TREATMENT OF WRIST AND METACARPAL PHALANGEAL JOINT EFFUSION RELATED TO RHEUMATOID ARTHRITIS WITH THERAPEUTIC ULTRASOUND: A CASE REPORT

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ABSTRACT

Objective: To discuss the management of a patient with rheumatoid arthritis treated with therapeutic ultrasound and chiropractic interventions.

Clinical Features: A 32-year-old female with rheumatoid arthritis complained of bilateral wrist and hand stiffness along with joint effusion. She was also seeing her rheumatologist, who prescribed methotrexate. She had decreased grip strength and difficulty holding heavy objects in her hands.

Intervention and Outcome: She had been coming into the clinic for approximately 2 years to recieve high-velocity low-amplitude adjustments to her wrists, thoracic and lumbar spine and both sacroiliac joints. Therapeutic ultrasound to her wrists was added to her treatment plan while eliminating the wrist adjustments. She was treated over the course of 8 weeks with 1 treatment per week. The ultrasound was performed for 3 minutes at 0.6 watts/cm2, with a 50% duty cycle to both wrists and the 1st and 2nd metacarpal phalangeal joints. Her grip strength, and pinch grip test improved and her joint effusion decreased.

Conclusion: Therapeutic ultrasound helped control this patient's wrist and hand. (*Chiropr J Australia 2017;45:229-235*)

Key Indexing Terms: Rheumatoid Arthritis; Chiropractic; Therapeutic Ultrasound

INTRODUCTION

Rheumatoid arthritis (RA) is the most common form of autoimmune chronic polyarthropathy (1,2). Most notably, RA is characterized by joint swelling, tenderness and radiological evidence of joint destruction, which can lead to early mortatlity (3). Radiological evidence of RA in the wrist shows a symmetric presentation, with periarticular soft tissue swelling, and marginal joint erosions with periarticular joint osteopenia (4). The disease can also lead to atlantoaxial instability (AAI). Upper cervical instability is a contraindication to manipulating the cervical spine in patients with RA. This underlines the importance of carefully evaluating a patient's symptomatology along with examining x-ray imaging findings before manipulating the cervical spine (5,6).

RA can also exhibit extra-articular manifestations. These involve the heart, lungs, eyes, nervous system, vascular system and kidneys (7). In order for RA to be diagnosed, the patient must meet the American College of Rheumatology's (ACR) criteria for

diagnosing RA (3). A patient must have a score greater than 6 out 10 to be diagnosed with RA, according to the 2010 guidelines published by the ACR (3).

RA affects approximately 1- 2% of the population (4). However, RA is rare in underdeveloped parts of the world, with a higher prevalence in more developed areas (1). One study showed that the prevalence of RA in the United States was 1.40% for women and 0.74% in men, though the data comes from 1985 (1). RA, an autoimmune disease, is therefore more prevalent in females. The onset of RA is multifactorial. The disease can be genetic, most notably via the HLA-DRB1 gene (2). Smoking has also been shown to increase the risk of developing RA (8). Since RA is more common in females, a hormonal factor may have some part in the onset (1,8).

Physiotherapy techniques have been shown to reduce symptoms in patients who experience RA in their hands. Low-level laser therapy, electrical stimulation, thermotherapy, and therapeutic ultrasound have all been suggested for treatment of the small joint involvement of the disease (9-13).

Therapeutic ultrasound was used here because it can increase grip strength, decrease morning stiffness, decrease tender and swollen joints and also increase dorsal wrist flexion (10). Therapeutic ultrasound can increase the extensibility of the collagen fibers contained in tendons and ligaments (14). The actual mechanical effects of ultrasound, in theory, are thought to change the conformation of the localized proteins in the applied area, which would result in altered signal transduction of the cells (15).

CASE REPORT

A 32-year old, female was being treated for mild thoracic pain and temporomandibular joint pain prior to her current course of care. Her rheumatologist diagnosed her some years ago with rheumatoid arthritis. Since originally seeking care she received care from multiple student interns working under the supervision of a licensed doctor of chiropractic. She had no other comorbid conditions and is an active person who enjoys the outdoors.

Bilateral joint effusion was present in her wrists and metacarpal-phalangeal joints. Nodules, pathognomonic of RA, were present in her 1st and 2nd metacarpal-phalangeal joints. She was receiving injections of methotrexate under the care of her medical doctor. She had tried numerous natural nutritional supplements such as turmeric and fish oil but was unsure of the dosage for these supplements. Fish oil along with turmeric has been shown to be beneficial in decreasing the inflammation brought on by RA (16). She decided that it was too expensive for her to keep buying natural supplements.

Extension was limited in both passive and active ranges of motion. She also had difficulty making a fist due to the lack motion in her thumb and index finger, bilaterally. She was left-hand dominant and the nodules in her left hand were larger than the right.

Diagnostic Imaging

We ordered a routine cervical series with lateral flexion/extension views before any manipulation of her cervical spine was performed. RA may affect the ligamentous integrity of the transverse ligament between C1 and C2. An unstable altantodental interspace (ADI) is an absolute contraindication to manipulation (17,18). Radiological findings found that her bone mineralization was adequate and the ADI space was within normal limits No pathological findings were present. However, on the lateral extension film she had decreased cervical extension.

Intervention and Management

She was seen once a week for 8 weeks. Her spine was evaluated and adjusted each week. Cervical adjustments were performed on the Thompson drop table. The manipulation of her cervical spine was carefully evaluated each time. If she was unable to receive her injection of methotrexate she did not receive a cervical adjustment, and myofascial release on the musculature surrounding the cervical spine was performed instead. Ultrasound was performed each week for 3 minutes on both hands and wrists at 0.6 watts/cm2, at a 50% duty cycle. She tolerated each treatment well and did not complain of any increasing pain or stiffness during the treatment plan.

After the first treatment she stated that she did not notice a change. It was only after she came back for her second visit that she noticed a difference. She felt she was still having some weakness but could make a fist and perform opposition of the thumb and index finger bilaterally.

At the first 8th visit her grip strength was measured using a dynamometer pre and post treatment with the ultrasound. On her first visit, pre-treatment her grip strength was 15 kilograms (kg) of force in the right hand and left hand. After treatment during the first visit her right-hand grip strength increased to 18 kg of force and 20 kg in her left. She originally missed her 8th appointment and had to reschedule the following week. When her grip strength was measured pre and post treatment, her right hand generated 15 kg of force and 14 kg of force in her left. It is possible that when she was not consistent with her treatment her grip strength could deteriorate. However, this is strictly anecdotal and many factors may have affected the readings.

She was asked to oppose her thumb and index finger, bilaterally, before and after each treatment. At the beginning of the treatment plan she could not perform this motion because she could not touch her index finger and thumb bilaterally. This motion was also resisted before and after treatment as well. At the beginning of her treatment she could not oppose the thumb and index finger. She also could not make a fist. By the end of the eighth treatment she was able to perform resisted opposition of the thumb and index finger, bilaterally, with a normal 5/5 strength.

When asked by the intern about her activities of daily living (ADLs), she stated that she noticed a change in her grip strength. She could hold heavy items in her right hand

without bracing her hand with the opposite hand. However, her left hand, was getting better but she still had to brace it. Her rheumatologist told her her hands had not looked this good in years.

DISCUSSION

This case report shows that a patient with RA can increase their ability to perform activity when treated with a combination of pharmacological and chiropractic intervention. She did not stop taking methotrexate. We are not a part of that conversation. Our role is to treat the whole person and to understand what their other interventions are doing to help[reduce their symptomatology.

RA is a chronic autoimmune disease that can lead to severe polyarthopathy and early mortality. There are a multitude of factors that increase the risk of RA, such as the environment, genetic predisposition, hormonal factors, ethnicity, recent infection and lifestyle choices like smoking. Late RA can lead to extra-articular manifestations as well (7).

According to a retrospective study of medical records based on the 1987 ACR criteria, RA has an incidence rate of 0.6 per 1,000 females and 0.3 per 1,000 males over the age of 18 (19). The prevalence of the disease past age 35 is 13.7 per 1,000 in women and 7.4 per 1,000 in men (19). According to a meta-analysis done by Alamanos, RA has the highest incidence and prevalence in the United States moreso than in any other country in the world (19).

Patients with RA may benefit from chiropractic care. Chiropractors should carefully assess each patient, inlcuding activities of daily living and the patient as a whole, to better treat the patient. Diet should also be assessed. Patients should use nutritional supplements that are natural anti-inflammatories. For instance, 2.8 g/day of gamma-linoleic acid (GLA) has been shown to decrease patient's use of non-steroidal anti-inflammatory drugs (16).

However, RA is a disease that carries with it the risk of contraindications to chiropractic care. It is the chiropractor's responsibility to be aware of these. Contraindications include AAI, glucocorticoid-related osteopenia and extra-articular manifestations (5). AAI is the most important intra-articular contraindication that RA can cause. This is why x-ray imaging on a patient with RA should also be ordered and carefully evaluated prior to any manipulation of the spine. With regard to physiotherapy, the patient must be examined for rheumatoid vasculitis (4).

Chiropractors and physiotherapists should consider the use of therapeutic ultrasound for patients with RA. Therapeutic ultrasound can increase blood flow to a localized area, reduce muscle spasm, and increase the extensibility of the collagen fibers in ligaments and tendons (20). Therapeutic ultrasound has been shown to be effective for treatment of soft-tissue injuries and must be used with caution (20).

There is a paucity of research on the use of therapeutic ultrasound for patients with RA. There also is no guidelines or specific protocol as to intensity and time frame that it must be performed to receive the maximum effect on the tissues.

CONCLUSION

Our approach aimed at reducing the inflammation in our patient's hands and wrists. We were successful, but this is a single case. It is interesting to note that when the patient missed her appointment, her grip strength did decrease. Therefore, the use of therapeutic ultrasound should be done once a week in order to maintain grip strength.. More research must be done on this topic not only to find an appropriate protocol but also to see if the use of therapeutic ultrasound is safe and reliable for the patient. The co-management of patients who have RA, with medical doctors and chiropractors alike must clearly be researched and outlined to better assist patients with RA.

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