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CASE REPORTS

Chiropractic Treatment of Postsurgical Neck Syndrome With Mechanical Force, Manually Assisted Short-Lever Spinal Adjustments

Bradley S. Polkinghorn, DC,[a] and Christopher J. Colloca, DC[b]

ABSTRACT

Objective: To describe a case of postsurgical neck pain, after multiple spinal surgeries, that was successfully treated by chiropractic intervention with instrumental adjustment of the cervical spine.

Clinical Features: A 35-year-old woman had chronic neck pain for over 5 years after two separate surgeries of the cervical spine: a diskectomy at C3/4 and a fusion at C5/6. Surgeries were performed 6 months apart in an attempt to resolve persistent neck pain and spasm of the cervical musculature. Neither surgery was effective in relieving the patient's pain. Five years after the second surgery, a third surgery was recommended by the patient's physicians to alleviate the chronic pain. The patient sought chiropractic evaluation of her condition to avoid further surgical intervention.

Intervention and Outcome: The patient was treated with conservative instrumental chiropractic manipulation, consisting of mechanical force, manually assisted short-lever spinal adjustments rendered with an Activator Adjusting Instrument (AAI) II . She comfortably tolerated the treatment and responded favorably to this therapy. All chronic symptoms had resolved within 30 days of instituting the chiropractic intrumental adjustments with an AAI. More interestingly, longitudinal examination over the next 2 years showed that the patient experienced no residual effects or further recurrences of her previous chronic problem after her initial course of chiropractic care.

Conclusion: Chiropractic treatment of postsurgical neck syndrome may be effectively treated, in certain cases, by mechanical force, manually assisted adjusting procedures with an AAI. The use of instrumental adjustment methodology may provide chiropractic physicians with an effective alternative to manual manipulation in those cases in which the patient's surgical history or presenting symptoms make forceful manipulation of the spine, particularly performed at end range, inappropriate. This approach may be contemplated by physicians faced with managing this type of condition. Further study should be made in this regard, in an academic research setting, to determine the safest and most effective approaches to managing postsurgical patients in a chiropractic setting. (J Manipulative Physiol Ther 2001;24:589-95)

Key Indexing Terms: Arthrodesis; Cervical Spine; Chiropractic; Manipulation; Surgery; Spinal Fusion; Pain

INTRODUCTION

Evaluation and treatment of the patient with failed back surgery syndrome (FBSS) is not uncommon in today's chiropractic practice. The chiropractic profession is involved in caring for a significant number of patients with FBSS.[1] FBSS is a serious health care problem, with the worldwide failure rates for spinal surgery reported to range from 25% to 40%.[2-5] The patient with FBSS is a frequent user of health care services because large numbers of these patients require care.[6] In addition, patients with FBSS are more prone to experience spinal problems than the general population.[7] Because the success rate of reoperation on FBSS is low,[8,9] these patients often seek out chiropractic evaluation and treatment in an attempt to resolve their chronic conditions. The prevalence of these types of patients in the primary care chiropractic practice has been found to be above the anticipated level in the general public.[1]

Although the literature has a limited amount of information regarding the role of chiropractic in treating FBSS, appropriate and carefully performed manual manipulation of the spine has been used to care for many of these patients.[1] However, depending on the nature and extent of the previous surgery, forceful high-velocity, low-amplitude (HVLA) manual manipulation, particularly performed at end range, may present an unwanted risk of aggravation or be completely inappropriate from the outset because of the severity of the patient's presenting pain and underlying structural weakness.[10] Instrumental chiropractic adjustment may offer an appropriate and effective therapeutic approach in certain types of these cases because of the low-force, location-specific nature of the manipulative thrusts that can be delivered to the spine with a hand-held adjusting instrument.[11,12]

[a]Private practice of chiropractic, Santa Monica, Calif.
[b]Postgraduate and Continuing Education Department Faculty, New York Chiropractic College, Seneca Falls, NY, and private practice of chiropractic, Phoenix, Ariz.
Submit reprint requests to: Bradley S. Polkinghorn, DC, 901 Montana Ave, Suite A-West, Santa Monica, CA 90403.
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Fig 1. *Lateral cervical radiograph postsurgical spine shows loss of normal cervical lordotic curve, with concomitant retrolisthesis of C4 and anterolisthesis of both C2 and surgically fused block of C5/6. Marked intervertebral disk degeneration with spondylosis affecting C3/4 motion unit (segmental level of previous diskectomy) is evident, along with intervertebral disk thinning and minor spondylotic changes exhibited at C6/7.*

This article presents an instrumental method of spinal manipulation to be considered in such cases: mechanical force, manually assisted (MFMA) short-lever chiropractic adjustments delivered with an Activator Adjusting Instrument (AAI) II (Activator Methods International, Ltd, Phoenix, Ariz). The AAI (commonly known as the Activator) is one of the most extensively studied modalities in the chiropractic profession. As such, there is a relative abundance of related articles in the literature.[13] The instrument itself, as well as the physics of its adjustment-thrust profiles, has been previously described in the literature.[12-25] It is used by over 50% of practicing chiropractic physicians in the United States,[26] by 14% in Europe,[27] and, interestingly, by over 70% in Australia and New Zealand[28] as part of their therapeutic treatment program. Although use of the AAI in successfully treating disorders of the cervical spine has been previously reported in the literature,[29-32] this article appears to be the first to describe its use in the treatment of the postsurgical cervical spine.

CASE REPORT

A 35-year-old accountant presented for chiropractic evaluation and treatment. She described a 15-year history of neck pain that had initially been characterized by recurring bouts of mild to moderate pain affecting the neck and shoulders. Approximately 6 years earlier, however, more consistent symptoms had begun to develop. The neck pain gradually became severe, was burning in character, and was accompanied by pronounced spasms of the cervical musculature. The intensity of the pain and myospasm was severe enough to hinder both work and leisure activities. The pain gradually became so severe that she was confined to bed. When a 6-month conservative course of analgesics, anti-inflammatory drugs, and physical therapy failed to provide relief, the patient consented to a diskectomy at the C3/4 level. The pain persisted after the surgery, however, and the patient remained essentially confined to bed because of the severity of her symptoms. After "waiting it out" for another 6 months, she underwent a spinal fusion at the C5/6 segmental level. Unfortunately, the patient's pain persisted after the second surgery as well, and she remained confined to bed, for the most part, for another 12 months.

At that point, the patient began a course of physical therapy, which helped resolve the pain to the point that she was able to leave the bed for the first time in 2 years. She returned to work, but her chronic neck pain persisted, and she remained vulnerable to severe spasmodic episodes of the cervical musculature that would cause the neck to completely "lock up" for days at a time. The patient went about her daily activities with extreme caution for fear of setting off another episode; she was very vulnerable to flare-ups caused by sudden or unexpected movements of the neck. Activity aside, she also began to experience severe symptoms preceding and during periods of damp or wet weather. The exacerbations would begin 24 hours before the inclement weather and would last until the weather cleared. These flare-ups were severe enough to confine her to bed.

As the weather-related episodes increased in frequency and severity, the patient became despondent over her persisting condition. She returned to her previous physicians for help. After assessing her current status, the surgeons recommended a third cervical surgery (fusion of the C3/4 motion segment) to stabilize the patient's condition. At this time she elected to seek chiropractic evaluation of her disorder.

At the time of her presentation for chiropractic assessment, the patient was still in the midst of a severe flare-up caused by inclement weather. She reported severe pain, burning in character, affecting both sides of the neck, particularly the left, and extending down the left side of the upper back. Because of the severity of the exacerbation, the patient was unable to demonstrate any appreciable range of motion of the cervical spine. Any attempt at movement resulted in marked splinting spasm of the cervical musculature, which brought the patient to tears.

Palpatory examination revealed severe bilateral paravertebral myospasm from C1 through T6, accompanied by extreme tenderness to digital pressure over the left lateral aspect of the corresponding vertebrae. Because the severity

of the exacerbation, positive findings were exhibited on a number of orthopedic tests, including foraminal compression, Soto-Hall test, O'Donoghue maneuver, and Valsalva's maneuver. Cervical distraction did relieve the patient's symptoms somewhat. Physiologic reflexes of the upper extremities were intact. Normal sensory perception to the Whartenberg pinwheel was apparent; however, a half-inch atrophy of the right forearm was noted. Psychologically, the patient was distraught over the severity of her condition and the possibility of facing a third spinal surgery.

Radiologic examination of the spinal column showed a loss of the normal cervical lordotic curve, with concomitant retrolisthesis of C4, accompanied by anterolisthesis of both C2 and the surgically fused block of C5/6. Marked intervertebral disk degeneration with spondylosis was evident at the C3/4 segmental level, with intervertebral disk thinning and minor spondolytic changes exhibited at C6/7 (Fig 1). Views of the lumbopelvic girdle were unremarkable, except for a slight (⅛ in) deficiency of the left femoral head, in comparison to the right. No pelvic tilting or obliquity was apparent.

Although magnetic resonance imaging would have been helpful to elucidate the precise status of the cervical soft-tissue structures, the patient wanted to attempt an initial course of conservative treatment before pursuing any further diagnostic measures. After a discussion with the patient, we agreed to proceed with chiropractic evaluation and treatment, on a trial basis, to determine whether an improvement could be achieved through the use of conservative chiropractic management.

Chiropractic evaluation, with tests and isolation procedures developed by Fuhr and others for the detection of neurologic facilitation/subluxation,[21,33-39] revealed a half-inch difference in leg length on the left, along with a concomitant involvement of the ipsilateral sacrum, ilium, and the seventh and second cervical vertebrae. The specific pattern of subluxation was as follows: left anteroinferiority of sacral base ($-\theta Y$, $-\theta Z$), posterior-inferior rotation of the left ilium ($-Z$, $-\theta X$), left rotational body subluxation of C7 ($+\theta Y$), and a contralateral body rotation of C2 ($-\theta Y$).

Because of the patient's extreme tenderness to pressure anywhere near the cervical spine, HVLA manual manipulation of the spine was not considered a viable option for initial chiropractic treatment. The patient was unable to tolerate any forceful rotary manipulation of the cervical spine in her presenting condition. In its place, MFMA short-lever chiropractic adjustments were rendered with an AAI (Fig 2). Adjustment was made to the cervical spine with the patient in the prone neutral position in an effort to avoid aggravation of the segmental area of surgical fusion.

Segmental contact points and lines of drive, generally opposite those of subluxation, were delivered after positive isolation testing procedures. Follow-up isolation testing procedures were performed after the adjustment as an indicator of rationale of benefit. Leg length inequality was observed to resolve after the indicated adjustive procedures. These procedures were the same as those specified in the adjusting protocol for Activator Methods Chiropractic Technique.[35]

Fig 2. *MFMA short lever adjusting procedure is rendered to the cervical spine with AAI. Line of drive is generally opposite that of subluxation. This AAI configuration includes conical-shaped mass attached to stylus designed to improve the frequency response of the adjustment.*[35]

No therapeutic intervention, other than MFMA spinal adjustments with an AAI used according to protocol, were used in the management of this case.

Treatment was initiated at a frequency of 3 times per week. The patient tolerated the treatment very well and experienced no pain during its application. The patient demonstrated a favorable response to treatment within the first week of MFMA adjusting. At the end of 1 week, the acute exacerbation had resolved, and the patient reported that she was feeling the best she had in weeks. After 1 month of sustaining treatment, virtually all of the previous chronic neck pain had resolved. In spite of rainy weather occurring at the time, she experienced none of her previous weather-related flare-ups. On re-examination 2 months after instituting treatment, the patient was pain-free and the observable cervical range of motion had improved to near normal. The patient was able to resume strenuous physical activities that she had previously avoided, such as skiing, jogging, and vigorous exercise. The frequency of the patient's treatment was reduced throughout the course of her care as improvement progressed. She was treated over an 8-month period, during which she had several slight episodes of pain, usually as a result of engaging in strenuous physical activity. All exacerbations were quickly resolved with subsequent MFMA chiropractic adjustments. She was dismissed from further active care after receiving 30 treatments over an 8-month period.

Longitudinal follow-up of the case over the subsequent 2 years showed that the patient's chronic neck problem had completely resolved without any residual symptoms, weakness, or need for further spinal surgery. The previously noted atrophy of the right forearm had resolved as well. She was able to lead a normal active life, both physically and professionally, with no limitations imposed as a result of her previous neck problem. She expressed satisfaction with the outcome of her previous care, as well as with being able to avoid further spinal surgery.

Table 1. Reasons for postoperative pain or radiculopathy[8]

Table available in print only

Image available in print only

Fig 3. *Referred pain map showing overlapping scleratogenous somatic pain arising from the zygapophyseal joints (Reproduced with permission from Dwyer A, Aprill C, Bogduk N. Cervical zygopophyseal joint pain patterns 1: a study in normal volunteers. Spine 1990;15:453-7).*

DISCUSSION

Resolution of chronic postsurgical neck pain and dysfunction by means of the conservative chiropractic care observed in this case is an encouraging outcome. Most obvious is the positive outcome of symptomatic and functional resolution of the patient as well as her return to normal activities of daily living. The avoidance of subsequent surgical intervention is also of great significance. Noteworthy is the understanding that the success of arthrodesis and clinical outcome is more difficult when performed adjacent to a prior fusion.[40] Based on her experience with previous surgical intervention, it is understandable that the patient sought alternative conservative measures rather than a third cervical spinal surgery.

The numerous reasons for recurrent symptoms after spinal surgery are outlined in Table 1. Kinematic evaluations of the cervical spine in patients with postsurgical fusion indicate that an alteration in the biomechanical behavior of adjacent functional spinal units is likely responsible for a degenerative fate.[41] Instantaneous centers of rotation have been found to shift anteriorly with flexion/extension movements of the cervical spine in patients undergoing fusion for cervical disk degeneration as compared with controls.[42] Altered function in adjacent cervical spinal segments have also been reported by Matsunaga et al.[43] They discovered abnormally high strains in cervical intervertebral disks postoperatively and noted accompanying herniation in some disks after anterior cervical decompression and fusion for herniation. Shifted centers of rotation have been found not only to be indicative of dysfunction but to be a cause of neck pain as well.[44]

Symptomatic adjacent-segment disease may affect more than one-fourth of all patients within 10 years after an anterior cervical arthrodesis.[45] Retrospective evaluations of patients who have undergone cervical spinal fusion indicate an increased rate of degenerative disease at the levels immediately adjacent to the fusion.[46-48] Other studies have demonstrated a 9% incidence of symptoms attributable to another level that may require a subsequent surgery.[49] Such information suggests avoidance of repetitive cervical spinal surgery whenever possible and provides insights into the possible etiology of the patient's presenting symptoms.

The progressively worsening neck and shoulder pain accompanied by burning and severe neck spasm are most likely attributable to nociceptive afferent stimulation in the discoligamentous soft tissues of the cervical spine, including the zygapophyseal joints. Although the most implicated source of post-traumatic chronic cervical neck pain is the zygapophyseal joints,[50-52] the cervical intervertebral disks and cervical musculature have also been implicated as pain generators as well.[53-57] Figure 3 demonstrates the referred pain patterns from the lower cervical zygapophyseal joints to the upper thoracic spine, consistent with the patient's presentation. Cervical discogenic or muscular pain would be likely to cause similar patterns because of the nature of the neurologic pathways responsible for such a referred distribution. Abnormal mechanical loading and altered kinematics of the postsurgical spine through mechanical and inflammatory means are a reasonable explanation for the stimulation of nociceptive afferent units that ultimately lead to pain recognition,[58] as witnessed in this case.

On physical examination, including palpation to the cervical spine, mechanical pressure reproduced the presenting symptoms consistent with hyperalgesia (abnormally intense pain produced by normally painful stimuli) from underlying nociceptive sensitization.[59,60] Hyperalgesia has been found to amplify protective muscular reflexes and promotes immobilization of the injury.[59] This may also help to explain the patient's inability to move her neck without severe pain "bringing her to tears." Of further interest was the worsening of the patient's symptoms with weather changes. Changes in weather sensitivity have been observed in patients with chronic pain.[61] One of the many possible explanations is that such nociceptive excitability may be stimulated by changes in barometric pressure or temperature, reflecting underlying peripheral nociceptive or central sensitization.

In this case, the chiropractic intervention of choice was MFMA short-lever spinal adjustments with the AAI. Activator Methods Chiropractic Technique[35] includes a protocol known as *isolation testing* in which the patient is asked to perform specific active range of motion tests while the observer monitors any changes in leg alignment reactivity. Changes in leg alignment reactivity are supposedly indicative of underlying alterations of muscular reflexes associated with neurologic facilitation/subluxation in this methodology. Although preliminary studies have begun to investigate this phenomenon,[38] it has not been subject to scientific scrutiny and remains unvalidated.

MFMA spinal adjustments are delivered to the patients' cervical spine while the patient is in the prone neutral position. The AAI provides a controlled means of delivering high-velocity thrusts to the patient without having to rotate the spine in the treatment delivery. As observed in this case, cervical range of motion reproduced severe pain during the physical examination. Therefore, the choice of treatment by MFMA adjusting provided a useful alternative to HVLA manipulation in this case and may also prove useful in similar cases in the future.

Rapid distraction of the functional spinal unit as applied in spinal manipulation is hypothesized to release entrapped synovial folds, relax hypertonic muscles, disrupt articular or periarticular adhesions, and unbuckle functional spinal units that have undergone disproportionate displacements.[62] Although evidence has yet to substantiate these concepts, concomitant neuromuscular reflex responses associated with spinal manipulation are promising factors associated with both traditionally applied manual and MFMA interventions[25,63-66] because afferent stimulation has been attributed to nociceptive inhibition.[67] Such responses are thought to originate from stimulation of mechanosensitive afferents in the discoligamentous and muscular soft tissues of the spine on distraction[68] or other mechanical stimulation.[69]

Reflex effects associated with spinal manipulation have not been found to be related to the magnitude of force application or the presence of an audible joint cavitation but rather the rate at which the force is applied.[70] In this regard, MFMA spinal adjustments may serve as effective as the more forceful, manually delivered HVLA adjustments of the cervical spine.[71] Indeed, several recent pilot studies comparing the clinical outcomes of both MFMA and HVLA chiropractic adjusting techniques have found the two to be equally effective in relief of pain.[20,23,71] Research has begun to investigate the functional effects of spinal manipulation in terms of influencing the musculoskeletal system and functional patient outcome.[66,72] Resolution of this patient's symptoms and the return of functional status after chiropractic intervention are most encouraging in this regard. Further research is required to investigate the nociceptive inhibitory effects of spinal manipulation or chiropractic adjustment and its role in improving patient clinical status.

CONCLUSION

Chiropractic physicians are often called on to treat postsurgical neck and back symptoms. Appropriate and carefully performed manual manipulation has been reported to help in many of these cases.[1] However, depending on the nature and extent of the previous surgery, forceful HVLA manual manipulation performed at end range may present an unwanted risk of aggravation or be completely inappropriate from the outset because of the severity of the patient's presenting pain and underlying structural weakness.[10] Chiropractic treatment of postsurgical neck syndrome may be effectively implemented, in certain cases, by using MFMA adjusting procedures with an AAI. The use of instrumental adjustment methodology may provide chiropractic physicians with an effective alternative to traditional HVLA manual manipulation in those cases in which the patient's surgical history or presenting symptoms make forceful manipulation of the spine, particularly performed at end range, inappropriate. Conservative MFMA methodology may therefore be considered by physicians faced with managing these types of conditions.

As with any form of chiropractic management of the patient with FBSS, MFMA adjusting methodologies are directed toward the treatment of the concomitant vertebral subluxations that may adversely affect spinal stability. Chiropractic adjustments are therefore not a generic treatment for all forms of FBSS, and each patient must be screened selectively to determine those who may best respond to chiropractic intervention. Further study should be made in this regard, in an academic or clinical research setting, to determine the safest and most effective approaches to managing postsurgical patients in a chiropractic setting.

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