Cox Decompression Manipulation and Guided Rehabilitation of a Patient With a Post Surgical C6-C7 Fusion With Spondylotic Myelopathy and Concurrent L5-S1 Radiculopathy

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Abstract

Objective: The purpose of this case report is to describe combined treatment utilizing Cox distraction manipulation and guided rehabilitation for a patient with spine pain and post-surgical C6-7 fusion with spondylotic myelopathy and L5-S1 radiculopathy.

Clinical features: A 38-year-old man presented to a chiropractic clinic with neck pain and a history of an anterior cervical spine plate fusion at C6-7 after a work related accident 4 years earlier. He had signs and symptoms of spondylotic myelopathy and right lower back, right posterior thigh pain and numbness.

Intervention and outcome: The patient was treated with Cox technique and rehabilitation. The patient experienced a reduction of pain on a numeric pain scale from 8/10 to 3/10. The patient was seen a total of 12 visits over 3 months. No adverse effects were reported.

Conclusions: A patient with a prior C6-7 fusion with spondylotic myelopathy and concurrent L5-S1 radiculopathy improved after a course of rehabilitation and Cox distraction manipulation. Further research is needed to establish its efficiency.

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Introduction

Patients commonly present with concurrent back and neck symptoms to conservative spine care practitioners. With numerous structures possibly responsible for symptomatology, identifying the pain generator is a

daunting task. Even if the cause seems to be clinically certain, open debate is still possible. Lower extremity findings may be related to or caused by cervical injuries.

Cervical spondylotic myelopathy is the most common disorder in the United States causing dysfunction of the spinal cord.¹ Cervical spondylotic myelopathy refers to impaired function of the spinal cord caused by degenerative changes of the cervical spine resulting in spinal cord compression.¹ Cervical myelopathy may reflect age-related changes, genetic

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predisposition, occupational and repetitive factors, or post-surgical changes. Treatment of patients with minor cord compression and myelopathy may occur in a chiropractic clinic, however surgery is the prevailing treatment. The prevalence of surgically treated cervical spondylitic myelopathy is estimated to be 1.6 per 100 000 inhabitants.² However, information on conservatively treated patients is lacking, and treatment protocols are not well identified. It has been reported that conservative treatment of cervical spine disc herniation patients without myelopathy respond better than surgically treated patients.³ However, no large-scale studies have been completed on conservative treatment of patients with myelopathy.

Manipulation is often utilized in conservative care of spine conditions and manual therapy has been used to treat both neck pain and back pain.⁴ Conservative treatment in spine care varies widely and there is little agreement on what defines conservative care, except for the absence of surgical intervention. Some suggest that conservative care may be a better and that surgery was no better than non-surgical patients.⁵ Another stated there was no clinical outcome difference between conservative and surgical treatment for cervical spondylitic myelopathy in a 64-patient randomized study over 10 years.⁶ Currently there is no evidence that outcome after surgery is better than the natural history or conservative therapy.

Radiographic or advanced imaging evidence of cord impingement or compression may be seen in asymptomatic people, thus it is unclear who may develop symptoms. There are no clear guides to the selection of patients who may benefit from the operation and there has been no standardization of preoperative evaluation, trials of conservative therapy, ascertainment of progressive disability, or assessment of outcome.⁷ These quandaries beg for further investigation.

There is little in the literature that describes the chiropractic care of patients who have previously had spine fusion. The purpose of this case study is to describe the conservative treatment of a post-surgical fusion with myelopathy and concurrent right L5-S1 radiculopathy utilizing Cox technique and rehabilitation.

Case Report

A 38-year-old male presented to a chiropractic clinic with neck pain and a history of an anterior cervical spine plate fusion at C6-7 after a work related accident 4 years earlier. He was referred from a physical medicine doctor who was his physician case manager. The patient had

neck, middle, and lower back pain of 4 years duration following working as a driver for a trucking company and while unloading boxes he was hit in the left neck and shoulder with 2 80-lb boxes. The impact knocked him to the ground. He was stiff and sore after the incident but did not go to the hospital for approximately 1 week. While driving a truck on a long trip, his pain became worse and he began to develop bladder and bowel issues with twitching and pulsing feelings into his legs. After presenting to the hospital, the examining doctors recommended surgery; however his workers compensation would not approve it. The working diagnosis at this time was cervical disc herniation with cord compression.

After 7 months, he was approved for surgery. The surgeons performed a cervical decompression and fusion at C6-C7. He completed post-surgical physical therapy, which focused on the cervical spine, with mild attention to the lumbar spine. The patient felt some relief but still had neck pain with a dull numbness in both hands. His low back continued to be painful and stiff and he had some bowel issues with chronic diarrhea and difficulty holding feces. He saw pain management specialists, an anesthesiologist, and physiatrists and received 2 epidural steroid injections and 1 nerve block. He was taking multiple medications including Duragesic patch 100 μ g; Percocet 10 325 mg, 4 per day, Baclofen 20 mg, 4 per day, and Parafon forte 500 mg. Since the patient thought there were no other medical options, he asked and was granted a chiropractic referral.

At the initial evaluation, he was on disability from Medicare. He had pain in his neck, mid back, and lower back. His pain diagram showed widespread stabbing and cutting pain in the neck with radiation down to fourth and fifth digits of both hands. He also had numbness, stabbing and cutting pain at the waistline with posterior thigh radiation, cramping and bilateral pins and needles sensations in both thighs to the knee. His pain was aggravated by sneezing, neck movement, lifting, bending, sitting, standing, and walking. He ambulated with the use of a cane and brace on his knee to help with his weakness. His rated his pain at 8/10 on a numeric pain scale.

Physical Evaluations

His appearance was a large-framed individual, with height of 6 ft 1 in, and weight of 260 lb. His coordination was poor, as he walked with a cane and wore a knee brace on the right side to prevent hyperextension. Upper extremity neurological signs included a positive Hoffman sign, which suggests an

upper motor neuron lesion from cord compression. Reflex testing of the biceps, brachioradialis, and triceps was within normal limits. Light touch, sharp/dull, vibration, and hot/cold were all normal. Strength testing to the upper extremity was all graded 5 out of 5. The patient was right-hand dominant. Dynamometric grip testing was 54 psi on the right and 60 psi on the left. Passive range of motion in the cervical spine was limited to 42/60° in flexion with increased pain. Extension was limited to 18° with increasing right-sided pain. Right lateral flexion was 22/25°. Left lateral flexion was 32° with increased right-sided pain. Right rotation was limited to 40/80° with increased right-sided pain and left rotation was 52/80°. Orthopedic evaluation of the cervical spine demonstrated abnormal neutral compression testing, abnormal extension compression testing, abnormal right and left compression testing. There was decreased pain with cervical distraction. Cervical Kemp's sign increased pain at the C4-C7 levels with awareness of the fused C6-7 segment. The scalene compression test was tender bilaterally. He exhibited bilateral cervical paraspinal muscle hypertonicity, bilateral upper trapezius, and levator scapulae hypertonicity with myofascial triggering. His lower extremity neurological reflexes showed abnormalities on the right. The patellar reflex responded as brisk, and the Achilles reflex exhibited a 2 beat clonus. Babinski response was downgoing. Sensory evaluation of light touch, sharp/dull, vibration and hot/cold all tested within normal limits. Muscle tests to the lower extremity all showed +3/5 weakness on the right, with bilateral Gluteus Maximus +3/5 weakness. Passive range of motion in the lumbar spine: flexion showed 42/60° with increased pain to L5, extension showed 8/25° with increased right L5 pain, right lateral flexion showed 12/25° with increasing pain to the right L5 level, left lateral flexion showed 14/25° with increasing pain to the right L5 level. On orthopedic evaluation, he exhibited an abnormal Minor sign. Bechterew test created lower back and right posterior thigh pain. Slump test and Kemp's reproduced low back pain at the L5 level. His heel walk was normal; however, his toe walk on the right was abnormal, as he could gently rise up but could not hold the heel off the ground. His straight leg raise on the right was positive for right lower back pain at 40°. His well leg raise was positive on the left for right-sided low back pain at 60°. Both Braggard and Sicard tests confirmed low back pain and right posterior thigh pain. DeJernie Triad was positive for coughing and it increased middle back pain. Double leg-lowering test increased his lower back pain; right side greater than left.

The FABERE test was positive for hip pain on the right. Hip compression increased bilateral hip pain on the right side greater than left. Yeoman test increased right-sided L5 pain. Sacroiliac compression increased right-sided joint pain. He had bilateral lumbar erector muscle spasm, right greater than left. Trigger point pain was present in the right gluteus medius and maximus. The patient tolerance tested well to the Cox decompressive manipulation technique for both the cervical and lumbar spine.

Imaging

CT of the cervical spine performed prior to presenting to the clinic demonstrated an intact C6-C7 anterior cervical spine fusion with anatomic alignment and no evidence of hardware failure. Mild to moderate marginal osteophytes were identified at the C6/7 level posteriorly which results in mild to moderate central canal stenosis and mild to moderate bilateral neuroforaminal stenosis (Fig 1A-C). No imaging of the lumbar spine was obtained, as no red flags were present in the presentation of low back pain, and the patient had responded positively to treatment.^{8,9}

Diagnosis

Post-surgical continued pain of a C6-C7 cervical fusion with spondylotic myelopathy, C2 through C5 degenerative disc disease, presumed L5-S1 disc lesion with associated sciatic radiculopathy, facet dysfunctions and myofascial pain.

Patient Management

The chiropractic manipulative treatment was delivered on a Cox Model 7 adjusting table. (Fig 2) Both cervical and lumbar flexion distraction techniques were utilized. Careful tolerance testing was applied in the cervical spine and lumbar spine prior to treatment and the patient tolerated both central and lateral tolerance testing procedures well. The contact in the cervical spine was on the C4 vertebrae, as to influence motion above and below the fusion. The bilateral numbness of the fourth and fifth digits followed the C8 root distribution. In the lumbar spine, the superior hand contact was placed on the L5 spinous to decompress the DRG and open the L5-S1 osseoligamentous foramen. Initially, the patient was treated utilizing protocol 1, which consists of three 20 second sets of distraction consisting of five 4-second repetitions of distraction. As the patient's radiculopathy centralized over time,

Fig 2. Cox model 7 adjusting table.

treatment was converted to protocol 2, which is the application of all physiological ranges of motion to facet joints and motion segments to restore mobility. Protocol 2 is applied with 1 set of 10 repetitions. This patient was seen a total of 12 visits, over 3 months. He was treated in the clinic 3 times within the first 7 days. The 50% rule was utilized in this patient, which consists of daily treatment until the pain is 50% improved, then the treatment frequency was decreased to every other day until 50% more pain relief. We continued to decrease treatments based on the patient's improvement until maximum relief was attained.

This patient was also treated with high volt galvanic current coupled with ultrasound applied to separate and distinct regions (cervical and lumbar) with the aim of decreasing pain and inflammation. The available evidence suggests that high volt stimulation administered using negative polarity, pulse frequency of 120 pulses/s, and intensity of 90% visual motor contraction may be effective at curbing edema formation.¹⁰ Manual myofascial therapy had been applied to disrupt trigger points. Manual-type therapies and some physiologic therapeutic modalities have

Fig 1. CT of the cervical spine demonstrates an intact C6-C7 anterior cervical spine fusion with anatomic alignment and no evidence of hardware failure. Mild to moderate marginal osteophytes are present at the C6-C7 level posteriorly with resulting mild to moderate central canal stenosis and mild to moderate bilateral neuroforaminal stenosis. A, Coronal CT of the cervical spine showing C6-C7 fusion. B, Sagittal CT of the cervical spine showing the fusion and posterior osteophytes at C6-C7. C, Axial CT of C6-C7 showing the fusion and mild to moderate central canal stenosis and mild to moderate bilateral neuroforaminal stenosis.

acceptable evidentiary support in the treatment of myofascial pain syndrome and trigger points.¹¹

Guided rehabilitation and exercise was also included in the treatment protocol. On the first visit, the lumbar and cervical static stretching were initiated. On the second visit, Bruegger postural corrective exercises and doorway pectoralis stretching were prescribed. On the third visit, the patient was given quadruped exercises abdominal bracing, cat-camel exercises, and lumbo-pelvic formsquats.

Following this, we initiated Cox protocol 2. By visit 5, he was able to perform 15 bodyweight squats. On visit 6, rehab was intensified to perform step back lunges to ensure proper foot knee positioning. By visit 7 he described having more energy and “more stiffness than pain.” We used counter and stool squats to progress proper lumbopelvic motion, and began cardiovascular activity with 5 minutes on a recumbent bike. He was instructed to increase the exercise duration per session 5 to 10 minutes every 1 to 2 weeks over the first 4 to 6 weeks of exercise.¹² Following any adjustment in the exercise prescription, the individual should be monitored for any adverse effects of the increased volume and downward adjustments should be made if the exercise is not well tolerated.¹² On his eighth visit, he self-reported 70% improvement from an initial status. On visit 9, we initiated hip flexor/psoas stretching routine.

Throughout care, the patient reported no adverse reactions to care. He experienced maintained relief, with pain down to 35/100 on a 100-mm Visual Analog Scale—a 60% improvement from initial intake. His bilateral or radicular pain had resolved. He had continued to improve his cardiovascular work and was up to 30 minutes on the bike. He stated that we had made more improvements than any other provider since his injury had occurred. For visit 10 to 12, his NPS score rated 3 to 4/10, and he had increased his biking time to 35 minutes. He was walking without a cane or use of brace.

By the end of care, he said that he wanted to be removed from disability and get cleared for part-time work. He hoped for a return to school and a new career in the culinary arts, as an occupation in truck driving would no longer be possible.

Discussion

This patient was treated with Cox decompression manipulation in addition to other therapies. In the lumbar spine, ligament loads are below tolerance failure to the spinal ligaments when the forces of 2° to 3° of downward table distraction are applied. The

intervertebral disc space increases by 2 to 3 mm during this application.¹³ Cox manipulation physiological properties aim to open and separate the body disc body complex, decrease the intradiscal pressure to between –39 and –192 mm Hg,¹⁴ increases the area in the osseoligamentous canal by up to 28%.

It is important to note that a patient with this type of spinal injury may never reach 100% improvement. We hoped to achieve at least 50% improvement within the first 4 weeks of care, realizing that any greater improvement would be beyond our expectation. This was discussed with the patient on the first visit. Additionally, his lumbar pain centralized to the back and buttock from full lower extremity radiculopathy in 4 visits. Pain centralization during the first 5 treatment sessions of mechanical end range spinal movements is a useful diagnostic tool to predict a good long-term outcome.¹⁵ It is suggested that Cox flexion distraction could be a helpful first line of treatment for cervical or lumbar disc injuries as has been documented in the literature.^{16–18}

The use of guided rehabilitation was an important component in this patient's recovery. Exercise may produce reductions in pain and disability, such as in the management of chronic low back pain.¹⁹ The goal for this patient was to help him regain strength, flexibility, and cardio respiratory benefits. This case demonstrates that the combined utilization of Cox flexion distraction manipulation and guided rehabilitation may produce benefits in a patient with a lumbar disc syndrome, cervical fusion, myelopathy, and post-surgical continued pain patient. Future research for patients with these injuries, such as the biomechanics of fused segments and the measured effects of decompression on such segments is needed.

Limitations

The limitations of this case report include that this report is for only 1 patient. The results of this study may not necessarily be transferrable to other patients. The study data had been only short term, so the long-term lasting benefits of treatment are not clear. It is possible that the patient may have improved in spite of care. Additionally, it is not certain that the patient's relief of symptomatology will be ongoing if he does not continue to perform regimented rehabilitation.

Conclusion

This combined treatment protocol of rehabilitation and Cox distraction manipulation demonstrated

beneficial results for a patient with spine pain and post-surgical C6-7 fusion with myelopathy and concurrent L5-S1 radiculopathy. This patient was treated 12 times over a 3-month time period, showing substantial clinical improvement with no reported adverse effects.

Funding Sources and Potential Conflicts of Interest

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

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