

Case Study

Resolution of Bilateral Carpal Tunnel Syndrome Following Subluxation Based Chiropractic Care: A Case Study

Jonathan Murphy, B.S.¹

Rod Floyd, D.C.²

Christopher Varnum, DC³

Joel Alcantara, DC⁴

1. Student – Palmer College of Chiropractic, Port Orange, FL
2. Associate Professor - Palmer College of Chiropractic, Port Orange, FL
3. Assistant Professor - Palmer College of Chiropractic, Port Orange, FL
4. Research Director – International Chiropractic Pediatric Association, Media, PA & Chair of Pediatric Research, Life Chiropractic College, West Hayward, CA

Abstract

Objective: To report on the successful care of an adult female with bilateral wrist pain along with numbness and tingling.

Clinical Features: A 57-year-old Caucasian female presented with a chief complaint of bilateral hand pain and numbness of the first three digits that radiated towards her left arm. The hand pain was worse when sleeping and when performing repetitive motions. Ibuprofen, icing and rest mildly and temporarily alleviated her pain complaint. The patient's numerical rating scale (NRS) for pain was 8/10 for both hands that affected her ability to use a mouse and keyboard and her ability to fall asleep or maintain her sleep.

Intervention and Outcome: The patient was cared for with a combination of Diversified Technique adjustments to sites of vertebral subluxations in the cervical spine along with adjunctive therapies that included soft-tissue manipulation, cold laser, icing and exercise to strengthen her wrist extensors. The patient's presenting symptoms improved based on subjective reports and the use of the Upper Extremity Functionality Index.

Conclusion: This study adds to the evidence on the salutary effects of chiropractic care (i.e., chiropractic adjustments and adjunctive therapy) for patients with carpal tunnel syndrome.

Keywords: Chiropractic, carpal tunnel syndrome, subluxation, adjustment, manipulation

Introduction

With prevalence ranging from 1-5% in the general population and as high as 14.5% among specific occupational groups, carpal tunnel syndrome (CTS) is a common and costly disorder among working-aged adults.^{1,2} CTS results from entrapment of the median nerve at the wrist and clinically presents with numbness or tingling in the sensory distribution of the nerve in the hand along with pain or weakness of the muscles of thumb abduction and opposition. Despite many studies examining potential risk factors, preventive measures, and interventions, no "gold standard" exists for CTS diagnosis.³

Clinical indicators for CTS includes positive findings on challenge tests in which either tapping over the median nerve at the wrist (Tinel's test) or sustained flexion (Phalen's test) or extension (Reverse Phalen's test) of the wrist produce numbness, tingling or pain in the median nerve's sensory distribution. Impaired nerve conduction testing of the median

nerve is widely regarded as a more reliable indicator of the disease.^{4,5}

In the interest of evidence-based practice and to inform higher-level research designs, we describe the chiropractic care of a patient with bilateral CTS.

Case Report

History

A 57-year-old Caucasian female presented to the Florida outpatient clinic at Palmer College of Chiropractic with a chief complaint of bilateral hand pain along with numbness of the first three digits that radiated towards her left arm. The patient had been experiencing numbness and pain in the right hand for the previous ten months and eight months on the left hand. On clinical presentation, thenar atrophy of the left hand was most noticeable.

The patient denied receiving medical treatment for her presenting complaints prior to her chiropractic consultation. The patient's symptoms included bilateral hand pain and numbness of the first three digits that radiated towards her left arm. The pain was worse when sleeping and when performing repetitive motions. Ibuprofen, icing and rest provided mild and temporary alleviation of her pain complaint.

The patient's numerical rating scale (NRS) for pain was 8/10 for both hands upon presentation to the clinic. Due to her hand pain, she was unable to work properly as it entailed frequently using a mouse and keyboard. Furthermore, the patient indicated that her pain complaints affected her ability to fall asleep or have continued sleep throughout the night as the pain would wake her up. She presented to the clinic with the hopes of finding relief of her bilateral hand pain and numbness.

Examination

On physical examination, the patient's vitals and other noteworthy examination findings are provided in Table 1. As part of the clinical work-up at the teaching clinic, a standardized Upper Extremity Functionality Index⁶ was used to assess the patient's symptomology. The patient scored 57/80.

On visual inspection, the patient's posture revealed an elevated right shoulder compared to the left side. Additionally, the patient presented with an anterior head carriage and bilateral rounded shoulders. On static digital palpation, the examination yielded tenderness and taut paraspinal muscle fibers bilaterally at the C₇-T₁ vertebral levels. Tenderness was also noted at the anterior aspects of her wrists, bilaterally. Motion palpation yielded restricted left rotation and extension at the C₆ and C₇ vertebral bodies (VBs). Her wrists were restricted at the lunate bone in anterior to posterior movements.

Orthopedic examinations yielded the following findings. Cervical compression, cervical distraction, prone extension test, Valsalvas's test, straight leg raise and bracelet test were all negative. Neurological testing involving dermatome, myotomes and deep tendon reflex testing yielded the following negative results: C₇-T₁ nerve root muscle testing, C₅₋₆ and T₁ nerve root sensory testing and all cranial nerve testing. The following orthopedic exams yielded positive results: Tinnel's tap test, Phalen's and Reverse Phalen's tests along with shoulder depression testing. Muscle strength testing reflecting the C₅ and C₇ nerve roots were graded at 3/5. The C₇ and C₈ nerve root sensory testing were diminished. Based on the history and physical examination findings, the patient was provided a working diagnosis of right and left wrist carpal tunnel with vertebral subluxation of the C₇-T₁ region and subluxation of the lunate bones bilaterally.

Intervention

On the first visit, the patient received Diversified Technique chiropractic adjustments characterized as high velocity, low amplitude (HVLA) thrusts. Chiropractic adjustments were performed to address subluxations at the C₇-T₁ functional spinal unit (FSU) and the right and left lunate bones.

The adjustment at the C₇-T₁ FSU was performed with the patient lying supine while the doctor contacted the patient's C₇ vertebrae with the doctor's right second digit utilizing a posterior to anterior (P-A), left to right (L-R) and inferior to superior (I-S) vector thrust. The right and left lunate bones were adjusted using the doctor's right and left distal segment of the first digit superimposed contacting the anterior portion of the patient's lunate bone delivering an A-P thrust with a scooping motion.

In addition to chiropractic adjustments, cold laser (Multi Radiance Medical, Solon, Ohio), soft tissue work with Biofreeze[®] and home exercises were employed. Cold laser was utilized to provide pain relief and reduce inflammation at the flexor retinaculum of the wrist. Soft tissue work with biofreeze was used to relax the patient's hypertonic flexor muscles including the pronator teres. The patient's home exercises included strengthening the wrist extensors with rubber bands, icing twice per day for fifteen minutes at a time and keeping the wrist in slight extension throughout the day and while sleeping using a carpal tunnel brace. The patient experienced significant pain relief following the first visit. After the fourth visit the patient said "I don't wear my brace anymore and there is no more tingling or pain."

Outcomes

The patient received care as described for one month consisting of 5 visits. At the review and update, the patient stated that she was no longer wearing her brace and that she felt much better with respect to her wrist complaints. The patient's activity of daily living began with the patient having significant pain while typing or using a mouse, having to wear a brace and having difficulty sleeping.

Following a trial of chiropractic care, the patient experienced no pain while typing or using a mouse, not having to wear a brace and having no trouble falling or maintaining her sleep. The patient's upper extremity functional index outcome assessment score improved to 20/80 from a baseline score of 57/80. The patient's NRS pain rating improved from an 8/10 to a 3/10 for both hands.

Discussion

Carpal tunnel syndrome is one of the most common peripheral entrapment disorders in the United States. It has been estimated that approximately 5 million workers⁷ suffer from the disorder with cost estimates for medical care placed over \$2 billion annually.⁸ The disorder affects mostly middle-aged and elderly women⁹⁻¹⁰ with peak prevalence in the 50s.¹¹ In terms of work-related neuropathies, CTS is common among blue-collar workers where tasks are hand-intensive involving great amounts of grip force, and sustained hand repetition (i.e., sustained and repeated extension and flexion of the wrists).¹² The disorder impacts the quality of life of workers and may lead to job change.¹³ The average lifetime cost of CTS, including medical and lost time from work, has been estimated at \$30,000 per injured worker.¹⁴

The median nerve and tendons that originate from the flexor digitorum superficialis, flexor digitorum profundus, and flexor pollicis longus muscles travel through the carpal tunnel.

Posteriorly, the carpal tunnel is bound by the carpal bones while anteriorly, it is bound by the flexor retinaculum, a band of fibers that runs between the hamate and pisiform bones. Medially, these involve the scaphoid and trapezium bones while laterally, from the forearm to the hand. The pathophysiology of CTS is the result of changes leading to increased pressure and compression of the median nerve. The causes are many and have been classified as anatomic, occupational, and systemic (see Table 2).¹⁵

The diagnosis of CTS is primarily from the history examination findings. Typically, patients will report burning pain, numbness, and paresthesia of the hands along the sensory distribution of the median nerve involving the thumb and first 2 ½ digits. Symptoms are often reported following the performance of repetitive motion of the hand and wrist along with forceful gripping. The symptoms are often reported as worst at night. As in the patient reported, most patients will demonstrate diminished grip strength and thenar muscle atrophy as the disease becomes chronic.¹⁵

According to Shi and MacDermid¹⁶, both conservative and surgical treatments are used to manage CTS. The non-surgical treatment options include splinting, steroids, activity modification, non-steroidal anti-inflammatory drugs, diuretics, vitamin B-6 and others. However, of the conservative approaches only splinting¹⁷ and steroids¹⁸ are supported by high quality evidence but provide only temporary effects. In comparing the efficacy of surgical treatment of CTS with conservative treatment, Shi and MacDermid¹⁶ concluded that both surgical and conservative interventions confer treatment benefits with surgical treatment being superior with respect to improved symptoms and function at 6 and 12 months.

However, given the complication and adverse effects of surgery and that conservative interventions benefit a substantial proportion of patients, the authors recommend a trial of conservative management with surgical only for severe or persistent symptoms. We would also offer chiropractic care as first line conservative care option.

Chiropractic Care

In a systematic review of manual and manipulative therapy (MMT) for common upper extremity pain and disorders, Brantingham et al.¹⁹ found “Fair (B) level” of evidence for MMT combined with exercise and/or multimodal therapy for lateral a number of upper extremity disorders, including CTS. However, specific to chiropractic care, McHardy et al.²⁰ concluded from their systematic review of the literature that there is only a small number of chiropractic studies into upper limb conditions and comprised mostly of case studies (level 4 evidence) and a small number of higher-level publications (level 1-3 evidence). These publications described care as multimodal in nature, and addressed both spinal and extra-spinal structures along with joint and soft tissue methods.

As with previous case reports, we report here improvements in patient's symptoms and function improved. As with previous case reports²¹⁻²², there was documented improvement in pain rating based on the NRS. While no standards or guidelines

exists for interpreting meaningful changes using the NRS for pain (i.e., 0=no pain; 10=worst pain), Farrar et al.²³ indicated that a 2-point improvement is clinically meaningful on an 11-point pain scale. Also similar to other reports on chiropractic care with CTS, a validated questionnaire specific for CTS was used to monitor the response to care.

In a clinical trial to evaluate the effect of ischemic compression therapy in the treatment of chronic CTS, Hains et al.²⁴ utilized a validated self-administered questionnaire for the assessment of severity of symptoms and functional status in CTS.²⁵ For the patient reported, the Upper Extremity Functional Index was utilized with the patient's baseline scoring at 57/80. Following a trial of care, her scoring improved to 20/80. A minimum level of detectable change for this questionnaire at 90% confidence is 9 points. The changes observed in the patient reported here was 37 points and indicates a clinically significant improvement in the patient's functionality.

The acknowledged limitation of case reports is their lack of generalizability due to the presence of confounders (i.e., lacking a control group, spontaneous remission, self-limiting course and natural history of the disorder, subjective validation, and expectations for clinical resolution). Conversely, empirical evidence from case reports provide the basis for generalization in clinical practice as it is epistemologically in-line with one's experience both from the clinician and patient perspective. In addition to informing higher-level research designs, case reports further provides for clinicians (and patients) an understanding of their clinical experiences that may lead to increase in their conviction that chiropractic care can “help”.

Conclusion

This case study demonstrates that chiropractic adjustments to spinal and extra-spinal articulations combined with physiotherapy such as cold laser and soft tissue work may be an effective means of care for patients with CTS. Further research should investigate chiropractic care with larger population of patients and/or higher-level research designs to delineate the effectiveness of various therapeutic approaches.

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Height	61 inches or 1.5 m.
Weight	130 pounds or 58.967 km
BMI	24.6 lb/in ² or 2.46 kg/m ²
Pulse	78 per minute
Respirations	16 per minute
Blood Pressure	103/70 mm Hg
Temperature	96.7 °F
Heart Rate	Regular

	Anatomic	Occupational	Systemic
Example	For example: Lunate dislocation can lead to narrowing of the carpal tunnel and increase carpal tunnel pressure	For example: Repetitive flexion and extension of the wrist leading to flexor tenosynovitis	For example: Rheumatoid arthritis, pregnancy, and diabetes can lead to increased carpal tunnel pressure