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An exploratory study of the effects of chiropractic treatment on selected visual findings

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An exploratory study of the effects of chiropractic treatment on selected visual findings

Abstract

An exploratory study of the effects of chiropractic treatment on selected visual findings

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AN EXPLORATORY STUDY OF THE EFFECTS OF
CHIROPRACTIC TREATMENT ON SELECTED
VISUAL FINDINGS

PART I
INTERIM REPORT

In Partial Fulfillment of the
Requirements for the
Doctor of Optometry Degree

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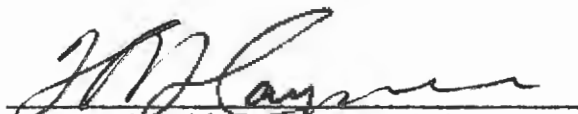
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Grade



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Introduction

This cooperative inter-institutional approved exploratory study was designed to determine if measurable changes in visual behaviors could be demonstrated following chiropractic treatment for selected patients with trauma induced injuries.

Review of clinical optometric and chiropractic literature revealed reports of visual problems following flexion-extension injuries which included unsubstantiated patient testimonials and clinical reports of improved vision following chiropractic treatment. Due to the fact that there is little scientific data available to evaluate these reports, a controlled clinical investigation was indicated to provide a firm basis for analysis.

Review of Literature

Johnston¹ in a study of several cases of post-traumatic injuries involving visual disturbances states, "Firm pressure over the lamina of C-2 precipitated an immediate bout of blurred vision and diplopia." Kinmura² studied victims of whiplash injuries and found that the injury caused a reduced fusional amplitude. This reduced amplitude was said to cause an increase in the accommodative-convergence system in order to ". . . maintain normal convergence." "The over-active accommodative-convergence causes a state of accommodative spasm which induces a pseudomyopia tendency which is reported as blurred vision at far. Utilizing visual training (synoptoscope) on these whiplash victims, a success rate of 95.8 percent was obtained."³ Only patients with decreased fusional amplitude were included in the orthoptic training, no exact number of patients listed,

and no operational definition for "psuedomyopia" was presented.

Tanak, et al.,⁴ reported on a study of 1,468 subjects. Forty percent of the subjects suffering from whiplash injuries, 31 percent of the subjects with both whiplash injuries and traumatic head injuries, and 11 percent with head injuries reported ocular symptoms. Based on their findings, they believe that the ocular symptoms were ". . .induced by the stimulation of the sympathetic nerve due to the traumatic injury to the head and/or neck." Further analysis of their subjects revealed that the "ocular symptoms" occurred after the cervical insult, and stellate block was reported to be an effective treatment for the ocular symptoms.⁵ However, the method of evaluating the visual symptoms and reported improvement was not presented.

Roy⁶ reported that whiplash injuries result in symptoms of headache; posterior cervical tension; trapezius tension; vertigo; blurred vision; hyperesthesia; referred pain to arms, fingers, forehead, nose, eye, temple, and parietal region of the head; nausea; motor and sensory loss. The cervical sympathetic is frequently involved in traumatic lesions of the spinal cord. The ocular phenomena consists of changes in the optic nerve, sympathetic phenomena, and pupillary changes. Patients with so-called whiplash injuries frequently complain of blurred vision or difficulty with focusing.

Frankel⁷ stated, "Dilated pupils and a flattened lens may result from sympathetic stimulation."

In experiments conducted by Eckardt, McClean, and Goodel,⁸ a three diopter vertical prism was placed in front of the subject's eye in whatever position caused the most discomfort. Diplopia was produced for about three minutes. Electromyographic studies showed tension in the frontalis occurring within ten minutes; in the cervical area within

eighty minutes; and down the trapezius into the deltoid within one hundred-twenty minutes. Upon removing the vertical prism, this muscle spasm and discomfort lasted in some subjects up to several hours. It was shown that neck massage gave temporary alleviation to the tonic spasm but soon afterward the tension increased to the original frequency. Thus, symptomatic relief of any referred pain may only bring temporary relief. "It seems that it would be impossible to permanently eliminate a secondary pain unless the primary noxious stimulation is found and eliminated."

Takaai, et al.,⁹ observed that head injuries were reported as causing near vision difficulties due to the disturbance of the accommodative system, the convergence system, and the near reflex of the pupil. The study investigated possible changes on the refractive system, the accommodative system, the convergence system, the fusional amplitude, and the AC/A ratio. The results stated that the refraction indicated a change toward a myopic direction, but was a mild change, and half of the patients were found to have a "normal" accommodative system and half of the patients had an "abnormal" accommodative system. No criteria for "normal" and "abnormal" accommodative function was stated, and vision training was the only therapy mentioned.

C.B. Passmore¹⁰ reported improved visual findings following head trauma with treatment of two cases with simultaneous vision training and chiropractic treatment. Visual findings were reported to improve, but vision tests were limited to a select few, mostly stereoscopic skills, as measured by the Keystone Telebinocular Card skills.

Theoretically, various parameters of the visual system may be subject to change with chiropractic treatment. The optometric and chiropractic clinical literature is inconclusive. The case studies

reported are only suggestive and no interdisciplinary controlled clinical studies were found. If specific visual behaviors can be improved following chiropractic treatment, then it is important for the patient's welfare that proper referral standards be developed. It is entirely possible that visual and chiropractic treatment may both be required, either simultaneously or sequentially.

Problem

This exploratory study was designed to investigate whether measurable changes in selected visual behaviors may be observed following chiropractic treatment, when no visual intervention is simultaneously administered. The specific parameters investigated included:

1. Visual acuity under monocular, binocular, and monocular testing under binocular viewing conditions.
2. Distance refraction.
3. Vertical vergences.
4. Lateral vergences-convergence and divergence performance.
5. Accommodative behaviors.
6. Sensory fusion and/or unification behaviors.

Determination of any measurable changes in visual behaviors, as measured by clinical tests, can only be accurately assessed through examination of a carefully screened subject population.

Subject Selection

Subjects selected for this study were restricted to those patients with a history of whiplash injuries at least four months prior to the first examination. Each subject had to have one or more visual symptoms and a chiropractic evaluation by Dr. Hathaway showing that chiropractic therapy was indicated. Subjects without visual symptoms were not included in the study. Subjects must accept not to undergo

optometric treatment while participating in this study.

Subjects manifesting the following ocular symptoms following the whiplash injury were accepted into the study:

1. Double vision at distance or near.
2. Blurred vision at distance or near.
3. Inability to sustain comfortable vision while reading for long periods of time.
4. Nausea associated with visual activities.
5. Headaches and other forms of discomfort following specific near visual tasks such as reading, drawing, sewing, etc.

Patients having any or all of these symptoms before the injury were excluded.

Design of Clinical Study

This exploratory study was difficult to design because there was no way to know how many subjects would be available and accept therapy. Ideally, subjects would be drawn randomly into a treatment and a control group from a pool of patients meeting the design criteria. Since this procedure could not be assured the visual testing was designed to permit a case study approach. The development of accommodative and convergence index scores together with "P" factor analysis provides a statistically acceptable procedure for determining changes in a single subject.¹¹

Optometric examination of selected subjects' visual behavior before and after chiropractic treatment compared findings for significant refractive, motor, or sensory behavioral changes, as measured by "P" factors before and after, accommodative and convergence index scores, and free and forced postures. Sufficient vertical vergence testing will be included to provide intra-case comparisons. No visual intervention

beyond pre and post visual examinations was planned or conducted.

Subjects were screened for a prior history of major binocular imbalance (including strabismus and amblyopia), eye surgery, or eye disease; participation was dependent upon negative findings in these areas.

The following optometric examination sequence was performed on each subject:

1. An optometric examination upon initial entry into the study.
2. An optometric re-evaluation seven days later to establish the optometric examiner's test-retest reliability and to evaluate the subjects for any possible changes in the visual systems.
3. An optometric evaluation following completion of the chiropractic treatment.

A modified standard clinical visual examination was administered to each subject. The following additional tests were included in the evaluation of each subject.

1. Entrance skills.
 - (a) visual acuity at 20' and 16"
 - (b) physiological diplopia
 - (c) Donder's push-up amplitude
 - (d) cover test at 20' and 16"
 - (e) near point of convergence
 - (f) ocular rotations
 - (g) ocular pursuits
 - (h) motor fields
 - (i) monocular light fixation
 - (j) external eye health
 - (k) pupillary response
2. Distance and nearpoint refractions (minimum of seven tests).
3. Battery of tests for accommodation, convergence, vertical and lateral vergences.
4. Keystone Telebinocular Card skills.
5. ± 2.00 D lens rock.
6. 8BI/8BO prism rock.

7. MEM retinoscopy.
8. Confrontation fields and/or perimetry.

A control group was obtained from patients who chose not to undergo chiropractic therapy or delayed therapy for six to eight weeks. Visual retesting after a sixty day period without chiropractic intervention, allowed the evaluation to change over time as compared to the treatment group.

Chiropractic Examination

Following the two optometric entrance examinations, subjects meeting criteria received chiropractic treatment from Dr. Hathaway. Chiropractic treatment was to be administered for a period of six to eight weeks; the number of adjustments required per week was determined by the subjective physician evaluation. (See Appendix I.)

All subjects were evaluated by radiographic and orthopedic/neurologic examination. Radiographic examination consisted of a series of pre-treatment films of the cervical spine: A-P, lateral, open mouth odontoid, obliques, flexion and extension. At the conclusion of treatment a radiographic re-examination consisted of A-P, lateral, OM odontoid, flexion and extension.

A complete orthopedic/neurologic examination was part of each subject's treatment. Determination of general spinal biomechanics was made with special emphasis of the cervical spine in relation to motor unit function, subluxation patterns, adaptive changes of the cervical curve, and soft tissue integrity. Additional monitoring of patient symptomology and progress was recorded.

Diversified manipulative techniques were utilized as the primary treatment mode.¹² The listing (Medicare) and segment adjusted was noted. Collective analysis of physical examination and x-ray findings

were utilized to determine:

1. Contraindications to manipulation.
2. Cervical spine biomechanics and variation of normal curvature.
3. Treatment listings and length of treatment.
4. Utilization of adjunctive therapies (i.e. ultrasound, hydrotherapy, etc).

Data Analysis

The optometric "P" tests, accommodative and convergence test scores were converted to z-scores (standard scores for each subject) and compared using normative analysis.¹¹ Analysis of variance and nonparametric procedures were used as indicated. Stereoscopic results were compared directly for evidence of changes.

A comparative analysis of chiropractic information was made on biomechanic function (i.e. range of motion, motor unit fixation, soft tissue structures such as muscles and ligaments and neurological signs). Additional evaluations compared patient symptomology and response to treatment.

Standard forms used in this study include examination, treatment record, re-examination, 30-60-90 days, and history/accident. A patient questionnaire (pre and post) was also designed. (See Appendix II.)

Results and Discussion

Results can not be reported due to the fact that no cases have been completed. The failure to complete this project on time has resulted for a variety of reasons. This paper must therefore serve as an interim report. Efforts on behalf of both colleges were made to conduct the study within a one year time frame with completion by May 1984. Tentative plans to extend the study through May 1985 were made in January of this year. Plans to extend the study are now established

with Gerald Komarnicky, third year intern, to be the principal investigator.

Financial considerations in a study so extensive as to involve two educational institutions and a private practitioner brought many delays for committee approvals. Another major obstacle has been simple logistics of location for exams and the equipment needed to complete the various portions of the study. Originally, the study was to be performed entirely at Western States Chiropractic College. However, midstream changes in chiropractic examiners was unavoidable. All future chiropractic treatment will take place at Dr. Hathaway's office and optometry exams at Pacific University College of Optometry clinics. X-rays are to be performed at Western States Chiropractic College.

The most significant factor in the delay of completion was the need to advertise the project's existence. Due to the specialized history required of each patient, a wide canvassing for subjects is essential. Without advertising budget approval and publication planning, it was not possible to generate the needed subjects to complete the study. To date, a radio spot was played as a public service announcement on various Portland radio stations. It will be necessary to broaden the advertising to include other mediums.

Originally 30 to 40 subjects were to be selected for the treatment group and at least 10 subjects for the control group. If subject availability proves to be fewer than originally intended redesign of the study procedure is not indicated, as accommodative and convergence index scores provide for a case by case analysis of motor and refractive changes. Accurate individual assessment can still be maintained with a limited subject population, and provide useful exploratory information.

Continued cooperation of both colleges should help to bring about successful completion of the project.

APPENDIX I

Patient L.F. is presently undergoing chiropractic treatment. L.F. is a 36 year old white female who presented with complaints of not being able to refocus at far after a near task, vision seems "muddy" at times, and a history of severe occasional headaches after near tasks. These symptoms have persisted since her last whiplash accident in 1981, although she also has a history of two other whiplash accidents in 1967 and 1979. L.F. is unsure as to the exact time of onset of symptoms, but is sure the problems did not exist prior to the first accident. L.F. takes motrin as needed for back pain.

Visual examination showed ocular health to be within normal limits, except for an observed anisocoria, OD larger than OS pupil by 1 mm. No afferent pupillary defect was observed. Visual acuity at far was OD 20/25+, OS 20/20-, OU 20/20-. Near visual acuity at 16" was 20/20 with either eye. Eye movements were normal and unrestricted, NPC was normal, and the cover test showed no tropia or high phoria present, far or near. Keystone binocular skills showed slight wandering of phoria arrows and intermittent doubling of the near 4-ball test. Refraction showed no significant amount of refractive error, relatively normal phorias, and no evidence of vertical imbalance. Near duction findings were constricted and accommodative performance was markedly reduced, as measured by PRA, ± 2.00 flips, and relative accommodative amplitude measurement. The latter findings may be interpreted as poor accommodative and convergence facility.

Results of optometric retest will be presented at the completion of chiropractic treatment.

APPENDIX IIResearch Questionnaire

Name _____ Date _____

Approximate date of accident Month _____ Year _____

Have you experienced double vision since the accident? _____

At near _____ At far _____ How often? _____

Is your vision always clear and distinct? _____ At near _____ At far _____

Do you experience discomfort while reading? _____

If so, describe discomfort _____

After what period of reading time do symptoms occur? _____

Have you experienced nausea associated with visual activities? _____

Explain _____

Do you have headaches or other discomfort following near visual tasks?

(such as reading, drawing, sewing, etc.) _____

If so, explain _____

Are you able to furnish a small picture (full face) of yourself prior to the accident? _____

Describe any other vision problems which began after the accident? _____

Were any of the symptoms described on this page present before the accident? _____

If so, explain _____

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