

The chiropractic management of two cases of cervical spondylotic radiculopathy

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Cervical spondylotic radiculopathy (CSR) is one of the potential sources of radiculopathy, particularly in patients aged 40 to 60 years. The hallmark sign of cervical-brachial pain presents in the majority of the cases, however a definitive clinical diagnosis is often difficult in the absence of reliable and valid diagnostic tests. Two cases of presumed CSR illustrate the usefulness of applying a comprehensive mechanical assessment that guides the patient's rehabilitation regardless of the traditional anatomical diagnosis. A brief overview of the epidemiology, clinical presentation, and management of CSR is also presented.
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KEY WORDS : cervical, radiculopathy, spondylosis.

La radiculopathie spondylotique cervicale (RSC) est l'une des causes potentielles de la radiculopathie, en particulier chez les patients âgés de 40 à 60 ans. Une douleur cervico-brachiale, signe révélateur, se présente dans la majorité des cas, mais un diagnostic clinique définitif est souvent difficile à établir en l'absence d'examen diagnostiques fiables et valides. Deux cas de RSC présumés illustrent l'utilité de l'application d'une évaluation mécanique complète qui oriente la rééducation du patient, indépendamment du diagnostic anatomique conventionnel. Une brève présentation de l'épidémiologie, des signes cliniques et du traitement de la RSC est également proposée.
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MOTS CLÉS : cervical, radiculopathie, spondylose.

Introduction

The diagnosis of cervical spondylotic radiculopathy (CSR) is largely based on standard clinical history and examination findings such as: complaints of neck and arm pain in conjunction with diminished upper limb sensation, reflexes or motor power, and positive Spurling's test (radicular pain reproduced with cervical lateral flexion, rotation and axial compression). Radiographs, advanced imaging and electrodiagnostics can be useful to confirm this diagnosis.¹ However, advanced imaging modalities and other diagnostic tests are not available for routine use

by chiropractors in Canada. In addition, wait lists for access to these tests can delay their use in non-emergent and non-surgical patients. Furthermore, as with most spinal pain syndromes, there are a number of difficulties in finding a definitive anatomical source of the patient's symptoms.² The poor reliability and validity of the diagnostic process often leads to the mislabeling of the patient's condition and potentially results in inadequate treatment. In the two cases below the anatomical diagnosis was presumed to be cervical radiculopathy secondary to spondylosis, however the therapy was guided more so by the

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patients response to mechanical assessment than this traditional diagnosis.

Case Reports

Case 1

A 55-year-old man presented with severe right neck and arm pain of five weeks duration. The pain extended from the neck to the lateral arm and forearm. He complained of radiating discomfort over the distal lateral forearm and thumb. He had a history of intermittent neck and shoulder pain over the last two years. His original discomfort began when he was cross-checked across the neck during a hockey game. This resulted in neck pain with shooting discomfort down the arm immediately after the incident. Since that time, he has experienced re-exacerbation of his complaints with minor trauma, such as light body contact during a hockey game. There was no particular incident or accident that precipitated this most recent episode. His medical history was otherwise unremarkable. There were no recent weight changes, pain at nighttime or in a supine position, or other constitutional symptoms. All neck movements aggravated the neck and arm pain, particularly extension coupled with right rotation. Relieving factors included rest and ice.

On examination, cervical rotation was reduced to approximately 45 degrees bilaterally. Extension was restricted to 15 degrees and reliably reproduced all of his chief complaints. On repeated movement testing both repetitive cervical flexion and cervical retraction (tucking in the chin while minimizing flexion in the lower cervical spine) reduced his arm symptoms. Repeated extension, lateral flexion and rotation recreated all complaints after only a few repetitions. Spurling's test was positive on the right, and elicited the neck and upper limb symptoms. He was tender over the posterior joints of the cervical spine on the right at the C4–5 and C5–6 levels, as well as at multiple segments within the upper thoracic spine on the right. Posterior to anterior compression over the C5–6 spinous processes reproduced his paresthesia within the right hand. Valsalva testing was unremarkable. Sensation to light touch was diminished in the C6 dermatome of the right hand. The biceps reflex was absent on the right. Muscle strength of the upper limbs was normal. Deep tendon reflexes of the lower limb were 2+ bilaterally and the plantar response was flexor.

X-ray examination revealed localized kyphosis at the level of C4. Disc space narrowing was present between the levels of C4 and C7. Uncovertebral joints spurs encroached upon the intervertebral foramina at C5–6 bilaterally. Flexion and extension views were unremarkable.

The patient was diagnosed with CSR affecting the C6 nerve root, and it was noted that his symptoms could be controlled with repetitions of cervical retraction. No barriers to recovery were anticipated.

Management included a course of simple rehabilitation exercises (cervical retraction exercises described above in the seated position), and spinal manipulation on each visit. In addition, a behaviour modification approach was used whereby the patient was regularly encouraged to maintain a neutral cervical posture and to initially avoid undue extension and rotation of the neck during all activities of daily living. Decisions regarding appropriate rehabilitative exercises were based on the repeated movement analysis. The patient was instructed to perform 10–15 repetitions of the cervical retraction exercise every 2 hours or whenever his symptoms seemed to be increasing.

The patient received 18 treatments over the course of three and a half months. The initial frequency of treatment was 2–3 times per week. The goal of this stage of the treatment was pain reduction in the arm and neck. As this goal was accomplished the frequency of treatment was tapered to approximately 1–2 times per week. By that time his symptoms were more manageable, however the range of movement of the neck was still reduced. He was given additional seated cervical rotation exercises (10 repetitions on each side with each repetition held for 30 seconds) to improve his flexibility. This exercise was performed 2–3 times per day.

He reported significant reduction in symptoms from the third treatment onward. The paresthesia and pain in his arm and hand was abolished and his discomfort and movement within the neck steadily improved. On discharge at three and a half months neck rotation was approximately 80 degrees bilaterally. Extension of the cervical spine was 50 degrees. These movements no longer recreated his symptoms. On last follow-up approximately nine months later, he remained symptom free and was pursuing all of his normal sporting activities.

Case 2

A 56-year-old female was referred to our clinic by her family physician with a complaint of neck pain radiating to the right lateral arm and medial forearm. She complained of numbness within the distal medial forearm and medial two fingers of the hand. The original onset was approximately seven months previously. She had not been employed since the onset of her symptoms. There was no particular incident that precipitated her discomfort. Her complaints were constant and disturbed her sleep (when she changed position in bed). She had numerous episodes of neck pain over the last five years, at a frequency of approximately two times per year. Her symptoms were aggravated by right rotation and/or extension of the neck, reaching overhead, and prolonged sitting. Her complaints were usually at their worst each morning on awakening, however they tended to ease after approximately two hours of being up and around. In addition, gentle stretching and forward flexion of the neck provided some relief. Since the onset there had been no progressive worsening of her symptoms in her arm or hand. There was no recent weight changes or constitutional symptoms. She stated that she was otherwise healthy.

On examination she exhibited anterior head carriage in both the sitting and standing positions. Ranges of motion in the cervical spine were moderately reduced in all directions. Extension, lateral flexion and rotation increased her neck pain and arm symptoms. Spurling's test on the right side was positive for neck and arm pain. On repeated movement testing repetitive cervical retractions relieved her arm and neck symptoms, whereas repetitive side bending to either side increased her symptoms. She was tender to palpation over the posterior joints and overlying paraspinal musculature mostly between the levels of C4 through C7 bilaterally.

Neurological examination revealed wasting of the hypothenar musculature in the right hand. There was decreased sensation to light touch in the C8 dermatome within the right hand. Deep tendon reflexes in the upper and lower limbs were 2+ bilaterally. Muscle strength was normal. The plantar response was flexor.

X-ray examination revealed narrowing of the disc spaces from C4–T1. Osteophytic joint spurs encroached upon the intervertebral foramen at C4–5 level on the left and the C6–T1 levels on the right.

The patient was diagnosed with CSR affecting the C8

nerve root on the right. It was noted that her symptoms responded favourably to repetitions of cervical retraction. The chronic duration of her symptoms, her continued sleep disturbance, and her unemployed status were possible barriers to recovery.

This patient was managed with a course of supervised exercise within our gym facility, and spinal manipulation. Initially exercises included simple cervical retraction exercises, both in the supine and seated position and cardiovascular conditioning for half an hour walking on the treadmill. Cervical retraction exercises were chosen based on her favourable response to this movement on her examination. Similar home exercises were prescribed. She was instructed to perform a set of 10–15 repetitions every 2 hours or whenever her symptoms seemed to be increasing. In addition, the patient was instructed to use a cervical roll within her pillow at bedtime, and she was encouraged to monitor her posture regularly in order to avoid a sustained head forward position during various activities of daily living.

The patient was seen 26 times at our office over a period of three months. For the first month of treatment the frequency was 3–4 times per week. In this stage, the goal was to reduce the symptoms, and address her barriers to recovery. In the second month there was less focus on her pain control exercises and more stretching and strengthening exercises were provided. This included cervical rotation and flexion stretches in the seated and supine position as well as some light weight training (using both circuit training on machines and hand held weights) for the upper limbs and back. During this stage of rehabilitation she was instructed to use the cervical retraction pain control exercise should any of her other exercises aggravate her condition. She was seen at the office 2–3 times per week during this stage and an emphasis was placed on her home exercise routine. In the final month of treatment she was seen for a few follow up visits to aid in her return to work and address some minor neck discomforts.

Throughout her treatment program she steadily improved, however she was an anxious patient who had to be frequently reassured about the benign nature of her condition and regularly motivated to perform her exercises in a consistent manner. She was able to sleep without disturbance almost immediately upon initiating her treatment program. By the end of her program at three months the patient had returned to work and her ranges of neck movements had increased in all directions. Specifically, flexion

and extension had both improved by ten degrees, lateral flexion had increased by 15 degrees bilaterally, and rotation to the left and right increased by approximately 40 and 30 degrees respectively. Her symptoms in the neck, arm and hand had been abolished. Sensation in the C8 dermatome of the right hand had returned to normal. A follow-up assessment of the patient 6 months later revealed that she was still symptom-free.

Discussion

Pathophysiology

The two patients described above were presumed to be suffering from CSR. Numerous bony and soft-tissue structures can contribute to the formation of lateral stenosis and cervical radiculopathy. The most likely causes are cervical disc herniation, followed by spondylotic changes of the foramen.³ These processes often manifest concurrently. The exact mechanism by which foraminal changes produce radiculopathy is unknown. Nonetheless, it has been suggested that as the nucleus pulposus deteriorates there is a redistribution of pressure loads⁴, resulting in additional stress to adjacent vertebral structures.⁵ Theoretically, this extra stress can lead to altered movement and eventual reactive formation of osteophytes. The initial changes and subsequent progression may be attributable to normal aging, acute trauma, repetitive microtrauma, or occupational activity.⁶

Clinical presentation

The hallmark of cervical-brachial pain at onset occurs in 95% of the cases, and this pain will follow a radicular pattern 66% of the time.⁷ Neurological signs such as paresthesia, sensation loss, and weakness occur less frequently. The cervical range of movement is often reduced both due to pain and the underlying osteophytic changes. Serial measurements of range of motion can be used to monitor treatment effectiveness, however the baseline measurements in this population will often be less than those of the general population.⁸ For this reason other patient-centred outcome measures such as, a global measure of the patient's perception of recovery, reduction in pain, and satisfaction with treatment, will be important measures for documenting recovery.

The traditional diagnosis of CSR is largely a clinical diagnosis. X-rays, advanced imaging and electrodiagnostics

are also used to confirm this clinical impression. It is debatable as to which of these is best, however CT myelography remains the gold standard for evaluating nerve root compression and planning surgery but MRI is important for the initial definitive diagnosis.⁹ Electrodiagnostic procedures are used to aid in the diagnosis when the root involved is uncertain or to rule out other peripheral neuropathies.^{1,8,10} As stated earlier, few chiropractors in Canada are able to order advanced imaging or electrodiagnostic tests. In addition for the non-emergent or non-surgical patient wait lists exist for some of these procedures. In the absence of red flags that prompt referral, and when the patient responds favourably to mechanical assessment and conservative treatment, further imaging procedures are academic, as they would not alter the patient's management.

Epidemiology

Few studies to date attempt to separate radiculopathy due to disc herniation and that due to degenerative changes. Nonetheless, a study of 3 Sicilian municipalities for the prevalence of cervical radiculopathy produced an estimate of 3.3 cases per 1000 in the general population.^{11,12} Radhakrishnan et al. estimated that the crude incidence of symptomatic cervical radiculopathy in Rochester, Minnesota was 1.07 cases per 1000 for men and 0.64 cases per 1000 for women.⁷ The same authors further estimated that the age and sex adjusted incidence of cervical radiculopathy due to spondylosis was 0.59 per 1000. Men and women in the 50–54 age group were most often affected (annual incidence of 2.03 cases per 1000).⁷ For both sexes the incidence declined at the age of 60.³ The average age (\pm SD) at diagnosis was 47.9 (\pm 13.91) for males and 48.2 (\pm 13.8) for females. The natural history of this condition is unclear; however, the concept of progressive deterioration of the condition is not supported, as 90.5% of all patients are asymptomatic or only mildly affected by their condition on follow-up (mean duration of follow up was 5.9 years).⁷ On the other hand, recurrent episodes are common, occurring in 37.1% of the patients.⁷

Perhaps, more relevant to a chiropractor is the prevalence of patients that potentially present with cervical radiculopathy. In this regard, we conducted a database review of all new patients presenting to 14 community based multi-disciplinary rehabilitation clinics in the provinces of Alberta and British Columbia in the month of

January 2001 (J.Dufton, unpublished data from CBI Physiotherapy and Rehabilitation, 2002). Approximately 0.7% (4 out of 586) of all new patients in this time frame were diagnosed with CSR. The diagnosis for these patients was based on standard clinical history and examination findings (for example complaints of neck and arm pain in conjunction with diminished upper limb sensation, reflexes or motor power, and positive Spurling's test) as well as any available imaging reports.

Factors associated with eventual referral for surgical treatment include: radicular pain with sensory loss and muscle weakness (hazard ratio of 17.29), objective weakness alone (hazard ratio of 5.98), and radicular pain with sensory loss (hazard ratio of 2.89).⁷ (The hazard ratio can be interpreted as the increase risk of having surgical intervention in the presence of one of these clinical findings, compared to the risk of having surgery in the absence of these findings.)

Treatment

Conservative therapy is believed to provide symptomatic relief for CSR. Saal et al. treated 24 consecutive patients with cervical radiculopathy with passive therapies and active rehabilitation. Although all patients in this cohort were diagnosed with cervical disc herniation, 14 of the patients additionally had multilevel degenerative changes. Seventy-one percent of the patients with multilevel degenerative changes reported good or excellent results.¹³ The 3 month program consisted of an initial stage of pain control strategies (ice, medication, rest and cervical positioning with a collar), and manual therapy (without joint manipulation), followed by a comprehensive rehabilitation program. Nine patients additionally received either a single epidural or selective nerve corticosteroid injection.

A number of case series and reports, including this one, have described good results with chiropractic manipulation alone or in combination with other conservative therapies for the treatment of cervical radiculopathy.¹⁴⁻¹⁷ Most of these nonrandomized reports consider all causes of radiculopathy and do not specifically attempt to investigate CSR.

There has been only one randomized trial comparing conservative therapy to surgical treatment.¹⁸ Persson et al. studied 81 patients with spondylotic encroachment with or without an additional bulging disc. The conservative measures used in this trial were left to the discretion of the

therapist, however various forms of manual therapy including mobilization and traction of the cervical spine were the most frequently used. Active rehabilitation included neck and shoulder strengthening and flexibility, and cardiovascular exercise. Other passive modalities such as transcutaneous electrical nerve stimulation, ultrasound, ice, and heat were also used. Chiropractic manipulation was not part of the treatment program for this study. The authors concluded that the early benefit of reduced pain observed in the surgical group was no longer apparent with long-term follow-up. In terms of pain, weakness, and sensory loss there was no difference in outcome between those patients managed surgically and those managed conservatively. These conclusions were echoed by a recent Cochrane review of the role of surgery in CSR.¹⁹

Alternative approaches to the diagnosis and management of spinal pain have been developed. These systems classify patients based on their response to mechanical assessment. The McKenzie method,²⁰ and a similar system developed by Hall et al.²¹ categorize patients based on clinical findings. These systems do not attempt to identify the anatomical source of the patients' symptoms. Once classified, the treatment provided is specific to the identified spinal pain syndrome. When the pattern and intensity of pain and other symptoms diminishes over the course of therapy the management protocol is deemed appropriate. If the pattern and intensity of symptoms increases at all over the course of therapy, then treatment is deemed inappropriate and modified accordingly. The functional assessment method described by Hall et al has demonstrated good reliability.²²

The body of literature to date suggests that a number of the various conservative therapies will be effective for managing patients with CSR. The two cases in this series did not have any clinical red flags that warranted immediate referral and were accordingly managed with a course of chiropractic treatment including exercise and manipulation. This strategy considered both the traditional anatomical source of pain as well as the individual patient's response to mechanical assessment. Germane to this approach is the gradual abolishment of the patient's extremity symptoms through a series of rehabilitation exercises and modifications of their daily behaviour. Initially each patient is prescribed the same exercises (in these two patients primarily cervical retraction exercises) that reduced their symptoms during the physical examination. These exercises

will be used for the remainder of their rehabilitation program as a pain control strategy, however they additionally will help to improve the range of movement. Correct technique in performing the pain control exercises and the effectiveness of the exercises to abolish the extremity pain requires periodic reevaluation. Poor exercise technique often results in delayed recovery. Manipulation and manual therapy is performed in a non-provocative position from the onset of the treatment program as a pain control strategy and to increase the range of motion. If necessary, additional range of motion and physical conditioning exercises will be provided.

Based on this report it is not possible to determine if the positive outcomes were a result of the treatment program or due to the favourable natural history of this condition. However, even if both of these cases were to represent the effects of natural history, our treatments provided meaningful symptomatic relief for the patient as they recovered.

Conclusion

CSR can be recognized by clinical history and examination findings. There are however, many pitfalls to avoid with the various diagnostic procedures. For this reason, one may wish to educate the patient based on the likely anatomical source of pain, while using the patients' response to mechanical assessment to guide the treatment. This condition may be effectively managed with conservative therapy including rehabilitation exercises and manipulation. Further research is necessary to determine which of the available conservative therapies are the most effective.

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