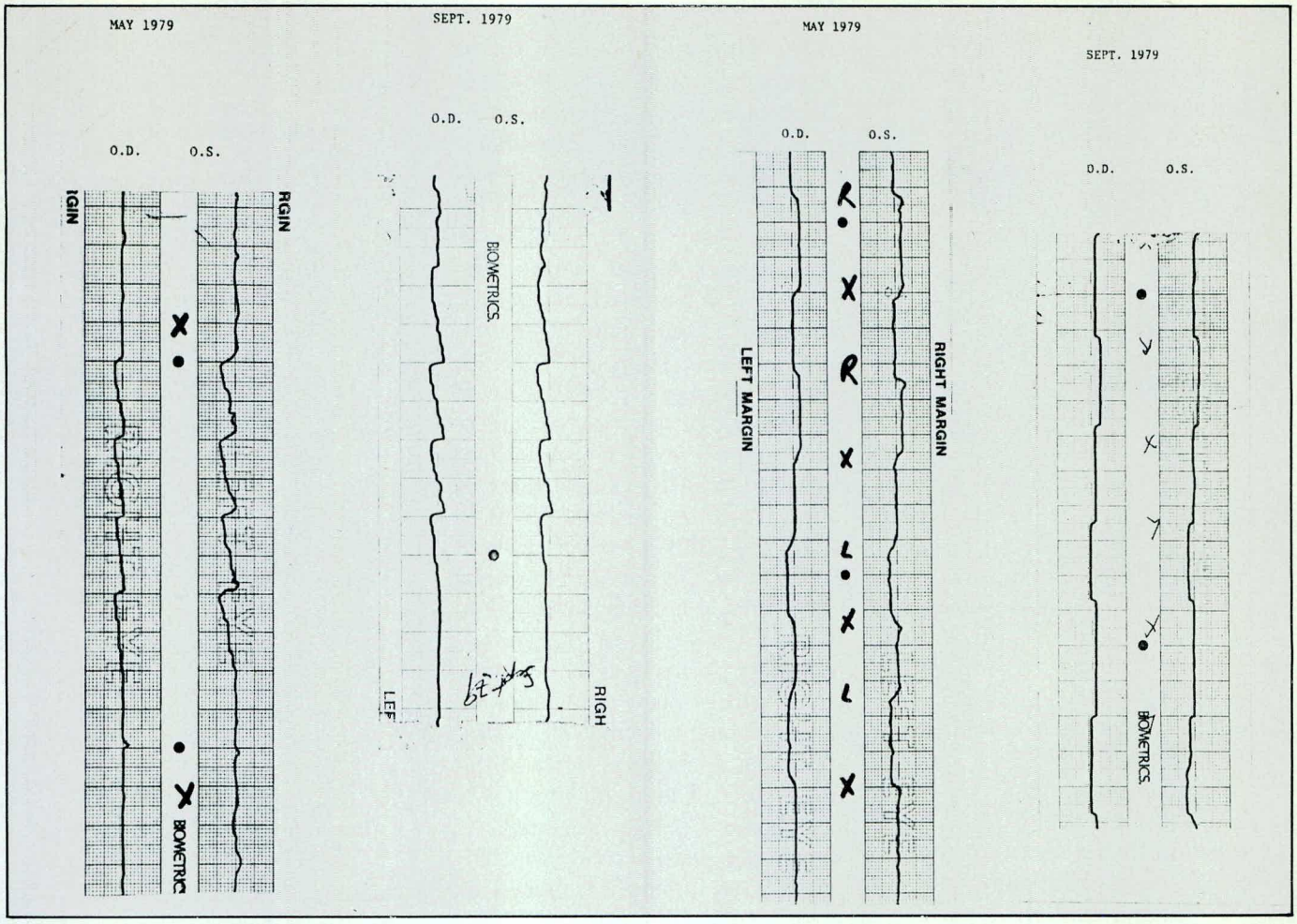

Fig. 1

The figures show Eye Trac traces recorded before and after the vision training program. The before training traces (May) show the left eye had a delayed response when changing fixation in comparison to the right eye. The left eye also overshot markedly when changing fixation and demonstrated an inability to maintain steady fixation of the target. The after training traces (Sept.) show the left eye no longer responded more slowly than the right eye when changing fixation. The left eye maintained steady fixation and did not make overshoots when changing fixation.

the performance of goaltending as possible. Goaltending involves, among many things, fine body balancing on skates. Ample evidence exists relating the regulatory role of the horizontal vestibulo-ocular reflex to eye movement control in the cerebellum[2-5]. Cerebellar climbing fibres relay with cells receiving vestibular, visual and neck information[6-9]. For these reasons a balance board was included in the training exercise procedures to enhance vestibular stimulation, and mimic to some extent the stimulus conditions present when balancing on skates.

The first exercise trained quick and accurate saccadic fixation. Forty-five 35mm slides were developed consisting of single Snellen letter E's, each oriented and positioned differently when projected. The sequence was randomly ordered and re-arranged daily. The patient stood on a balance board 30 ft in front and to the right of the projected area. Wearing his goalie mask and without moving his head, he fixated each letter E, noting aloud the orientation. Initially slides changed every 2 seconds. After some weeks, they were changed once a second. This procedure was repeated 30 ft in front and to the left of the projected area to train right versions. It was repeated with a variation. The patient inserted loose prisms bases out of magnitudes 5, 10 and 15$^{\Delta}$ before each eye. The patient fixated each letter E, moving only his eyes and inserted prism base out, fused the images, and then withdrew the prism before the next letter appeared. This trained saccadic fixation and asymmetrical vergence. A second variation of this involved using −2.00DS lenses before both eyes. As each letter appeared he fixated it, inserted the lenses, focused the letter and then removed the lenses before the next letter appeared. By quickly altering the stimulus to accommodation, accommodative facility was trained (Fig.2).

The second exercise trained fixation. Letter E's mounted on plexiglass plates before two lamps provided the accommodative stimuli. Again the patient balanced on a board and wore his mask. One light was positioned 20 ft in front while another was 30 ft to the right or left of the patient. Independently, each lamp was illuminated intermittently by inserting a Rodale flasher between socket and bulb. Without moving his head, the patient fixated the letter illuminated at that moment. Right and left versions were

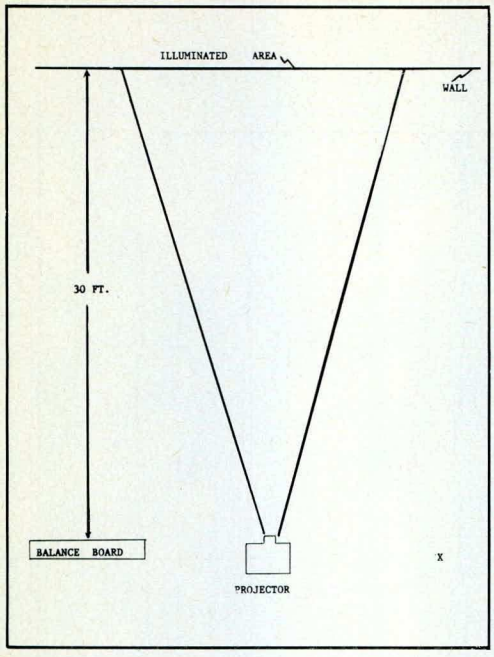

Fig. 2
This diagram presents the position of training equipment for the first exercise. The exercise is designed to train the eyes to make quick and accurate fixation movements.

trained in this manner (Fig.3). The third and fourth exercises were jump ductions[1b] for accommodative facility training and the Biopter for motor and sensory fusion training.

Exercises were prescribed twice daily. Due to the exceptional distance from the School to the patient's home in Los Angeles, there was only one visit other than the diagnostic examinations before and after the training program. During this visit, exercises were explained and demonstrated. Progress was monitored by telephone.

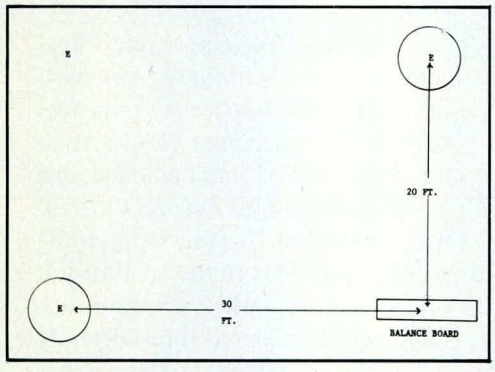

Fig. 3
This diagram presents the position of training equipment for the second exercise. The exercise trains the eyes to fixate quickly and accurately targets which flash randomly.

Results

The patient complied with the therapy, exercising two hours daily. His compliance was exceptionally good. Many patients, given home training over such a long period of time, would not have kept to the schedule. After three months of at-home training he was re-examined. Rogie felt his tennis and golf games, which he played in the off-season, had improved. He was able to see 'better' and more 'clearly' and was 'more aware of his eyes'. His binocular findings were now 1$^{\Delta}$ esophoria at 6m and .4m. His fusional reserves were x/12/10$^{\Delta}$ B.I. and x/30/25$^{\Delta}$ B.O. at 6m and x/24/16$^{\Delta}$ B.I. and x/40+$^{\Delta}$ B.O. at .4m. He did not experience either blur or breaking of fusion up to 40$^{\Delta}$ B.O. which were the limits of the rotary prisms used for measurements. His gradient ACA ratio and binocular plus and minus acceptance remained unchanged. He still did not report a fixation disparity. Accommodative facility measured one second per cycle for both eyes. His stereoscopic threshold remained the same at 6m but improved to 20 sec arc on the Stereofly and Randot tests at .8m, and 53 sec arc on the Random Dot E test. Examination of Eye Trac traces showed both eyes now had similar reaction times. The left eye had steady fixation and no longer made overshoots (Fig.1).

Conclusions

Therapy was effective in producing a level of binocular coordination wherein both eyes performed more equally. Accommodative facility and fusional ranges improved. Suppression no longer occurred with introduction of base out prism. Even stereoscopic discrimination improved. The patient reported relief of symptoms and subsequently improved his goaltending performance.

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