

**THE
VERTEBRAL
SUBLUXATION
IN
CHIROPRACTIC
PRACTICE**

Chapter Outline

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I. Overview

This component of the International Chiropractors Association protocols and guidelines represents the incorporation of a fully compatible clinical practice document developed by a parallel guidelines committee. The focus of this section is on the subluxation, the core of chiropractic clinical responsibility. In many respects, this chapter is a summary document that addresses in an efficient and concentrated format the essentials of subluxation detection and care.

This section is the intellectual product of an independent panel of chiropractic researchers, educators and practitioners, the Council on Chiropractic Practice (CCP), consisting of William Ralph Boone, Ph.D., DC, Terry A. Rondberg, DC, Harold G. McCoy, DC, Emmanuel T. Akporiaye, Ph.D., Robert Blanks, Ph.D., Patrick Gentempo, DC, John J. Gerhardt, M.D., Veronica Gutierrez, DC, Jonathan Hatch, Esq., Jay Holder, DC, Carol James (consumer representative), Matthew McCoy, DC, Stephen F. Renner, DC and Steven Shochat, DC. This panel was chaired by Christopher Kent, DC, who also served as a member of the ICA Guidelines Committee. The CCP effort came to fruition in 1998, and this text has been incorporated into the ICA protocols and guidelines with the permission of the CCP and upon vote of the ICA Board of Directors.

These guidelines were specifically compiled according to strict evidenced-based guidelines development procedures. Evidence-based clinical practice is defined as “The conscientious, explicit and judicious use of the current evidence in making decisions about the care of individual patients...(it) is not restricted to randomized trials and meta-analysis. It involves tracking down the best external evidence with which to answer our clinical questions.” (Sackett, DL. Editorial: Evidence Based Medicine, Spine, 1998; 23(10):1085.

RATINGS AND CATEGORIES OF EVIDENCE

RATINGS

Established: Accepted as appropriate for use in chiropractic practice for the indications and applications stated.

Investigational: Further study is warranted. Evidence is equivocal, or insufficient to justify a rating of “established”.

Inappropriate: Insufficient favorable evidence exists to support the use of this procedure in chiropractic practice.

CATEGORIES OF EVIDENCE

- E. Expert opinion based on clinical experience, basic scientific rationale, and/or individual case studies. Where appropriate, this category includes legal opinion.
- L. Literature support in the form of reliability and validity studies, observational studies, “pre-post” studies, and/or multiple case studies. Where appropriate, this category includes case law.
- C. Controlled studies, including randomized and non-randomized clinical trials of acceptable quality.

The entire following text represents the unaltered work of the CCP panel. The International Chiropractors Association wishes to express sincere appreciation for the efforts of those who participated in this important endeavor. ICA wishes to highlight the full compatibility of the findings of this group with those of the ICA Guidelines Committee. That these parallel yet independent efforts developed such highly consistent findings is an indication of the fundamental validity of the respective conclusions and practice recommendations.

History and Chiropractic Examination

II CASE HISTORY

RECOMMENDATION

A thorough case history should precede the initiation of chiropractic care. The elements of this history should include general information, reason for seeking chiropractic care, onset and duration of any symptomatic problem, family history, past health history, occupational history, and social history.

Rating: Established

Evidence: E, L

Commentary

The purpose of the case history is to elicit information which might reveal salient points concerning the patient's spinal and general health that lead the chiropractor to elect appropriate examination procedures. The case history may provide information which will assist the chiropractor in determining the safety and appropriateness of chiropractic care as well as the nature of additional analytical procedures to be performed. History taking is considered a key element of quality patient care necessary for effective doctor-patient communication and improved patient health outcomes.(1-4) Verbal, nonverbal and cognitive assessment are also included in the patient history. The chiropractic case history should emphasize eliciting information relevant to the etiology and clinical manifestations of vertebral subluxation.

CHIROPRACTIC EXAMINATION

RECOMMENDATION

The initial chiropractic examination shall include a case history and an assessment for the presence of vertebral subluxation, which, if present, is to be noted with regard to location and character. A review of systems may be conducted at the discretion of the practitioner, consistent with individual training and applicable state laws.

Reassessments may be conducted periodically throughout a course of chiropractic care to assess patient progress. Such reassessments typically emphasize re-examination of findings which were positive on the previous examination, although need not be limited to same. Reassessment is also indicated in the case of trauma or change in the clinical status of a patient.

Rating: Established

Evidence: E, L

Commentary

The term subluxation has a long history in the healing arts literature. It may be used differently outside of the chiropractic profession. The earliest non-chiropractic English definition is attributed to Randall Holme in 1668. Holme defined subluxation as "a dislocation or putting out of joynt"(5) In medical literature, subluxation often refers to an osseous disrelationship which is less than a dislocation.(6) However, B.J. Palmer, the developer of chiropractic, hypothesized that the "vertebral subluxation" was unique from the medical use of the term "subluxation" in that it also interfered with the transmission of neurological information independent of what has come to be recognized as the action potential. Since this component has yet to be identified in a quantitative sense, practitioners currently assess the presence and correction of vertebral subluxation through parameters which measure its other components.(7) These may include some type of vertebral biomechanical abnormality,(8-14) soft tissue insult of the spinal cord and/or associated structures(15-49) and some form of neurological dysfunction involving the synapse separate from the transmission of neurological information referred to by Palmer.(50-57)

As noted, chiropractic definitions of subluxation include a neurological component. In this regard, Lantz (58) stated "common to all concepts of subluxation are some form of kinesiologic[al...sic] dysfunction and some form of neurologic[al...sic] involvement." In a recently adopted position paper, The Association of Chiropractic Colleges accepted a definition of subluxation as follows: "A subluxation is a complex of functional and/or structural and/or pathological articular changes that compromise neural integrity and may influence organ system function and general health."(59) The case history and examination are means of acquiring information pertinent to the location and analysis of subluxation. This information is primarily used to characterize subluxation regarding its presence, location, duration, and type. Additionally, the information gained through

analysis guides the practitioner to ascertain which chiropractic techniques best suit the patient to effect correction of the condition.

Data collected during the patient's initial consultation and examination, pertaining to the health history and presenting concerns, thus supports the decision-making process of the practitioner. This information, relayed by the practitioner to the patient, further serves to incorporate the patient into the decision-making process regarding chiropractic care.

Elements of the Examination

History

Important elements of the case history include previous and present social and occupational events revealed by the patient; unusual sensations, moods or actions relative to the patient, with dates of occurrence and duration; previous chiropractic and non-chiropractic intervention; and other factors. The case history usually includes the following:

1. Patient clinical profile.
 - A. Age.
 - B. Gender.
 - C. Occupation.
 - D. Other information germane to the presenting complaint, if any.
2. Primary reasons for seeking chiropractic care.
 - A. Primary reason.
 - B. Secondary reason.
 - C. Other factors contributing to the primary and secondary reasons.
3. Chief complaint, if one exists. This may include onset and duration of symptoms as well as their subjective and objective characteristics, and location, as well as aggravating or relieving factors.
 - A. Trauma, by etiology, when possible.
 - B. Chief complaint.
 - C. Characteristics of chief complaint.
 - D. Intensity/frequency/location, radiation/onset/duration.
 - E. Aggravating/arresting factors.
 - F. Previous interventions (including chiropractic care), treatments, medications, surgery.
 - G. Quality of pain, if present.
 - H. Sleeping position and sleep patterns.

4. Family history.
 - A. Associated health problems of relatives.
 - B. Cause of parents' or siblings' death and age of death.

5. Past health history.
 - A. Overall health status.
 - B. Previous illnesses.
 - C. Surgery.
 - D. Previous injury or trauma.
 - E. Medication and reactions.
 - F. Allergies.
 - G. Pregnancies and outcomes.
 - H. Substance abuse and outcomes.

6. Social and occupational history.
 - A. Level of education.
 - B. Job description.
 - C. Work schedule.
 - D. Recreational activities.
 - E. Lifestyle (hobbies, level of exercise, drug use, nature of diet).
 - F. Psychosocial and mental health.

Chiropractic Analysis

Complementing the case history is the necessity of conducting a thorough chiropractic analysis. This involves procedures which indicate the presence, location, and character of vertebral subluxation. Inherent in this process is the noting of unusual findings, both related and unrelated to vertebral subluxation. This information is useful in determining the safety and appropriateness of chiropractic care.

The analysis is based partly upon the recognition that vertebral subluxation may be asymptomatic, yet still exert various physiological effects. Thus, by assimilating information relative to certain body systems, the presence of vertebral subluxation may be inferred. Examination protocols have been developed by field practitioners and researchers. Many of these protocols have been deemed acceptable by the various chiropractic educational institutions. This acceptance is expressed either through adding the protocols to the curriculum, or awarding continuing education credit to post-graduate seminars instructing these protocols, thus judging them to be sufficient in safety, efficacy, and validity to be included in clinical practice.

Manual palpation is a basic element of the chiropractic examination. This aspect of analysis includes palpation of the bony elements of the spine and includes assessment of the motion of the spine as a whole as well as the individual vertebral motion segments. Palpation of the numerous muscles which attach to and control the stability, posture, and motion of the spine is included. Static vertebral position is analyzed for abnormality. The chiropractor is additionally interested in locating areas of abnormal

segmental motion to identify hypermobile segments and segments with decreased joint play (hypomobility). Palpation may also include evaluation of soft tissue compliance, tenderness, and asymmetric or hypertonic muscle contraction. The presence of vertebral subluxation may bring with it varying degrees of attendant edema, capsulitis, muscle splinting, and tenderness to digital palpation. There may be tenderness of the spinous processes upon percussion of these structures when vertebral subluxation is present.

Neurological components of the subluxation, postural distortions and other factors may bring deep and superficial myospasm to muscles of the spine, pelvis and extremities. Palpation may reveal myofascial trigger points which are associated with the articular dysfunctions accompanying vertebral subluxations. Muscular involvement may manifest as "taut and tender" fibers.

Visual inspection of the spine and paraspinal region may reveal areas of hypo- or hyperemia associated with vertebral subluxation. Observation of patient posture is an important element of chiropractic analysis.(60-62) Posture has far-reaching effects on physiology, biomechanics, psychology, and esthetics.(63) Proper body alignment relates to functional efficiency while poor structural alignment limits function. Changes in posture are considered in some chiropractic approaches as a measure of outcome.(64-69) Plain film radiographs, as well as other forms of imaging may provide information concerning the integrity of osseous and soft tissues as well as juxtapositional relationships. Other assessments such as leg length analysis,(70-94) palpatory and strength challenges(95-130) are also employed to assess states of muscular responses to neurological facilitation. Spinal distortions and resultant neurological interference may create postural or neurological reflex syndromes which result in a functional change in apparent leg length. This information is also combined with skin temperature assessments(131-138) and/or electromyography(139-167, 175-180) as well as technique-specific examination procedures to evaluate the integrity of the nervous system.(181-182) Although clinical tradition supports the use of orthopedic and neurological tests in chiropractic practice, research to support the applicability of many of these tests to the assessment of vertebral subluxation is lacking or negative.(168-174). Orthopedic and neurological tests are indicated only when relevant to the assessment of vertebral subluxation, or when determining the safety and appropriateness of chiropractic care.

It is recognized that research will continue to evolve the most efficacious applications of assessment techniques described in this document. However, the literature is sufficiently supportive of their usefulness in regard to the chiropractic examination to warrant inclusion as components of the present recommendation.

The chiropractic examination may include, but not be limited to:

1. Clinical examination procedures.
 - A. Palpation (static osseous and muscular, motion).
 - B. Range of motion.

- C. Postural examination.
 - D. Muscle strength testing.
 - E. Orthopedic/neurological tests.
 - F. Mental status examination procedures.
 - G. Quality of life assessment instruments.
 - H. Substance abuse and outcomes.
2. Imaging and instrumentation
- A. Plain film radiography.
 - B. Videofluoroscopy.
 - C. Computerized tomography.
 - D. Magnetic resonance imaging.
 - E. Range of motion.
 - F. Thermography.
 - G. Temperature reading instruments.
 - H. Electromyography.
 - I. Pressure algometry.
 - J. Nerve/function tests.
 - K. Electroencephalography.
3. Review of systems.
- A. Musculoskeletal.
 - B. Cardiovascular and respiratory.
 - C. Gastrointestinal.
 - D. Genitourinary.
 - E. Nervous system.
 - F. Eye, ear, nose and throat.
 - G. Endocrine.

Clinical Impression

An appropriate interpretation of case history and examination findings is essential in determining the appropriate application of chiropractic care within the overall needs of the patient. The clinical impression derived from patient information acquired through the examination process is ultimately translated into a plan of corrective care, including those elements which are contraindicated. The clinical impression serves to focus the practitioner on the patient's immediate and long-term needs. It is through this process that a clear picture is created regarding the patient's status relative to chiropractic care.

Initial Consultation

The initial consultation serves the purpose of determining how chiropractic care can benefit the patient. It is during this interchange that the practitioner presents and discusses examination findings with the patient. Additionally, during the initial consultation, the practitioner should take the opportunity to present his/her practice objectives and terms of acceptance. The terms of acceptance provides the patient with

information regarding the objectives, responsibilities and limitations of the care to be provided by the practitioner. This reciprocal acknowledgment allows both practitioner and patient to proceed into the plan of care with well-defined expectations.

While not limited to the following, it is suggested that the initial consultation include the following parameters:

1. Description of chiropractic: Chiropractic is a primary contact health care profession receiving patients without necessity of referral from other health care providers. Traditionally, chiropractic focuses on the anatomy of the spine and its immediate articulations, the existence and nature of vertebral subluxation, and a scope of practice which encompasses the correction of vertebral subluxation, as well as educating and advising patients concerning this condition, and its impact on general health.
2. Professional responsibility: To assess the propriety of applying methods of analysis and vertebral subluxation correction to patients; to recognize and deal appropriately with emergency situations; and to report to the patient any nonchiropractic findings discovered during the course of the examination, making referral to other health professionals for care or for evaluation of conditions outside the scope of chiropractic practice. Such referral does not obviate the responsibility of the chiropractor for providing appropriate chiropractic care.
3. Practice objective: The professional practice objective of the chiropractor is to correct or stabilize the vertebral subluxation in a safe and effective manner. The correction of vertebral subluxation is not considered a specific cure or treatment for any specific medical disease or symptom. Rather, it is applicable to any patient exhibiting vertebral subluxation, regardless of the presence or absence of symptoms and diseases.

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III Instrumentation

RECOMMENDATION

Instrumentation is indicated for the qualitative and/or quantitative assessment of the biomechanical and physiological components of vertebral subluxation. When using instrumentation, baseline values should be determined prior to the initiation of care.

Rating: Established

Evidence: E, L

Commentary

The chiropractor uses a variety of procedures to assess the vertebral subluxation. These methods may include history taking, physical examination, imaging procedures and instrumentation. Through information gained from research and personal experience, the chiropractor generally assigns a personal value to each procedure in a particular clinical circumstance. The intent of this chapter is to describe clinical applications for the various instruments that may be used by chiropractors in examining their patients for evidence of vertebral subluxation.

Definition of instrumentation: The use of any tool or device used to obtain objective data, which can be recorded in a reproducible manner, about the condition of the patient relative to vertebral subluxation. Such instrumentation as that described below may provide information concerning the biomechanical and/or neurological aspects of vertebral subluxation.

POSTURAL ANALYSIS

Sub-Recommendation

Postural analysis using plumb line devices, computerized and non-computerized instruments may be used to evaluate changes in posture associated with vertebral subluxation.

Rating: Established

Evidence: E, L

Posture analysis is recommended for determining postural aberrations associated with vertebral subluxation. The findings of such examinations should be recorded in the patient record. In order to encourage standardization of reporting, it is suggested that findings be recorded in a form consistent with manufacturers' recommendations.

Posture analysis may include the use of such devices as the plumb line, scoliometer and posturometer.(1-8) Posture is often analyzed by x-ray methods(9-13) simply by visualizing the patient and making determinations based on that visualization. The procedure is often enhanced by a plumb line and other vertical and horizontal lines.

BILATERAL AND FOUR-QUADRANT WEIGHT SCALES

Sub-Recommendation

Bilateral and four-quadrant weight scales may be used to determine the weight distribution asymmetries indicative of spinal abnormalities.

Rating: Established

Evidence: E, L

Unequal weight distribution has been shown to be indicative of spinal abnormalities.(14-18) Weight scales are a simple and effective means to determine weight distribution asymmetries.

MOIRÉ CONTOUROGRAPHY

Sub-Recommendation

Moiré contourography may be used to provide a photographic record of changes in body contour associated with vertebral subluxation.

Rating: Established

Evidence: E, L

Moiré contourography is a photographic technique which yields information regarding body contours and their variations for the purpose of evaluating structural abnormality. It is useful to the chiropractor because body surface asymmetries may be indicative of the presence of vertebral subluxation.(19-33)

INCLINOMETRY

Inclinometry may be used as a means of measuring motion against a constant vertical component of gravity as a reference. Changes in ranges of spinal motion may be associated with vertebral subluxation.

Rating: Established

Evidence: E, L

Mechanical, electronic and fluid-filled inclinometers are available.(34-38) Inclinometer measurements have been thoroughly studied regarding their ability to measure complex motions of the spine.(39-49) Inclinometers are considered superior to goniometers for assessing spinal motion.(50) Inclinometers have been shown to be accurate within 10% of those obtained by radiographic evaluation.(51) Achieving acceptable reliability is dependent upon use of standardized procedures.

GONIOMETRY

Sub-Recommendation

Goniometry, computer associated or not, may be used to measure joint motion. Incliniometry is superior to goniometry when standardized procedures are employed.

Rating: Established

Evidence: E, L

A goniometer is a protractor that may be held in the proximity of the area being measured to provide a means by which to determine degrees of motion.(35) Although goniometry is common, a wide range of variance has been reported, (56-59) expressing up to 10°-15° error.(60, 61)

ALGOMETRY

Sub-Recommendation

Algometry may be used to measure pressure-pain threshold. Changes in sensory function associated with vertebral subluxation may produce changes in pressure-pain thresholds.

Rating: Established

Evidence: E, L

A pressure-pain threshold meter yields a measurement of when a patient feels a change from pressure to tenderness as the device produces mechanical irritation of deep somatic structures. Pressure-pain-threshold measurements produce acceptable levels of reliability.(62-66, 142-145) Algometry has been shown to be very useful in measuring changes in paraspinal tissue tenderness as the thresholds are symmetrical.(145) This renders the procedure applicable to chiropractic analysis.

CURRENT PERCEPTION THRESHOLD (CPT) TESTING

Sub-Recommendation

Current perception threshold devices may be used for the quantitative assessment of sensory nerve function. Alterations in sensory nerve function may be associated with vertebral subluxation.

Rating: Established

Evidence: E, L

The current perception threshold device is a variable voltage constant current sine wave stimulator proposed as a simple noninvasive and quantitative measure of peripheral nerve function.(67-71, 137-141) One type of current perception threshold instrument, the neurometer, has been shown to be appropriate for rapid screening for neural dysfunction.(69)

ELECTROENCEPHALOGRAPHY (EEG)

Sub-Recommendation

Electroencephalographic techniques including brain mapping and spectral analysis, may be used to assess the effects of vertebral subluxation and chiropractic adjustment associated with brain function.

Rating: Established

Evidence: E, L

Standard EEG and computerized EEG techniques, including spectral analysis and brain mapping, have been shown to change following chiropractic adjustments or manipulation.(72, 161, 204) Such procedures may be useful in evaluating possible effects of chiropractic care on brain function.

SOMATOSENSORY EVOKED POTENTIALS (SSEP)

Sub-Recommendation

Somatosensory evoked potentials may be used for localizing neurological dysfunction associated with vertebral subluxations.

Rating: Established

Evidence: E, L

Somatosensory and dermatomal evoked potentials are used for localizing neurological abnormalities in the peripheral and central conducting pathways. These findings are useful as objective indicators of the level or levels of involvement.(73-86, 154) One study reported that improved nerve root function was observed in subjects who received a high-velocity chiropractic thrust; similar changes were not observed in controls.(73)

SKIN TEMPERATURE INSTRUMENTATION

Sub-Recommendation

Temperature reading devices employing thermocouples, infrared thermometry, or thermography (liquid crystal, telethermography, multiple IR detector, etc.) may be used to detect temperature changes in spinal and paraspinal tissues related to vertebral subluxation.

Rating: Established

Evidence: E, L

The measurement of paraspinal cutaneous thermal asymmetries and other measurements of anomalies have been shown to be a mode of sympathetic nervous system assessment, (88, 90, 91, 93-95, 97-103, 160) which may be used as one indicator of vertebral subluxation. Demonstrable changes in thermal patterns have been observed following chiropractic adjustment.(19, 92) Thermocouple instruments have been shown to demonstrate an acceptable level of reliability and clinical utility applicable to the assessment of vertebral subluxation related temperature changes.(87, 89, 96, 104) Normative data have been collected concerning the degree of thermal

asymmetry in the human body in healthy subjects.(105) These values may serve as one standard in the assessment of sympathetic nerve function and the degree of asymmetry as a quantifiable indicator of possible dysfunction.(106)

SURFACE ELECTROMYOGRAPHY

Sub-Recommendation

Surface electrode electromyography, using hand-held electrodes, or affixed electrodes, may be used for recording changes in the electrical activity of muscles associated with vertebral subluxations.

Rating: Established

Evidence: E, L, C

Surface electromyographic techniques using both hand-held electrodes and affixed electrodes have demonstrated an acceptable level of reliability for general clinical usage.(107-112, 114-121, 129-136, 159) Other studies have demonstrated that significant changes in muscle electrical activity occur following adjustment or spinal manipulation.(111, 113, 126, 136) Protocols and normative data for paraspinal EMG scanning in chiropractic practice have been published.(122-125, 127-128) Surface EMG techniques may be used to assess changes in paraspinal muscle activity associated with vertebral subluxation and chiropractic adjustment.

MUSCLE STRENGTH TESTING

Sub-Recommendation

Muscle strength testing may be used to determine bilateral differences or other differences in patient resistance. These differences may be characterized by the experienced examiner based on various technologies. Manual, mechanized and computerized muscle testing may be used to determine changes in the strength and other characteristics of muscles. These changes may be a result of alterations of function at various levels of the neuromuscular system and/or any other system related to the patient. Such changes may be associated with vertebral subluxation.

Rating: Established

Evidence: E, L

Muscle testing as a means of evaluation and diagnosis of patients within chiropractic as well as other disciplines, is well documented.(146-153, 155-158, 163-177) Muscle testing techniques may be used to assess the effect of vertebral subluxation on various aspects of muscle strength. Research has shown manual muscle testing to be sufficiently reliable for clinical practice. (148, 149, 153, 156, 169, 170, 171, 175) Studies concerning manual muscle testing have also demonstrated electromyographic differences associated with various muscle weaknesses, and differences in somatosensory evoked potentials associated with weak versus strong muscles.(146,

147) Other studies have demonstrated the clinical utility and reliability of hand-held muscle strength testing devices.(151, 152, 157, 172)

QUESTIONNAIRES

Sub-Recommendation

Questionnaires may be used in the assessment of the performance of activities of daily living, pain perception, patient satisfaction, general health outcomes, patient perception outcomes, mental health outcomes, and overall quality of life, throughout a course of chiropractic care. Questionnaires provide important information, but should not be used as a substitute for physical indicators of the presence and character of vertebral subluxations.

Rating: Established
Evidence: E, L

There are a variety of questionnaires of demonstrated reliability and validity which may be used to document outcomes,(178-203) including pain and symptoms, although these are not necessary correlates of vertebral subluxation. However, correction of vertebral subluxation and reduction of the abnormal spinal and general functions associated with it may be accompanied by reduction or elimination of pain and symptoms. It must be emphasized that the clinical objective of chiropractic care is the correction of vertebral subluxations. No questionnaires exist which assess the presence or correction of vertebral subluxation. Therefore, it is inappropriate to employ questionnaires to determine the need for chiropractic care, but questionnaires are appropriate as one aspect of monitoring patient progress and the effectiveness of subluxation-based care.

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IV Radiographic and Other Imaging

RECOMMENDATION

Diagnostic imaging procedures may be utilized to characterize the biomechanical manifestations of vertebral subluxation, and to determine the presence of conditions which affect the safety and appropriateness of chiropractic care.

Sub-Recommendation

Plain film radiography is indicated: to provide information concerning the structural integrity of the spine, skull and pelvis; the misalignment component of the vertebral subluxation; the foraminal alteration component of the vertebral subluxation; and the postural status of the spinal column. Imaging procedures, including post-adjustment radiography, should be performed only when clinically necessary. It is common for lines of mensuration to be drawn on radiographs to assess subluxation and alignment. These procedures may be done by hand, or the chiropractor may utilize computerized radiographic digitization procedures.

Rating: Established

Evidence: E, L

Commentary

In considering the use of imaging methods employing ionizing radiation as a component of patient assessment, the clinician should determine if the methods of subluxation correction, patient safety, and management require the use of such procedures. The patient should be asked about any conditions which may contraindicate certain imaging procedures.

Reliability studies of several systems of biomechanical analysis, including radiographic marking systems, have been published. Imaging is a necessary component of a number of different chiropractic analyses. The preponderance of evidence supports the reliability of these procedures when properly performed.(1-8, 12, 15-27, 29-32, 36-39, 42-61, 64-68, 70-79, 153)

Moreover, radiographic imaging has revealed statistically significant changes in the direction of atlas positioning following chiropractic adjustment(s).(14, 28, 33-35, 146-148) The effect of chiropractic care on lateral curvature of the cervical spine has been investigated, with significant changes in the cervical curve noted in patients receiving chiropractic care.(9, 62, 63, 69, 149-152, 156-158)

Sub-Recommendation

Imaging procedures employing ionizing radiation should be performed consistent with the principles of obtaining films of high quality with minimal radiation. This may include

the use of gonad shielding, compensating filters, and appropriate film-screen combinations.

Rating: Established

Evidence: E, L

A number of dosimetry studies using supplemental filtration and single-speed screens have revealed that in the case of 14 x 36 inch AP full-spine radiographs, the radiation levels were less than sectional films of like-sized subjects. Shielding of radiosensitive structures may be used when it does not obliterate structures of clinical interest. Such shielding results in a reduction of radiation exposure.(10, 11, 13, 160)

Conclusion

The judicious use of spinographic techniques can be valuable in characterizing aspects of the biomechanical manifestations of vertebral subluxation.(146, 154, 155, 187-193) The use of post-adjustment radiographs may also assist the chiropractor in determining effects of chiropractic adjustments on the spine when other less hazardous examination techniques cannot reveal the desired information.

VIDEOFLUOROSCOPY

Sub-Recommendation

Videofluoroscopy may be employed to provide motion views of the spine when abnormal motion patterns are clinically suspected. Videofluoroscopy may be valuable in detecting and characterizing spinal kinesio pathology associated with vertebral subluxation.

Rating: Established

Evidence: E, L

Commentary

A videofluoroscopic system consists of an x-ray generator capable of operating at low (1/4 to 5) milliamperage settings, an x-ray tube assembly, an image intensifier tube, a television camera, a VCR, and a monitor. The heart of the system is the image intensifier tube. This tube permits imaging at very low radiation levels. It is used instead of intensifying screens and film as a image receptor.

The role of videofluoroscopy in the evaluation of abnormalities of spinal motion has been discussed in textbooks, medical journals, and chiropractic publications.(19, 20, 23, 80-83, 140, 145, 163, 164, 168-170, 172-179, 186, 220) Studies have appeared in the literature comparing the diagnostic yield of fluoroscopic studies versus plain films, as well as reporting abnormalities detected by fluoroscopy which could not be assessed using plain films.(161, 165-167, 171, 180, 183-185)

Reliability has been addressed in a number of studies.(162, 181, 182, 214) Additionally, in a study evaluating the interexaminer reliability of fluoroscopic detection of fixation in the mid-cervical spine, two examiners reviewed 50 videotapes of fluoroscopic examinations of the cervical spine. The examiners achieved 84 percent agreement for the presence of fixation, 96 percent agreement for the absence of fixation, and 93 percent total agreement. The Kappa value was .80 (p .001). The authors concluded, The current data indicate that VF determination of fixation in the cervical spine is a reliable procedure. (181, 214)

Conclusion

Observational and case studies support the use of videofluoroscopy to evaluate vertebral motion when this information cannot be obtained by other means.

Sub-Recommendation

Magnetic Resonance Imaging (MRI)

MR imaging may be employed to assess suspected neoplastic, infectious and degenerative conditions of the spine and related tissues as well as the stages of spondylosis degeneration. Its use is generally restricted to instances where the desired information cannot be obtained by less costly procedures.

Rating: Established

Evidence: E, L

Commentary

Magnetic resonance imaging enables clinicians to obtain clear images of the human body without ionizing radiation.

Literature supports the use of MR imaging for the detection and characterization of numerous manifestations associated with spondylosis degeneration.(84-107, 141-143, 194-198, 212) These studies cover a spectrum of phenomena, including:

1. Osseous malalignment
2. Intervertebral disc desiccation and degeneration
3. Osteophytosis
4. Corrugation/hypertrophy of the ligamentum flava
5. Spinal canal stenosis
6. Foraminal stenosis
7. Disc herniation and disc bulging
8. Facet asymmetry
9. Facet degeneration
10. Altered cerebrospinal fluid dynamics
11. Cord compression
12. Gliosis and myelomalacia

13. Spinal cord atrophy

Conclusion

MRI may be employed to disclose manifestations of vertebral subluxation when this information cannot be obtained by more cost-effective means. MRI is also appropriate for evaluating patients with clinical evidence of conditions which may affect the safety and appropriateness of chiropractic procedures.

Sub-Recommendation

Computed Tomography (CT)

CT imaging may be employed to assess osseous and soft tissue pathology in the spine and contiguous tissues. Its use is generally restricted to instances where the desired information cannot be obtained by less costly procedures.

Rating: Established

Evidence: E, L

Commentary

Computed tomography (also referred to as CT or CAT scanning) is an imaging technique which produces axial (cross sectional) images of body structures using x-radiation. Computer reconstruction methods may be used to depict other planes.

Manifestations of subluxation degeneration which may be demonstrated by CT scanning include disc lesions, spinal canal stenosis due to infolding of the ligamentum flava, osteophytosis, and bony sclerosis.(108-139, 144, 199-201, 210, 211, 213, 220) In addition, CT may be used to evaluate developmental variance and pathologies which could affect the chiropractic management of a case.

Conclusion

CT may be employed to disclose manifestations of vertebral subluxation when this information cannot be obtained by more cost-effective means. CT is also appropriate for evaluating patients with clinical evidence of conditions which may affect the safety and appropriateness of chiropractic procedures, particularly fractures, degenerative changes, and osseous pathology.

Sub-Recommendation

Spinal Ultrasonography

Spinal ultrasonography may be used to evaluate the size of the spinal canal, and to detect pathology in the soft tissues surrounding the spine. Its applications in the

assessment of the facet inflammation and nerve root inflammation remain investigational at this time.

Ratings: Established for determining spinal canal size.

Investigational for facet and nerve root inflammation.

Evidence: E, L

Commentary

Sonographic imaging is a technique which utilizes echoes from ultrasonic waves to produce an image on a cathode ray tube.

Sonographic techniques have been employed to measure the lumbar canal, as well as determining focal stenosis and disc disease.(202-209, 221, 222)

A small study compared sonographic results in patients with back pain previously examined by MRI, x-ray and standard orthopedic examination. The study concluded that the correlation with MRI, x-ray, orthopedic and neurologic examination was approximately 90 percent.(207)

Conclusion

The low cost, availability, ease of application, and noninvasive nature of sonographic imaging make it an attractive addition to the chiropractor's armamentarium. Furthermore, it has the potential to image various components of the vertebral subluxation. However, caution must be exercised in evaluating the claims of promoters of sonographic equipment, particularly those relating to the assessment of nerve root inflammation or facet joint disease. Further research toward the establishment of chiropractic protocols should be undertaken to explore the clinical utility of spinal sonography in chiropractic practice.

Sub-Recommendation

Radioisotope Scanning (Nuclear Medicine Studies)

Radioisotope scans performed by qualified medical personnel may be used by a chiropractor to determine the extent and distribution of pathological processes which may affect the safety and appropriateness of chiropractic care when this information cannot be obtained by less invasive means.

Rating: Established

Evidence: E, L

Commentary

In this procedure, bone-seeking radioisotopes are injected, and an image is produced demonstrating the degree of uptake of the radioisotopes. The examination is sensitive to regional changes in osseous metabolism, but is not specific. Abnormal bone scans

may be due to metastasis, infection, fracture, osteoblastic activity or other pathology.(215-219) No studies or case reports were found linking abnormal bone scans with vertebral subluxation. Bone scans may have limited value in determining the safety and appropriateness of chiropractic procedures.

Conclusion

Radioisotope scans have a limited role in chiropractic practice. Bone scans are a sensitive, but nonspecific indicator of abnormal metabolic activity in bone.

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V Clinical Impression and Assessment

RECOMMENDATION

Practitioners should develop a method of patient assessment which includes a sufficient diversity of findings to support the clinical impression as related to vertebral subluxation.(1-24) In this regard, it is considered inappropriate to render an opinion regarding the appropriateness of chiropractic care without a chiropractic assessment, including a physical examination of the patient by a licensed chiropractor. When management of patient care is carried out in the collaborative setting, the chiropractor, as a primary contact health care provider, is the only professional qualified to determine the appropriateness of chiropractic care. The unique role of the chiropractor is separate from other health disciplines,(25-35) and should be clarified for both the patient and other practitioners. The patient assessment, specific to the technique practiced by the chiropractor, should minimally include a biomechanical and neurophysiological component. It is inappropriate to make a retrospective determination of the clinical need for care rendered prior to the assessment.

Rating: Established

Evidence: E, L

Commentary

The procedures employed in the chiropractic assessment may include some or all of, but are not limited to the following:

Physical examination:

- Palpation (static osseous, static muscle, motion).
- Range of motion.
- Postural examination
- Comparative leg length (static, flexed, cervical syndrome).
- Manual muscle tests.
- Nerve function tests.
- Mental status examination and psychosocial assessment.

Instrumentation examination:

- Range of motion.
- Thermography.
- Temperature reading instruments.
- Muscle testing.
- Electromyography.
- Pressure algometry.
- Nerve-function tests.
- Electroencephalography and brain mapping.
- Bilateral and four quadrant weight scales.

Imaging examination:

Spinography.
Videofluoroscopy.
Computerized tomography.
Magnetic resonance imaging.

Following the determination of a clinical impression, the patient should be made aware of the findings and consent to the proposed plan of care. Literature support for the use of these technologies may be found in the chapters on chiropractic examination, instrumentation and diagnostic imaging (Chapters 1, 2, 3).

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VI. Reassessment and Outcomes Assessment

RECOMMENDATION

Determination of the patient's progress must be made on a per-visit and periodic basis. This process provides quantitative and qualitative information regarding the patient's progress which is utilized to determine the frequency and duration of chiropractic care. Per-visit reassessment should include at least one analytical procedure previously used. This chosen testing procedure should be performed each time the patient receives chiropractic care.

Concomitant with this process, the effectiveness of patient care may also be monitored through the development of an outcomes assessment plan. Such a plan may utilize data from the patient examination, assessment and reassessment procedures. Patient-reported quality of life instruments, mental health surveys, and general health surveys are encouraged as part of the outcomes assessment plan. The analysis of data from these sources may be used to change or support continuation of a particular regimen of patient care and/or change or continue the operational procedures of the practice.

Rating: Established

Evidence: E, L

Commentary

The reassessment provides information to determine the necessity of an adjustment on a per-visit basis. Partial reassessment involves duplication of two or more preceding positive analytical procedures. Full reassessment involves duplication of three or more preceding positive analytical procedures. Any additional or complementary analytical procedures should be performed as indicated by the patient's clinical status. The frequency of partial and full reassessments should be at the discretion of the practitioner, consistent with the objectives of the plan of care.

A substantial body of literature attests to the methods and significance of measuring outcomes.(1-100) For the practicing chiropractor the implication is that regular evaluations of practice and procedures provides a form of quality control. Outcomes assessments can alert the practitioner to problems with, as well as reinforce, aspects of practice which might otherwise be overlooked. In addition, on-going evaluation provides information about the clinical value of care to both patients and third-party providers. It is important to point out that there is no one "ideal" way to assess outcomes. While the responsibility to conduct this type of assessment rests with the chiropractor, so does the choice of how it is to be implemented.

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VII Modes of Adjustive Care

RECOMMENDATION

Adjusting procedures should be selected which are determined by the practitioner to be safe and effective for the individual patient. No mode of care should be used which has been demonstrated by critical scientific study and field experience to be unsafe or ineffective in the correction of vertebral subluxation.

Rating: Established

Evidence: E, L

Commentary

This chapter is concerned with the modes of adjustive care (techniques) associated with the correction of vertebral subluxation. The literature reveals many articles on adjusting modes. These articles include technique descriptions, various applications of techniques, and reliability studies usually assessing inter- and intra-examiner reliability. A number of review articles provide discussion of the modes of care. Available research data has been complemented with professional opinion, derived from two separate forums of chiropractic experts' The International Straight Chiropractic Consensus Conference, Chandler, Arizona (1992) and the Council on Chiropractic Practice Symposium on Chiropractic Techniques, Phoenix, Arizona, (1996), both of which served to validate procedures by common knowledge and usage.

The intent of this chapter is not to include nor exclude any particular technique, but rather to provide a guideline, drawing upon the commonality of various techniques, which contributes to the chiropractic objective of correcting vertebral subluxation. Any technique which does not espouse the correction of subluxation would be considered outside the scope of the Guidelines.

A list of descriptive terms and definitions related to chiropractic adjustive care as commonly practiced follows:

Adjustment: The correction of a vertebral subluxation.

Adjustive Thrust: The specific application of force to facilitate the correction of vertebral subluxation.

Adjusting Instruments: Fixed or hand-held mechanical instruments used to deliver a specific, controlled thrust to correct a vertebral subluxation.

Amplitude: Magnitude; greatness of size or depth.

Blocking Technique: The use of mechanical leverage, achieved through positioning of the spine or related structures, to facilitate the correction of vertebral subluxation.

Cleavage: The movement of one vertebra between two other vertebrae.

Concussion: An adjustic thrust produced by arrested momentum. Momentum is the result of weight (mass) in motion and also of speed. An adjustic concussion depends more on speed than mass.

High Velocity Thrust with Recoil: A controlled thrust delivered such that the time of impact with the vertebra coincides with the chiropractor's contact recoil, thus setting the vertebra in a specific directional motion.

Impulse: A sudden force directionally applied to correct a malpositioned joint.

Low Velocity Thrust with Recoil: A controlled thrust administered at low speed with a sudden pull-off by the practitioner, setting the segment in motion.

Low Velocity Thrust without Recoil: A controlled thrust administered at low speed coupled with a sustained contact on the segment adjusted.

Low Velocity Vectored Force without Recoil: A short or long duration (usually ranging from 1 to 20 seconds) contact with the segment being adjusted, with or without a graduation of force.

Manually Assisted Mechanical Thrust: A manually delivered specific thrust enhanced by a moving mechanism built into the adjusting table.

Manipulation: The taking of a joint past its passive range of motion into the paraphysiological space but not past the anatomic limit, accompanied by articular cavitation (Kirkaldy-Willis). It is not synonymous with chiropractic adjustment, which is applied to correct vertebral subluxation.

Multiple Impulse: Impulses delivered in rapid succession.

Recoil: The bouncing or springing back of an object when it strikes another object.

Tone: The normal degree of nerve tension.

Thrust: The act of putting a bony segment in motion using a directional force.

Toggle: A mechanical principle wherein two levers are hinged at an elbow giving mechanical advantage. Combinations of toggles may be used to multiply or strengthen mechanical advantage.

Toggle Recoil with Torque: A method of using the toggle with rotation twist) as the toggle straightens, causing the adjusting contact to travel in a spiral path.

Torque: A rotational or twisting vector applied when adjusting certain vertebral subluxations.

Velocity: The speed with which a thrust is delivered.

Conclusion

Considerable evidence substantiates the adjustment being administered for the purpose of correction of vertebral subluxation.(1-11) Studies regarding the different modes(4, 12-86) compare low force methods to those employing a high velocity thrust without recoil, and low velocity vectored force without recoil, high velocity thrust with recoil, low velocity thrust with and without recoil, manually and mechanically assisted thrusts, blocking techniques, and sustained force. These studies are often presented in the context of effects on various physical and physiological parameters.

Although providing useful information, the majority of these studies are limited by uncontrolled variables and lack of statistical power. They do, however, demonstrate that the application of various modes of adjustive care is accompanied by measurable changes in physical and physiological phenomena. The importance of this information, in terms of its linkage to processes used by the body in the correction of subluxation, will be assessed through continued research.

These guidelines consider(86) the modes of adjustive care in common usage, which adhere to one or more of the descriptive terms presented in this chapter, as appropriate for correction of subluxation. However, studies regarding their theoretical basis and efficacy are often conducted by advocates of (those practicing or instructing) the respective techniques. While the information attained in the numerous investigations is not in question, since many of the studies have not passed the scrutiny of peer and editorial review, it is suggested that the advocates of particular modes of adjustive care encourage research by chiropractic colleges, independent universities and other facilities to extend the level of credibility already achieved.

Continuing research and reliability studies are necessary to better understand and refine the underlying mechanisms of action common to the various modes of adjustive care. In addition, it is suggested that more observational and patient self-reporting studies be conducted which deal with quality of life assessments and overall "wellness," to demonstrate the pattern of health benefits which heretofore have been the purview of the patient and the practitioner. A conference sponsored by U.S. Department of Health and Human Services, Public Health Service Agency for Health Care Policy and Research, proposed many different approaches for studying the effects of treatments for which there is no direct evidence of health outcomes.(87)

The CCP recognizes that many subluxation-based chiropractors do not adhere, in totality, to the current hypothetical model thus far described. These practitioners consider two additional components. One is interference with the transmission of

nonsynaptic neurological information which is homologous to the Palmer concept of mental impulse. The other limits the misalignment component of the subluxation to the vertebrae and their immediate articulations. While these practitioners may adhere to some concepts of other subluxation models, their practice objectives are based on correction of the vertebral subluxation as proposed by Palmer, which has recently been elaborated by Boone and Dobson.(88-90)

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VIII Duration of Care for Correction of Vertebral Subluxation

RECOMMENDATION

Since the duration of care for correction of vertebral subluxation is patient specific, frequency of visits should be based upon the reduction and eventual resolution of indicators of vertebral subluxation. Since neither the scientific nor clinical literature provides any compelling evidence that substantiates or correlates any specific time period for the correction of vertebral subluxation, this recommendation has several components which are expressed as follows:

- a) Based on the variety of assessments utilized in the chiropractic profession, the quantity of indicators may vary, thus affecting the periodicity of their appearance and disappearance, which is tantamount to correction of vertebral subluxation.
- b) Vertebral subluxation, not being a singular episodic event such as a strain or sprain, may be corrected but reappear, which necessitates careful monitoring and results in a wide variation in the number of adjustments required to affect a longer-term correction.
- c) Based on the integrity of the spine in terms of degree and extent of degeneration, the frequency of assessments, and the necessity for corrective adjustments, may vary considerably.
- d) Because the duration of care is being considered relative to the correction of vertebral subluxation, it is independent of clinical manifestations of specific dysfunctions, diseases, or syndromes. Treatment protocols and duration of care for these conditions are addressed in other guidelines, which may be appropriate for any practitioner whose clinical interests include alleviation of such conditions.

Rating: Established

Evidence: E, L

Commentary

Attempts have been made to identify an appropriate number and frequency of chiropractic visits based on type of condition and degree of severity.(1-24) Unfortunately, these recommendations are based merely on consensus, and research to support these recommendations is lacking. Moreover, little to no delineation has been made in the duration of care literature base between care for specific symptomatic profiles such as low-back pain, and long-term subluxation-specific care.

Two studies were found which addressed quality of life issues in patients under chiropractic care. One large, well-designed retrospective study assessing patient reported quality of life found no clinical end point where improvement reached a plateau.(25) A second study involved a detailed examination of a database collected during a randomized clinical trial testing the effectiveness of a comprehensive geriatric

assessment program. It was reported that compared to non-chiropractic patients, chiropractic patients in this population were less likely to have been hospitalized, less likely to have used a nursing home, more likely to report a better health status, more likely to exercise vigorously, and more likely to be mobile in the community. Furthermore, they were less likely to use prescription drugs.(26)

It is the position of the Guideline Panel that individual differences in each patient and the unique circumstances of each clinical encounter preclude the formulation of "cookbook" recommendations for frequency and duration of care.

The appropriateness of chiropractic care should be determined by objective indicators of vertebral subluxation.

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IX Chiropractic Care of Children

RECOMMENDATION

Since vertebral subluxation may affect individuals at any age, chiropractic care may be indicated at any time after birth. As with any age group, however, care must be taken to select adjustment methods most appropriate to the patient's stage of development and overall spinal integrity. Parental education by the subluxation-centered chiropractor concerning the importance of evaluating children for the presence of vertebral subluxation is encouraged.

Rating: Established

Evidence: E, L

Commentary

Schneier and Burns(1) published the results of a blinded study describing the relationship of atlanto-occipital hypermobility to sudden infant death syndrome (SIDS). These authors described the phenomenon of atlas inversion where the posterior arch of C-1 enters the foramen magnum. They further stated, Relative measurements suggested that a correlation existed between instability in the atlanto-occipital articulation and sudden infant death syndrome. Instability is a manifestation of vertebral subluxation.

These findings corroborate those of Gilles, Bina and Sotrel in their paper, Infantile atlanto-occipital instability.(2) These investigators studied 17 infant cadavers. Eleven were SIDS cases and six were non-SIDS cases. Ten of the 17 cases demonstrated atlas inversion, and all ten cases were in the SIDS group. These authors also suggested that atlanto-occipital instability may be a factor in other conditions. They stated, At this early stage in the development of our notions about the potential contribution of atlanto-occipital instability to deaths in infants, it is very difficult to assess the role of this proposed mechanism in the death of an infant with a conventional disease. Thus, one might anticipate that the controls will be contaminated by children who had a conventional disease, but whose death was, in fact, caused by this mechanism.

Towbin(3) addressed the clinical significance of spinal cord and brain stem injury at birth, noting that such damage is often latent and undiagnosed. According to Towbin, Death of the fetus may occur during delivery or, with respiratory function depressed, a short period after birth. Infants who survive the initial effects may be left with severe nervous system defects. In some, the neurologic sequellae are attributable directly to the primary lesion in the cord or brain stem; in others, secondary cerebral damage results, a consequence of the imposed period of hypoxia at birth. Chesire(4) described three cases of traumatic myelopathy in children without demonstrable vertebral trauma. In this paper, the classical mechanism of trauma is said to be hyperextension of the cervical spine in a difficult breech delivery. Although tetraplegia may result, the x-rays are described as usually normal. Complicated deliveries represent a higher risk to the

child of suffering spinal cord damage during the birth process. High cervical spinal cord injury in neonates is a specific complication of forceps rotation. The vacuum extractor exerts considerable traction force. Fetal skull fracture can result, and its true incidence may be higher than expected, considering that few neonates with normal neurologic behavior undergo skull x-ray.(5-7) Byers(8) published an excellent review paper addressing spinal cord damage during the birth process. Traction and rotational stresses applied to the spinal axis were listed as causes of spinal cord injury during birth.

The vagus nerve is involved in mechanisms associated with control of tidal volume, breathing rate, and respiratory reflexes. Sachis et al.(9) performed histological examinations of the vagus nerve in infants who died of SIDS and those who died of other conditions. Significant differences were noted between the two groups. Several hypotheses were proposed by authors to explain the data, including damage to the vagus nerve resulting in delayed development.

Gutman(10) described how relational disturbance between occiput and atlas can lead to blocked atlantal nerve syndrome in children and adults. The author listed a variety of conditions which appear clinically related to this syndrome. Although SIDS was not discussed as an entity, the author stated that a brain stem component is a part of this syndrome. It was concluded that for those affected, manual treatment by a qualified practitioner is appropriate.

In her paper Physical stresses of childhood that could lead to need for chiropractic care, presented at the first National Conference on Chiropractic and Pediatrics, McMullen(11) stated, Any condition that arises to change the normal birth process frequently results in subluxation at the level of greatest stress. Severe subluxation resulting in nerve damage may be clinically obvious at birth (e.g., Bells, Erbs and Klumpkes palsies), however, more frequently the trauma remains subclinical with symptoms arising at a later time. These symptoms include, but are not limited to, irritability, colic, failure-to-thrive syndromes, and those syndromes associated with lowered immune responses. These subluxations should be analyzed and corrected as soon as possible after birth to prevent these associated conditions.

Bonci and Wynne(12) and Stiga(13) published papers discussing the relationship between chiropractic theory and SIDS etiology. Banks et al.(14) stated Functional disturbances in the brainstem and cervical spinal cord areas related to the neurophysiology of respiration may contribute the clinical factors associated with sudden infant death syndrome...Any process, whether genetic, biochemical, biomechanical or traumatic, that alters normal development of the respiratory control centers related to spinal constriction and compression following birth trauma may be contributory to sudden infant death syndrome.

Other traumatic events of childhood may produce vertebral subluxations. Orenstein et al.(15) did a retrospective chart review involving 73 children who presented at a children's hospital with cervical spine injuries. Sixty-seven percent of these injuries were

traffic related resulting from motor-vehicle crashes. The injured children were passengers in an automobile, pedestrians, or bicyclists. The mean age of the patients surveyed was 8.6 years, with bimodal peaks at 2 to 4 and 12 to 15 years. The authors noted that younger children sustained more severe injuries than older children. Distraction and subluxation injuries were the most common injuries in children aged 8 years and younger. Fractures were more common in older children.

Glass et al.(16) evaluated 35 children with lumbar spine injuries following blunt trauma. Thirty-one of these children were injured in motor-vehicle crashes. Abnormalities noted on plain radiographs and CT scans included subluxation, distraction, and fracture alone or in combination. The authors stated, Children involved in motor-vehicle crashes are at a high risk for lumbar spine injuries Lumbar spine radiographs are necessary in all cases with suspected lumbar spine injury This paper underscores the need to evaluate the entire spine in cases of motor-vehicle accidents, not just the cervical region. It may be cited when claims for lumbar radiographs are questioned in cases of children involved in car accidents.

Rachesky et al.(17) reported that on the cervical spine radiographs of children under 18 they examined, vehicular accidents accounted for 36% of radiographic abnormalities. It was further stated that clinical assessment of a complaint of neck pain or involvement in a vehicular accident with head trauma would have identified all cases of cervical spine injury.

Other authors have described aspects of cervical spine injuries in children involved in motor-vehicle accidents. Hill et al.(18) noted that 31% of the pediatric neck injuries reviewed were the result of motor-vehicle accidents. In younger children (under 8 years of age) subluxation was seen more frequently than fracture. Agran(19) stated that non-crash vehicular events may cause injuries to children. Non-crash events discussed in this paper included sudden stops, swerves, turns, and movement of unrestrained children in the vehicle.

Roberts et al.(20) described a case where a child involved in a motor-vehicle accident sustained a whiplash injury resulting in immediate neck and back pain. Neurobehavioral abnormalities increased in the two-year period following the accident. Four years after the accident, symptoms persisted. Position emission tomography (PET scan) demonstrated evidence of brain dysfunction.

The clinical manifestations of pediatric cervical spine injury may be diverse. Biedermann(21) stated that a wide range of pediatric symptomatology may result from suboccipital strain. The disorders reported include fever of unknown origin, loss of appetite, sleeping disorders, asymmetric motor patterns, and alterations of posture. Maigne(22) stated that trauma to the cervical spine and head can cause such problems as headaches, vestibular troubles, auditory problems and psychic disturbances. Gutmann(23) discussed the diverse array of signs and symptoms which can occur as a result of biomechanical dysfunction in the cervical spine. Others have also reported various pathoneurophysiological changes in children,(24-31) as well as reduction of

pathology following chiropractic care.(29,31-41,44) In the chiropractic literature, Clow(42) published a paper addressing pediatric cervical acceleration/deceleration injuries.

Two peer reviewed journals, Chiropractic Pediatrics and the Journal of Clinical Chiropractic Pediatrics are being published to disseminate critically reviewed papers in this field. Additionally, courses in pediatrics are offered at the professional and postgraduate levels at accredited chiropractic colleges and by the International Chiropractic Pediatric Association.

The pediatric case history and physical examination necessarily differ in content and scope from those of adult patients. Even taking into consideration the difference between the two populations, however, a recent quasi meta-analysis reveals an extremely low risk for chiropractic pediatric patients receiving adjustments.(43)

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X Patient Safety

RECOMMENDATION

Patient safety encompasses the entire spectrum of care offered by the chiropractor. Consequently, it is important to define at the onset, the nature of the practice as well as the limits of care to be offered. Minimally this should include a Terms of Acceptance document between the practitioner and the patient. Additionally, all aspects of clinical practice should be carefully chosen to offer the patient the greatest advantage with the minimum of risk.

Rating: Established

Evidence: E, L

Commentary

Patient safety is assured by more than the practitioner's causing no harm. Since every consumer of health care is ultimately responsible for his/her own health choices, patient safety is also a matter of the availability of accurate and adequate information with which the patient must make these choices. The patient's expectations should be consistent with the provider's goals. If the patient perceives those goals as anything different, proper and safe choices cannot be assured. Thus, it is important to recognize that chiropractic is a limited, primary profession which contributes to health by addressing the safe detection, location, and correction or stabilization of vertebral subluxation(s). It is important that the chiropractor take the steps necessary to foster proper patient perception and expectation of the practitioner's professional goals and responsibilities. It is within this context that patient safety is addressed in this chapter.

A Terms of Acceptance is the recorded written informed consent agreement between a chiropractor and the patient. This document provides the patient with disclosure of the responsibilities of the chiropractor and limits of chiropractic, and the reasonable benefit to be expected. This enables the patient to make an informed choice either to engage the services of the chiropractor, aware of the intended purpose of the care involved, or not to engage those services if the proposed goals are not acceptable or not desired. This embodies the responsibility of assuring patient safety by not providing false or misleading promises, claims or pretenses to the patient.(1-7)

Professional Referral: Professional referral requires authority and competence to acquire accurate information concerning matters within the scope and practice of the professional to whom a referral is made. There are two types of professional referrals made by chiropractors:

(A) Intraprofessional referral: Chiropractors, by virtue of their professional objective, education, and experience, have authority and competence to make direct referrals within the scope and practice of chiropractic. Such a referral may be made when the attending chiropractor is not able to address the specific chiropractic needs of a particular patient. Under these circumstances, the chiropractor may refer the patient

directly to or consult with another chiropractor better suited by skill, experience or training to address the patient's chiropractic needs.

(B) Interprofessional referral: In the course of patient assessment and the delivery of chiropractic care, a practitioner may encounter findings which are outside his/her professional and/or legal scope, responsibility, or authority to address. The chiropractor has a responsibility to report such findings to the patient, and record their existence. Additionally, the patient should be advised that it is outside the responsibility and scope of chiropractic to offer advice, assessment or significance, diagnosis, prognosis, or treatment for said findings and that, if the patient chooses, he/she may consult with another provider, while continuing to have his/her chiropractic needs addressed.

Rare case reports of adverse events following spinal manipulation exist in the literature. However, scientific evidence of a causal relationship between such adverse events and the manipulation is lacking. Furthermore, spinal adjustment and spinal manipulation are not synonymous terms.

In the case of strokes purportedly associated with manipulation, the panel noted significant shortcomings in the literature. A summary of the relevant literature follows:

*Lee(8) attempted to obtain an estimate of how often practicing neurologists in California encountered unexpected strokes, myelopathies, or radiculopathies following chiropractic manipulation. Neurologists were asked the number of patients evaluated over the preceding two years who suffered a neurological complication within 24 hours of receiving chiropractic manipulation. Fifty-five strokes were reported. The author stated, Patients, physicians, and chiropractors should be aware of the risk of neurologic complications associated with chiropractic manipulation. No support was offered to substantiate the premise that a causal relationship existed between the stroke and the event(s) of the preceding 24 hours.

*In a letter to the editor of the Journal of Manipulative and Physiological Therapeutics, Myler(9) wrote, I was curious how the risk of fatal stroke after cervical manipulation, placed at 0.00025%(10) compared with the risk of (fatal) stroke in the general population of the United States. According to data obtained from the National Center for Health Statistics, the mortality rate from stroke in the general population was calculated to be 0.00057%. If these data are correct, the risk of a fatal stroke following cervical manipulation is less than half the risk of fatal stroke in the general population.

*Jaskoviak(11) reported that not a single case of vertebral artery stroke occurred in approximately five million cervical manipulations at the National College of Chiropractic Clinic from 1965 to 1980.

*Osteopathic authors Vick, et al.(12) reported that from 1923 to 1993, there were only 185 reports of injury associated with several million treatments.

*Pistolese(13) has constructed a risk assessment for pediatric chiropractic patients. His findings covering approximately the last 30 years indicate a risk of a neurological and/or vertebrobasilar accident during a chiropractic visit about one in every 250,000,000 visits.

*An article in the Back Letter(14) noted that In scientific terms, all these figures are rough guesses at best... There is currently no accurate data on the total number of cervical manipulations performed every year or the total number of complications. Both figures would be necessary to arrive at an accurate estimate. In addition, none of the studies in the medical literature adequately control for other risk factors and co-morbidities.

*Leboeuf-Yde et al.(15) suggested that there may be an over-reporting of spinal manipulative therapy related injuries. The authors reported cases involving two fatal strokes, a heart attack, a bleeding basilar aneurysm, paresis of an arm and a leg, and cauda equina syndrome which occurred in individuals who were considering chiropractic care, yet because of chance, did not receive it. Had these events been temporally related to a chiropractic office visit, they may have been inappropriately attributed to chiropractic care.

*In many cases of strokes attributed to chiropractic care, the operator was not a chiropractor at all. Terrett(16) observed that manipulations administered by Kung Fu practitioner, GPs, osteopaths, physiotherapists, a wife, a blind masseur, and an Indian barber were incorrectly attributed to chiropractors. As Terrett wrote, The words chiropractic and chiropractor have been incorrectly used in numerous publications dealing with SMT injury by medical authors, respected medical journals and medical organizations. In many cases, this is not accidental; the authors had access to original reports that identified the practitioner involved as a non-chiropractor. The true incidence of such reporting cannot be determined. Such reporting adversely affects the reader's opinion of chiropractic and chiropractors.

*Another error made in these reports was failure to differentiate cervical manipulation from specific chiropractic adjustment. Klougart et al.(17) published risk estimates which revealed differences which were dependent upon the type of technique used by the chiropractor.

The panel found no competent evidence that specific chiropractic adjustments cause strokes. Although vertebrobasilar screening procedures are taught in chiropractic colleges, no reliable screening tests were identified which enable a chiropractor to identify patients who are at risk for stroke.

After examining twelve patients with dizziness reproduced by extension rotation and twenty healthy controls with Doppler ultrasound of the vertebral arteries, Cote, et al.(18) concluded, We were unable to demonstrate that the extension-rotation test is a valid clinical screening procedure to detect decreased blood flow in the vertebral artery. The value of this test for screening patients at risk of stroke after cervical manipulation is

questionable. Terrett(19) noted, There is no evidence which suggests that positive tests have any correlation to future VBS (vertebrobasilar stroke) and SMT (spinal manipulative therapy). Despite this lack of evidence, some have suggested that failure to employ such tests could place a chiropractor in a less defensible position should litigation ensue following a CVA.(20)

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XI Professional Development

RECOMMENDATION

Continuing professional development, as in all responsible health professions, is a necessary component of maintaining a high standard for both the practitioner and the profession. Continuing development should be directed to areas germane to each individual practice, including but not limited to: credentialing, continuing education programs, participation in professional organizations, ethics forums, and legal issues.

Rating: Established

Evidence: E, L

Commentary

Continuing professional development is currently widely mandated by most licensing jurisdictions, or encouraged through most professional organizations. Perhaps the most compelling reason for advocating this type of on-going education is to afford practitioners the opportunity to keep abreast of current issues, techniques, and methods which serve to enhance patient care. The fact that most programs are conducted by individuals skilled in the topics presented, also provides a high ratio of quality information delivered in a relatively short period. Thus, professional development serves not only the practitioner, but ultimately benefits the patient through enhanced practice skills acquired in different areas by the chiropractor.(1-14)

In addition to formal postgraduate education courses, other opportunities for professional development may include:

- Reading scholarly journals
- Attending scientific symposia
- Participation in research
- Publication of clinical and scientific papers
- Audio and videocassette courses
- Teleclasses
- Distance education programs

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