Poster Presentations

Active Learning Sessions as a Method of Teaching Critical Thinking in Reaching Clinical Impressions

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Active learning techniques have been developed and implemented for teaching students in several medical programs in the United States, yet the utilization of such techniques in chiropractic colleges is limited. The mastery curriculum implemented at Palmer Chiropractic College Florida has introduced such techniques as a part of student training.

OBJECTIVE

This article discusses two models that were introduced in the function tract during the summer quarter of 2004, and an assessment of students participating in these activities.

METHODS

Two models were developed and introduced to the 4th-quarter students. Problems introduced concepts to students with no prior discussion of these concepts in class. They were presented with guiding questions to focus learning. For both models, students were surveyed about their impressions of the activities' usefulness in enriching their education, the efficiency of time utilization, and the accessibility of the course director as facilitator to their activities.

RESULTS

A total of 60 students participated in the activities, of which 54 reported high level of satisfaction with the utilization of the time, 56 reported satisfaction that the activity was effective in enriching their education, and all 60 students reported satisfaction with the availability and helpfulness of the course director during the activity.

DISCUSSION

There are several factors that determine choosing a model, including class size, intellectual maturity of students, the level of student motivation, and the course's learning objectives. The availability of the course director as floating facilitator moving from group to group to ask questions, direct discussions, and check understanding helps to keep the students motivated and facilitates a greater degree of instructor input and ability to monitor group progress and dynamics. Limiting team sizes to four or five members reduces the burden of grading through group papers and projects (as opposed to individual assignments) and instills in each student a sense of accountability, to keep every team member connected to the team.

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Chiropractic Care of a Pediatric Patient With Symptoms Associated With Gastroesophageal Reflux Disease

Joel Alcantara, D.C., and **Renata Anderson**, D.C., Private Practice

OBJECTIVE

The purpose of this article is to describe the chiropractic care of a pediatric patient with complaints associated with gastroesophageal reflux disease (GERD).

CLINICAL FEATURES

A 3-month-old girl was provided with chiropractic and cranial sacral care at the request and consent of her mother for symptoms associated with medically diagnosed GERD. The patient exhibited frequent vomiting, difficulty with breast-feeding, interrupted sleep, generalized muscle rigidity, and frequent high-pitched crying. The patient previously received chiropractic care elsewhere as well as medically prescribed Prilosec. The infant's condition was unaffected by these previous treatments to the point that the infant's condition was adversely affecting the family dynamics in a variety of ways.

INTERVENTION AND OUTCOME

The patient was treated with site-specific, low-amplitude, high-velocity chiropractic adjustments to sites of vertebral subluxations, particularly at the atlas and the fourth thoracic vertebra. The patient was also cared for with low-force cranial sacral therapy to the mandible, temporal, and parietal cranial plates. The patient responded favorably to care with reduction in frequency of vomiting, improved feeding, decreased generalized muscle rigidity, and decreased high-pitched and frequency of crying. The above notable changes were observed within four patient visits and with total resolution of symptoms within approximately 3 months of care.

CONCLUSION

This case study demonstrates that pediatric patients suffering from gastrointestinal disorders such as GERD may benefit from a clinical and theoretical framework of adjustments to sites of vertebral subluxations.

ACKNOWLEDGMENT

This study was funded by the International Chiropractic Pediatric Association (Media, PA) and Allied Health Chiropractic Center (Onalaska, WI).

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Chiropractic Care of a Pediatric Patient With Vertebral Subluxations Concomitant With a Seizure Disorder

Joel Alcantara, D.C., and **Van Fotinopoulos**, D.C., Private Practice

OBJECTIVE

The purpose of this article is to describe the successful chiropractic care of a 6-year-old girl with vertebral subluxations concomitant with medically diagnosed grand mal seizures.

CLINICAL FEATURES

The pediatric patient was brought in by her parents for chiropractic evaluation and possible care for grand mal seizures following trauma. Their child "would fall down and bounce around the floor like she was going into convulsions." Previous medical care was unsuccessful. Chiropractic examination revealed subluxation findings throughout the patient's spine and sacrum.

INTERVENTION AND OUTCOME

The patient was cared for with adjustments to sites of vertebral subluxations. Within a period of 4 months, the patient's seizures decreased to two to three times per week. Following 1 year of care, her seizure activity resolved.

CONCLUSION

This case report provides supporting evidence on the effectiveness of chiropractic care in children with epileptic seizures.

ACKNOWLEDGMENT

This study was funded by International Chiropractic Pediatric Association (Media, PA).

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A Structural Approach to the Postsurgical Laminectomy

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OBJECTIVE

The purpose of this case report is to discuss treatment of a patient with persistent low back and leg pain following a L4–L5 surgical laminectomy, who underwent Clinical Biomechanics of Posture® (CBP®) protocol designed to correct postural distortions.

CLINICAL FEATURES

A 35-year-old male suffered from low back and leg pain following a work injury despite having a lumbar spine laminectomy 6 months prior to chiropractic care. Radiographic analysis revealed a 16-mm left lateral thoracic translation and a 47-mm forward head translation with loss of the cervical lordosis. Generalized decreased lumbar range of motion was present. Positive orthopedic tests included left leg Minor's sign, Kemp's sign, toe walk, straight leg raise at 45°, Milgram's test, and the well-leg raise at 45°. Muscle strength testing revealed weakness of the left leg flexors (4/5); all others were normal. Reflexes were normal except the left Achilles reflex could not be elicited. Dermatome testing revealed a lack of pricking sensation of the left L5 dermatome.

INTERVENTION AND OUTCOME

The patient received 36 treatments, utilizing CBP protocol, over the course of 12 weeks with total correction of a thoracic translation, as well as a significant reduction in forward head posture, resulting in alleviation of positive orthopedic tests. Postexamination at 9 months indicated that the improvements in thoracic translation, forward head posture, and cervical lordosis had been maintained. Disability rating from the Oswestry Chronic Low Back Pain Disability Questionnaire indicated that the patient improved during treatment from 74% to 24%.

DISCUSSION

In comparison to the costs of spinal surgery, the CBP treatments given to this patient ranged from as high as 5% to as low as 0.8% of the costs. Thus, although the treatment duration was 9 months, the results were more successful, while being only a fraction of the cost of invasive medical procedures that had failed this patient initially. These results indicate that the correction of thoracolumbar and cervical deformity following surgical laminectomy is achievable and may be a desirable clinical outcome.

SUMMARY

A postsurgical laminectomy patient was successfully treated with CBP protocol, achieving a significant reduction in symptoms not obtained following recent surgery. Normalization of posture resulted in the elimination of positive orthopedic and neurologic tests. A 9-month follow-up examination revealed preservation of both the postural correction and patient health and well-being.

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R + C Factors and Sacro-occipital Technique Orthopedic Blocking A Pilot Study

Charles L. Blum, D.C., Private Practice, and **Gary Globe**, D.C., M.B.A., Ph.D., Cleveland Chiropractic College, Los Angeles

Since the early 20th century, some within the chiropractic profession have posited that there is a functional relationship between the lumbar and cervical vertebra and have incorporated this concept into methods of evaluating and treatment. This concept of a systematic or predictive relationship between distant vertebral levels distinct from accumulative functional compensatory mechanisms, such as in scoliosis, is perpetuated based on observation and clinical experience without published report of any systematic study.

OBJECTIVE

This study seeks to investigate this relationship between the cervical and lumbar vertebra.

METHODS

Patients were selected from the patient base of a private practice, and were limited to patients who had sensitivity at specific cervical reflex points. Using the visual analog scale (VAS) as an outcome measurement, sensitivity was noted at specific points of the cervical vertebra. In accordance with sacro-occipital technique R + C protocol, the related lumbar vertebra was adjusted opposite to the direction indicated by the cervical vertebral sensitivity. VAS measurements were recorded before and after lumbar manipulation.

RESULTS

A total of 38 patients were enrolled in this pilot study: 26 in the experimental group and 12 in the control group. Raw data from the VAS recordings were entered into SPSS, version 12.0 with a 10% check for accuracy performed. Mean change in sensitivity as measured by VAS was notably larger for the experimental group. The data were checked for normality to determine whether parametric testing would be appropriate. Both the Kolmogorov-Smirnov and Shapiro-Wilk tests indicated that the data were normally distributed. The authors tested whether there was a statistically significant difference between mean VAS upon study entry. A t test demonstrated that there was no statistically significant difference ($p = .189$). This was important as there should not be a statistically significant difference between the two groups' pretest VAS measurement to be present at the outset or this might bias any interpretation of the study's posttest findings. A t test was then used to determine whether there was a statistically significant difference between pre- and post-VAS measurements and the findings indicated that there was a notable difference in mean VAS scores between the experimental and control groups ($p < .001$).

DISCUSSION

In an attempt to develop a biological plausibility to the R + C factor and orthopedic block treatment phenomena found clinically, some hypotheses have been proposed. They include fascial and myological interrelationships; referred pain patterns; facilitating tonic neck reflexes involving intersegmental spinal pathways; and visual, vestibular, proprioceptive, and plantar mechanoreceptors affecting righting mechanisms for posture of the cervical region. The findings of this study suggest that further research into cervical and lumbar vertebra interrelationships as well as orthopedic block placement and treatment may be warranted.

Physical, Physiological, and Immune Status Changes, Coupled with Self-Perceptions of Health and Quality of Life, in Subjects Receiving Chiropractic Care
A Pilot Study

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The benefits of chiropractic care are well accepted with regard to physical conditions. Emerging reports also suggest benefits relative to health and quality of life. While biomechanical and neuromuscular changes may account for physical improvements, the health-related quality-of-life benefits require further exploration.

OBJECTIVE

The purpose of this study was to gain insight into the physiology and immunology dynamics that might contribute to self-perceptions of improved health and quality of life.

METHODS

A pilot study was conducted at the New Zealand College of Chiropractic, in Auckland. The study followed 11 novice chiropractic subjects (seven males, four females) over a period of 9 months. Other than presenting with biomechanical complaints, the subjects represented a healthy population as determined by history, complete blood count, and immune status. During a 9-month period, subjects received chiropractic adjustments when indicated. Assigning numeric values to positive findings objectified chiropractic assessments. A self-reported quality-of-life questionnaire was completed by each subject following the initial visit (baseline), and at 3 and 9 months reassessment periods. At the same intervals, a complete blood count and an immune panel including absolute counts and percentages for CD3, CD4, CD8, CD20, CD56, and CD4/CD8 ratio were obtained.

RESULTS

Subjects demonstrated significant reductions in all chiropractic indicators at 3 months and 9 months as compared to baseline. A statistically significant positive change in the domain of life enjoyment occurred from 3 months to 9 months (from $.57 + .10$ to $.65 + .13$, $\Delta = .08$, $p = .026$). Statistically significant negative correlation was also observed between motion palpation findings and CD56 count at baseline ($r = -.7$, $p = .015$).

DISCUSSION

The changes in physical assessments collectively decreased, suggesting steady physical improvement among the 11 subjects. Neither absolute values nor percentages for the CD markers varied significantly over the duration of the study. However, a negative correlation between motion palpation findings and CD56 and CD56% suggest a stress-related link. Motion palpation, one of the assessments, has been considered a test that can provide information about stress. Notably, CD56, also associated with stress response, is negatively correlated with motion palpation findings, but no other assessments. The observations made in this pilot study, interpreted cautiously, suggest a link between the extent of physical stress (greater motion palpation findings) and lower CD56 and/or CD56% levels.

Statistically significant changes in certain indices of the CBC were also observed. However, the changes still remained within the reference range for healthy (nondiseased) adults. This suggests that the numeric changes did not constitute a clinically significant change, as the clinical effect (effect size) was small for each. These subjects appear to have maintained a healthy physiology (CBC) and immune profile throughout the duration of the study, since all variations remained within reference values for healthy adults established by Auckland Hospital (New Zealand).

In addition to physical improvements, a large clinical effect regarding improvement in self-reported perception of life enjoyment was associated with care. The small sample size may also have masked a broader response in significant changes in self-perceptions in other health-related domains. This pilot study has provided some preliminary information regarding chiropractic care and possible links to immune status and improved aspects of health and quality of life. Larger studies will be necessary, including ill and healthy populations, to investigate the parameters presented herein and others such as killer cell activity.

Effects of Collaborative Testing on Student Satisfaction Survey

Michael L. Bovée, M.S.Ed., D.C., and **Donald F. Gran**, M.S.Ed., D.C., Palmer College of Chiropractic

Conventional testing methods have disadvantages, including poor student performance due to test anxiety, language barriers, and/or cultural bias. Higher levels of anxiety interfere with optimal learning and recall of learned material and have been associated with negative emotional and physical consequences. Collaborative testing can be defined as cooperative testing in which students work together but turn in individual work on which consensus is not required. Collaborative test taking can help reduce anxiety levels while building cooperation, and aids in the development of interpersonal skills and teamwork. Elimination of the competitive nature of testing increases critical thinking, discrimination, and confidence in judgment. Collaborative testing provides an opportunity to discuss concepts during the exam, thus increasing the understanding of the material.

OBJECTIVE

The purpose of this exploratory study was to test the null hypothesis that there was no significant difference in students' responses between two similar groups taught with the same methods but tested differently.

METHODS

Students in the study had met matriculation requirements to be enrolled in the course and were at least at the 6th-trimester level of a 10-trimester curriculum. The earliest scheduled class section was chosen to use collaborative testing and was the experimental group. Collaborative testing students worked together on examinations in randomly assigned groups but turned in their own work. Consensus is not a requirement in this type of testing. The class consisted of 32 male (32/43; 74%) and 11 female (11/43; 26%) students. The next class section of the same course, which immediately followed, was tested with traditional methods using the same examination and represented the control group. They were tested with no collaborative efforts on examinations. The class section consisted of 61% ($n = 28$) male and 39% ($n = 18$) female students.

On test dates the experimental group was randomly assigned to 1 of 10 subgroups. The subgroups were different for each of three examinations over the trimester period. Each student in the subgroups had a copy of the test and each student returned his/her own answer form. Individuals could answer their own choice or the group's if the group's answer differed from their own. The traditional testing groups received the same examination but were not allowed any collaborative measures and took the test as individuals. Each of the three examinations consisted of 15 questions related to spinal evaluation designed to test synthesis of knowledge, not rote memory. A nine-item survey questionnaire was administered to note student responses related to testing after three separate test experiences had been conducted over a 3-month period. The outcome assessment of survey responses concerning testing was the dependent variable. The actual testing method for the course information in the clinical science course studied was the independent variable. An independent sample t test was applied to test for any significant difference on the survey between the control and experimental group.

RESULTS

The average mean response score of the experimental group (3.4) was higher that the average mean response score of the control group (2.7), suggesting a higher level of agreement to the survey ($p < .01$).

DISCUSSION

Interpretation of the study results suggests that a significant difference was found in students' satisfaction with collaborative testing. This is evidenced by the relationship between the average mean scores measuring student levels of agreement on the survey. Therefore, the null hypothesis was rejected.

Methodology to Describe the Regulation of Sensory Feedback Mechanisms

Jeanmarie R. Burke, Ph.D., New York Chiropractic College

Neuromuscular concepts underlying the benefits of orthotics suggest that improvements in sensorimotor integration may contribute to the reduction in muscle activity and the resultant increase in comfort perception. Sensorimotor integration refers to the modulation of motor outputs via modifying sensory feedback signals. Modifications to H-reflex amplitudes that occur as a function of changes in motor task demands, postural orientations, and background muscle activity are considered functional indices of sensorimotor integration. It is hypothesized that sensory feedback mechanisms are impaired in patients with chronic low back pain. Clinical efficacy of orthotic interventions in patients with chronic low back pain may involve improvements to the regulation of sensory feedback mechanisms.

OBJECTIVE

The purpose of this research is to determine the effects of Foot Leveler's orthotics on the recruitment profiles of the tibial nerve H-reflex response in chronic low back patients during quiet standing as compared to lying prone on a table.

METHODS

The recruitment profile describes the activation of the Ia afferents (H-reflex amplitude) and alpha motoneuron axons (M-wave amplitude) as a function of stimulus intensity. The first step was to establish normal values for the amount of H-reflex inhibition from the prone position to quiet standing among healthy young adults. Participants were seven healthy young adults. All were free of pathologies and medications that could affect postural stability. In the prone and standing positions, H/M recruitment profiles were generated with subjects wearing their aerobic shoes. The subjects rested prone with their feet secured against a wall. During quiet standing trials, subjects maintained a relaxed posture while balanced equally on both feet. A hand support at hip level was used to minimize postural sway and fatigue. M-wave and H-reflex responses from the gastrocnemius muscle of the right leg were recorded. Electromyographic (EMG) responses from the gastrocnemius muscle were recorded using disposable surface electrodes. EMG amplitudes and peak-to-peak EMG values of the H-reflex and M-wave responses were the dependent variables. Increasing stimulus intensity in 5-volt increments from below motor threshold until a maximal M-wave was recorded generated the H/M recruitment profile. Motor threshold was the stimulation voltage at which M-wave response first appears. The maximal M-wave response was defined as the plateau in EMG amplitude that occurred in response to three successive 5-volt increments of stimulus intensity. Three trials were recorded for each stimulation voltage. The ratio of the H-wave to the M-wave (H_{max}/M_{max}) was calculated from the recruitment profile in each test position. A paired t test for H_{max}/M_{max} was used to determine the amount of H-reflex inhibition from the prone position to quiet standing.

RESULTS

The amount of H_{max}/M_{max} inhibition from the prone position to quiet standing was 15.4% ($p < .05$). During quiet standing, there was an inhibition of H_{max}/M_{max} in all seven subjects, ranging from 2.6% to 26.9%. The EMG amplitudes of the maximal M-wave response and the recruitment profiles were similar for the prone position and the quiet standing position.

DISCUSSION

These results indicated that the H-reflex response was modulated from the prone position to the quiet standing position. The amount of H-reflex inhibition from the prone position to quiet standing was consistent with normative values previously reported in the literature for healthy young adults. Five additional healthy young adults will be collected to confirm these preliminary results. More importantly, this measurement protocol may now be extended to understand impairments to sensory feedback mechanisms in chronic low back patients and the role of orthotic interventions.

ACKNOWLEDGMENTS

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The Presence of Extensor Digiti Medii Muscle
An Anatomical Variant

Jonathan Carlos, M.D., and **Emile Goubran**, M.D., Ph.D., Southern California University of Health Sciences

There have been reported multiple variations in the extensor tendons and presence of supernumerary intrinsic muscles on the dorsum of the hand. No single factor has been identified for these variations. Some investigators suggest ethnic differences. There is evidence that during limb development the tendons originate from the lateral plate mesoderm, while the limb musculature is derived from the migrating myotome of the mesodermal somite. This observation may account for such variations.

OBJECTIVE

The purpose of this study is to report the presence of the extensor digiti medii muscle in three cadavers in the Anatomy dissection lab.

METHODS

Routine dissection and study of the hands of 24 embalmed human cadavers was conducted, of which 12 were male and 12 were female. Both hands were examined for bilateral symmetry. The long extensor tendons were carefully exposed and separated and then cut to fully expose extensor digiti medii muscle. The specimens were then photographed.

RESULTS

There were three male cadavers that showed the presence of an extensor digiti medii muscle. In two of these specimens, the extensor digiti medii muscle was found on the left hand, and in the other the extensor digiti medii was found on the right hand. The muscle was found in a plane deep to the tendons of the extensor digitorum muscle. The muscle belly measured approximately 3–4 cm in length and was thin and fusiform. Further dissection revealed that the muscle proximally attaches to the ulna just distal to the attachment of the extensor indicis. It had a single tendon inserting to the proximal phalanx of the middle finger. There were no tendinous connections between any portion of the extensor digiti medii muscle and any other extensor tendon.

DISCUSSION

Presence of the extensor digiti medii muscle appears to be based only on cadaveric studies. Previous investigators have reported its prevalence ranging from 1% to 12% of cadavers. In the current report the prevalence is at the higher end of this range (13%). Some reports indicate that a bilateral presence of extensor digiti medii is a rare occurrence. Traction of the muscle causes extension of the middle finger at the metacarpophalangeal joint. In some studies, the muscle appeared to have been supplied by the posterior interosseous nerve, just like that of the outcropping muscles of the forearm.

CONCLUSION

In this report, the presence of extensor digiti medii muscle appeared to have high incidence and is prevalent in male cadavers.

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An Independent AGREE Evaluation of the Occupational Medicine Practice Guidelines

Jeffrey Cates, D.C., M.S., **David Young**, D.C., Ph.D., **Dan Bowerman**, D.C., and **Robert Porter**, M.D., Private Practice

Healthcare professionals need to critically evaluate guidelines to understand whether they are well constructed. In this instance the authors selected and used the AGREE instrument to evaluate the *Occupational Medicine Practice Guidelines, 2nd Edition*, published by the American College of Occupational and Environmental Medicine (ACOEM).

METHODS

Four appraisers volunteered to evaluate the ACOEM guidelines. The AGREE guideline evaluation instrument was selected for the purpose of guideline evaluation. The instrument is widely used across Europe and Canada. The AGREE instrument is arguably the world standard for guideline evaluation. Chapters 8–16 of the ACOEM Guidelines were identified as appropriate for assessment. Each chapter was assessed individually across six domains. A global assessment was rendered for each chapter. "Strongly recommend" guidelines generally score above 60% in the majority of domains and indicate high overall quality. Those "recommended with proviso" generally score between 30% and 60% and indicate that the guideline is of moderate overall quality. Guidelines in this category could still be considered for use in practice when no other guidelines are available. Those guidelines assessed as "not recommended for use in practice" score below 30%.

RESULTS

AGREE domain scores were very similar for all chapters evaluated within any given domain. The mean scores across the domains were 80% (range, 75–81) for scope and purpose; 46% (range, 46–48) for stakeholder involvement; 27% (range, 26–30) for rigor of development; 87% (range, 63–92) for clarity and presentation; 31% (range, 31–36) for application; and 29% (all chapters rated at 29%) for editorial independence. The chapters of the ACOEM Guidelines are uniform and all reviewers provided the same global assessment of "recommended for use with some modification or proviso" across all chapters. It was felt that although the recommendations are consistent with generally accepted clinical practice, they may not be valid due to possible evidence selection deficiencies. The reader should consider the flaws and limitations of the document when using the guideline, and consider utilizing guidelines of higher quality when possible.

DISCUSSION

The ACOEM Guidelines lack transparency that would allow readers to link citations and data to the specific opinions and recommendations contained in the document. The literature review is poorly described and the grading of evidence is poor. This makes it impossible for the reader to follow data from the recommendation to the source data or assess/consider the amount and quality of the research supporting the given recommendations. The patient identification specificity, with respect to patient age, clinical comorbidities and chronicity, and treatment recommendations for such variants are disappointing. Similar problems were documented with the first edition of the ACOEM Guidelines. There are limits to this study and the instrument employed. The AGREE instrument evaluates the quality of the guideline construction process and not the validity of guideline content. The AGREE instrument should be adopted by the United States as the preferred method of guideline process assessment.

CONCLUSION

The ACOEM Guidelines appear to have content consistent with their stated objectives, but the reporting of the guidelines construction process is flawed, and the recommendations may not be valid due to possible evidence selection deficiencies. The reader should consider these flaws and limitations when using the guideline and consider utilizing guidelines of higher quality when possible.

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Application of Current Motor Learning Theory to Chiropractic Motor Skills Instruction

Mary Kate Connolly, D.C., C.C.S.P., and **A. Paige Morgenthal**, D.C., M.S., Southern California University of Health Sciences

Traditionally, teaching chiropractic motor skills has utilized methodology that relies on instructions that focus the learner's attention on his/her own body movements when performing a particular skill coupled with continuous feedback pertaining to those movements (internal focus of attention). Challenges encountered with this approach have been student dependence on instructions and feedback and a lack of inherent understanding by the student of the task to be performed.

OBJECTIVE

The authors propose that changing the focus from how

the student performs the procedure (internal focus) to the outcome of that procedure (external focus) will facilitate a higher level of retention and performance of novel motor skills.

BACKGROUND

Earlier studies determined that discovery learning is sometimes more effective than learning attempted after the participant has been given instructions that direct his/her attention to a particular aspect of the movement that is to be learned. In many cases, the instructions given to learners may contain too much information and can be detrimental to learning because they apparently disrupt automated skills. Instructions that focused the learner's attention to his/her body movements (internal focus of attention) were less effective for learning than those that cued the performer to focus on their movements' effects on the environment (external focus of attention). Feedback that induces an external focus of attention can enhance motor skill learning if the instructions and feedback given steer the learner's attention to the effects of his/her movements rather than to the movements themselves. Learners whose attention was directed to the effects of their movements on the environment (specific type of external focus) demonstrated superior learning and performance than those who focused on other external cues used to discourage them from focusing on their actions.

METHODS

Based on the findings of these studies, it seems prudent to attempt a methodological shift in instruction strategies that may enhance chiropractic motor skills learning and development. Implementation of the external focus of attention approach could begin during the initial palpation class. The following example contrasts the current teaching of a basic palpation skill (prone extension of the sacroiliac joint using an ilium contact) with an external focus approach to that same skill.

Implementing the traditional approach (internal focus), students would be given detailed instructions on contact points, tissue slack, and vectors in which to move their hands on the patient's PSIS to generate the proper line of drive. Instructor feedback pertaining to execution of the students' movements would then be given. Conversely, implementing an external focus of attention strategy would give students limited details (only the contact points on the ilium) and instructions to "extend the ilium." This places the focus on the outcome/effect of the procedure allowing the students to "discover" how to perform the motion. Feedback given (after four or five attempts) would concentrate on steering the students' attention to the effect of their movements.

DISCUSSION

Implementation of an external focus of attention in teaching chiropractic motor skills creates the potential to raise the bar on the motor skills development of our students. It is our intention to shift our focus to encourage student discovery learning by having them consciously focus attention on their "effect" of their action on the environment in which it is applied. Application of these current motor learning principles is possible throughout the motor skills training in the chiropractic procedures curriculum.

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Use of a Journal Club as a Supplement to Chiropractic Education
Setup, Design, and Conduct

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The acceptance and application of evidence-based chiropractic by students and the chiropractic profession have been a challenge. One of the difficulties is engaging students in the research process. Lack of familiarity and difficulty understanding the available scientific literature, poor reading habits, and poor critical appraisal skills are barriers to bridging the gap between research and practice. To address these issues, journal clubs have been used extensively in medical education. However, in a brief informal telephone survey of chiropractic colleges in Canada and the United States, only 21% confirmed the presence of an extracurricular journal club. The most common goals of journal clubs are improvement in critical appraisal skills and keeping up with current literature. Some benefits of journal clubs include improved knowledge and access to information, improved reading habits and use of literature, and promotion of interest in research.

OBJECTIVE

The purpose of this article is to describe the setup and implementation of a journal club at a chiropractic college.

DISCUSSION

A forum was started at Cleveland Chiropractic College, Kansas City, as a faculty initiative to investigate the evidence pertaining to the core technique curriculum. It became apparent that students and faculty had a poor understanding of research. These discussions were the impetus for the formation of a student-based journal club. The aim of the journal club was to discuss research topics; gain experience in finding, reading, and critically appraising scientific literature; and discuss ways to implement research into evidence-based practice.

Initially, journal club meetings were during a 1-hour lunch break and held biweekly. However, this was too little time and there was some confusion as to when the meetings would be held. Attendance increased with weekly meetings. Presently, four students moderate meetings and present special topics, such as the scientific method, research design, logic, scientific writing, critical appraisal skills, literature searching, and evidence-based health care. All journal club members are encouraged to find and present articles. Handing out several references at the beginning of the trimester appears to be the most effective method of disseminating discussion papers. New and classic papers are chosen based on their significance, level of interest, and clinical relevance. Members also participated in a small research project and found the experience reinforced the idea that conducting research is feasible in a small practice-based setting.

Promotion has been done predominantly by flyers, word of mouth, student functions, e-mail, and special events. Word of mouth has been the most effective strategy. Lack of faculty interest and involvement has been disappointing and more effort will be focused on promotion in this area. Increasing advertisement and campus presence are specific short-term goals. Continued and increased emphasis will be put on flyers and attendance at school-sponsored events. Availability of food at select meetings is also being considered. This has been reported to be an effective means to increase attendance and longevity of journal clubs. Plans are also in the works for developing a Web site that would list previous article references, as well as links to indexing databases, research organizations, and evidence-based healthcare sites. This would allow future students to revisit articles and encourage faculty and alumni involvement.

The journal club has given students a voice among their peers, the administrators, and faculty, and the tools to critically evaluate information presented to them in the curriculum. Deficiencies in research understanding among students and faculty both mimic and contribute to the apathy noted in the general chiropractic community toward research and evidenced-based practice. By implementing an extracurricular journal club, interest and understanding of research topics and critical thinking are enhanced.

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Survey on Manual Adjustive Procedures in the Chiropractic Classroom Setting

Robert Cooperstein, M.A., D.C., and **Elaine Morschhauser**, D.C., Palmer Center for Chiropractic Research

It is difficult to go beyond "posiology," the practice of setting up to deliver an adjustment without actually thrusting, in assessing the psychomotor skills of chiropractic students. Although adjustive skills (including but not limited to high-velocity, low-amplitude thrusting [HVLA]) are taught in classroom settings, both lecture and hands-on classes, ideally speaking they would only be applied as such to real patients suffering from subluxation or other conditions believed amenable to adjustive care, including wellness, preventive, and maintenance care. These classroom settings are not likely to be the ideal situations in which such patients would be found, as most of the students are young and relatively healthy.

OBJECTIVE

The purpose of this study was to gather data on how manual adjustive procedures are applied in chiropractic classroom settings, as opposed to student and outpatient clinics where office visits are logged and count toward graduation requirements.

DESIGN AND METHODS

An anonymous survey was administered to 14 representatives of North American chiropractic colleges. The survey

characterized protocols on (a) actual thrusting procedures and (b) simulated adjustive procedures (also known as mock thrust, test thrust: a light thrust, not intended to cavitate a joint, but otherwise resembling an HVLA thrusting procedure in a learning or testing environment).

RESULTS

Adjustive procedures are allowed in technique classes at 11 of the 14 colleges. A history is taken by either the student or the faculty member in all but one of these 11 colleges. Likewise, in all but one college, some level of examination is conducted to determine a listing in these technique laboratory settings. The student patient provides consent to treat in 10 of the 11 colleges: written in five, verbal in three; two responders did not specify the form of consent. Student "patients" declined adjustive treatment in technique labs in three of the 11 colleges. Injuries to student "patients via classroom adjustive procedures during the past 5 years were reported by seven of the 11 colleges, with three also reporting attendant legal action. Simulated thrusting protocols in technique classes have evolved at 11 of the 14 colleges. Informed consent is provided in seven of the 11 cases: three written and four verbal. Very few injuries were reported, and there were no medicolegal incidents reported. Mock thrusting commonly results in accidental cavitations. Each of the 11 colleges allowing simulated thrusting has established contraindications, such as the student "patient" having an active problem, or a serious condition (e.g., spondylolisthesis, instability, a history of trauma or surgery).

DISCUSSION

The chiropractic colleges surveyed apparently have decided that the pedagogic value of allowing adjustive procedures in classroom settings outweighs whatever negative impact this practice may have on the colleges' goal of presenting adjusting for subluxation as a matter of clinical necessity. Furthermore, these colleges are willing to assume whatever biological and medicolegal risks may accrue to allowing adjustive procedures in classroom settings, with meager documentation and incompletely demonstrated clinical necessity.

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Applications of the Mind Map Learning Technique in Chiropractic Education

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Chiropractic education has utilized different learning strategies that include case studies, didactic learning, and problem-based learning. One learning strategy which has not been widely used in chiropractic education is mind mapping. The mind map learning technique is an active learning strategy that has been proposed to force learners to integrate information using visuospatial orientation and thus enhance learning. To create a mind map, an image representing the theme of the mind map is first drawn in the center of a page. From this central image, pertinent categories are created, each accompanied by an image that aids in recall. These categories are further divided into subcategories so that linkages can be made between different sections of the mind map. The central area of a mind map contains general information that becomes more specific toward the outer perimeter of the page. Some of the connections in a mind map can be linked with previously acquired knowledge, representing levels of cognition needed in chiropractic practice.

METHODS

Fourteen 3rd-year Doctor of Physical Therapy students enrolled in a neurorehabilitation course were given the choice of either writing a journal entry or creating a mind map based on the lecture presentation and assigned readings for six of the diagnoses covered. Prior to the initial assignment due date, students were given a brief presentation on the theoretical basis of the mind map learning technique, followed by guidelines that delineated the basic rules of mind mapping.

RESULTS

All 14 students chose to create a mind map for each diagnosis, and subsequently, submitted their mind maps for instructor review and feedback. Upon completion of the course, students were asked to complete a survey that focused on their perceptions regarding the use of the mind

map learning technique in improving integration of course material. Although the subject pool was limited to 14 students, 10/14 agreed that the mind map learning technique enabled them to better organize/integrate material presented in the course, 2/14 students responded neutrally, and 2/14 disagreed. However, the two students who did not think that the technique enabled them to better organize/integrate material did agree that this technique enabled them to recognize areas in which further study was necessary for them to adequately master the course material.

CONCLUSION

While the data obtained from this limited educational experience offers some support for the use of the mind map learning technique in promoting course material integration and learning, further research is needed to explore its efficacy in chiropractic education.

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The Effects of Lumbar Spine Manipulation on Motor Evoked Potentials Recorded From Human Lumbar Erector Spinae Muscles
A Pilot Study

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Spinal manipulative therapy is a common conservative treatment used in the treatment of low back pain. The mechanism by which manipulation relieves low back pain is not well understood. To date there is no universally accepted paradigm describing how manipulation affects low back dysfunction. A fuller understanding of the physiologic responses associated with manipulation may lead to a neurophysiologic paradigm for manipulation.

Transcranial magnetic stimulation is an effective tool to examine the corticospinal pathway and to gain an assessment of central motor system excitability before and after lumbar spine manipulation. The potentials elicited by transcranial magnetic stimulation are referred to as motor evoked potentials. Transcranial magnetic stimulation can readily evoke motor evoked potentials in the lower extremity. Previous studies in our laboratory indicated that motor evoked potentials from the gastrocnemius muscle were significantly augmented from 20 to 60 s after lumbar manipulation.

OBJECTIVE

The purpose of this study was to determine the effects, if any, of lumbar manipulation on the central motor system by using transcranial magnetic stimulation to activate the lumbar erector spinae musculature, and to further develop and refine the technique of recording motor evoked potentials from the erector spinae musculature.

METHODS

This study was reviewed and approved by the Institutional Review Board of the New York College of Chiropractic. The subjects were healthy volunteers ($n = 27$) recruited from a college student population. Subjects were randomized into one of three groups: L3–L4 manipulation group ($n = 9$), L3–L4 mobilization group with no manipulative thrust ($n = 9$), and the control group ($n = 9$). Motor evoked potentials were recorded from the right lumbar erector spinae musculature. The amplitude of the motor evoked potential was quantified by measuring the peak-to-peak electromyographic response from the test muscle. In the manipulation group, motor evoked potential amplitudes were measured before and after L3–L4 manipulation procedure. In the mobilization group, motor evoked potential was measured before and after side posture positioning for an L3–L4 manipulation procedure with no manipulative thrust. In the control group, motor evoked potential was measured with the subject lying in side posture with no movement of the subject. The manipulation procedures were delivered homolateral to the recording side (right side). One clinician performed the L3–L4 manipulation procedure.

RESULTS

Following the manipulation procedure to the lumbar spine, there was an 18% facilitation of motor evoked potential peak-to-peak amplitude from the L3–L4 erector spinae muscle. Augmentation of the motor evoked potential amplitude was observed in seven of the nine subjects. There was a slight

decrease in the motor evoked potential amplitude following mobilization of the lumbar spine. Motor evoked potential amplitudes in the control group decreased by 10% during the course of the experiment.

DISCUSSION

This study is the first known report of postmanipulation motor evoked potential evaluation from the human erector spinae muscle. The data suggest that facilitation of the corticospinal system occurs as a result of lumbar manipulation. This response appears to be similar to previous data recorded from the lower limb muscles. Thus, these data support the supposition that lumbar manipulation leads to a transient increase in the excitability of lumbar paraspinal motoneurons. Clinical applications of this physiologic mechanism are not fully known at this time.

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Teaching and Testing Wellness
A Curricular Dilemma

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There appears to be a disconnect between how doctors of chiropractic believe they practice and the public perception of what chiropractors do. Chiropractors report that they routinely determine patients' general state of health and encourage them to change habits and lifestyle. The public and other healthcare providers see chiropractors primarily as limited scope practitioners who specialize in the management of musculoskeletal disorders. Contributing to these discordant views is the lack of specific competencies spelled out in chiropractic educational standards, and in test plans that present the subject areas on which chiropractic students are examined. A subcommittee of the ACA Committee on Wellness has attempted to address this disconnect in both the teaching and testing areas related to a wellness curriculum. It is doubtful that wellness practices are learned, but not taught. Rather, it is more likely that health promotion practices that lead to wellness are taught in multiple courses, but where it is being taught and under what discipline it is being tested have simply not been identified.

OBJECTIVE

The objective of this article is to promote the testing of wellness strategies based on identifiable competencies.

METHODS

To determine the frequency with which doctors of chiropractic provide health promotion, disease prevention, and self-care advice to their patients, seven specific questions were included in the 2004 National Board of Chiropractic Examiners (NBCE) Job Analysis of Chiropractic Survey. Material from the Executive Summary of Healthy People 2010 was submitted to the NBCE on which to base questions related to health promotion. Subsequently, 10 questions were included in Part I, Section 4—Microbiology and Public Health. These additional questions first appeared in the September 2004 administration of the National Boards. The authors reviewed the current competencies established by the Council on Chiropractic Education (CCE) that relate to wellness in chiropractic practice. Since it is difficult to claim that chiropractors are wellness practitioners without specific, testable competencies for their training programs, the authors have submitted additional, explicit competencies that are specific to wellness practice to the CCE for consideration.

DISCUSSION

Wellness care is defined as a process of optimal functioning and creative adaptation involving all aspects of life. Health, that is the state of optimal well-being, has been distinguished from wellness, which is an active process in which one pursues activities with the aim of achieving optimal functioning that promotes health. Patient-centered care, a hallmark of chiropractic practice, includes a proactive approach that encourages patients to take responsibility for their health. The patient and practitioner act as partners in making decisions that promote the patient's health through a preference for minimally invasive and conservative care. Chiropractors facilitate wellness through determination of the patient's general state of health and encouraging appropriate changes in habits and lifestyle.

Current CCE Standards contain the following statements regarding health promotion and wellness care: "Doctors of chiropractic must ... be able ... to provide wellness care and to promote health maintenance... to perform common screening procedures and wellness assessments in different

age groups." "A doctor of Chiropractic is a primary care physician whose purpose . . . is to help meet the health needs of individuals and of the public." "The responsibilities of the doctor of chiropractic as a primary care physician include wellness promotion" . . . and to. . . "promote wellness by assessing health risk and providing problem related general health information and lifestyle counseling."

Primary care is defined by the Institute of Medicine as "The provision of integrated, accessible health care services by clinicians who are accessible for addressing a large majority of personal health care needs, developing a sustainable partnership with patients and practicing in the context of family and community."

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Developing a Case Study Protocol for Subluxation Syndromes

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Despite the growth of the chiropractic profession, it is still claimed that little published evidence exists that establishes the chiropractic subluxation as a valid or significant clinical entity. Additionally, the word subluxation has been defined in many different ways and its utility is even questioned. The fact that only 16–23% of the U.S. population seek the services of a chiropractor suggests that the public as well as other healthcare professions, governmental agencies, and insurance companies may not fully understand the clinical relevance of subluxation as stated by chiropractors.

OBJECTIVE

The objectives of this investigation were to review the literature in regards to the use of the term *subluxation*, review the literature in regards to the clinical evidence concerning the validity of subluxation, and if warranted, establish a research protocol to study subluxation in a clinical setting.

METHODS

A literature search was performed utilizing the words *subluxation, joint dysfunction, joint pain, manipulation, clinical studies*, and *case studies* that involved the Index Medicus and MANTIS databases and a chiropractic library. A review was then done to determine the number and quality of studies specifically related to the treatment of subluxation in a clinical setting. A second literature review examined common patient outcome measures for spinal pain and disability. A final literature review was performed to determine which valid and reliable subluxation analysis methods exist. The above information was utilized to create a specific research protocol to study subluxation in a clinical environment.

RESULTS

It is clear that chiropractors want to retain the term *vertebral subluxation complex* and that they educate their patients about subluxation. A consensus project established the term *subluxation syndrome* as the clinical entity that chiropractors treat, and attempts have been made to further classify spinal subluxation syndromes in order to facilitate clinical investigation and understanding. There have been no well designed published clinical studies (including case studies) in peer-reviewed journals on subluxation and adjustment of the cervical, thoracic, or lumbar spine. However, there are at least 73 randomized clinical trials related to spinal pain or headaches and treatment by manipulation. Quality outcome measures that measure spinal pain and disability do exist, especially in regards to patient questionnaires, some orthopedic tests, and digital algometers. There are a number of commonly used subluxation analysis methods, yet none have good interexaminer reliability, while some appear to have fair to good intraexaminer reliability.

DISCUSSION

Subluxation syndrome seems the most suitable term/concept to utilize in clinical investigations as it allows the systematic categorization of subluxations by region of the spine and by well established signs and symptoms. Given the scarcity of clinical studies, a well designed protocol for studying patients with subluxation syndromes should be developed and implemented, but development of reliable and valid subluxation analysis methods would have to occur. Subluxation analysis findings could then be monitored in conjunction with changes in valid and reliable clinical outcome measures. The best initial investigations would involve a time series case study format. Outcome measures utilized would include active range of motion, pressure algometry, pain rating scales, and an impairment questionnaire related to that spinal region, such as the Bournemouth Questionnaire. Subluxation analysis tools would include static palpation for misalignment and pain, passive osteokinematic motion palpation, joint end-feel challenge with patient input, postural analysis, and x-ray film analysis (if films were clinically indicated).

CONCLUSION

There is a paucity of peer-reviewed clinical evidence in regards to subluxation. A series of well designed case studies focusing on subluxation syndromes that respond well to manipulative adjustments would help establish these as important clinical entities (and treatments) requiring further investigation.

Cervicogenic Headache With Cervicogenic Vertigo Treated With Chiropractic Spinal Manipulation
A Case Study

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Cervicogenic headaches (CGH) are one of the more common types of headache. The typical CGH patient is middle-aged and female. Cervicogenic vertigo is characterized by dizziness or episodes of dizziness associated with neck pain or dysfunction. In light of current investigation into the prevalence of vertebrobasilar injury, dizziness may be considered a red flag. However, cervicogenic vertigo may be amenable to chiropractic treatment including manipulation. This report is the first to document a case of cervicogenic headache with cervicogenic vertigo treated by diversified-type spinal manipulative therapy (SMT).

CLINICAL FEATURES

A 42-year-old female presented with headache and neck pain and stiffness. The headache started a week prior to presentation, at the base of the skull, and was more intense on the right temporal-parietal region. It was intermittent and rated as severe to moderate pain. She had a 7- to 8-year history of headaches previously diagnosed as both tension-type and migraine. She had previously seen two neurologists for the recurrent headaches. A CT and EEG were unremarkable. She was diagnosed with recurrent migraines and prescribed Midrin, which was ineffective. A follow-up CT scan 2–3 years later was again unremarkable. Her prescription was changed to Imitrex, which gave no significant relief. At presentation, physical and neurological examinations, space-occupying lesion tests, and VBI tests were unremarkable. Rotation range of motion (ROM) testing of the cervical spine caused upper cervical discomfort. Jackson's, cervical compression, and cervical stress tests elicited sharp, localized upper cervical pain that was not very severe. While performing cardinal fields of gaze and convergence tests for oculomotor function, after performing cervical ROM and orthopedic testing, the patient reported feeling dizzy and slightly nauseated. There was no nystagmus present. The dizziness had started 2–3 weeks prior to the onset of headaches and occurs for only 10–30 s at varying times during the day. The dizziness often occurred with the headaches but not always.

Upper cervical and cervicothoracic segmental restriction with the suboccipital, trapezius, and levator scapulae trigger points, hypertonicity, and bilateral tenderness were noted. Midthoracic stiffness associated with rhomboid muscle hypertonicity and paravertebral muscle tenderness was noted as well.

INTERVENTION AND OUTCOMES

A working diagnosis of cervicogenic headache with cervicogenic vertigo and concomitant joint dysfunction of the cervical spine was made. The patient was treated with spinal manipulation therapy along with myofascial release therapy to the posterior cervical spinal musculature. Moist heat was used prior to manipulation. The three primary areas of focus were the motor units of C0–C2, C6–T1, and T5–T7. The initial frequency of treatment was three times per week for 2 weeks. Following the first treatment, the patient experienced a 10-s episode of vertigo immediately following a supine lateral break manipulation. This episode resolved quickly without any other neurological or physical signs being noted. Only mobilization was performed in the upper cervical region for the next three treatments. On the fifth visit, high-velocity, low-amplitude manipulation of the upper cervical spine was once again performed with no production of vertigo. The patient experienced continual improvement and a decrease in presenting symptoms with each treatment. She had not experienced a headache since the second treatment and the episodes of dizziness had decreased. Following the 10th treatment, the patient reported no major symptoms. The patient has had sustained improvement in all areas of presenting complaints.

DISCUSSION

This case report documents a patient in which cervicogenic headaches and cervicogenic vertigo present together. The patient was treated with spinal manipulation with a favorable outcome. Both conditions may be a result of the same pathomechanics and as such may respond to the same course of treatment.

Spinal Modeling From T1 to S1
Elliptical Modeling of the Path of the Posterior Vertebral Bodies in 50 Normal Subjects

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Few studies have been presented on normal alignment, geometric shape, and normal values for the entire region of T1 to S1.

OBJECTIVE

The purpose of this study was to determine the average spinal geometry in the sagittal view from lateral full-spine radiographs of normal subjects.

METHODS

Geometrical modeling of the path of the posterior vertebral body margins from T1 to T12 and T12 to S1 in the shape of ellipses was determined from the lateral full-spine radiographs of 80 normal subjects. Using previously published normal values for the mean and standard deviation of the elliptical ratio of minor axis to major axis (0.39 ± 0.15) in the lumbar area, a subgroup of 50 subjects was obtained by excluding subjects with ratio of minor axis to major axis outside ± 1.5 standard deviations of the mean. The average geometry of this subgroup was evaluated for sagittal alignment, segmental and global angles of alignment, and circular and elliptical modeling parameters.

RESULTS

A three-parameter approach using a least squares method found that elliptical models match closely for measurements from T1 to T12 and L1 to S1. The measurement error was 1 mm for the thoracic spine and 1.7 mm for the lumbar spine. The minor to major axis ratios were 0.67 for the thoracic ellipse and 0.32 for the lumbar ellipse. The sagittal balance of the T1, T12, and S1 posterior-inferior body corners was nearly ideal, with the x-coordinates varying only ± 1 mm from the origin at S1.

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A Brief History of the Anterior to Posterior Open-Mouth Radiograph

John Hart, D.C., Sherman College of Straight Chiropractic

The anterior to posterior open-mouth (APOM) radiograph has a long history of use in the chiropractic and medical professions. The view is taken to assess the upper cervical vertebrae (C1 and C2). Some chiropractors include assessments of the atlanto-occipital articulations within the APOM x-ray procedure.

OBJECTIVE

The purpose of this study was to determine the origins of the APOM radiograph, since this has been a matter of dispute among chiropractors.

METHODS

Searches in pubmed and standard x-ray texts were performed, as well as telephone interviews. Literature from foreign sources was interpreted by those fluent in those languages.

RESULTS

Dr. Albers Schonberg, M.D., from Germany is the earliest known person to describe and take an APOM radiograph (1906). The first description of the APOM radiograph in

the United States appears to have been described in 1919 in two different publications, but only one of these—a chiropractic publication—provided a published photograph of an APOM radiograph that had actually been taken. Radiological assessment of the atlas-occiput biomechanics via the APOM radiograph was described in 1933 and later in 1937 in chiropractic publications. Biomechanical assessment of atlanto-occipital articulations via the APOM radiograph continues to be primarily a chiropractic procedure.

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Interexaminer Agreement of Five Examiners Using Activator Methods Chiropractic Technique Leg-Length Analysis

Matthew Holstein, D.C., **Dave Backus**, D.C., Private Practice, and **Rodger Tepe**, Ph.D., Logan College of Chiropractic

OBJECTIVE

The purpose of this study was to investigate interexaminer agreement of Activator Methods Chiropractic Technique (AMCT) protocol for prone leg-length analysis.

METHODS

Five senior student doctor examiners with advanced proficiency rating in AMCT examined 132 consecutively selected consenting normal volunteers from the student body at Logan College. Exams were performed in a counterbalanced order and results were recorded as shortening or lengthening at position 1 and position 2. Chi-square analysis of the combined data was used to assess interexaminer agreement.

RESULTS

The overall interexaminer agreement was 81.1% at position 1 and 79.5% at position 2. Chi-square analysis of the combined data showed a calculated value of 0.33 with an expected value of 16.27, $\alpha < 0.001$.

DISCUSSION

The goal of this study was to determine if interexaminer agreement of AMCT leg-length analysis remained consistent with different examiners. The results of this research showed a high degree of reproducibility in determining the short leg in position 1 and position 2. Several other published papers have shown statistically significant interexaminer agreement at position 1. The current study is the first of which the authors are aware to show significant interexaminer agreement at both positions. It is possible that the rigor and thoroughness of AMCT advanced proficiency training contributed to the high interexaminer agreement between the five student examiners. The authors are aware that chi-square does not compensate for chance agreement and that the results overstate the extent of agreement in this study. Nonetheless, the authors believe that a statistically significant degree of interexaminer agreement with AMCT leg-length analysis among five examiners with advanced proficiency rating in AMCT is an outcome worthy of attention.

Commonly used and frequently researched methods of subluxation detection, such as static and motion palpation, have failed to consensually demonstrate acceptable interexaminer agreement in the empirical literature. The encouraging results of this study justify continued research utilizing AMCT leg-length analysis. Future investigations should include studies on symptomatic populations and comparison studies with other methods of subluxation detection.

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Gender-Balanced Education Initiative
The Introduction of a Women's Issues Class Into the Chiropractic Curriculum

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The chiropractic profession has been historically male dominated. This is reflected in the curricula of chiropractic colleges nationwide. Classes that specifically address gender-specific symptom patterns for common illnesses and conditions unique to women are rare. The training of chiropractic students to be sensitive to the needs of their female patients was also not being emphasized. Medical schools had already struggled with this problem and had arrived at some solutions that could easily be implemented at a chiropractic college.

METHODS

Action was taken to develop and introduce a Women's Issues elective into the chiropractic curriculum. The elective covered gender-specific symptom patterns in coronary artery disease, diabetes, depression, and so forth. Treatment protocols, including adjustive procedures, nutritional counseling, and supplements, were presented for each topic covered. Classroom discussions focused on increasing awareness and sensitivity to the needs of the female patient.

DISCUSSION

The class was created and added to the curriculum as an elective. The goal of creating more gender-sensitive practitioners who are more qualified and confident to treat female patients is currently being examined.

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Changes in Biophoton Emission Associated With Chiropractic Treatments
A Descriptive Pilot Study

Marius Hossu, M.D., **Ronald Rupert**, M.S., D.C., and **Ndetan Harrison**, M.S., Parker College of Chiropractic

Biophoton emissions (BPE) are associated with high-energy processes of living organisms. These processes include cell metabolism, growth, phagocytosis, neural activity, and oxidative stress. BPE has also been suggested to reflect the organism's global state of health as well as the response to a therapeutic intervention. If BPE changes occur as a result of chiropractic intervention, this could prove useful as an outcome to monitor both the patient's response to a specific treatment and global changes in health status.

OBJECTIVE

This descriptive study attempts to identify BPE changes associated with three different chiropractic techniques.

METHODS

The study protocol and the informed consent form were approved by the Institutional Review Board of Parker College of Chiropractic. Three asymptomatic male adult volunteers were used for this study. The BPE was measured at the neck and/or low back area with the aid of a sensitive photomultiplier in a completely dark room. These measurements were made before and after chiropractic interventions. The treatment techniques included a high-velocity adjustment with the aid of a drop table, sacro-occipital technique, and the bioenergetic synchronization technique. Enough time (at least 200 s) was allotted for each measurement in order to differentiate between natural fluctuation of the BPE and the changes induced by the intervention.

RESULTS

All techniques induced small (up to 20%) but statistical significant changes ($p < .05$ in one case, $p < .001$ in all the others) in the BPE. Each technique demonstrated a different pattern of BPE change that could be specific to the technique.

CONCLUSION

The results revealed that BPE is a noninvasive indicator of high-energy processes of the human body and are significantly altered in different ways by chiropractic interventions. Future research is necessary to explore the clinical utility of any of these findings.

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Evaluating Technology Improvements in the Classroom
A Survey of Student Perceptions

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The addition of technology in academic settings is rapidly becoming ubiquitous. Cleveland Chiropractic College initially purchased three laptops and three portable video projectors for use in the classroom on a pilot basis. Faculty response was immediate, with utilization and demand outstripping availability. Due to the high demand, the administration elected to install dedicated computer and projector systems into all classrooms. The impact of the increased use of computer presentations on student satisfaction and perceived performance has yet to be evaluated.

OBJECTIVE

The purpose of this study was to survey students on their perceptions of the value and utility of faculty use of computer-based lecture presentations, such as PowerPoint, and the perceived impact on their learning and performance.

DESIGN AND SETTING

A survey was designed to use a combination of Likert and other percent scaled questions. The survey was distributed to five different trimester-level students representing diverse stages of the chiropractic program. Data were entered into SPSS version 12.0 and were reviewed for input accuracy (10% check). Descriptive statistics were then calculated.

RESULTS

A total of 113 students were given and responded to this technology survey. Students reported that over half of the courses were presented in PowerPoint with lectures presented in PowerPoint 75% of the time. Approximately 67% of the students reported that they believed that computer presentations were an improvement over lectures that did not use computer presentation technology such as PowerPoint. Alarmingly, over 64% of the students reported studying 2 hours or less in a doctorate program of 25–30 units per trimester.

DISCUSSION

From this survey, it is concluded that PowerPoint is commonly used for instructional purposes by the faculty of Cleveland Chiropractic College, Los Angeles. Many students perceived their learning to be enhanced by the technology. Overwhelmingly, they approved of the PowerPoint being available as handouts as this decreased their note taking.

CONCLUSION

The decision to provide the computer and projector technology in classroom was sound, from the standpoint of self-reported student satisfaction.

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Routine Surgical Foot Conditions
The Basis for Chiropractic Intervention

Paul M. Kell, D.C., Private Practice, and **Roger J. R. Hynes**, D.C., Palmer College of Chiropractic

Chiropractors have generally not given the feet the full conservative attention they deserve. Bone deformity in itself is rarely the sole criterion for surgical intervention in the feet. According to the American College of Foot and Ankle Surgeons, conservative treatment aimed at the relief of pain and the restoration of joint motion before surgery is a consideration. Therefore, a look at the recommendations for care from three viewpoints may provide a clearer picture regarding the treatment of conditions routinely treated surgically. Successful nonsurgical treatment of a variety of foot conditions has been reported in the literature. The recommendations of orthopedists, podiatrists, and chiropractors are presented regarding the management of common foot conditions that are often treated surgically. A new approach is sought regarding the basis for chiropractic intervention in treating Morton's neuroma, hallux valgus, hammer toe, and plantar fasciitis.

DATA SOURCES

Recent texts pertaining to podiatry and orthopedics were obtained from the University of California Biomedical Library. A PubMed literature search was conducted utilizing keywords pertaining to the discussed conditions. A review of chiropractic case studies and techniques for adjusting the feet were compared to podiatric and orthopedic texts.

RESULTS

A review of chiropractic methods and outcomes suggests reasonable success at managing Morton's neuroma, hallux valgus, hammer toe, and plantar fasciitis when a short course of treatment is provided. The variation and similarities in recommendations offered by the professions of podiatry, medicine, and chiropractic bring light to the need for intercommunication between professions. Chiropractic short-lever manipulative procedures combined with physiotherapeutic measures aimed at the restoration of joint motion and relief of pain may be an alternative in the resolution of symptoms associated with routine foot conditions that are often treated surgically. Since the patient deserves the most efficient and cost-effective treatment available, more inquiry into the field of conservative foot care is still needed.

DISCUSSION

Chiropractic procedures aimed at the restoration of joint motion and pain relief may be an alternative to surgical intervention. More intercommunication is needed among healthcare professions who deal with foot conditions.

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Influence of Spine Morphology on Intervertebral Disc Loads and Stresses in Asymptomatic Adults
Implications for the Ideal Spine

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Sagittal profiles of the spine have been hypothesized to influence spinal coupling and loads on spinal tissues.

OBJECTIVE

The purpose of this study was to assess the relationship between thoracolumbar spine sagittal morphology and intervertebral disc loads and stresses.

STUDY DESIGN AND METHODS

A cross-sectional study was performed to evaluate sagittal x-ray geometry and postural loading in asymptomatic men and women. This study was reviewed and approved by an Institutional Review Board. Subjects were asymptomatic chiropractic students. Outcome measures were morphological data derived from radiographs (anatomic angles and sagittal

balance parameters) and biomechanical parameters (intervertebral disc loads and stresses) derived from a postural loading model. An anatomically accurate, sagittal plane, upright posture, quadrilateral element model of the anterior spinal column (C2–S1) was created by digitizing lateral full-spine x-rays. Morphological measurements of sagittal curvature and balance were compared to intervertebral disc loads and stresses obtained using a quadrilateral element postural loading model.

RESULTS

Sixty-seven subjects (51 males, 16 females; mean age 27 years) formed the study group. In this group the neutral posture spine was characterized by an average thoracic angle (T1–T12) of $43.7^\circ \pm 11.4^\circ$, lumbar angle (T12–S1) of $-63.2^\circ \pm 10.0^\circ$, and pelvic angle of $+49.4^\circ \pm 9.9^\circ$. Sagittal curvatures exhibited relatively broad frequency distributions, with the pelvic angle showing the least variance and thoracic angle showing the greatest variance. Sagittal balance parameters, C7–S1 and T1–T12, showed the best average vertical alignment (5.3 mm and -0.04 mm, respectively). Anterior and posterior disc postural loads were balanced at T8–T9 and showed the greatest difference at L5–S1. Disc compressive stresses were greatest in the midthoracic region of the spine, whereas shear stresses were highest at L5–S1. Statistically significant linear correlations were found between a number of biomechanical and morphological parameters. Notably, thoracic shear stresses and compressive stresses were correlated to T1–T12 and T4–hip axis sagittal balance, respectively, but not to sagittal angles. Lumbar shear stresses and body weight normalized shear loads were correlated with T12–S1 balance, lumbar angle, and sacral angle. Body weight normalized lumbar compressive loads were correlated with T12–S1 balance and sacral angle. Body weight normalized lumbar disc shear loads increased significantly and compressive loads decreased with decreasing lumbar lordosis. Cervical compressive stresses and loads were correlated with all sagittal balance parameters except S1–HA and T12–S1. A neutral spine sagittal model was constructed from the 67 subjects.

CONCLUSION

The analyses suggest that sagittal spine balance and curvature are important parameters for postural load balance in healthy male and female subjects. Morphological predictors of altered disc load outcomes were sagittal balance parameters in the thoracic spine and anatomic angles in the lumbar spine.

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Enhancing Chiropractic Students' Confidence and Comfort in Caring for Aging Patients
A Multifactorial Approach and Assessment

Lisa Z. Killinger, D.C., Palmer College of Chiropractic

From 1996 to 1999 the U.S. Health Resources and Services Administration offered a series of contracts to the chiropractic profession to develop, assess, and implement a "model course" in geriatrics for chiropractic students. This course was subsequently institutionalized and is now assessed each term related to the effectiveness of this "model course," in enhancing student knowledge and attitudes toward caring for aging patients.

OBJECTIVE

This project assesses student knowledge and attitudes toward caring for aging patients and their perceived comfort level in providing such care. While successes related to this course were previously reported, this project will assess the results of pre- and posttests administered each term in the academic year 2003–2004. This presentation will summarize the assessment results and contrast them to previous results and studies of other health professional students in geriatrics. Additionally, a summary of the educational approaches utilized in this course will be given.

METHODS

The Palmore Facts on Aging Quizzes 1 and 2 and the Aging Semantics Differentials were administered, pre- and postcourse, each term to the entire cohort (ranging from 150 to 200 students). An additional form tracked demographics and student comments about their comfort and confidence in caring for aging patients. Data from this study will be compared to literature published on the knowledge and attitudes of various health professional students. The educational approaches utilized in this course were multifaceted. Community-based activities and in-class opportunities to interact with aging persons (aged 69–99 years old) were offered to enrich student learning. Course discussions and topics incorporated the best available scientific evidence and

literature on aging, with consistent reference to the Healthy People 2010 Objectives.

RESULTS

Interestingly, the preassessments on aging knowledge from 2000 to 2001 had indicated that our classes of chiropractic students had slightly better knowledge scores on the Palmore Facts on Aging Quiz 1 than the normative data for medical students in geriatrics, or of the students, staff, and faculty of Duke University. Student evaluations and written comments remained consistently high in this course, particularly related to the course's clinical relevance and student comfort with caring for aging patients. Our year 2001 data from this course reflected measurable positive changes in attitude, a more dramatic change than was detected in earlier pilot tests. Our previous data had indicated that at baseline, chiropractic students had "better" attitudes about caring for aging patients than other physician-level health professions students, such as osteopathic or medical students.

DISCUSSION

Case-based, evidence-based, and community-based methods, as utilized in this course, also appear to be consistent with methods reported to be effective in the higher education literature. Although experiential courses such as this one are labor intensive, it is felt that a multifaceted clinically relevant approach is essential to help students gain the knowledge and skills required to deliver competent care to meet the healthcare needs of our graying nation.

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Pilot Study on Chiropractic Management Concerns for Treating Groups With High Predisposition of Diabetes

Dennis P. Lopez, D.C., and **Terry Kile**, Palmer College of Chiropractic

OBJECTIVE

The purpose of the pilot study was to initiate research to investigate the prevalence of diagnosed diabetes in a group with high predisposition of diabetes and resulting lifestyle choices because of being diagnosed with diabetes, and the effectiveness of addressing chiropractic management concerns through academic and clinical instruction specific to the predisposition of diabetes.

BACKGROUND

This pilot study was developed because there is a lack of information addressing the education of chiropractic students to better serve underserved populations, which have specific predispositions to specific health concerns. The incidence of diabetes for American Indians is on the rise. Between 1990 and 1998, the number of American Indian and Alaska Native children, adolescents, and young adults with diagnosed diabetes who used IHS or tribal health facilities increased by 71% (from 4534 to 7736 persons). There is a need for chiropractors to be prepared to treat patients previously diagnosed with diabetes, as according to the Center for Disease Control almost 6% of the United States population is diabetic.

PARTICIPANTS

As part of a Palmer College of Chiropractic Clinic Abroad Program, which is an ongoing international chiropractic clinical education experience, chiropractic externs and chiropractors were given the opportunity to provide chiropractic care to members of the Blackfeet Nation at the Blackfeet Reservation in Browning, Montana, during June 2003.

METHODS

A patient survey was administered ($n = 837$) prior to chiropractic treatment to measure the prevalence of diagnosed diabetes and whether a diabetes diagnosis affected subsequent lifestyle choices. Frequency counts were generated. A pretest ($n = 21$), two instruction treatments, and a posttest ($n = 10$) were administered to chiropractors and chiropractic students. The pretest was given to measure knowledge of diabetes. Two instruction treatments were administered to emphasize neuromusculoskeletal conditions associated with diabetes. The first instruction treatment was an informative presentation on diabetes. The other instruction treatment was administering supervised chiropractic treatments to Native Americans. A posttest was given to measure knowledge of diabetes, and scores were subjected to analysis for statistically significant differences ($p < .05$).

RESULTS

About 40% (333/823) Native American respondents at the Blackfoot Reservation in Montana self-reported that they had at least one immediate family member who had been diagnosed with diabetes. About 8% (69/823) Native American respondents self-reported that they had been personally diagnosed with diabetes. Of those personally diagnosed with diabetes, about 93% (56/69) reported they sought out a healthcare provider on a regular basis. Regarding lifestyle choices attributed to either diagnosed with diabetes or the management of diabetes, about 90% (54/69) reported they eat more fruits and vegetables on a daily basis; 90% (53/69) reported they control their weight; 88% (52/69) reported they maintain the health of their feet; 86% (51/69) reported they monitor their blood sugar on a daily basis; and 66% (39/69) reported that they do stretching exercise on a regular basis to improve flexibility. Posttest score mean was greater than the mean pretest score, but not significantly.

DISCUSSION

Although weaknesses exist, this particular pilot study adds important data to the current literature, and provides valuable information useful for designing subsequent full research studies on chiropractic management concerns for treating groups with high predisposition of diabetes.

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Determination of the Distance Between Adjacent Lumbar Vertebrae by an Ultrasonic Based Imaging System
A Feasibility Study

Ariel Medina, Auburn University, **Ram Gudavalli**, Ph.D., National University of Health Sciences, **P. K. Raju**, Ph.D., Auburn University, and **Gregory Cramer**, D.C., Ph.D., National University of Health Sciences

Ultrasound has been widely used in the characterization, measurement, and evaluation of different materials and structures. In chiropractic medicine, it is of clinical significance to know the variation of the intervertebral distance when a subject is treated by the flexion-distraction technique.

OBJECTIVE

The objective of this research project is to develop an ultrasonic based testing system and evaluate its reliability to locate and assess the distance between adjacent lumbar vertebrae in human subjects. This study is part of a large project that aims to measure the variation in the intervertebral distance of patients treated by the flexion-distraction technique.

METHODS

The distance between the vertebrae was measured using the relative separation of contiguous spinous processes. The tips of the bones were chosen as an anatomic point that could be repeatedly identified. Tests were performed on five male volunteers aged between 19 and 29 years old during two sessions. The participants were asked to lie face down on a conditioned stretcher with their lumbar back section uncovered while the tests were executed. The scans were performed covering the first three lumbar vertebrae previously identified by palpation. A computer-controlled ultrasonic system was designed for this application. A single-element 3.5-MHz immersion transducer held by a customized assembly was used to propagate and receive the ultrasonic signals. The transducer was moved along the assembly to fully scan at least two contiguous spinous processes. A software program was designed to generate a two-dimensional image that displays the shape and position of the bone tips as well as the distance between them. In addition to the tests carried out on human beings, the reproducibility of the technique and the error associated to the subjectivity of the data analysis was evaluated using an artificial spine model. Three different observers measured the distance between the L1 and L2 spinous process tips as well as the distance between the first three transverse processes (L1–L2 and L2–L3) in both sides of the plastic model.

RESULTS

The standard error obtained from the measurements of the distance between the tips of the spinous processes, within a subject, was 0.305 mm (about 1%). On the other hand, measurements involving the distance between the spinous processes in the plastic model were performed with an error of 0.1%, whereas the measurements between transverse processes had an approximated error of 0.4%.

DISCUSSION

The study demonstrated the viability of utilizing ultrasound to measure precisely the distance between spinous processes of adjacent lumbar vertebrae. The low standard deviations and errors obtained in repeated measurements in each individual subject support the consistency of the results. The system can be used to measure the intervertebral distance variation of human beings being treated by the flexion-distraction technique. This capability will allow evaluating the correlation between the intervertebral variation and the effectiveness of the flexion-distraction treatment technique. The system can be trusted to measure variations greater than 0.3 mm with an error close to the 0.1%. The design was found unsuited to measure the intervertebral distance in the low lumbar area (sections L3–L4 and L4–L5) due to the high spine curvature. Most of the methodology disadvantages and error sources present in the system and can be minimized using a more sophisticated testing system such as the one used for advanced abdominal ultrasonic imaging. The tradeoff of such an update is a large increase in the cost of the devices and less portability.

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Use of Clinical Biomechanics of Posture (CBP) Protocol in a Postsurgical C4–C7 Total Fusion Patient
A Case Study

Paul A. Oakley, M.Sc., D.C., and **Deed E. Harrison**, D.C., Private Practice

OBJECTIVE

This is a case report of a patient presenting with chronic neck pain and heavy medication use following an occupational injury and subsequent total surgical fusion of C4–C7, 6.5 years prior to presentation. Because spinal manipulation therapy (SMT) was not an option for treatment due to the fusion and because the patient requested not to get her upper neck manipulated, Clinical Biomechanics of Posture® (CBP®) protocol was performed as the only treatment to the head/neck area.

CLINICAL FEATURES

A 56-year-old female suffered from chronic neck pain, weekly migraines, daily left arm numbness, and occasional left foot numbness. Other findings included severe cervical tenderness on palpation, global decreased cervical range of motion, and positive cervical compression/distraction tests. Posture analysis revealed a significant right head translation. Cervical x-ray analysis confirmed this posture with a 28-mm right head shift with surgical plating ranging from C4 to C7. Numerical Rating Scale (NRS) indicated that the pain was a 6/10 (0 = no pain; 10 = worst possible pain), Neck Disability Index (NDI) score indicated a "severe" disability rating (64%), and the SF-36 form indicated the patient's health status was clinically significantly below average in several health scales as well as the Physical and Mental Component Summary scores.

INTERVENTION AND OUTCOME

The patient received 25 treatments utilizing CBP protocol over the course of 11 days due to time constraints and special circumstances. Treatments ranged from two to four per day during this time. The treatment regimen consisted of mirror image exercises, adjustments (via drop table and instrument), and traction. Trigger point-type soft tissue massage was also performed on the neck as well as SMT to the mid and low back areas. After the course of treatment an approximate 50% reduction in the laterally translated head posture occurred (28 mm vs. 13 mm), as determined by digital photography and radiographic mensuration procedures. Left arm numbness ceased. The patient also stopped the consumption of all pain medications. Pre- and posttreatment NRS scores indicated a significant improvement of pain (1 vs. 6, at time of exams; 0 vs. 3–4, on average). Pre- and posttreatment NDI revealed a dramatic improvement in disability (64% vs. 12%), and norm-based SF-36 scores indicated clinically significant improvements in Social Functioning, Role-Physical, Bodily Pain, Vitality, and Mental Health indices, as well as a return to greater than average for the Physical Component Summary and the Mental Component Summary scores.

DISCUSSION

A patient having a total surgical fusion of C4–C7 was successfully treated with CBP protocol, achieving a significant reduction in symptoms and medication use not obtained following prior surgery. The case illustrates the suggestion that head translation postures are often overlooked and probably play a major role in the production of neck pain. This case also illustrates that use of nonmanipulative chiropractic procedures such as CBP can lead to clinically significant outcomes in patients presenting with chronic pain and previous history of major surgery to the spine. The authors urge the use of standardized questionnaires and reliable/repeatable x-ray analyses in common practice so that case reports can include more rigorous and meaningful clinical response measures to treatments.

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Patient Characteristics in the Edith Davis Acupuncture and Oriental Medicine Teaching Clinic

Paul J. Osterbauer, D.C., M.P.H., **Mark McKenzie**, L.Ac., M.O.M., Northwestern Health Sciences University, **Eileen McKenzie**, R.N., B.S.N., Minnesota Consortium of Complementary and Alternative Medicine, and **Roni Evans**, D.C., M.Sc., Northwestern Health Sciences University

Popularity of acupuncture and oriental medicine (AOM) in the United States is growing considerably. A small but growing number of studies of AOM utilization patterns show unique demographic patterns emerging. In an effort to develop a research program of AOM in an academic setting, prospective data were collected on patients at our teaching clinic to determine their demographic and clinical characteristics.

METHODS

Prospective data were gathered on all new patients during 1 month to describe patient characteristics, chief complaint, and perceived comorbidities, and to estimate the effectiveness of care using rating scales, overall health/quality of life (EuroQol questionnaire), and satisfaction. Outcomes were collected at 2-week and 2-month intervals following their initial treatment via mail and telephone follow-up. Descriptive statistics were computed to assess the data.

RESULTS

Forty-three patients were enrolled, of which 29/43 were female. The average age was 37 ($SD = 19$) years. The predominant racial descriptor was white (37/43). Subjects had higher than average education, with 36/43 having 2 or more years of college. Chief complaints were mainly musculoskeletal in nature (12/21; 37%), followed by ill-defined conditions 8/43(19%). Some had genitourinary complaints (5/43; 12%), and less than 10% included disorders of other organ systems. Most of the conditions were chronic [average duration 8.6 ($SD = 19$) years]. Average complaint severity was 5/10 ($SD = 2.6$; $n = 26$), at the initial visit. The average self-reported overall health status was 72 ($SD = 18$; $n = 33$) on a 100-point scale (100 = perfect health).

DISCUSSION

Our patients are similar to those reported in the literature of complementary and alternative medicine, with most conditions musculoskeletal in nature. Two-week follow-up rates were below 50% and efforts are being directed to improve this to an acceptable range. Further studies at the clinic are feasible and promising as a means of understanding the characteristics of the clinical setting.

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Filling in the Gaps
An Interactive Research Project Poster at ACC/RAC

Edward F. Owens, Jr., M.S., D.C., Palmer Center for Chiropractic Research, and **Kathryn Hoiriis**, D.C., Life University, College of Chiropractic

Even though small, the chiropractic educational and research community is quite diverse in its approaches and topics under investigation. It is difficult to grasp the full scope of the work under way and to identify all the people involved. If manpower is limited, we may be spreading ourselves too thin across the wide range of areas that need to be studied. On the other hand, some topic areas that might be quite fertile for research may be understudied because no one has thought to look there. An overview of possible research topic areas would be useful, along with a comparison to projects already under way. This inventory may provide assistance in the further development of timely and effective communication between researchers for a dynamic research agenda in chiropractic.

METHODS

At the 2003 joint session of the Research Agenda Conference and annual meeting of the Association of Chiropractic Colleges, we created an impromptu poster with three purposes: (1) to develop taxonomy of research project areas that might be investigated; (2) to identify the projects currently under way by the pool of researchers at the conference; and (3) to connect people who might be working in similar areas for possible collaboration. The poster design was simply a hierarchical division of project topics, starting with the general categories: basic science, clinical, outcomes, health services, and education. Each of these major divisions was further broken down into more specific project areas. Only the concept had been developed somewhat before the conference. The actual poster was made on the spot during an evening poster session from a blank sheet of paper and colored marking pens. Attendees who came by were curious and would often ask what we were doing. We would tell them the main ideas and they would most often respond by remarking that it was a good idea and asking how they could help. We provided marking pens and invited attendees to help develop the hierarchy further and add their names to the project areas in which they were involved. Quite a bit of excitement was generated as we watched the poster take shape.

RESULTS

There were 34 platform and 94 poster presentations at the conference. Of those individuals in attendance at the poster session, about 20 contributed to the poster. An additional main category was added: chiropractic history. Also, the educational research area was significantly expanded. The areas of highest documented activity were in the basic sciences, clinical, and educational categories. In the basic sciences, intense activity centered on physiology and biomechanics, with 14 projects listed. The clinical research area was almost completely covered with entries in the diagnostic topics ($n = 4$), functional assessment ($n = 7$), and treatment areas ($n = 5$). Educational research centered on projects in course development, outcomes, and program assessment ($n = 6$). Outcomes ($n = 5$), health services ($n = 4$), and history ($n = 3$) received the fewest entries.

CONCLUSION

Our original taxonomy for research projects was incomplete in two areas: history and education. When those areas were further developed, the map of research projects was able to contain any project that was suggested. The profession, represented by attendees at this particular conference, is heavily working in the areas of joint physiology and biomechanics, diagnosis/assessment, and educational research. Surprisingly little activity was reported by attendees in the area of outcomes research, which showed several gaps in topics under way, despite a fairly detailed breakdown of possible topic areas. The results presented in this summary, while not an exhaustive survey of research under way in chiropractic, may provide details to help focus future research efforts and possibly incite collaborative efforts.

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Growth Restart Lines
A Case Report

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OBJECTIVE

The purpose of this report is to present the radiological features of growth restart lines and to propose a new etiology of these findings.

CLINICAL FEATURES

Growth restart lines are encountered commonly about the lower limb, especially about the knee. Other regions of the skeleton may also be affected, although less commonly, especially about the spine. The salient features in the cases presented included the presence of multiple radio-opaque horizontal lines along the vertebral bodies of the thoracic and lumbar spine. The history evaluation and further medical examinations of both patients lead the clinicians to believe that the radiological findings were associated with prior repetitive trauma incidents that each individual sustained during their lifetime. These cases demonstrate that it is imperative that both the radiological findings and the patient's history be used together when deciding upon a diagnosis.

INTERVENTION AND OUTCOME

Two case reports of individuals with varying athletic and lifetime experiences are presented. Both individuals had

radiographs taken which showed multiple growth restart lines throughout the lumbar and thoracic regions. Once all the differential diagnoses were ruled out, the restart/recovery lines were attributed to the repetitive trauma that each individual suffered. These individuals followed a chiropractic plan of management and all symptoms resolved quickly.

DISCUSSION

Although the etiology and epidemiology of growth restart lines has yet to be elucidated, the clinical implications regarding misdiagnosis and treatment are extremely important to chiropractic practitioners.

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Treatment of Neck and Back Pain With Associated Scoliosis With Full-Spine Chiropractic Adjustments
A Case Report

Sheldon T. Sharpe, B.Sc., D.C., Private Practice

OBJECTIVE

The purpose of this report is to discuss the case of a patient suffering from neck, midback, and low back pain with associated scoliosis that was successfully managed with chiropractic adjustments and adjunctive procedures for the reduction of spinal curvature and decreased symptomatology.

CLINICAL FEATURES

An 18-year-old male presented to the clinic suffering from constant back and neck pain with associated scoliosis. Static palpation revealed taut and tender muscle fibers at several vertebral levels as well as pain localized at those levels throughout the cervical, thoracic, and lumbar spine. In addition, there was an overall decrease in active ranges of motion in the cervical, thoracic, and lumbar spine. Radiographically, the patient initially presented with an S-shaped thoracolumbar scoliosis measuring 38° to the right from T6 to T12 and to the left from L1 through L4 measuring 32°.

INTERVENTION AND OUTCOME

Patient had no prior experience with chiropractic care or rehabilitative exercises. Previous treatment had included various nonsteroidal anti-inflammatory drugs and muscle relaxants. He was treated in our office with specific diversified adjustments to C2, T2, T6, and the sacrum. Lumbar flexion-distraction was performed to L3. Additionally, he was prescribed several spinal stabilization and neuromuscular re-education exercises and received Russian electromuscle stimulation to the convex side to both thoracic and lumbar curvatures. Following a treatment plan consisting of three visits per week for 5 weeks, the patient's symptoms had abated and the scoliosis had reduced radiographically in the thoracic and lumbar areas by 3° and 8°, respectively.

DISCUSSION

Spinal fixation results in a decrease in the stimulation of joint proprioceptors and muscle spindles associated with the fixated segment and, ultimately, a decrease in higher brain stabilization feedback to paraspinal musculature. In addition, this decrease in proprioceptive stimulation at the spinal level causes an increase in the activity of the muscles that support that joint. Provided this subluxation occurs early enough in life, this asymmetry in the paraspinal muscle activity can predispose a person to scoliosis. A decrease in proprioceptive stimulation will reduce the inhibitory effect of pain at the spinal level and will facilitate sympathetic output at the spinal level as well as higher cortical levels via reduced active inhibiting at the intermediate lateral column of the spinal cord and reticular formation respectively.

Removal of these subluxations can restore joint function, restore normal brain input of proprioceptive activity from zygopophyseal joints and muscle spindles, and therefore, actively inhibit the facilitation of nociception at the dorsal horn in the spinal cord. Improved proprioceptive stimulus will also create an inhibitory effect on the intermediate lateral column in the spinal cord, causing a decrease in sympathetic output. Proper proprioceptive input to the cord decreases activity at the ventral horn, facilitates active inhibition at the reticular formation, and ultimately results in restoration of proper innervation to spinal stability muscles, thereby allowing abnormal curvatures to be reduced and further progression of scoliosis to be prevented.

Therapeutic and neuromuscular re-education exercises were used as adjunct therapies to speed recovery. These procedures aid in returning muscles to normal physiological length and strength and facilitate proprioceptive stimulation of joint mechanoreceptors and muscle spindles.

CONCLUSION

Specific chiropractic adjustments coupled with proper adjunctive therapies may provide a treatment option for selected cases of scoliosis for the reduction of curvature and decrease of symptomatology. Further studies should be undertaken concerning the prevention of scoliosis. Better understanding of early detection may be useful in optimally effective management and prevention of scoliosis.

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Phantom Limb Pain/Sensation Treated With Logan Basic Chiropractic Technique
A Report of Two Cases

Christopher N. Shoff, D.C., and **Connie J. D'Astolfo**, D.C., Private Practice

Phantom limb pain/sensation is a widespread neuropathic condition affecting a high percentage of amputees. Phantom limb pain responds poorly to conventional medical and surgical treatments. It is estimated that over 500,000 Americans today suffer from phantom limb pain. Two case reports are presented regarding the management of phantom leg pain/sensations via chiropractic care.

CASE DESCRIPTIONS

Phantom limb symptoms were present in an elderly woman with diabetes and peripheral vascular disease and a man who suffered an amputation due to a motorcycle injury. The treatment plan for both patients included Logan Basic chiropractic technique along with the diversified chiropractic adjustments they were receiving as treatment for lower back pain. The diversified technique that was employed was a combination of prone diversified and Spears chiropractic technique to treat the lumbosacral region. Logan Basic technique contact that was used for treatment was the apex contact. The apex contact is applied to the sacrotuberous ligament at its insertion into the sacrum. The line of drive lies in a 90° arc and is lateral, superior, and posterior. The side of the Logan Basic apex contact is determined by five physical signs: height of the iliac crests; erector spinae tension; rotation of the lowest freely movable vertebra; pain in the sacroiliac joints; and sacrotuberous tension.

RESULTS

Both patients responded favorably to treatment, even though of differing ages, gender, and comorbidities. Both patients experienced a reduction in both the severity and frequency of pain as evidenced by their subjective report of pain and the posttreatment quadruple visual analog pain scale.

DISCUSSION

Both patients had no previous or current therapeutic interventions for their phantom limb besides this chiropractic treatment trial. Although self-monitoring may involve the patient's attempt to please the doctor, both patients experienced ongoing phantom limb pain that did not appear to decrease over time, either in severity or frequency, prior to the treatment trial. This is consistent with the available literature, which indicates that phantom limb pain does not tend to remiss over time. Both neurological (reduced nocioception through stimulation of mechanoreceptors) and biomechanical (correction of pelvic and sacral structure/function) mechanisms may explain the reduction in pain experienced by both patients.

Further investigation is warranted to determine correlation, if any, between low back pain, pelvic/sacral dysfunction, and phantom limb pain. More sophisticated studies need to be conducted to establish the efficacy of Logan Basic technique in the management of this neuropathic condition. Since low back pain appears to be prevalent in lower limb amputees, it is also prudent that this condition is also addressed and managed along with the phantom limb pain.

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A Manual Therapy Approach to Meralgia Paresthetica in Pregnancy
A Case Report

Clayton D. Skaggs, D.C., Washington University School of Medicine and Logan College of Chiropractic, **Daryl C. Rich**, D.C., Logan College of Chiropractic, **Brett A. Winchester**, D.C., Private Practice, and **Heidi Prather**, D.O., Logan College of Chiropractic

Leg pain and/or paresthesia presents a complicating factor to treatment of low back pain/pelvic pain during pregnancy. Previous studies on low back pain in pregnancy have excluded such patients due to this complexity.

OBJECTIVE

The purpose of this report is to describe a conservative approach to treating and evaluating a pregnant patient with low back pain and thigh parethesia, presenting as entrapment at the lateral femoral cutaneous nerve also known as meralgia paresthetica.

STUDY DESIGN

The authors report a case of a 22-year-old patient in her 16th week of pregnancy. She presented with a chief complaint of low back pain, bilateral anterior lateral thigh paresthesia, and groin pain of 1-month duration.

METHODS

The clinical history and physical exam signs that led to the clinical diagnosis of meralgia paresthetica included the straight leg raise, active straight leg test, long dorsal ligament test, and the pelvic pain provocation test. Treatment for the condition involved evaluation and manual intervention five times during a period of 6 weeks. Active release technique was performed to the restricted right sacroiliac joint complex and to the area of entrapment at the lateral femoral cutaneous nerve. The home exercise program consisted of low back stabilization and relaxation exercises.

RESULTS

After four treatments, the patient reported 90% improvement in leg symptoms. At 1-year follow-up, the patient reported no further complications or pain.

CONCLUSION

This case illustrates an approach to treating low back pain complicated by paresthesia during pregnancy. Because the procedures offer an intervention of very low risk, additional clinical studies are warranted to determine classifications that may benefit from similar treatment.

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Low-Force Chiropractic Adjustments on Acute and Chronic Low Back Pain

Brian J. Snyder, D.C., and **John Zhang**, M.D., Ph.D., Logan College of Chiropractic

Low back pain puts an enormous burden on healthcare systems and the economies of developed countries. It has been reported that more than 50% of Americans experience back pain each year for at least a week. The cost for treating back pain has been estimated at $25 billion annually. with another $50 billion for lost productivity and disability payments. Low-force adjusting has been employed clinically for many years by multiple adjusting techniques. One form of low-force adjustment is the Toftness adjusting method that primarily uses a hand-held unit to determine where to adjust, and a pressure applicator to adjust the full spine. Although there are a limited number of randomized controlled trials on the effectiveness of this chiropractic adjustment technique, research studies on Toftness adjusting have demonstrated positive findings.

OBJECTIVE

The specific aim of the proposed study is to assess the effectiveness of low-force spinal adjusting using the Toftness method for subjects with acute and chronic low back pain.

METHODS

This study was reviewed and approved by the Institutional Review Board of the Logan College of Chiropractic. Each subject was scheduled for two or three adjustments per week for 4–6 weeks, with a minimum of at least eight adjustments. The practitioner delivered a low-force (2–32 oz.) Toftness chiropractic adjustment, using a metered hand-held pressure applicator at the cervical, thoracic, lumbar, or sacral contact site. The pain measurements included the visual analog scale (VAS) and the Oswestry Disability Questionnaire scores.

RESULTS

Twenty-two patients with acute and chronic low back pain were recruited in private chiropractic clinics. The average age of the patient population (8 male, 14 female) was 53 ± 16. There were 10 acute low back pain subjects. After 4–6 weeks of chiropractic adjustments, VAS score was reduced significantly from 6.8 ± 1.3 to 1.8 ± 1.0 ($p < .001$). The Oswestry score was decreased significantly from 63 ± 18 to 8 ± 4 ($p < .001$). There were 12 chronic low back pain subjects. After 4–6 weeks of chiropractic adjustments, VAS score was reduced significantly from 7.8 ± 1.1 to 1.6 ± 1.6 ($p < .001$). The Oswestry score was decreased significantly from 75 ± 17 to 16 ± 13 ($p < .001$). There were no adverse treatment effects reported by the participating patients.

DISCUSSION

The intent of this study was to expand on the initial observations of the clinical benefit of the Toftness system of chiropractic for acute and chronic low back pain. This study demonstrated that subjects with acute and chronic low back pain, after receiving a series of Toftness adjustments, had a significant reduction in pain and restoration of activities of daily living. The mechanism of pain reduction is not clear and indicates a need for further research.

CONCLUSION

Low-force Toftness adjustment could potentially be beneficial for patients with acute and chronic low back pain.

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Student Mentoring Program
A Novel Approach to Improving Chiropractic Clinical Education

Gerald L. Stevens, D.C., M.S., and **Matthew C. Cote**, D.C., D.A.B.C.O, New York Chiropractic College

The student mentoring program is a novel program designed to improve the clinical education of students at the Depew outpatient clinic of New York Chiropractic College. The program is novel because it allows students to choose the patients on the daily schedule they want to see to improve their own education. Students can schedule themselves to observe more patients who are acute or have disease to increase their preparation to handle such patients in practice.

OBJECTIVE

The objectives of the student mentoring program are threefold: (1) increase student exposure to different types of patients at various phases of treatment to prepare them better for practice; (2) immediately get students involved in observing patient visits with another treating intern upon entering the clinic; and (3) rapidly familiarize students with clinic policies and procedures.

METHODS

Sixty-two students undertook this program during the 8th and 9th trimesters of a 10-trimester program for a 4-month period. The students recorded the type of visit and what they learned into a log, which was reported to their clinician mentors once a month. An electronic survey was prepared to determine effectiveness, value, student satisfaction, and improvements for this pilot program.

RESULTS

The survey had a 41% response rate and showed that 73% of the students were introduced to a case they had not seen before. Seventy-eight percent of the students polled believed this program was best suited to 7th- and 8th-trimester students. Only 27% of the students believed it helped them learn clinic procedures better.

DISCUSSION

The results indicate some success with reaching the first two objectives. However, there is room for progress by improving clinician involvement and by limiting the program to 7th- and 8th-trimester students where it might be most effective.

CONCLUSION

The student mentoring program appears effective but further refinement is required for optimal results. Another follow-up survey is recommended in 4 months to determine if changes were successful.

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Practical Quiz
A Method of Reinforcement

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This project was the outcome of an attempt to find a more productive way to utilize classroom practice time in a chiropractic technique class. Ways to make class a more productive avenue for learning are always being sought. This author has presented earlier presentations on that search.

OBJECTIVE

All these presentations had one objective in mind: clinical excellence. This project represents the continuation of that search.

METHODS

Like the traditional classroom quiz, a "practical quiz" is a pre-exam exercise to keep the students on task in preparation for an actual midsession practical examination (one of two) that they will be taking. During the quiz the student enters the classroom and is presented with an adjusting simulator, a sheet of headrest paper, and the selection of a random group of cards that have technique listings written on them. After the selection (one of eight possible listings) the student must place the patient (simulator), administer the adjustment, and then bring the patient (simulator) up from the table. The student can receive 2 points for a flawless procedure, 1 point for a procedure with one or two mistakes, or 0 points for a procedure with more than three mistakes. To assess the impact of the practical quiz on student performance, the actual examination scores of a cohort of students experiencing the practical quiz ($n = 119$) were compared to the combined scores of three previous cohorts ($n = 447$).

RESULTS

The mean raw practical examination score of students experiencing the practical quiz was 32.5/35. The mean raw practical examination score of students in the control group was 32.7/35.

DISCUSSION

The use of a "practical quiz" resulted in no meaningful change in student examination scores. A marked increase in the confidence, attitude, and skills demonstrated on the actual adjusting exercise was apparent. Increased confidence is understandable. The student has had three opportunities to demonstrate mastery before a faculty member prior to adjusting. Prior to the "practical quiz" the student only had one occasion.

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Effects of Time Scale of Didactic Instruction on Learning and Retention in a Chiropractic Curriculum
A Model for Evaluating Changes in Instructional Methodology

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Two cohorts of students attended a didactic course in laboratory diagnosis. One completed the course in 5 weeks and the other in 14 weeks. The intensive approach provided a sharp focus on the material, whereas the traditional scheduling allowed assimilation and integration.

OBJECTIVE

It was hypothesized that there would be differences with regard to short-term learning and long-term retention. Described below are the means by which the impacts of this change in instruction were evaluated.

METHODS

A literature search of educational databases seeking similar previous studies was performed, without success. Each course meeting was 2 hours in length and presentations remained consistent between groups. The first cohort (intensive) met three times each week, finishing in 5 weeks. The second cohort (traditional) met weekly for 14 weeks. Each student's percentage course grade (multiple-choice written examinations) was used to measurement short-term learning. In the subsequent academic term, most students enrolled in a course in organic differential diagnosis. Included in the written final examination were six representative questions from the initial course. A score for these six questions was generated for each student, for both courses. The difference between the two scores assessed long-term retention. Comparison of cohorts at each time point utilized a t test with the hypothesized difference set at 5%, or one-half of a letter grade level. Written examinations for the initial course were identical for the two cohorts.

RESULTS

Analysis of course performance revealed a significant difference, with a raw score average of 67% for the intensive cohort and 58% for the traditional cohort ($\Delta = 9\%$, $p = .003$). Assessment of long-term retention revealed no significant difference. The average score decreased 14% in the intensive cohort and 13% in the traditional ($\Delta = 1\%$, $p = .32$).

DISCUSSION

Since long-term retention and application, not short-term performance, are the goals of the educational process, it would appear that these approaches to course presentation were equivalent. There are potentially confounding factors. A decrease in long-term performance by the traditional cohort may have been masked by communication from the first cohort regarding the carry-over of examination questions from a previous course. To investigate this possibility, the frequency with which long-term retention increased or decreased was examined. No difference was observed between the cohorts in the frequency with which the long-term performance of students increased or decreased. If the test items chosen had different performance characteristics between the two cohorts on the initial assessment this could have masked long-term differences. This was not a source of error, as the initial performance of each cohort questions was identical (89%). The test items chosen may be insensitive to changes in information retention. This potential confounder could have been eliminated by having students retest on all of the examination items from the initial course, but this was highly impractical. The length of time between the conclusion of the first course and the long-term assessment may have been insufficient, and was also unequal between the two cohorts (6 months for intensive, 4 months for traditional), potentially masking differences. Both of these considerations could be addressed by utilizing a longer time scale (preferably 1 or 2 years). This was impractical, as there would be no direct access to the students beyond the interval used in this study. There is no basis for generalizing the results of this study to other educational situations. However, this study does provide an example of how changes in educational methodology can be evaluated for impact on learning outcomes.

CONCLUSION

Within the context of this study, a more rapid, intensive presentation of didactic course material had a positive impact short term, but had no impact on long-term retention. The two time scales of course delivery were therefore equivalent.

A Prospective Evaluation of Imaging Study Data in Patients Presenting to a Chiropractic Clinic

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The teaching of radiology and diagnostic imaging plays an important role in the undergraduate education of chiropractors, contributing to knowledge of osseous pathology, clinical reasoning, and overall clinical management of the patient presenting to the chiropractic practice.

OBJECTIVE

The objective of this study was to chronicle the basic parameters in the chiropractic clinic in order to confirm the utilization of radiology in the clinical setting. Furthermore, controversy has previously existed as to the necessity of including certain courses in the chiropractic radiology syllabus and this study was performed to demonstrate the necessity of such courses.

METHODS

A prospective study was performed to determine the role of imaging in the chiropractic clinic over a period of 6 months. Inclusion criteria were patients with imaging studies during the period of 6 months. Data concerned the number, type, region, and category of disorder of each imaging study.

RESULTS

A total of 1299 imaging studies were viewed during the 6 months of the prospective study. Nine imaging studies were excluded, and 1290 were therefore included in the data. A broad range of disorders presented to the chiropractic clinic ranging from normal imaging studies in 149/1290 (11.6%) studies to 1141/1290 (88.45%) studies demonstrating disorders. The most common groups of disorders were arthritides (271/1290, 20.9%). Normal variants and developmental or congenital anomalies contributed to 229/1290 (17.7%) of the workload. Traumatic lesions formed 176/1290 (13.6%) of the cases seen. Internal derangements of a nontraumatic origin detected on special imaging (most commonly MR and CT imaging) contributed 71/1290 cases (5.5%). Conventional and digital imaging comprised the majority of imaging studies viewed, contributing 900/1290 (69.8%) of all studies. The increasing use of special imaging was reflected in magnetic resonance imaging contributing 158/1290 (12.2%) of studies and computed tomography in 129/1290 (10.0%) of imaging studies. The adult population contributed to 1249/1290 (96.82%) of the imaging studies, whereas the pediatric population contributed 41/1290 (3.2%) of cases. The region of the studies included 645/1290 (55.1%) spine studies and 526/1290 (44.9%) extremity studies.

DISCUSSION

The results of this study demonstrate that a significant quantity of imaging studies accompany the chiropractic practice of a teaching clinic. A small number of studies were excluded due to various reasons, including inability to classify the disorder in to one specific category (for example, a patient with Paget's disease, concurrent degenerative joint disease, and a contralateral total hip prosthesis). However, the majority of the cases were not difficult to categorize.

CONCLUSION

This pilot study demonstrates the substantial involvement of imaging in the chiropractic practice. The use of special imaging in the assessment of the neuromusculoskeletal system is substantial. The range of disorders presenting to the chiropractic practice is varied and the chiropractic student needs to be trained to determine the nature and clinical consequences of the disorders.

Initial and Treatment-Induced Changes to Muscle Activation Patterns in Patients With Adolescent Idiopathic Scoliosis Compared to the Frontal Plane Spinal Configuration as Measured With Surface Electromyography

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OBJECTIVE

The purpose of this study is to report paraspinal muscle activity patterns in adolescent idiopathic scoliosis (AIS) patients in comparison to the frontal plane spinal geometry and to report changes to the muscle activity resulting from a multifactorial treatment program that included chiropractic manipulation.

METHODS

This study was reviewed and approved by the Institutional Review Board of the Logan College of Chiropractic. The study design was a case series performed in a private clinic. Radiographic examination was performed on nine patients (ages 11–19) who were previously diagnosed with adolescent idiopathic scoliosis. The frontal plane spinal geometry was obtained using computer-assisted methods. Surface electromyography (SEMG) was recorded at nine bilateral paraspinal locations and plotted to the spinal configuration. The patients participated in a 24-week multifactorial treatment program that included various forms of traction, resistance exercises, and spinal manipulation. SEMG recordings were made before and after each treatment session. Initial SEMG values and measurements at 12 and 24 weeks of treatment were compared with a paired t test.

RESULTS

There were seven female and two male patients. All patients presented with an "S" configuration scoliosis. Five patients had upper right convex curves, ranging from 16° to 26°. The associated lower left convex curves ranged from 18° to 30°. Four patients had upper left convex curves which ranged from 10° to 15°. The associated lower right convex curves ranged from 9° to 23°. The initial SEMG examinations demonstrated seven of nine patients with suboccipital hyperactivity on the opposite side of the upper convex curve. Hyperactivity at L5/S1 on the side of the lower convex curve was observed in six patients. Unilateral hyperactivity from C5 to L3 was demonstrated in six patients. All patients demonstrated hyperactivity on the concave side of one of the two curves, while one patient had hyperactivity on the concave side of both curves. One patient had a mix of hyperactivity on the concave and convex sides of both the upper and lower curves. Following 12 weeks of treatment, the upper and lower curves demonstrated the same left/right distortion characteristics, and in all but one patient the amplitude of the lateral curves remained stable within ±2°. The suboccipital SEMG values were symmetrical (within 1 μV). The SEMG values across the curves were either symmetrical or hyperactive on the convex side. The L5/S1 SEMG values were either balanced or hyperactive on the same side as the convex curve. A paired t test of the initial and final SEMG values at locations where hyperactivity crossover occurred from concave to convex demonstrated a statistically significant difference ($p < .001$). Curve progression halted in eight patients. These findings were maintained throughout the remainder of the 24-week treatment regimen.

DISCUSSION

In this sample of nine patients with "S" curve configurations, all demonstrated hyperactivity on the concave side of at least one curve. Imbalance of the paraspinal muscles is one factor that may contribute to the development and progression of scoliosis. As one curve compresses the other will reactively compensate in the opposite direction. This occurs as righting and balance reflexes attempt to reestablish spinal balance, thus causing a vicious cycle of dual curve progression.

CONCLUSION

Inhibition of concave-sided muscle hyperactivity was demonstrated using a multifactorial treatment program of traction, resistance exercises, and spinal manipulation. As a result of changing muscle activation patterns, curve progression halted in eight of nine patients. Additional case studies are warranted using this multifactorial treatment approach to assess outcome consistency. If consistency can be demonstrated, early detection and intervention using this multifactorial approach gives hope to halting progression and improving AIS deformities.

Role of Classroom Assessment in Enhancing Student's Learning

Isis Zaki, M.D., M.S., Ph.D., and **Gary Globe**, D.C., M.B.A., Ph.D., Cleveland Chiropractic College, Los Angeles

Assessment is the process of defining, selecting, designing, collecting, analyzing, interpreting, and using information to increase student's learning and development. Classroom assessment is an ongoing process. By employing a number of simple techniques that are quick and easy to use, teachers get feedback on what, how much, and how well their students are learning. Faculty can then use this information to refocus their teaching and provide students with feedback on the results of assessment and suggestions for improving learning. Instructors could use various class assessment techniques. One is a postlecture quiz that can serve as an early check on student's learning. In the current pilot study, the postlecture quizzes were used as a classroom assessment technique to evaluate whether a prompting method would improve student performance on a brief postlecture quiz. The quiz was assumed to be an indicator of short-term learning and retention of key lecture points.

METHODS

The study design used a repeated measure of student performance utilizing three different prompting methods. The first method was to give the quiz at the end of class session without any warning in advance. The second method was to announce that there would be a postlecture quiz. The third method was to review lecture objectives without warning students that there would be a quiz at the end of the class session. Each method was used in three separate anatomy courses during Spring trimester of 2004, with the results combined by method. The results were analyzed for statistically significant differences between the three methods. The postlecture quizzes consisted of five multiple-choice questions. Each quiz included at least one question that was assumed to be sufficiently basic that most students would be able to answer it correctly and at least one more difficult question. In the next class session, students were informed about the proper answers, and results and grades were posted. The analysis of variance (ANOVA) test was utilized for group comparisons.

RESULTS

The mean for the quiz was $71 \pm 25\%$ without prompting, $86 \pm 19\%$ with prompting, and $55 \pm 56\%$ for review of lecture objectives. The ANOVA test demonstrated a statistically significant difference between all group comparisons ($p < .1$).

DISCUSSION

Assessment measures educational effectiveness. To improve learning, students need to receive appropriate and focused feedback on their learning early enough before they are evaluated for grades. Within the context of the current study, the best results were observed when students were prompted by announcing at the beginning of lecture that there would be a postlecture quiz. Prompting students, therefore, could lead to better learning outcomes. Taking a few minutes to administer a simple assessment immediately after the class session helps to: (1) reinforce the material taught; (2) uncover gaps in understanding before they become serious impediments to further learning; (3) monitor learning throughout the semester, providing information faculty can use to refocus their teaching; (4) provide students with appropriate feedback on their learning early enough before they are evaluated for final grade; (5) motivate students to be attentive; (6) eliminate stress associated with the final test; and (7) encourage students not to miss any lecture.

CONCLUSION

Prompting students of an impending quiz at the end of lecture improved learning outcomes. This procedure served two functions: first, it was used as a technique of assessing student's learning, and second, as an effective method of enhancing student's learning and short-term memory skills.

Taking Nutritional Supplements for 3 Months Reduced Blood Pressure but Not Blood Lipid Levels in Students

John Zhang, M.D., Ph.D., **Rebecca Bateman, Shastidy Metzger**, and **Kurt Lanigan**, Logan College of Chiropractic

Nutritional supplements and physical activity are important factors in maintaining health. Cardiovascular disease risk factors include hypertension, serum cholesterol, high-density lipoprotein and low-density lipoprotein, body mass index, body weight, dietary fat, energy intake, dietary fiber, and exercise. It has been reported that eating fruits and vegetables, particularly dark green leafy vegetables, appears to have a protective effect against coronary heart disease.

OBJECTIVE

This study was designed to investigate the effects of a nutritional supplement on cardiovascular health as determined by blood and saliva biochemistry in asymptomatic college students and faculty members.

METHODS

This study was reviewed and approved by the Institutional Review Board of the Logan College of Chiropractic. Forty students and faculty members were recruited into the study via a schoolwide e-mail notification and through personal contacts. All subjects were required to sign a written informed consent before participating in the study. A specific type of green vegetable supplement drink was tested to document its effect on the blood and saliva biochemistry in relation to cardiovascular health. After the initial baseline tests, all subjects were asked to take the supplement for 90 days. Subjects were asked to undergo blood and saliva biochemistry tests before and after the 90-day study period.

RESULTS

After taking the supplement for 90 days, both the systolic and diastolic blood pressure decreased significantly. The heart rate decreased but did not reach statistical significance. Time domain analysis of heart rate variability (HRV) showed a slight decrease in standard deviation of normal to normal QRS (SDNN) and RMS-SD but did not reach statistical significance. Frequency analysis of HRV found increasing total power and high frequency but both did not reach significant level. The very-low-frequency and low-frequency components did not change significantly. Saliva DHEA and cortisol decreased after taking the supplement, but the decrease was not statistically significant. Blood glucose concentration was increased slightly but the change was not significant. Blood serum tests showed no significant changes in the total cholesterol or the low-density lipoprotein levels. However, it was noted that the high-density lipoprotein level was decreased significantly. Triglycerides did not show any significant changes but were slightly elevated after the treatment period. Homocysteine was increased significantly after taking the supplement for 90 days.

DISCUSSION

The favorable response was indicated by a decrease in systolic and diastolic blood pressure after taking the supplement for 90 days. It is known that hypertension can be caused by atherosclerosis, imbalances in the rennin-angiotension system, and hyperinsulinemia. Hypertension is the leading cause for heart disease, kidney disease, and stroke. Previous studies have found that vegetarian diet trials reduced blood pressure in normotensive and hypertensive individuals. In a large randomized controlled study, diet and blood pressure were evaluated in subjects on an 8-week diet of vegetables and fruit daily. The experimental group showed a significant reduction in blood pressure.

Effect of Chiropractic Care on Heart Rate Variability and Pain in a Multisite Clinical Study

John Zhang, M.D., Ph.D., Logan College of Chiropractic, **Douglas Dean**, Ph.D., Logan College of Chiropractic, and **Dennis Nosco**, Ph.D., Nosco Consulting

The autonomic nervous system involuntarily controls the functions of the body systems. There are two branches of the autonomics, the parasympathetic nervous system (PNS) and sympathetic nervous system (SNS), that work as antagonists. One target of the autonomic nervous system is the heart rate. Heart rate variability (HRV) analysis has been used extensively as a measurement of fitness level, and recent studies now indicate that it may be a useful tool in detecting and following disease processes. HRV analysis determines the balance between PNS and SNS using time and frequency domain measurements.

OBJECTIVE

The purpose of this study was to investigate the effect of chiropractic care in a multiclinic setting on balance of the sympathetic and parasympathetic nervous system using the heart rate variability analysis. It was hypothesized that chiropractic adjustment has a positive effect on the balance of the autonomic nervous system activities, thereby increasing HRV.

METHODS

This study was reviewed and approved by the Institutional Review Board of the Logan College of Chiropractic. Chiropractors in private practice were provided with an HRV device to perform analysis before and following chiropractic adjustment on 10 subjects. Eight subjects were monitored before and after a single chiropractic adjustment, and two additional patients were followed for a 4-week period with two HRV recordings per week, in addition to the baseline recording. Information collected included patient personal information, frequency of treatment, and disease history. Copies of patient information forms, a pain diagram, and a visual analog scale (VAS) were completed before and after each chiropractic adjustment. A total of 125 chiropractors were recruited across the United States.

RESULTS

Data from 96 doctors were divided into single-visit and 4-week groups. The average age of the patient population in the single-visit group was 46 ± 15 years old ($n = 625$). Of these, 393/625 were female, 230/625 were male, and 2/625 did not report gender. After one chiropractic adjustment, pain as analyzed by VAS was reduced significantly from 3.8 ± 2.3 to 2.2 ± 2.0 ($p < .001$). The mean heart rate was reduced from 76.7 ± 12.7 to 74.3 ± 12.4 ($p < .01$), the standard deviation of normal to normal QRS (SDNN) increased from 55.8–44.6 to 60.6–47.2 ($p < .001$), the high-frequency component (HF) was increased from 359 ± 968 to 444 ± 1069 ($p < .01$), the low-frequency component (LF) was increased from 403 ± 753 to 465 ± 755 ($p < .05$), and the total power was increased from 1063 ± 1886 to 1265 ± 2048 ($p < .01$). In the 4-week group, the average age of the patient population was 43 ± 16 years old ($n = 132$). Of these, 95/132 were female and 37/132 were male. After 4 weeks of chiropractic adjustment, pain measured by VAS was reduced significantly before and after each visit analyzed by t tests, but these changes were not found to be significant using analysis of variance (ANOVA). The reduction of pain from each treatment was not maintained over the 4 weeks of study period. The ANOVA analysis on the HRV 4-week data found that changes in the SDNN, total power, VLF, and LF components reached statistically significant levels ($p < .05$). The heart rate and the HF component did not change significantly ($p > .05$). In this study, the authors examined several different chiropractic adjustment techniques and found similar effects with each technique.

CONCLUSION

The authors concluded that the decreased heart rate and increased SDNN as well as the total power from the HRV analysis indicates that chiropractic treatment is associated with a shift to a healthy autonomic nervous system balance.

The GoFor Hunt Program
A Pilot Project to Teach Skills to Produce Clinic Education Tools, Evidence-Based Search Skills, Ethics, and Clinic Marketing to Undergraduate Chiropractic Interns

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Chiropractors are interested in providing patients with clinical literature to help improve their understanding and awareness of health, to reduce their anxiety and instill a sense of satisfaction with the service. Clinicians also wish to make efficient use of their time and take advantage of an opportunity to promote their service.

OBJECTIVE

The objective of this project was to develop a program that would challenge chiropractic interns to acquire the skills to prepare clinical educational and marketing tools, such as brochures, newsletters, and spinal care classes. The program is called the "GoFor Hunt." It derives its name from the requirement for participants to "go for and hunt down" clinically significant information.

METHODS

The GoFor Hunt is a competitive structured approach for self-learning and peer teaching of skills needed to prepare patient communication and clinic marketing literature. It depends on the student's ability to research, design, and produce various types of practice literature and marketing tools, including pamphlets, newsletters, and spinal care classes. Participants completed a questionnaire and responded to questions on a scale from 0 (minimal/poor) to 10 (maximum/excellent). Response data were collected and collated.

RESULTS

Ten clinical groups (80 interns) participated. They self-rated their interest as 4.9/10 (moderate) and their effort at 7.3/10. The timing of the program from June to September was good (6.4/10). Program communications was just adequate (5.1/10). Intern motivation to participate was graded at 6.8/10, whereas clinician's motivation was graded 6.0/10. The literature search skill was graded 7.6/10 by interns, whereas clinicians graded them at 7.2/10. Interns felt their desktop publishing skills improved from 4.5 to 7.4/10 (64% increase). Interns rated their marketing/advertising skills at 3.7, and are interested in using advertising and marketing in their practices. Two ethical issues arose as a result of inappropriate humor.

DISCUSSION

The program demonstrates that interns can quickly acquire computer and literature search skills. Other benefits of the program include a quick development of motivation and competitive team spirit, sharing of skills, and appreciating the value of ethical practice literature. Some difficulties with the program included minor administrative coordination, intern time management conflicts, and motivational fatigue with frequent rounds.