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The Amelioration of Symptoms in Cervical Spinal Stenosis with Spinal Cord Deformation Through Specific Chiropractic Manipulation: A Case Report with Long-Term Follow-Up

George W. Kukurin, DC[a]

Abstract

Objective: To describe the chiropractic management of a patient with paresthesia on the entire left side of her body and magnetic resonance imaging (MRI)-documented cervical spinal cord deformation secondary to cervical spinal stenosis.

Clinical Features: A 70-year-old special education teacher had neck pain, headaches, and burning paresthesia on the entire left side of her body. These symptoms developed within hours of being injured in a side-impact motor vehicle accident. Prior to her visit, she had been misdiagnosed with a cerebrovascular accident.

Intervention and Outcomes: Additional diagnostic studies revealed that the patient was suffering from cervical spinal stenosis with spinal cord deformation. Two manipulative technique systems (Advanced Biostructural Therapy and Atlas Coccygeal Technique) unique to the chiropractic profession and based on the theory of relief of adverse mechanical neural tension were administered to the patient. This intervention provided complete relief of the patient's complaints. The patient remained symptom-free at long-term follow-up, 1 year postaccident.

Conclusion: There is a paucity of published reports describing the treatment of cervical spinal stenosis through manipulative methods. Existing reports of the manipulative management of cervical spondylosis suggest that traditional manual therapy is ineffective or even contraindicated. This case reports the excellent short-term and long-term response of a 70-year-old patient with MRI-documented cervical spinal stenosis and spinal cord deformation to less traditional, uniquely chiropractic manipulative techniques. This appears to be the first case (reported in the indexed literature) that describes the successful amelioration of the symptoms of cervical spinal stenosis through chiropractic manipulation. More research into the less traditional chiropractic systems of spinal manipulation should be undertaken. (J Manipulative Physiol Ther 2004;27:e7)

Key Indexing Terms: *Chiropractic; Cervical Spine; Stenosis*

Introduction

Stenosis or narrowing of the central vertebral canal was originally described in the lumbar spine by Verbiest[1] in 1949. Although stenosis of the central canal can occur anywhere along the length of the spine, this condition is considered more ominous with greater potential for serious neurological sequelae when it occurs in the cervical spine.[2-4] Depending on the nature and location of the neurological insult, symptoms associated with cervical spinal stenosis (CSS) may be radicular or myelopathic. Any combination of upper and lower motor neuron syndromes and sensory symptoms ranging from unilateral, bilateral, or with a Brown-Sequard-like presentation have been described.[2] A neurological condition that is associated with impingement of the spinal cord secondary to CSS is cervical spondylotic myelopathy (CSM). There are several theories concerning the development of the neurological signs and symptoms associated with CSS. The most obvious would appear to be direct spinal cord compression.[5,6] Compression and deformation of the normal oval shape of the spinal cord can be readily visualized on axial computed tomography (CT) or magnetic resonance imaging (MRI) of the cervical spine.[5,6] However, there are other potential mechanisms that may explain neurological compromise and resultant signs and symptoms. In addition to direct nerve fiber compression, neural ischemia secondary to compression of neurovascular structures has also been proposed.[7,8] There are several studies which suggest that tensile forces transmitted

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Paper submitted October 8, 2002.

0161-4754/$30.00

doi:10.1016/j.jmpt.2004.04.009

Fig 1. *Axial T2-weighted MRI image at a relatively normal level. Note the bright white cerebrospinal fluid ring (CSF) surrounding the cord.*

Fig 2. *Sagittal T2-weighted MRI of the cervical spine. Note the areas of stenosis.*

to the cord through its dural and dentate ligament attachments play an important role in the generation of the neurological signs and symptoms seen clinically.[9-11] It is likely that all of these mechanisms play a role in the neurological compromise and that symptoms are generated through multifactorial pathophysiology.[6]

Given the lack of understanding about the cause and mechanisms that generate symptoms in CSS, it is not surprising that there is also controversy and a lack of data concerning the natural history of CSS, as well as the long-term benefits of treatment.[12-14] There are even fewer reports in the literature of the utility of manipulative management of CSS. A computer search of Medline and a hand search of the Chiropractic Research Archive Collection produced a paucity of data concerning the appropriateness of spinal manipulation for CSS. Several reports suggest that manipulation is contraindicated in patients demonstrating compromise of the neurological elements.[15-17] Another published report of 2 cases of cervical myelopathy suggested modest improvement following spinal manipulation.[18]

Imaging of Cervical Stenosis

Cervical stenosis is defined as a narrowing of the central canal of the vertebral column. This narrowing becomes clinically important when impingement of the neurological elements results. There are many grading systems designed to classify the neurological insult seen in cases of CSS.[5,6,13,19] One such system for the grading of neurological insult depends on the findings of the axial magnetic resonance (MR) image at the level of impingement (stenosis) visualized on the sagittal MR image.[19] In a normal axial image of the cervical spine, the cord appears ovoid and a bright ring of cerebrospinal fluid (CSF) can be readily visualized surrounding the neural tissue (Fig 1). If the CSF ring surrounding the spinal cord is broken or discontinuous, a finding of thecal sac effacement is suggested.[19] If the stenosis deforms the spinal cord but preserves the CSF ring on the posterior aspect of the spinal cord, spinal cord effacement is suggested.[19] A significant degree of spinal cord effacement will alter the appearance of the spinal cord on axial imaging, changing the normal cross-sectional appearance from ovoid to "banana-like."[6] Finally, if in addition to impingement of the CSF anteriorly and deformation of the cord proper, the CSF ring is broken on the posterior aspect of the axial image, actual spinal cord compression is suggested.[19] The degree of change seen in cross-sectional images of the spinal cord appears to offer some value in predicting both the development of neurological compromise and the response to decompressive surgical treatment.[5,13]

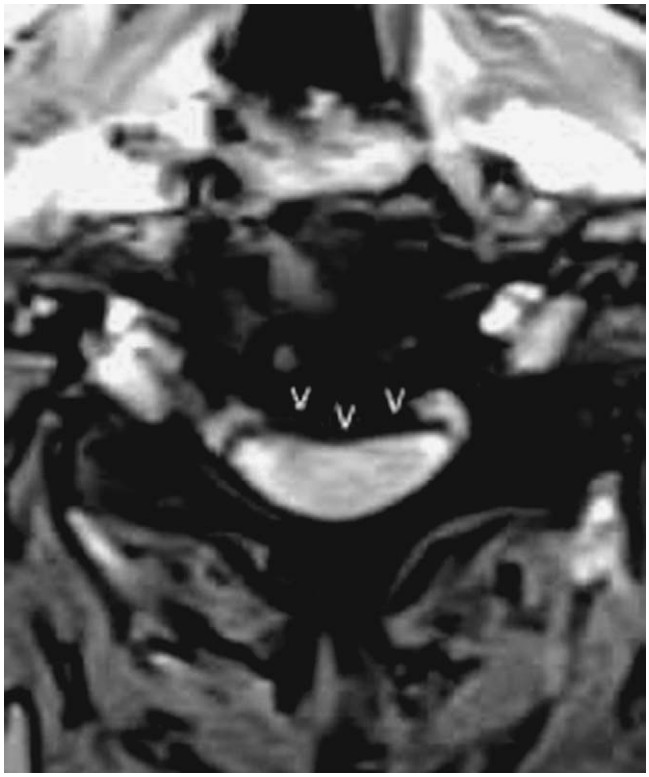

Fig 3. *Axial T2-weighted MRI image at a stenotic level. Note the loss of CSF signal (V V V) surrounding the cord. See text for more information.*

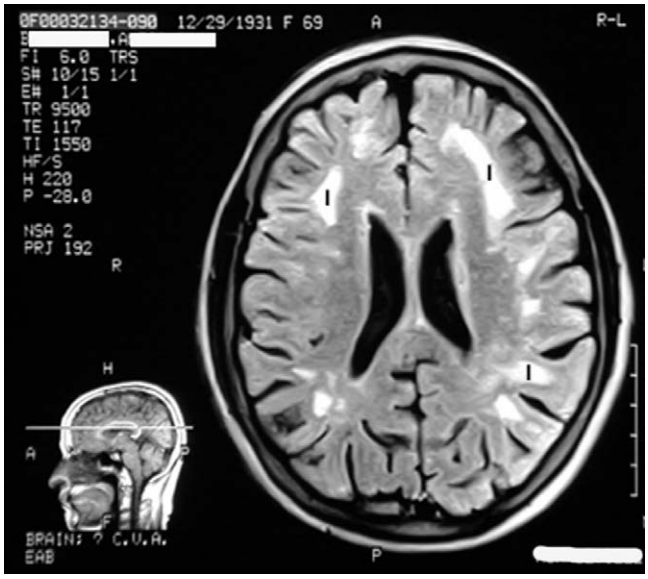

Fig 4. *Axial MRI slice demonstrating areas of ischemia* (i) *in the patient's brain that originally led to the diagnosis of CVA.*

I discuss a case of cervical spinal stenosis with frank spinal cord compression, treated with manipulative techniques that have several unique characteristics. Most notably, the manipulative treatment of this patient was limited to chiropractic techniques that are not generally seen in other professions that practice manual therapy. The manipulative methods employed in this case are derived from the chiropractic techniques known as Advanced Biostructural Therapy (ABT)[20] and Atlas Coccygeal Technique (ACT).[21] Additionally, the extent and nature of the spinal cord compression seen in this patient is well documented through magnetic resonance imaging (Figs 2 and 3).

The patient's MRI images in this case illustrate the concept of spinal cord compression described above.[19] The axial image in this case taken at the stenotic level clearly demonstrates loss of the normal CSF ring on both the anterior and posterior aspect of the spinal cord, with gross deformation of the neural elements into a "banana-like" shape (Fig 3). These 3 findings suggest a "pincher" effect on the spinal cord. Under these circumstances, the cord is thought to be migrated and deformed away from the anterior impingement, only to have secondary compromise and encroachment posteriorly.

Case Report

The patient is a 70-year-old female special education teacher who was injured in a side-impact motor vehicle accident (MVA) that occurred in July of 2000. Within hours of the accident, she developed headaches, neck pain, and a burning sensation on the left side of her face and the entire left side of her body, including her extremities. She was taken to the emergency room where an MRI of her brain was obtained. She was diagnosed with a cerebrovascular accident (CVA) based on her symptoms and areas of ischemia (marked i) as visualized on MRI (Fig 4). She was later seen by a neurologist who felt that her signs and symptoms did not correlate with the ischemic changes seen on the MRI scan of her brain. She had a magnetic resonance angiography (MRA) procedure that demonstrated that the arterial supply to her brain was not compromised. Figure 5 is a representative image of her MRA study demonstrating the patency of the distal ends of her vertebral arteries (VA), intact basilar artery (BA), circle of Willis (COW), and internal carotid arteries (ICA). An MRI study of the cervical spine was then obtained. This revealed significant spinal stenosis with spinal cord deformation as described above. Her diagnosis was changed from CVA to cervical myelopathy, and she was referred for surgical decompression.

She came to my office less than 2 weeks later. Her stated goal was to avoid spinal surgery. At that time, she complained of headaches, neck pain, and an "odd sensation like my left face, body, arm, and leg are hot and burning." Neurological assessment revealed normal gait and station. Her cranial nerves were intact, and she communicated well

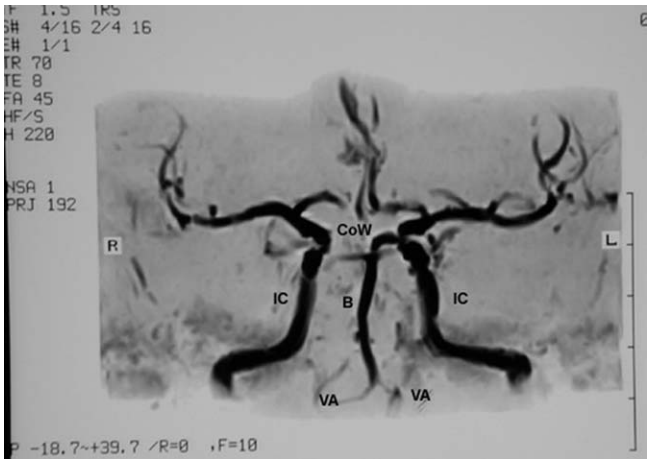

Fig 5. *MRA image that demonstrates relatively normal vascular anatomy of the patient's vertebrobasilar system.*

with no evidence of cognitive impairment. She did not exhibit dysphasia, dyslalia, dysphonia, or any other sign of CVA. Her deep tendon reflexes were globally and symmetrically reduced and rated 1 over 4. She had no weakness, no pathological reflexes, or other signs of an upper motor neuron syndrome. Her sensory complaints were subjective, but her orthopedic evaluation was remarkable in that cervical compression tests exacerbated her burning paresthesia and cervical spine distraction relieved these symptoms. She had the usual paracervical muscle spasms seen commonly in post-MVA patients. Chiropractic assessment was based on the clinical models of ABT and ACT manipulative systems.[20,21] From a chiropractic perspective, she had gross anterior head translation (sagittal plane subluxation) and a noticeable head tilt with the high side on her left (coronal plane subluxation).

Intervention

There are many styles and theories of application of spinal manipulative techniques. A number of generic spinal manipulative maneuvers are practiced across the various disciplines that make up the manual therapy professions. Many chiropractic, orthopedic, osteopathic, and physiotherapy spinal manipulative procedures are indistinguishable. Some are identical with only the theory of application differing. This case employed 2 systems of spinal manipulation (ABT and ACT) that are distinctly associated with the chiropractic profession. Part of the theory of their application is based on the concept that global spinal orientation (posture) is related to tension or insult within and along the neuroaxis.[20,21] One of the treatment goals of the ABT chiropractic technique system is to restore the patient to a more neutral resting head posture in the sagittal plane.[20] In the ACT technique, tilting of the head in the coronal plane (as visualized by a line representing the transverse plane of the foramen magnum) is believed to transmit tension to the spinal cord through dural attachments to the rim of the foramen magnum and upper cervical vertebrae.[21] ACT practitioners postulate that reduction of tension on the neuroaxis is accomplished by restoring the patient to a neutral head posture in the coronal plane. The mechanisms of both these chiropractic techniques are based on theoretical models derived from basic science studies of the biomechanics of the nervous system.

However, there is at least some evidence that suggests that changes in the posture of the cervical spine in the sagittal plane can alter the degree of compression of the spinal cord seen in some patients with CSS.[22-24] Muhle[22,23] demonstrated through dynamic MRI investigation that a neutral head posture can reduce the deformation of the spinal cord when compared with more flexed or extended postures. Muhle's[22,23] dynamic MRI studies offer at least some support to the theory that a neutral resting posture offers the greatest potential for cord decompression in cases of cervical spinal cord impingement.

Resting posture can be measured on radiographs or can be visualized as postural deviations from a plumb line. In the case presented here, head forward posture and head tilt were determined by plumb line assessment. This postural examination revealed a clinical presentation consisting of an anterior head translation (head forward posture/anterior translation subluxation) and head tilt, with the line representing the foramen magnum higher on the left (right lateral flexion subluxation of the head on the neck). The manipulative techniques were employed in such a way as to reverse the observed spinal distortions with the hope of reducing spinal cord insult.

Description of the Manipulative Techniques

The Advanced Biostructural Therapy approach to correcting head forward subluxation involves adjusting or manipulating the first rib.[20] The standard first rib adjustment utilized by practitioners of ABT was modified as follows. In this case, the patient was placed supine on an adjusting table equipped with an upper thoracic drop mechanism. The medial aspect of the first rib was palpated with the thumb. The thumb remained in contact with the first rib. The pisiform area of the opposite hand was placed over the palpating thumb. A thrust was directed inferiorly to superiorly and anteriorly to posteriorly. The thrust was high-velocity, low-amplitude and delivered with enough penetration to cause the drop mechanism of the table to release. This manipulative procedure was repeated 3 times each visit (a number of repetitions arbitrarily determined by the author) on both the right and left first rib. It is my experience that this maneuver causes a rapid reduction of abnormal head forward subluxation. This maneuver was

applied to the patient on each office visit for 18 sessions over 55 days at a frequency of 3 times per week for the first 2 weeks and then once per week for the duration of the treatment period.

The Atlas Coccygeal Technique adjustment is designed to reduce head tilt subluxation in the coronal plane. It consists of placing the patient in a side-posture position. The drop mechanism of the adjusting table was elevated slightly so the patient's head and neck were in a neutral position (no left or right lateral flexion). With the patient on her side, the inferior (low) side of the foramen magnum plane (as determined by upright postural assessment) was placed superiorly. The patient was placed in what resembles the left decubitus position. The region of the right mastoid process of the skull was palpated with the doctor's thumb. The mastoid process served as a landmark with which to identify (and remain in contact with) the transverse process of the C1 vertebra. Contact of the transverse process was maintained, while the pisiform region of the author's opposite hand was placed in contact with the palpating thumb. A thrust was delivered with a line of drive superior to inferior (right atlas transverse process toward the left atlas transverse process). The penetration was deep enough to cause the cervical drop mechanism to release. This procedure was repeated 3 times. The application of the ACT atlas adjustment was performed only on those visits where the patient demonstrated a head tilt in the coronal plane as observed by postural assessment using plumb line analysis. This varied from visit to visit.

Within 2 weeks of treatment utilizing the spinal manipulative methodologies described, the patient reported that her burning paresthesia had diminished by about 90%. The improvement in symptoms seemed to parallel her improvement in sagittal and coronal plane alignment, and her treatment frequency was reduced to 1 session per week. The patient did experience 1 episode of spontaneous exacerbation of her burning sensory symptoms. This rapidly returned to preexacerbation status with increased frequency of treatment (3 times per week for 1 week). Her associated muscular aches and pains also quickly resolved under this adjustive approach. The time frame from initial presentation to complete resolution of symptoms was just under 2 months and encompassed 18 manipulative sessions. She was discharged without residual signs or symptoms from the accident. The patient was most recently reevaluated 2 years later. She remained asymptomatic at this long-term follow-up evaluation.

Discussion

The exact mechanism by which the signs and symptoms in CSS are generated is controversial. The 2 most prominent theories are direct compression of the neural elements at the stenotic spinal level and tension within the neuroaxis transmitted from the spinal column to the neural tissues through various soft tissue supporting structures.[10] The clinical picture is further complicated because the neurological insult may be from direct pressure on the neural elements or produced indirectly through compression of vascular elements.[8] The emerging model is one of a multifactorial causation, with each patient having a unique combination of neural pressure and tension, as well as vascular compromise. The 2 manipulative procedures administered to this patient are based on theories derived from the known interrelationship between the bony spinal column (posture) and the response of the neural elements to these postures. Based on the MRI data of Muhle,[23] it does seem plausible that in at least some patients with CSS, an abnormal resting posture may increase compression of the neural elements. Unfortunately, without a posttreatment MRI in this case, it is impossible to determine if the chiropractic procedures employed actually reduced neural element impingement. Other explanations for the clinical recovery seen in this patient, such as effects of mechanoreceptor stimulation, are possible. Reflex pain inhibition following mechanoreceptor stimulation has been well documented.[25] However, unlike its known effects on pain modulation, it is unclear if mechanoreceptor stimulation can alter what appears to be, in this case, centrally generated paresthesia. Furthermore, it is doubtful that a short course of mechanoreceptor stimulation (if it can modulate paresthesia) could provide the long-lasting suppression of symptoms seen in this case. Spontaneous recovery is another possibility; however, even with surgical intervention, it appears that the long-term prognosis of patients with CSS is only modest. A large number of patients tend to deteriorate after an initial phase of improvement.[12,14] However, a controlled trial with a larger number of patients would be needed to rule out spontaneous recovery. The growing availability of weight-bearing and dynamic MRI studies like the ones described by Muhle[23] may provide the technology needed to better understand the pathophysiology of CSS. These imaging techniques may also provide a valuable tool with which to assess various chiropractic techniques. Further study utilizing emerging imaging and other noninvasive technology may help to explain the clinical improvement frequently reported in chiropractic patients and help to identify the mechanisms responsible for this improvement.

Conclusion

Resolution of the signs and symptoms of cervical stenosis with MRI-documented spinal cord compression through chiropractic techniques is reported. This case suggests the need for more research into the less traditional chiropractic techniques. More research is needed to identify the exact mechanisms of neurological insult seen in cervical spinal

stenosis. Better understanding of the pathophysiology of this condition may lead to novel conservative approaches to treatment.

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Reduction of Cervical Dystonia After an Extended Course of Chiropractic Manipulation: A Case Report

George W. Kukurin, DC[a]

Abstract

Objective: The diminution of the signs and symptoms of cervical dystonia following an extended course of specific chiropractic manipulation is described.

Clinical Features: A 38-year-old man had gross anterior-lateral torticollis, focal dystonia of the head and neck, and radicularlike pains which failed to respond to physical therapy, medication, and injection.

Interventions and Outcomes: Two specific spinal manipulative technique systems unique to the chiropractic profession (Applied Biostructural Therapy [ABT] and Atlas Coccygeal Technique [ACT]) were applied to the patient. The patient's grading on a modified cervical dystonia scale dropped from a grade 16 to a grade 5 after an extended course of these specific chiropractic manipulative techniques.

Conclusions: The application of Advanced Biostructural Therapy and Atlas Coccygeal chiropractic techniques for management of cervical dystonia is presented. Substantial reduction in the cervical dystonia rating scale was observed with this approach, even after standard medical interventions had failed. (J Manipulative Physiol Ther 2004;27:421-6)

Key Indexing Terms: *Chiropractic; Cervical Dystonia; Torticollis; Chiropractic Manipulation; Movement Disorder; Alternative Medicine*

Introduction

Cervical dystonia (CD) is a focal movement disorder of the head and neck with an uncertain etiology. While the exact cause of this condition in unknown, multiple abnormalities have been identified in patients with CD. Reports suggesting dysfunction in the vestibular system,[1,2] defects of sensory-motor integration,[3] and lesions in the brainstem[4] and cervical spinal cord[5] appear in the literature. There is growing evidence that CD is associated with dysfunction of the extrapyramidal system[4,6,7] and even an association between short leg[8] and CD has been described. It remains unclear, however, if these various abnormalities are part of the primary physiopathology of the disease or if they are merely epiphenomenona.

Despite the idiopathic nature of CD and the diverse abnormalities observed in the condition, CD patients have a rather well-characterized clinical presentation. Symptomatically, CD may be painful with a radicularlike or myelopathic-like presentation[9,10] or it may present as a relatively painless movement disorder. By far, the most striking aspect of the presentation is involuntary muscle activation that leads to gross postural distortion, motor tics, and twitches.[4,11,12]

In cervical dystonia, the observed involuntary motor activation is confined to the head and neck musculature and leads to postural distortions in one or any combination of sagittal, coronal, and/or axial planes resulting in the appearance of torticollis.[12] Unlike the torticollis seen in orthopedic patients, the torticollis of CD is not fixed and the patient has some ability to override the involuntary muscle activation that creates the abnormal posture.[11] Another characteristic finding in CD is the *geste antagonistique* (GA) phenomenom.[11,13] The GA phenomenom has also been described as "sensory tricks" that the CD patient employs to temporarily overcome involuntary muscle activation and abnormal posture.[11] Classically, the CD patient will pull on his chin or touch the top of his head in an attempt to override the involuntary muscle activation.[11] These involuntary motor activation patterns and resultant postural abnormalities are also more than cosmetic; they have been shown to produce profound degradation of quality of life in CD patients.[9,14,15]

Electromyography (EMG) studies of dystonic muscles have documented abnormal activation patterns and

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Paper submitted October 29, 2002; in revised form November 13, 2002

0161-4754/$30.00

doi:10.1016/j.jmpt.2004.05.008

disintegration of motor control in CD patients.[16-20] It appears that a lead or trigger muscle can be identified.[18,19] This lead muscle then triggers abnormal involuntary activity in other synergistic and/or antagonistic muscles.[18] The abnormal muscle activity seen in CD also has several other interesting characteristics. The EMG activity does not always correlate with the expected increase in muscle activity that would clinically explain the patient's posture.[16] The abnormal motor activation appears to be a plastic phenomenon with patterns of activity changing even for a specific posture.[17] The abnormal motor activation patterns differ in the same patient and between patients for a given postural distortion.[16,17] Studies suggest that the muscle activation patterns seen in CD cannot be duplicated through voluntary muscle contractions.[21] Recent studies of central motor activation in CD patients using motor evoked potentials (MEPs) suggest abnormalities in central activation of muscles above and beyond those abnormalities documented in peripheral motor activation,[3] indicating a central nervous system component of the disorder.

Virtually all current treatments of CD are palliative.[11,22,23] With the exact cause of the condition unknown, it is not surprising that CD has proven to be refractory to most types of treatment. CD is definitely not a self-limited condition; one study suggests that spontaneous recovery was seen in only 12% of CD patients.[24] Conservative treatments requiring months or even years are not uncommon.[25]

Neuromuscular blockade using botulism toxin is emerging as the most viable conservative treatment option.[22,26-28] Unfortunately, like other treatments of CD, this is palliative and must be repeated, as the blockade wears off in several weeks to months.[11,26] Failure of adequate palliation after 1 to 2 years of conservative care is considered an indication for surgical interventions.[25] Current surgical procedures include muscle denervation[22,25,27] and, more recently, deep brain stimulation similar to those procedures used for Parkinson disease.[6,7,22] It is estimated that cervical dystonia affects 60,000 to 90,000 patients in the United States.[11]

Case Report

A case of reduced cervical dystonia following an extended course of specific chiropractic manipulative therapy (CMT) is reported. The manipulative techniques employed, Atlas Coccygeal Technique (ACT) and Applied Biostructural Therapy (ABT), are unique to the chiropractic profession.[29,30] The techniques employed were chosen because in the case of ACT, they purport to reduce coronal plane distortion and axial plane rotations of the head and neck,[29] and in the case of ABT, they purport to reduce anterior head translations.[30] These were the predominant presenting postural distortions of this case of CD (see Figs 1, 2, and 3) and they form the basis of at least 1 system designed to rate the severity of CD.[12]

The patient was a 38-year-old man. He had gross anterior lateral cervical torticollis. He could, with great difficulty, attain a neutral posture and retain it for several seconds. He had obvious involuntary motor activation that would "snap" his head back to the distorted position. He utilized the commonly described hand-to-chin and hand-to-top-of-head *gestes* to interrupt his involuntary muscle activity. He had received several courses of physical therapy and had a course of nerve injections that he believed made him worse. He was developing radicular pain patterns in his right arm. Documentation of the severity of his postural distortion was based on a modification of a postural rating scale that has been proven to be a reliable method to grade CD in clinical practice.[12] The Cervical Dystonia Severity Scale (CDSS) method utilizes a protractor and wall chart to grade the severity of the patient's head deviation from neutral in each of 3 planes of motion (axial, coronal, and sagittal).[3] The severity of the cervical dystonia is then scored in 5° intervals: mild or grade 1 = 1° to 5° of total deviation. The grades are increased in 5° increments. The most severe rating is grade 18, measuring between 86° to 90° of total distortion.[3]

In the case presented here, a combination of an arthrodial protractor,[31] radiographs, and a computed tomography (CT) scan were used to obtain the baseline dystonic posture. The degree of lateral flexion in this patient can be seen in Figures 1 and 2. This measured 30° from the horizontal. The degree of rotational subluxation of the altanto-axial complex can be seen on the CT image of the spine (Fig 3). The degree of axial rotation measured using an arthrodial protractor was determined to be 15° to the left of midline. This tool also allowed for the measurement of the excursion and oscillations of the patient's head that were due to involuntary muscle contractions. They ranged from 5° to 15° and did not appear to have a set rhythm. The measure of forward flexion of the head and neck was derived by averaging the measures obtained from a lateral radiograph and the arthrodial protractor. I chose to average these 2 measurements because the extreme distortion of the patient's head posture made accurate measurement in the sagittal plane difficult. Averaging the measures derived from the lateral radiograph and arthrodial protractor yielded an anterograde distortion of 30°. The baseline total distortion in this patient was determined by adding the displacements measured in the axial, coronal, and sagittal planes. The total pretreatment distortion was 75°. Using the criteria of the CDSS, this would indicate a pretreatment cervical dystonia grade of 16.

Intervention and Outcome

An abbreviated description of the chiropractic protocols of Advanced Biostructural Therapy and Atlas Coccygeal Technique is presented. A more detailed description of the methods can be found in Pratt[29] and Jutkowitz.[30]

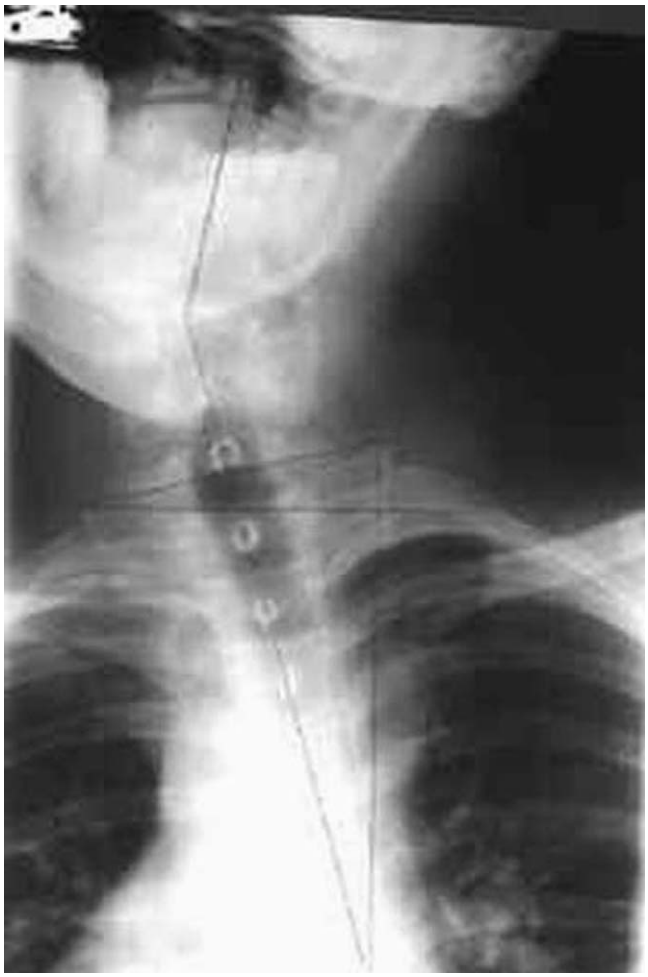

Fig 1. *AP radiograph showing lateral deviation of the patient's head and neck.*

Fig 2. *APOM radiograph showing lateral deviation of the upper cervical spine.*

The Applied Biostructural Therapy approach to correcting head forward posture involves adjusting or manipulating the first rib and thoracic spine from an anterior to posterior direction.[30] These maneuvers are traditionally performed with the patient standing. However, they were modified in this case and performed with the patient supine on an adjusting table. The modification of the first rib adjustment consisted of placing the patient supine on an adjusting table equipped with an upper thoracic drop mechanism. The medial aspect of the first rib was palpated with the thumb. The thumb remained in contact with the first rib. The pisiform area of the opposite hand was placed over the palpating thumb. A thrust was directed inferiorly to superiorly and anteriorly to posteriorly. The thrust was high velocity and low amplitude and delivered with enough energy to cause the drop mechanism of the table to release. This manipulative procedure was repeated 3 times each visit (a number of repetitions arbitrarily determined by the author) on both the right and left first rib. It is my experience that this maneuver causes a rapid reduction of abnormal head forward resting posture. Since the patient exhibited a gross anterior-lateral torticollis, I believed that the first rib maneuver would be an ideal manipulation to attempt to reduce the anterior distortion of the patient's head and neck. This maneuver was applied to the patient on each office visit over a course of 7 months and 54 manipulative sessions. Manipulation of the thoracic spine from anterior to posterior is also a major component of the ABT protocol. This manipulation is not materially different from other commonly employed extension-type manipulations of the upper thoracic spine.

The Atlas Coccygeal Technique is derived from the work of Grostic upper cervical technique system.[29] However, rather than relying on radiographs to determine the distortion of the skull-atlas-cervical spine complex, the ACT protocol uses postural assessment. Abnormal relationships between the occiput, atlas, and axis are believed to translate into postural distortions in the coronal and transverse body planes. Gross postural distortion is used as an indicator to determine the line of drive of the upper cervical adjustment. The theory of application is to "reduce" upper cervical subluxations that produce lateral

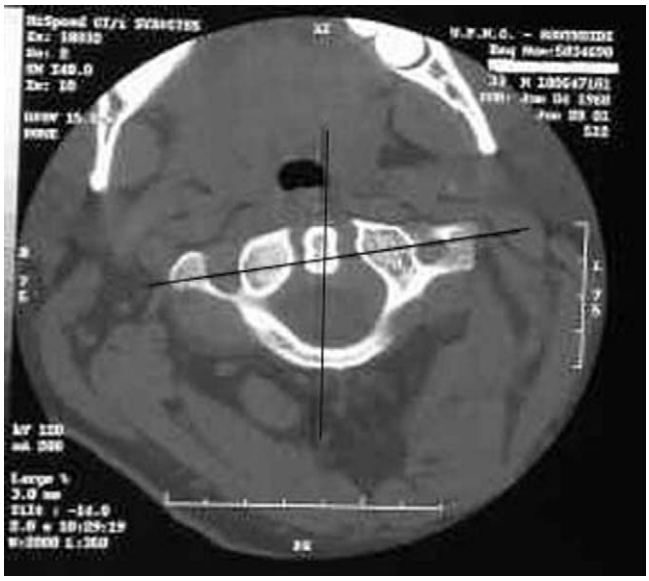

Fig 3. *CT scan at the atlanto-axial complex. Note the rotational subluxation in the neutral head posture.*

flexion and rotational deformities in the patient's head and neck posture.

Based on this case presentation, the Atlas Coccygeal Technique adjustment was deemed by me to be an appropriate procedure with which to attempt to reverse the patient's postural distortions.

The ACT adjustment consists of placing the patient in a side posture or decubitis position. The manipulation requires a specialized adjusting table equipped with a cervical drop mechanism. The side of the lateral flexion distortion is placed superiorly on the cervical drop mechanism. Here, the patient's left side was placed down against the table (left decubitis position). The drop mechanism of the adjusting table was lowered slightly to prestress the patient's head and neck into a neutral position (no left or right lateral flexion). The region of the right mastoid process of the skull was palpated with the author's left thumb. The mastoid process served as a landmark with which to identify (and remain in contact with) the transverse process of the C1 vertebra. Contact with the transverse process was maintained while the pisiform region of the doctor's opposite hand was placed in contact with the palpating thumb. I stood in front of the patient while performing the manipulation. The purpose of this position was to introduce an anterior to posterior vector on the right atlas transverse process (TP). This was introduced in an attempt to reduce both the rotational component of the upper cervical misalignment (head rotation in the transverse plane) and the lateral flexion of the head on the neck. The main component of the thrust was delivered with a line of drive superior to inferior (right atlas TP toward the left atlas TP). The amplitude of the adjustment was sufficient enough to cause the cervical drop

Fig 4. *Reduction of torticollis after extended chiropractic treatment.*

mechanism of the table to release. This procedure was repeated 3 times.

To summarize, the anterior thoracic and first rib adjustments of ABT techniques were applied for the purpose of reducing the anterior component of the patient's dystonic posture and the side posture upper cervical drop adjustments of ACT were applied to reduce the lateral flexion and rotational postural deformities seen in this case.

These techniques were applied 3 to 5 times per week for the first several months. Initially, there was no observable or

objective change in the patient's dystonic posture. The patient did feel subjective improvement. Based on this reported subjective improvement, the treatment regimen was continued. I did not see visible improvement in the patient's posture until after 3 months of care. The patient and his family, however, reported substantial improvements several hours after the adjustments. These reports started in the first month of care.

The intensity of this treatment regimen continued over the next few months. A measurable reduction in the patient's postural distortion became apparent. A subjective improvement in involuntary muscle activation also appeared to develop. Unfortunately, there was no adequate method available to attempt to document this change in motor activity. The change in the patient's total spinal distortion was from 75° pretreatment to 25° degrees after specific chiropractic manipulative procedures (see Figure 4). Using the CDSS scale, this case demonstrated a drop in cervical dystonia from grade 16 to grade 5 following a course of chiropractic manipulation.

Discussion

As with all single case studies, there are numerous limitations. Two obvious explanations for the substantial improvement seen in this patient include spontaneous recovery or a therapeutic response to the chiropractic manipulation described above. Spontaneous recovery in CD is unlikely, since it occurs in as little as 12% of the cases studied objectively. The fact that CD is resistant to most forms of intervention suggest that the treatment rendered influenced the clinical course seen in this case. This leaves open the possibility that CD in at least some cases may respond to CMT. As stated above, CD patients have abnormalities in vestibular, sensory-motor integrations, central motor activations, and/or extrapyramidal system function. Some studies suggest that CMT can have a positive clinical effect in vestibular dysfunction.[32,33] While vestibular dysfunction has been reported in some patients with CD, this case had no objective testing prior to manipulative intervention. So, it is impossible to know if vestibular dysfunction and its modification through CMT played a role in the reduction of dystonia seen in this case. Another study suggests that CMT can restore proprioceptive function in cervical spine.[34] This would seemingly be beneficial in patients suffering from movement disorders and involuntary abnormal cervical postures. Motor-evoked potential (MEP) studies have been used to demonstrate abnormal central motor function in CD patients. Recently, a motor-evoked potential study has demonstrated that CMT can alter central motor drive.[35] However, this study demonstrated facilitation rather than inhibition of central motor activity in normal subjects.[35] One would expect that facilitation of central motor function would exacerbate the central motor hyperactivity measured in CD patients. A study investigating the affects of CMT on MEPs in CD patients might determine if CMT inhibits rather than facilitates central motor activity in these patients. The extrapyramidal system may be implicated in cervical dystonia. Parkinson disease is a common condition associated with dysfunction in the extrapyramidal system. Elster[36] recently published a case report of Parkinson disease that improved following a course of upper cervical chiropractic manipulation. The techniques used in the present case were very similar to the chiropractic techniques employed by Elster.[36] The mechanism for the observed improvement in her study is likewise unknown, suggesting the need for much more research in this area. Given the lack of an adequate treatment for CD, its profound affect on quality of life, and the substantial improvement seen in this case, collaborative research in a more controlled environment seems warranted. What cannot be appreciated in static radiographs are the waves of involuntary muscle contractions and the uncontrollable oscillations in the head and neck musculature. Technology that time-locks EMG activity to video recordings of the patient's dystonia has been developed, but it is not readily available outside specialized movement disorder centers.[17,18]

Does chiropractic manipulative therapy alter the abnormal muscle patterns in CD patients? This question can only be answered by conducting controlled trials and utilizing technology that is available to document not only the static postural changes seen in this case but also the dynamic and physiological video-link EMG data that documents the true physiopathology of CD. It is also unclear if the improvement seen in this patient was due to the specific type of chiropractic manipulation employed or if similar results could have been obtained using more traditional manipulative techniques.

Conclusion

A case is presented that exhibited substantial improvement of cervical dystonia following specific chiropractic manipulation. Possible explanations for this observed therapeutic response are offered, and the need for future research of less traditional chiropractic techniques in general and in cases of cervical dystonia is suggested.

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J Manipulative Physiol Ther: JUL/AUG 2004(27:6): 421-426	Reduction of cervical dystonia after an extended course of chiropractic manipulation: a case report	KUKURI GW
J Manipulative Physiol Ther: OCT 2002(25:8): 540-541	Chronic pediatric asthma and chiropractic spinal manipulation: A prospective clinical series and randomized clinical pilot study [letter]	KUKURI GW
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JUNE, 1985 VOLUME 22, NUMBER 6

JOURNAL of CHIROPRACTIC

Chiropractic Makes Strides: CONVENTION '85

The ACA Gathers in New Orleans for Annual Convention and Breaks Ground for New Headquarters Building

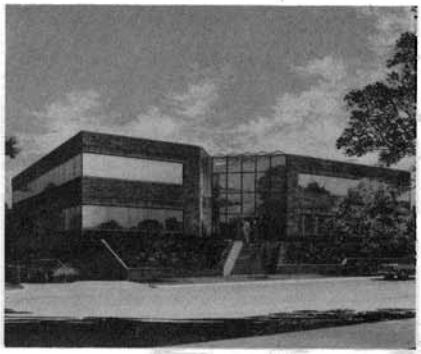
American Chiropractic Association

JUNE, 1985 VOLUME 22, NUMBER 6

JOURNAL of CHIROPRACTIC

The Journal is a forum for open and responsible discussion of matters relevant to the field of chiropractic. Its mission is education: To inform its readers of progress of chiropractic procedures, research, and of developments in other fields of interest to chiropractors.

Contents



The ACA's Annual Convention/Exhibit '85 runs from June 26 through 29 in New Orleans, Louisiana. Details on the programs, exhibits, features, and activities for this year's convention appear in a special section of this issue beginning on page 16. The ACA can be proud of its many accomplishments in recent years — one of which is the proposed move to a new headquarters building (pictured above and on the cover) in the very near future.

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American Chiropractic Association

professional papers

Chiropractic and Spinal Manipulative Therapy: A Critical Review of the Literature

By G. W. Kukurin, D.C.

Dr. Kukurin graduated from Pasadena College of Chiropractic in 1983. He has taken postgraduate courses in chiropractic biophysics, acupressure, and flexion-distraction therapy. He is a former instructor at Pasadena College of Chiropractic in clinical neurology and was affiliated with the Neurophysiology Lab. Dr. Kukurin is a member of the American Chiropractic Association, the ACA's Council on Neurology, and the Foundation for Chiropractic Education and Research. Licensed to practice in the states of Pennsylvania and California, Dr. Kukurin is in private practice in Pittsburgh, Pennsylvania.

Many trials of spinal manipulation have been reported in the scientific literature. The data may be grouped into several categories: 1) clinical observations,* 2) spinal manipulative therapy (SMT) — as compared with conventional therapy (CT) commonly used for the treatment of low back pain,† 3) SMT compared against inert placebos,[2, 21, 31] 4) trials of manipulation utilizing anesthesia (MUA),‡ and 5) reports of the biomechanical and physiological effects of spinal manipulation.§ In a review of published data on randomized controlled trials of SMT, there is generally noted a lack of stated goals and objectives in many of the literature references. As a result of this, most of the investigators' conclusions are subject to differing opinions.

Group 1: Clinical Observations

Most of the reports of success rates are either based on retrospective studies of case histories or are inferential comparisons between different types of practitioners, that is, manipulative specialists with conventional allopathic physicians. These types of reports are of little value aside from the fact that they may stimulate interest in controlled clinical trials. Seldom are the variables inherent to scientific investigation adequately controlled in the clinical setting. Therefore, the following reports are subject to debate.

The most abundant literature sources are those reporting percent-positive results. They have little significance without data on duration and frequency of treatment. Without a comparable control population, it is impossible to determine if the treatment is responsible for the observed improvement or if the natural direction of the history of the disease had run its course. This is particularly true for the study of back pain, which has a high rate of spontaneous resolution.[13] It is reported that 80% to 90% of all cases of back pain will self-resolve, with or without treatment, in approximately 60 days.[13] Therefore, a claim of 80% improvement in a patient population after 50 days is much less significant than 60% of the patients experiencing relief after treatment requiring 30 days. The therapy that is capable of truly altering the natural history of low back pain must demonstrate effectiveness early in the treatment period. As the treatment

* References 1, 3, 4, 6, 18, 20, 22, 30, 33, 36, 40, 41.
† References 5, 11, 12, 14-17, 27, 29, 39, 46, 60.
‡ References 10, 22, 28, 38, 47, 51, 54.
§ References 7-9, 26, 37, 39, 42-44, 48, 52, 53, 57-59.

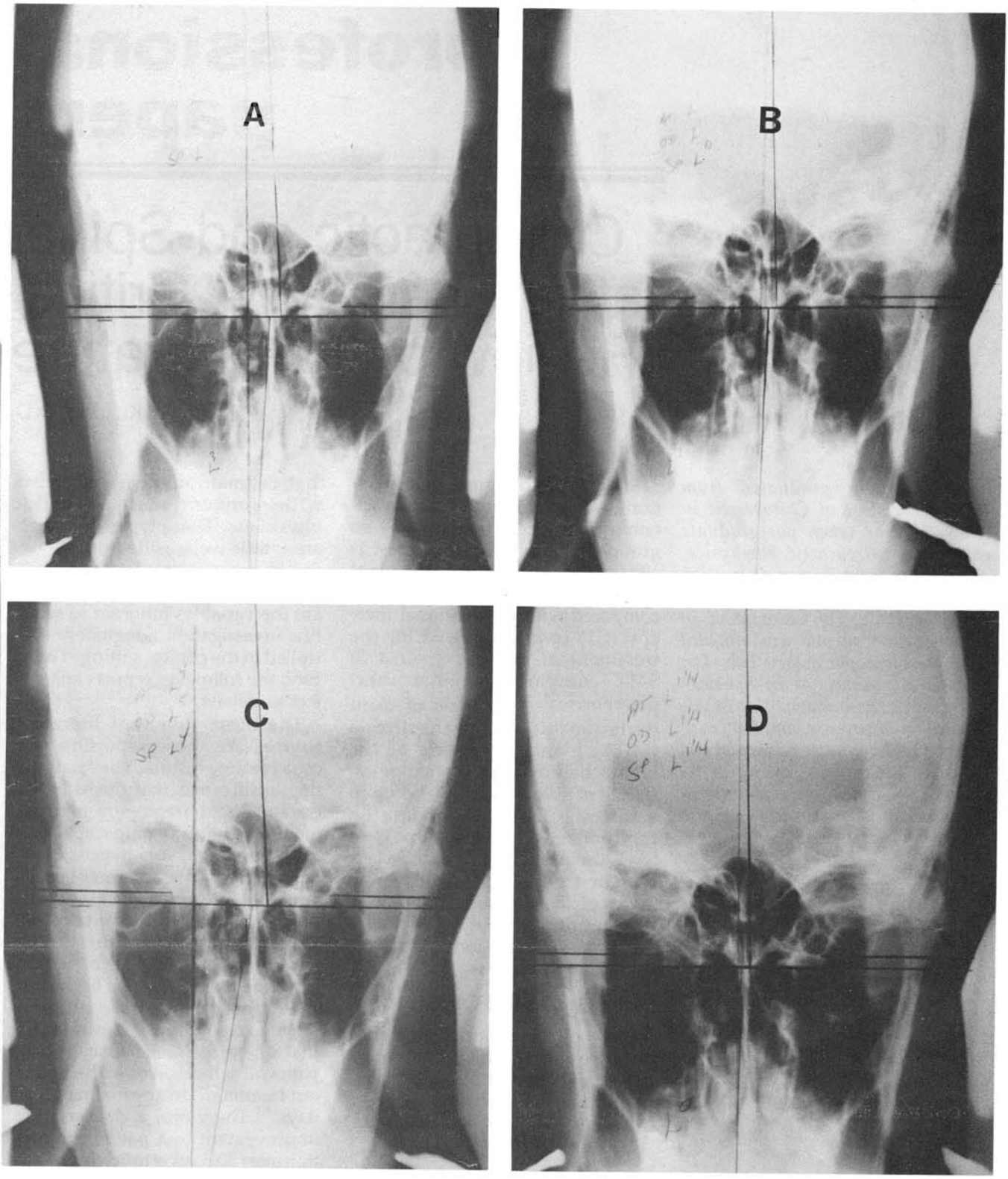

Figure 1 — Radiographs demonstrating differing effects of a NUCCA-style and a Maitland or diversified-style manipulation on the static alignment of the cervical spine. A = Initial misalignment before manipulation of the patient's cervical spine. B = Radiograph taken immediately following a NUCCA-style adjustment demonstrating reduction of misalignment of the cervical spine. C = The same patient following a diversified or Maitland manipulation (as practiced by physical therapists). Note the exacerbation of misalignment. D = Patient's cervical spine is restored to more normal alignment following second NUCCA-style adjustment. (Radiographs courtesy of Dr. Glen Cripe, New Port Beach, California.)

time progresses toward 60 days, the results of low back pain therapy become masked by the natural high rate of self-resolution. Meaningful conclusions about therapy for low back pain are difficult to formulate as time progresses.[55] Comparisons of two different types of practitioners, based on case histories, are similarly open to question. Meaningful comparisons depend upon homogeneous patient populations, which can only be guaranteed with identical pre- and post-treatment examinations. Also, no exclusions can be made during treatment, as is often done in formal research. Individual practitioners are likely to overreport their own successes. An impartial examiner would have to evaluate the patient before and after treatment for these types of comparisons to have true scientific value. However, these studies have much relevance to sociological, medicolegal, insurance, and business concerns as well as to the health-care consumer. Interesting speculations may be stimulated by comparison of records from patients who cross over from one type of practitioner to another. With the aforementioned variable conditions noted, the following literature references are discussed. Kane[33] compared workman's compensation records from patients treated by chiropractic physicians with patients treated by allopathic doctors for work injuries to the spine in the state of Utah. For these musculoskeletal conditions, SMT as performed by chiropractors was just as effective as conventional methods utilized by medical doctors. In a similar study, Bergman[1] found that chiropractors in the state of Oregon were more cost efficient than their medical counterparts in the treatment of work injuries. The chiropractors were able to return their patients to work in significantly less time than Oregon's medical practitioners.[1] Breen[3] reviewed chiropractic records and reported that 43% of these patients were significantly improved or completely better within seven office visits. Parker and Tupling[40] report that 82% of the patients seen by chiropractors had received and not responded to conventional treatment before they sought chiropractic services. Of these, three of four were sufficiently satisfied with their improvement to seek chiropractic care again, if this need should arise. Burton[4] states that chiropractic manipulation can successfully relieve pain from mechanical dysfunction of the low back.

In reviewing the literature reports of percent-positive result, claims of 75% to 90% are reported. Parsons and Cummings[41] describe several maneuvers for manipulation of the lumbar spine. These authors report that they can successfully treat 75% of their low back patients with these procedures. An 85% success rate for reduction of pain from IVD displacement through SMT of the low back is reported by Fonti and Lynch.[20] Potter[45] reports a 94% success rate for the treatment of acute low back pain. He was able to successfully treat 77% of the patients presenting with acute low back pain complicated by leg pain by SMT. Fisk[18] reviewed 369 cases of patients experiencing low back pain who were treated with SMT. He concluded that 90% were completely relieved, 5% of these patients at least benefited from SMT, and only 5% received no relief from SMT. The combined patient population of these references is in excess of 4500 cases. It is unfortunate that data on the duration of treatment are lacking. These studies may be extremely significant if most of the patients had tried conventional therapy before being treated by manipulative methods, as reported by Parker and Tupling.[40]

The most valuable trials, which provide much more useful information, are the trials of SMT compared with conventional therapies for the treatment of back pain. These trials eliminate the need for speculation as to the relative effectiveness of SMT and CT.

Group 2: Comparison of SMT with CT for Low Back Pain

Possibly due to the numerous variables involved with SMT and probably because of the difficulty in developing an appropriate placebo, the bulk of controlled clinical trials compare SMT with therapies commonly used in the treatment of spine pain. These investigations provide direct information about the relative effectiveness of different therapies. Coxhead[11] compared SMT with traction, exercises, bed rest, and a lumbosacral support used as treatment for 292 patients with sciatic symptoms.

This experimental design was such that combinations of treatments as well as individual therapies could be evaluated. The evaluation criteria were 1) the patient's subjective evaluation of pain relief and 2) the ability of the treatment to return the patient to work at the same capacity as before the back dysfunction.[11] Each patient was evaluated at four weeks and at four months and 16 months. Coxhead reports that pain and disability appear to respond more favorably to multiple treatments than to individual therapies.

The patients receiving manipulation as part of their treatment responded more favorably than patients receiving other forms of treatment that did not include manipulation. These differences were statistically significant at the conventional levels of probability used in scientific research.[11] Nwuga[39] compared SMT with CT, evaluating only those parameters that are objectively measurable. The biomechanical function of the spine in flexion/extension, lateral bending, rotation, and SLR was recorded before and after treatment with either SMT or CT. Statistical analysis of the results shows that the SMT group of patients required less treatment time and had significantly greater range of motion in

total flexion, side bending, and total rotation than the patients receiving conventional treatment for low back pain.[39]

Farrell[17] compared SMT with a microwave diathermy and exercise program. He reports that SMT offers greater pain relief, shorter duration of symptoms, and increased range of motion compared with the patients receiving the physical therapy program in his investigation.[17] Henderson[27] compared the relative effectiveness of a plaster jacket, lumbosacral support, SMT, and an exercise program for the treatment of patients suffering from IVD syndrome.

The patients were divided, with moderate cases placed in groups receiving L-S supports and exercises; 90% of these patients experienced improvement. The more severe cases were assigned to the groups receiving plaster jackets, SMT, or bed rest. Of these patients 70% to 75% experienced improvement in their symptoms. No significant differences were reported by Henderson between these groups at the end of the trial. However, 20 patients receiving SMT had previously received physical therapy without benefit.[27] Zybergold[60] compared SMT with heat and a home exercise program. She reports no significant differences between the groups. Those patients receiving SMT, however, did approach the conventional level of statistical significance in both pain reduction and improvement in forward flexion range of motion.[60]

Buswell[6] compared the long-term effects of a flexion treatment program with an extension program that included mobilization and manipulation for the prevention and treatment of low back pain. It was concluded that mobilization and postural correction tend to reduce the frequency of attacks.[6] Edwards[15] compared heat, massage, and exercises with SMT for the treatment of various low back pain disorders. The patients experiencing low back pain without radiation, in both the CT and SMT groups, responded about 83% of the time. The patients receiving SMT experienced this improvement in half as much treatment time. For patients with low back pain with radiation into either buttocks, thigh, or calf, SMT was able to improve a greater percentage of patients (78% to 70%, 96% to 65%, 79% to 52%, respectively) while still requiring less treatment time.

Coyer[12] compared manipulation with bed rest and analgesic. He reports that after one week, 50% of the patients receiving manipulation were completely recovered from their low back pain, whereas only 27% of the patients receiving conventional therapy could be classified as well. This figure is comparable with Breen's report.[3] After three weeks, 87% of the patients in Coyer's study receiving SMT were well, compared with only 60% of the CT patients. After six weeks, 28% of the patients treated with conventional methods were still symptomatic.[12] Rasmussen[46] compared the relative effectiveness of SMT and short-wave diathermy. He reports that 92% of the patients receiving SMT were completely well after 14 days, compared with only 25% completely well in the PT group of patients.[46] Bueger[5] found SMT to be superior to massage; he concluded that the therapeutic effects of SMT cannot be explained by the physical contact between doctor and patient.

Hoehler[29] also investigated the possibility that the "laying on of hand" was a unique variable in testing SMT that had not been adequately controlled by other investigators. He also studied the relative effectiveness of SMT and soft tissue massage. The patients in his study who received actual manipulations experienced greater improvement in SLR to pain, were able to perform their daily activities more easily, and had an overall greater reduction of pain compared with the patients who were receiving massage.

Evans[16] compared manipulation with analgesics for the treatment of low back pain. The patients were reevaluated at one and three weeks. Those patients receiving SMT had statistically significant reduction of pain and increased flexibility compared with the CT patients.[16] Doran[14] is often cited by opponents of SMT, but careful investigation of his literature reveals that his data are much more favorable to SMT than his conclusions suggest. Doran concluded that SMT has no value above and beyond an L-S corset. The experimental design tested the relative effectiveness of PT, SMT, analgesics, and L-S corset for the treatment of low back pain. By scientific standards, it is doubtful if Doran's trial is valid because 40 patients in the SMT group withdrew from treatment. This is nearly half of the patient population assigned to the SMT group. According to the author, 26 of these discontinued treatment because they were completely well. However, in the author's Table 1 (page 162), he lists only 14 patients as completely relieved by spinal manipulation. The total number of patients who were completely well on or before the first evaluation period at three weeks is unclear. Regardless of whether it was 14, 26, or 40 patients completely relieved by SMT, Doran reports that only three patients wearing a corset as treatment for their low back pain were completely relieved, this being significantly less than the group receiving manipulation.

Doran's data demonstrate SMT to be more beneficial than a corset in the treatment of low back pain. It is unclear to this author how Doran determined the corset to be superior. Doran further states in his text that patients wearing a corset demonstrated reduced range of motion in left lateral flexion and flexion-extension movements. At the end of the trial, these symptoms were still apparent, indicating that

the patients wearing a corset may have been free of pain at the end of the trial but were not symptom free.[14] Unlike the patients receiving manipulation, those wearing a lumbosacral corset had durations of pain similar to those expected in the natural course of low back pain with or without treatment. It appears that lumbosacral corsets offer little therapeutic benefit above no treatment at all, based on the data reported by Doran.

Summary of SMT vs. CT

Direct comparison of SMT with therapies commonly used to treat low back pain, including various forms of physical therapy, exercises, massage, orthotic devices, and analgesic, equivocally demonstrated SMT to be the superior treatment. Many of the commonly used traditional treatment regimens appear incapable of shortening duration of symptoms or restoring biomechanical function. Virtually every literature reference supports the use of SMT as the primary treatment modality for low back pain when the objectives of treatment are rapid pain reduction and restoration of functional capacity.

Group 3: SMT Compared with Inert Placebo

A comparison of SMT with inert placebo is, in effect, an investigation of the inherent therapeutic properties of manipulative treatment. There are only three reported literature references involving this format. Jayson et al.[31] compared patients assigned to either a general practitioner or hospital group using SMT or detuned diathermy as treatment for their low back pain. The patients allocated to the general practitioner group were of sufficiently mild symptoms to warrant outpatient care. The hospital group of patients were those patients who had symptoms that warranted specialist consultation. At the one-month interval, the patients in the general practitioner group receiving SMT experienced significant pain reduction and were better able to perform their work duties than the patients receiving placebo treatment. In the hospital group, no such advantage was observed.[31] Bergquist et al.[2] compared SMT and ergonomic advice with a placebo diathermy treatment. The patients receiving both SMT and the ergonomic advice had their duration of pain reduced to approximately one half the duration of those patients receiving the detuned diathermy placebo.[2] Glover[21] compared rotary manipulation with a diathermy placebo similar to the placebos used by Jayson et al.[31] and Bergquist et al.[2] He reports that the pain reduction capabilities of SMT were extremely short term. After several days, no significant therapeutic effect above placebo was evident in the patients in his investigation. A possible explanation for the weak correlation between Glover's results and the results of the other investigators may be their differing experimental designs. Glover apparently did not choose an optimum manipulative maneuver for his patient population, nor did his experimental design allow for the modification of manipulative technique by the treating physician.[21] Glover included patients in his investigation who had pain from the inferior angle of the scapulae to the mid-sacrum.[21] The inferior angle of the scapulae is a surface landmark for the sixth thoracic vertebra. The manipulative maneuver described by Glover in his text has maximum biomechanical effect at the sacroiliac or low lumbar lumbosacral articulations. An experienced manipulator would almost assuredly use a different manipulative maneuver designed to offer more mechanical advantage in the thoracic region of the spine.[23] It is unfortunate that Glover did not utilize an experimental design that allowed for the modification of the treatment at the manipulator's discretion.

Summary of the Trials of SMT vs. Inert Placebo

All three of the literature sources involving the manipulation versus placebo design agree with the clinical trials of SMT compared with conventional therapy for the treatment of low back pain. SMT was shown to have inherent therapeutic properties, which cannot be explained by the placebo effect. Future trials of SMT should be designed in close cooperation with an experienced manipulator to avoid the errors that plagued Glover's investigation.

Group 4: Manipulation Under Anesthesia (MUA)

In this group of investigations are included those trials that used manipulation in combination with various injectable therapeutic agents. Riches[47] reported successful treatment of 87% of his patients with chronic sciatica and 92% of his patients with chronic sacroiliac strains by using MUA. Siehl[51] used MUA on patients with positive EMG findings, comparing results with patients on bed rest and analgesics with those patients receiving surgical intervention. He found that 14% of the patients responded favorably to MUA, with 43% of this group becoming worse and the remainder of the patients experiencing no change.[51] No patients on bed rest demonstrated improvement in symptoms, and the patients receiving surgical intervention fared most favorably. Of these, 47% were successfully treated. Warr[54] combined MUA with epidural injections and bilateral sciatic nerve stretch. Evaluation at two weeks and six months revealed that 63% of these patients responded favorably. Heyse-Moore[28] used combinations of MUA methylprednisolone, hylase, cortisone acetate, and sciatic nerve stretch in varying combinations. The author reports that 50% of the patients receiving MUA and sciatic

nerve stretch were improved at one-year evaluation. Unfortunately, many of the acute cases were made worse by this treatment.[28] Chrisman[10] used MUA on patients with myelographic evidence of disc herniation. Fifty percent of these patients demonstrated improved sciatic symptoms within 24 hours. Eighty percent of the patients with a postural list were straight after two days.[10] A group of patients with similar low back dysfunction did poorly by comparison. Mensor[38] used MUA to treat a group of private and industrial patients diagnosed as having IVD syndrome. Comparing the patients receiving MUA with a similar group of patients receiving surgical intervention, Mensor reports that 54 of the manipulated patients were satisfactorily relieved, compared with 17 of the surgically treated patients. Mensor reports that 64% of the private patients and 45% of the patients involved with industrial accidents were successfully treated with MUA. The patients in this investigation receiving MUA were reported to have less permanent disability than the surgically treated patients. Gray[22] reports that 50% of the patients presenting with intractable back and leg pain treated by MUA and traction demonstrated marked improvement.

Summary of MUA

Various regimens of manipulation and anesthesia, injectable chemotherapeutic, and ancillary maneuvers are reported to have significant therapeutic properties. However, there appears to be an increased risk of exacerbation of symptoms reported by investigation performing MUA that does not exist in the literature on straight manipulation. Because no superior effect is apparent in MUA as compared with SMT, its use does not appear warranted.

Group 5: Biomechanical and Physiological Effects of SMT

The literature clearly suggests that SMT can alter gross biomechanical function as determined by range of motion measurements.* Fisk[19] tested patients with unilateral back pain and asymptomatic patients serving as controls using a tensiometer. After manipulation there was significant reduction of tension measurements in the experimental group of patients, whereas those patients serving as controls did not show significant post-treatment changes.[19] Roberts[49] investigated lumbar flexion-extension radiographs before and after manipulation. He could demonstrate no measurable changes after manipulation. However, reduction of altered biomechanics can be readily demonstrated on lateral bending radiographs.† Specific manipulations designed to restore lost coupling motions are so commonly used by chiropractors, and reproducible and predictable radiographic changes are common.[43] Mathews and Yates[37] used epidurography to demonstrate the ability of SMT to reduce disc herniation. Chrisman,[10] on the other hand, was unable to document changes in pre- and postmanipulative myelographs. He does report that rotary manipulation of the trunk administered during laminectomy was observed to cause a separation of the adjacent laminae, increasing the IVF visibly.[10] White and Panjambi[56] state that regardless of the manipulative maneuver, only six resultant directions of movement are possible. The implication that all manipulations have the same effect on the spine is incorrect. While it is true that individual vertebrae can only move in three of six possible directions, not all manipulations affect regional spinal dynamics equally. Specific chiropractic manipulations can alter cervical hypolordosis,[35, 44] lumbar scoliosis,[26, 42, 44] and the relationship of the pelvic bones to the sacrum and spinal axis.[44] True plane* radiographic procedures have documented predictable and reproducible postmanipulative changes after specific manipulations that do not commonly occur with general mobilization-type manipulations[42] (Fig. 1). It is wrong to assume that all manipulations affect the spine similarly. To state that manipulation is limited in its effect on six possible directions of movement is a simplistic idea. Spinal manipulations have been claimed by chiropractors and osteopaths to influence the nervous system. There is some literature that suggests that SMT can alter EMG, SEP, EGG, and plethysmographic recordings.†

Discussion

Many medical practitioners have raised specific questions to me concerning SMT and chiropractic services. The most frequent inquiries include 1) How do we know that spinal manipulative therapy is effective in the treatment of low back pain? 2) Are the empirical results obtained by chiropractors and other spinal manipulators due to the treatment or to a placebo effect? 3) Is the physical contact between doctor and patient or some other doctor-patient interaction responsible for clinical successes found in chiropractic care? 4) What objective evidence is there to support the use of chiropractic services? 5) How does chiropractic care compare with the care delivered by medical manipulators? and 6) How safe is SMT?

It was these questions that prompted me to critically review the literature on SMT. Rarely in the course of scientific investigation has a therapy been so overwhelmingly demonstrated to have therapeutic benefits. Virtually no literature source reported SMT to lack

* References 10, 14, 16, 17, 19, 29, 32, 39, 60.

† References 7-9, 23-25, 32, 43.

* True Plane Radiographic Procedures are designed to eliminate distortion of radiographic images. REF. Pettibone.

† References 20, 48, 52, 53, 57-59.

clinical value. Every author reports at least a temporary reduction of pain in patients after they received SMT. This surprised even most chiropractors who reviewed this manuscript. The literature clearly supports what has been known in chiropractic for nearly a century. SMT can easily correct many problems that were unamendable by other forms of physical treatment.[27, 40] SMT appears to be the most potent treatment for low back pain currently available. The variations in percentages of patients responding favorably to SMT and to the durations of their symptoms reported in the literature may be explained by differences in expertise of the investigators or variations in treatment frequency. Both of these factors are known to affect the outcome of SMT in low back pain.[23, 36] The second obvious therapeutic property of SMT is its ability to accelerate the resolution of low back pain. It is unimaginable that any treating physician would not consider this an outstanding therapeutic property.

The placebo effect does not seem to explain the therapeutic effectiveness of SMT.[2, 21, 31] Although it is impossible to design a true placebo for SMT, all the authors report significantly more therapeutic results for their patients receiving manipulation than for the patients treated by the placebo they devised. Only Glover[21] reports that this effect was not lasting. His methods may be questioned (see above). The fact that a true placebo for SMT may never be discovered is inconsequential because SMT has been compared directly with established modalities commonly used by established medicine. From these studies it can be concluded that SMT is the most effective treatment for low back pain, PT is less effective, and bed rest and analgesics offer little benefit above no treatment at all.*

The literature clearly demonstrates that SMT is safe when performed by a manipulative specialist. The only significant reports of injury occurring in a controlled clinical setting are associated with MUA.[28, 54] Because no significant superior clinical effects were observed using these procedures, their risks outweigh their benefits. Furthermore, in no controlled trial of manipulation not utilizing anesthesia or chemotherapeutic adjunct were deleterious side effects reported. Contentions that SMT can produce catastrophic side effects are empirical, and no direct cause-and-effect relationship can be documented. Kleynhans[34] cites 23 published reports of postmanipulative sequelae. Of these apparent side effects, only five are claimed to have resulted from chiropractic manipulations. The remaining 18 were at the hands of medical practitioners.[34] Kleynhans cites Mainge on the safety of SMT: "One death out of several tens of millions of manipulations is a possibility." Furthermore, examination of 10,000 cases spanning 15 years shows not a single undesirable side effect.[34] Injuries, if they can be attributed to SMT, are thought to be a result of inexperienced manipulators substituting brute force for proper technique.[34]

The hypothesis that the laying on of hands is responsible for patients subjectively stating improvement after manipulation is rejected by controlled clinical investigation.[5, 29] There is objective radiographic evidence that demonstrates that specific spinal manipulative maneuvers can alter both aberrant dynamic* and postural mechanic† of the spine.

How do chiropractors compare with their medical counterparts for the treatment of low back pain? Epidemiological and sociological studies suggest that chiropractors are at least as effective as medical doctors in a clinical comparison, and are probably superior to the medical doctors for cost efficiency.[1, 3, 33] In the largest study of low back pain reported, involving over 3000 patients in the Static Medical Clinicals of Italy, 85% of the patients treated by chiropractors were judged to be improved by medical evaluators.[20] A similar study is currently under way in Egypt. This figure compares favorably with the success rates claimed by most chiropractors. Most procedures used by chiropractors are similar to those used by practitioners of physical medicine. Some of the manipulations employed by chiropractors elicit predictable postural changes that do not occur with the use of the commonly employed medical manipulations.*

Conclusions

Spinal manipulative therapy as performed by chiropractors can no longer be accused of being unscientific or untested in controlled investigations. There is objective evidence demonstrating both biomechanical and physiological effects of SMT. Independent investigators suggest that chiropractors are at least as competent as medical doctors in the treatment of musculoskeletal disorders and are more cost efficient. Adverse side effects have not been demonstrated in controlled clinical trials. The empirical evidence suggesting SMT to be dangerous seems to be associated with predominantly medical manipulators. In the treatment of musculoskeletal dysfunction, when the goals of therapy are rapid reduction of pain and restoration of function, the literature strongly suggests that chiropractic manipulative therapy is the treatment of choice. ■

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Radiographic Perspective

By Edward L. Maurer, D.C., D.A.C.B.R.

There is an old saying which states that "you cannot legislate morality"; I would add that it is also near impossible to legislate professional responsibility to the patient.

This issue presents itself perhaps more frequently in roentgenology than in any other area. The reasons, centering around unnecessary exposure to potentially harmful ionizing radiation, the monetary cost factor, and the sometimes lack of significant demonstrated clinical need in many cases, are indeed subject to debate.

Little doubt remains in the minds of our practitioners that x-ray is one of our more important diagnostic tools. What does seem