Chiropractic management using Cox cervical flexion-distraction technique for a disk herniation with left foraminal narrowing in a 64-year-old man

Allen M. Manison DC, DACBSP, CSCS*

Chiropractor, Private Practice, Columbia, MD

Received 11 January 2011; received in revised form 24 March 2011; accepted 30 April 2011

Key indexing terms:

Spinal stenosis;
Manipulation,
Chiropractic;
Radiculopathy;
Nerve compression
syndromes;
Neck pain

Abstract

Objective: The purpose of this case report is to describe chiropractic management of a patient with a C6/C7 left posteromedial disk herniation with foraminal narrowing and concomitant neurological compromise in the form of left upper extremity radiating pain and hypoesthesia/anesthesia using Cox flexion-distraction technique.

Clinical Features: A 64-year-old man presented to a chiropractic clinic with complaints of neck/left shoulder pain and hypoesthesia/anesthesia into the palmar side of his left hand. Magnetic resonance images of the cervical spine revealed a left posteromedial C6/C7 disk herniation along with foraminal narrowing. In addition, there were other levels of degeneration, most noted at the C3/C4 spinal level, which also had significant left-sided foraminal narrowing.

Intervention and Outcome: Treatment included Cox flexion-distraction protocols aimed to reduce nerve root compression along with supportive physiological therapeutic interventions to aid with pain reduction and functional improvement. The patient was treated a total of 10 times over a course of 4 weeks. The patient reported being pain-free and fully functional 8 months following the conclusion of care.

Conclusion: This case study demonstrated the use of Cox flexion-distraction for treatment of a patient with a cervical disk herniation, foraminal narrowing, and associated radiating pain and radiculopathy in the left upper extremity.

© 2011 National University of Health Sciences.

Introduction

Cervical radiculopathy is compression of exiting nerve root(s) by various tissues such as disk herniation or arthritic change, which usually presents as pain or abnormal sensations along a dermatomal distribu-

* 8835 Columbia 100 Pkwy, Suite D, Columbia, MD 21045.
Tel.: +1 410 964 3229; fax: +1 410 964 9671.
E-mail address: dmanison@yourchiropractor.net.

tion. It peaks in the fourth and fifth decades of life and has an annual incidence of 2.1 per 1000.¹ Conservative treatment, including chiropractic, is used primarily^{2,4-8,16,22,23}; but for those who do not respond, surgery is an option.³

Cox flexion-distraction is a chiropractic joint manipulation/mobilization technique that can be applied to patients with cervical radiculopathy. At this time, however, there are only 4 case studies and 1 retrospective study addressing Cox flexion-distraction and cervical spine disorders.⁴⁻⁸ In contrast, Cox flexion-distraction has more extensive representation in the literature for the treatment of low back pain. One study compared the short-term results of Cox flexion-distraction and physical therapy, and 2 follow-up studies evaluated the long-term outcomes for low back pain.⁹⁻¹¹ The first study demonstrated improvement in chronic low back pain with the Cox flexion-distraction technic.⁹ The 2 follow-up studies showed the following 1-year outcomes: (1) compared with the physical therapy group, the Cox flexion-distraction group required far fewer visits to health care providers¹⁰; and (2) Cox flexion-distraction was more effective than physical therapy in reducing pain.¹¹

This case study describes the chiropractic management of a patient with cervical disk herniation with concomitant radiating pain in the left upper extremity and hypoesthesia/anesthesia in the palmar side of the left hand.

Case report

A 64-year-old African American presented on March 5, 2010, for evaluation of upper back and lower neck pain with left upper extremity radiating pain and hypoesthesia/anesthesia symptoms in the palmar side of the left hand. His pain began on October 7, 2009, when he was stretching, originating in the upper back and lower neck. Over the course of 2 months, the pain spread to his left shoulder and then began radiating down his left arm to the elbow. Below the elbow, he experienced at times both hypoesthesia and anesthesia into the median and ulnar nerve pathways of his left hand. The patient visited his primary care physician on November 12th and was prescribed analgesics and muscle relaxants, which did little to alleviate his symptoms. He was also referred to physical therapy, which he began on November 27th. He tried physical therapy for 4 weeks. He stated that it did not give him any relief and that he experienced increased pain. By

this time, the patient was frustrated; and he began a course of acupuncture on December 12th. He also tried herbal therapy. Neither of these treatments helped him. The patient again visited his primary care physician (on December 30th) who ordered a shoulder radiograph and cervical spine magnetic resonance imaging (MRI). The shoulder radiograph revealed some degenerative changes, but the cervical spine MRI revealed degenerative changes and disk pathology that were consistent with the patient's symptoms.¹² He finished his course of acupuncture on February 16, 2010. Without relief for his condition, he returned one final time to his primary care physician (February 23rd); and it was at this time that he was referred for chiropractic care.

At the initial chiropractic visit on March 5, 2010, the patient reported the pain as 3 to 4 out of 10 (with 10 being the worst). He complained of pain in the left upper extremity, worst in the left shoulder blade and left lower cervical spine. He described the pain as dull; continuous; and, at times, throbbing. He complained of "tingling" and "numbness" in the palmar portion of his left hand. He stated that, many times, he was unable to get comfortable while at work and that his work involved sitting at his computer for long periods of time. Exacerbating factors included shoveling snow and poor postural patterns. Relieving factors included only lying on his back.

Examination and palpation revealed moderate spasm of the upper trapezius and levator scapulae musculature. The rhomboid muscles also exhibited some mild/moderate spasm. Moderate tenderness was elicited with palpation of the cervicothoracic junction bilaterally. Cervical spine ranges of motion revealed decreased left axial rotation (60°). Flexion, extension, bilateral lateral flexion, and right axial rotation were all within normal limits. Pain was produced in the left side cervical spine and left shoulder with flexion, right lateral flexion, and left lateral flexion. Neurological testing revealed intact and normal biceps, brachioradialis, and triceps reflexes. Muscle testing did not reveal any weaknesses. Orthopedic testing revealed a negative result in the foraminal compression test, and the Valsalva maneuver result was negative. Distraction test produced cervical spine pain, as did shoulder depression test on the left (pain was on the left).

The cervical spine MRI involved sagittal T1-weighted images, sagittal and axial T2-weighted images, and fat-saturated sagittal T2-weighted images. The images revealed a C6/C7 posteromedial (paracentral) disk herniation along with notable left foraminal narrowing. Level C3/C4 also demonstrated significant degenerative and arthritic changes that abut

Fig 1. A T2-weighted sagittal image of the cervical spine. Most visible are the C3/C4 and C6/C7 disk space pathologies. Although C3/C4 exhibits foraminal narrowing (the left is worse), the C6/C7 level has the disk herniation that is consistent with the patient's complaints.

the ventral surface of the cord (Figs 1, 2, and 3). Although there was a noticeable amount of cervical spine degeneration apparent on the patient's MRI, history and physical examination suggested that the C6/C7 left paracentral disk herniation was the primary cause of the patient's left upper extremity radicular signs and hypoesthesia/anesthesia. The sixth (25%) and seventh (60%) cervical nerve roots are most often affected by disk herniation (usually for the younger population) and foraminal narrowing (usually for the

Fig 2. A T2-weighted axial image from the C3/C4 level. It is clear to see the increased arthritic changes on the left (reader's right), just off the midline.

Fig 3. T2-weighted sagittal cervical spine image with the level indicator on the C6/C7 disk level. The bottom right picture is the T2 weighted axial image of the C6/C7 level demonstrating the left side posteromedial disk herniation with left foraminal narrowing (on reader's right). (Color version of figure is available online.)

older population) in the cervical spine,¹³ and this correlates well with the finding in this case study (seventh cervical nerve root). It is also important to note that the severe arthritic changes at the C3/C4 level may have contributed to the patient's localized pain, given the degree of cord abutment; however, any disk pathology at this level would not directly influence movement at the C6/C7 spinal level¹⁴ and should not directly produce pain in the left upper extremity.

The treatment included chiropractic manipulation/mobilization using Cox technique. Cox flexion-distraction Protocol I involves treatment of the cervical disk herniation along with pain below the elbow. Protocol II

involves care for cervical disk herniations that do not present with pain below the elbow.¹⁵ To begin, the tolerance test, which involves holding each spinous process–transverse process segment for 4 seconds while applying gentle y-axis traction, was applied. The patient was asked if he experienced any pain in the neck, shoulder/arm, or thoracic region. He stated that he did not experience any increase in symptoms, so the technique application continued. Three repetitions of flexion at the C6/C7 level consisting of five 4-second flexion pumps were administered. Application was slow and controlled. Each movement involved headpiece flexion and distraction. There was a 15- to 20-second rest period between each set. The clinician's hand was in constant contact with the patient's neck during the entire treatment. There were no adverse reactions to this application.

Protocol I discusses movement with only y-axis traction, whereas Protocol II (treatment of the neck without pain below the elbow) mentions movements in all ranges of motion. In this case study, the technique application involved a combination of Protocols I and II. Cox flexion-distraction headpiece movements involved flexion and distraction along with left movements (left lateral flexion and left circumduction).

Fig 4. Cox flexion-distraction demonstrating patient in flexion, distraction (y-axis), and left lateral flexion.

The lateral flexion was performed while the table was in flexion and distraction (Fig 4).

The patient was treated a total of 10 times from March 5, 2010, to April 9, 2010. Treatment consisted of Cox flexion-distraction Protocols I and II for the C6/C7 left paracentral disk herniation (visits 1 through 9); static axial decompression traction with flexion and left lateral flexion (first visit only, for 20 minutes); Active Release Techniques of the upper trapezius, levator scapulae, serratus posterior superior, and rhomboids musculature; chiropractic diversified manipulation to the left side C6/C7/T1 spinal joint complexes as well as to the upper and midthoracic spine bilaterally; Graston Technique to the cervical spine (fifth through seventh visits); and therapeutic exercises to help with poor postural patterns (eighth through 10th visits).

After the first 3 treatments (March 5th, 10th, and 12th), the patient noted minimal change in his symptoms. However, after his fourth through sixth visits (March 19th, 24th, and 26th), he reported improvement in his left shoulder/arm and a reduction in the left hand hypoesthesia/anesthesia. Of note, on his seventh visit (March 31st), the patient stated that he was no longer having any pain in his left arm and the left hand had normal sensation; however, he did complain that his left hand was getting swollen because of an acute gout attack.

Over his eighth and ninth visits (April 2nd and 7th), progress continued to be “slow and steady” per the patient; and therapeutic exercises were introduced. These included the Brugger exercise for proper seated posture, as well as various exercises to facilitate the lower and middle trapezius and strengthen the rhomboids and latissimus dorsi. The patient's 10th treatment of this condition was on April 9th. He reported “feeling good” and that his shoulder was only sore because of the exercises. On this final visit, exercises for the rear deltoids and serratus anterior were added. Bronfort et al¹⁶ have shown that strengthening exercises in combination with spinal manipulation are more beneficial to patients with chronic neck pain than spinal manipulation alone.

There was no further contact with the patient until December 16, 2010, when he returned with a different chief complaint. This condition was unrelated to his original complaint from March 2010. The patient confirmed that his neck and left upper extremity radiculopathy signs remained completely resolved following his course of chiropractic treatment in March/April 2010. The patient provided consent for the publication of this report.

Discussion

There are various approaches to cervical disk herniations and associated pain. Medical interventions consist primarily of analgesics, muscle relaxants, injections, and surgery. The Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders reviewed all literature from 1980 to 2006 related to neck pain alone or neck pain with radicular signs, in the absence of serious disease.¹⁷ It found no support for radiofrequency neurotomy, cervical facet injections, cervical fusions, and cervical arthroplasty for neck pain alone. It suggests that injection procedures and/or surgery should be used only in patients with severe impairments. However, epidural corticosteroid injections did lead to short-term improvements; but they have a minor adverse event rate of 5% to 20%. The neck pain literature in general shows both benefits¹⁸ and harms¹⁹ of cervical epidural injections in the management of chronic pain.

The same Task Force also evaluated nonmedical approaches to neck pain and its associated disorders. One hundred fifty-six articles from 1980 to 2006 were reviewed.²⁰ Results showed that manual therapy and supervised exercise interventions, low-level laser therapy, and perhaps acupuncture were more effective than no treatment, sham, or alternative interventions. Treatments aimed at regaining function tended to be more effective.²⁰ Accordingly, complementary therapy, including chiropractic, is a viable option for cervical pathology.

In this case study, the patient presented with left shoulder, arm, and neck symptoms that were found to be due to C6/C7 left posteromedial disk herniation. The patient's symptoms improved after treatment focusing on Cox flexion-distraction to the cervical spine. It is this author's belief that the improvement was due to disk reduction as a result of the flexion, distraction, left lateral flexion, and left circumduction movements, which may have created negative pressure and ultimately reduced the disk compression.

Support for this theory can be found by comparing the results of the Cox flexion-distraction protocol with that of the Bakody Sign orthopedic test. The test states that abduction and external rotation of the arm, along with placing the hand on the top of the head, decrease the symptoms associated with a disk herniation. According to Cox,²¹ symptoms decrease because this movement pulls the disk off of the nerve root. Importantly, the arm movements in the Bakody Sign test appear to mimic those of the Cox flexion-distraction protocols used in this case, specifically, the left-sided movements for the left

medial disk herniation at C6/C7. Therefore, it is proposed that the observed improvement in this case may be due to a reduction of disk pressure on the nerve root.

The effectiveness of multimodal treatment of neck pain has precedence in the literature. A small case series ($n = 3$) by BenEliyahu²² showed that chiropractic care, along with physiotherapy and exercises, helped resolve neck pain with upper extremity radiculopathy and radiating symptoms. More significantly, a larger case series ($n = 27$) by the same author showed improved subjective ratings and radiographic findings in patients receiving a combination of flexion-distraction, traction, chiropractic manipulation, physiotherapy, and rehabilitative exercises for cervical and lumbar disk herniations. Repeat MRIs revealed reduced size or completely resorbed disk material in 63% of patients. Furthermore, 80% of patients reported visual analog scores of less than 2; and 78% were able to return to their predisability jobs.²³

Before this case report, Kruse et al⁶⁻⁸ demonstrated a reduction in pain using the Cox flexion-distraction technique for numerous cervical spine conditions including spinal stenosis, cervical radiculopathy, Klippel-Feil syndrome, and disk herniation/degeneration. Further research should help validate Cox flexion-distraction as a noninvasive treatment option for cervical disk pathology with and without radiculopathy and radiating pain symptoms.

Limitations

The main limitation of this study is that multiple assistive modalities were used alongside the Cox flexion-distraction protocols. Although the Cox protocols were the most consistently and rigorously applied treatments, the presence of additional modalities may confound the conclusion that Cox flexion-distraction provided the greatest relief of symptoms.

Another limitation of this study is that only a single patient was reported and, therefore, the findings may not necessarily be generalizable to other patients. A case series and/or randomized clinical trials evaluating the efficacy of this novel treatment protocol for cervical spine disorders are warranted.

Conclusion

This case study showed successful treatment of a patient with confirmed cervical disk herniation with

radiating pain and loss of sensation. Cox flexion-distraction applied to the cervical spine, along with assistive modalities such as Active Release Techniques, Graston Technique, and therapeutic exercises, led to full recovery. Eight months after the final treatment, the patient remained pain-free and fully functional.

Acknowledgment

The author thanks Jennifer Hepps, MD, for her help with this manuscript and John Reeder, MD, FACR, for his help with the diagnostic imaging portion of this study.

Funding sources and potential conflicts of interest

No funding sources or conflicts of interest were reported for this study.

References

- Wainner RS, Gill GH. Diagnosis and nonoperative management of cervical radiculopathy. *J Orthop Sports Phys Ther* 2000;30:728-44.
- Whalen W. Resolution of cervical radiculopathy in a woman after chiropractic manipulation. *J Chiropr Med* 2008;7(1):17-23.
- Levine MJ, Albert TJ, Smith MD. Cervical radiculopathy: diagnosis and nonoperative management. *J Am Acad Orthop Surg* 1996;4(6):305-16.
- Gudavalli S, Kruse RA. Foraminal stenosis with radiculopathy from a cervical disc herniation in a 33-year-old man treated with flexion distraction decompression manipulation. *J Manipulative Physiol Ther* 2008;31:375-80.
- Schliesser JS, Kruse RA, Fallon LF. Cervical radiculopathy treated with chiropractic flexion distraction manipulation: a retrospective study in a private practice setting. *J Manipulative Physiol Ther* 2003;26:592-6.
- Kruse RA, Gregerson D. Cervical spinal stenosis resulting in radiculopathy treated with flexion-distraction manipulation: a case study. *J Neuromusculoskeletal System* 2002;10:141-7.
- Kruse RA, Imbarlina F, DeBono VF. Treatment of cervical radiculopathy with flexion distraction. *J Manipulative Physiol Ther* 2001;24:206-9.
- Kruse RA, Schliesser J, DeBono VF. Klippel-Feil syndrome with radiculopathy. Chiropractic management utilizing flexion-distraction technique: a case study. *J Neuromusculoskeletal System* 2000;8:124-31.
- Gudavalli MR, Cambron JA, McGregor M, Jedlicka J, Keenum M, Ghanayem AJ, et al. A randomized clinical trial and subgroup analysis to compare flexion-distraction with active exercises for chronic low back pain. *Eur Spine J* 2006;15:1070-82.
- Cambron JA, Gudavalli MR, McGregor M, Jedlicka J, Keenum M, Ghanayem AJ, et al. Amount of health care and self-care following a randomized clinical trial comparing flexion distraction with exercise program for chronic low back pain. *Chiropr Osteopat* 2006;14:19.
- Cambron JA, Gudavalli MR, Hedeker D, McGregor M, Jedlicka J, Keenum M, et al. One-year follow-up of a randomized clinical trial comparing flexion distraction with an exercise program for chronic low back pain. *J Altern Complement Med* 2006;12:659-68.
- Song KJ, Choi BW, Kim GH, Kim JR. Clinical usefulness of CT-myelogram comparing with the MRI in degenerative cervical spinal disorders: is CTM still useful for primary diagnostic tool? *J Spinal Disord Tech* 2009;22(5):353-7.
- Malanga GA. The diagnosis and treatment of cervical radiculopathy. *Med Sci Sports Exerc* 1997;29(7):236-45.
- Daffner SD, Xin J, Taghavi CE, Hymanson HJ, Mudiyan C, Hongyu W, et al. Cervical segmental motion at levels adjacent to disc herniation as determined with kinetic magnetic resonance imaging. *Spine* 2009;34(22):2389-94.
- Cox JM. Low back pain: mechanism, diagnosis, and treatment. 6th ed. Baltimore, MD: Williams and Wilkins; 1999. p. 261-72.
- Bronfort G, Evans R, Nelson B, Aker PD, Goldsmith CH, Bernon HA. Randomized clinical trial of exercise and spinal manipulation for patients with chronic neck pain. *Spine* 2001;26(7):788-97.
- Carragee EJ, Hurwitz EL, Cheng I, Carroll LJ, Nordin M, Guzman J, et al. Treatment of neck pain: injections and surgical interventions: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* 2008;15(33(4 Suppl)):S176-93.
- Benyamin RM, Singh V, Parr AT, Conn A, Diwan S, Abdi S. Systematic review of the effectiveness of cervical epidurals in the management of chronic neck pain. *Pain Physician* 2009;12(1):137-57.
- Lee HJ, Lee JK, Seo BR, Moon SJ, Kim JH, Kim SH. Spinal cord injury produced by direct damage during cervical transforaminal epidural injection. *Reg Anesth Pain Med* 2008;33(4):377-9.
- Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J, et al. Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *J Manipulative Physiol Ther* 2008;32((2) Supplement):S141-75.
- Cox JM. Neck, shoulder, & arm pain: mechanism, diagnosis, and treatment, 3rd ed. Fort Wayne, IN: Chiro-Manis, Inc; 2004. p. 201-2.
- BenEliyahu DJ. Chiropractic management and manipulative therapy for MRI documented cervical disk herniation. *J Manipulative Physiol Ther* 1994;17(3):177-85.
- BenEliyahu DJ. Magnetic resonance imaging and clinical follow-up: study of 27 patients receiving chiropractic care for cervical and lumbar disc herniations. *J Manipulative Physiol Ther* 1996;19(9):597-606.