Effect of Wrist Manipulation & Cyriax Physiotherapy Training on Pain & Grip Strength in Lateral Epicondylitis Patients

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Abstract

The purpose of the study was to evaluate the effect of manipulation of wrist technique and Cyriax physiotherapy training in reducing pain and improving grip strength in lateral epicondylitis. A total of 30 patients (male =16; female=14) were selected as subjects and they were further divided into 2 groups. Each group comprising of 15 subjects (male=8; female=7). Results of this study suggest that there was an improvement in the mean values of Numeric Pain Rating Scale and Grip Strength after treatment in both groups. But the improvement was statistically more significant in wrist manipulation group than the Cyriax physiotherapy training receiving group. It was concluded that the patients of lateral epicondylitis procured more substantial benefits from wrist manipulation as compared to Cyriax physiotherapy after three weeks.

Keywords: Lateral Epicondylitis, Manipulation, Cyriax, Strength, Pain

Introduction

Lateral epicondylitis (LE) is the second most frequently diagnosed musculoskeletal upper extremity disorder in a primary care setting *(Harr & Andersen, 2003)*. The most commonly affected structure is the Extensor Carpi Radialis Brevis (ECRB) tendon that is characterized by the increased presence of fibroblasts, vascular hyperplasia and disorganized collagen and the average duration of a typical episode of LE is 6 months – 2 years *(Stasinopoulos & Johnson, 2004)*. Lateral epicondylitis occurs 7 to 20 times more frequently than medial epicondylitis *(Brotzman & Wilk, 1996)*. The dominant arm is commonly affected with the prevalence of 1-3% in general population, but this increase to 19% at 30-60 years of age *(Allender, 1974)*.The condition is not differing between men and women *(Vicenzino, 1996)*. There has been a well defined clinical presentation, the main complaints being pain and decreased grip strength. Diagnosis is simple and can be confirmed by the tests that reproduce pain such as palpation over the facet of the lateral epicondyle, resisted wrist extension, resisted middle finger extension and passive wrist flexion *(Kamein, 1990)*. Traditional treatment program for people with lateral epicondylitis have focused primarily on the pain control by ultrasound, anti-inflammatory medication, iontophoresis or phonophoresis followed by rehabilitation program which ranges from flexibility to strengthening and endurance training. Numerous treatments

have been tried for lateral epicondylitis including drug therapies, corticosteroid injection, electrical stimulation, laser, acupuncture, counterforce bracing, ergonomics, splintage etc. However no one treatment has been reported to be universally efficacious. Surgical treatment is needed in 5-10% of patients who do not respond after many months of conservative treatment *(Manchanda & Grover, 2008)*. Manipulation has been frequently used for the management of back and neck complaints and is thought to be free motion segment that have undergone disproportionate displacement or are felt to be hypo-mobile and causes muscle relaxation. These mechanisms are thought to be associated with distribution of abnormal stresses within the joint, resulting in pain, restriction of motion and potential inflammation *(Cooprestein, 2001; Shekelle et al., 1992)* Manipulation of wrist is capable of relieving symptoms in lateral epicondylitis patients *(Struijis et al., 2003)*. *Cyriax and Cyriax (1983)* suggested the use of deep transverse friction massage in combination with Mill's manipulation for the treatment of LE. For it to be considered a Cyriax intervention, the two components must be used together in the order mentioned. There are 40 different treatment methods reported in literature to treat the LE. All the treatment options have one aim of reducing pain and improving function. It suggests that the optimal treatment strategy is not known. However to build the evidence base for the physiotherapy management of LE; the purpose of the present study is to evaluate the effect of Cyriax physiotherapy and manipulation of wrist technique in reducing pain and improving grip strength.

Materials & Methods:

Thirty patients of lateral epicondylitis both males & females in the age range of 25 to 55 years were selected as subjects after obtaining their consent based on inclusion and exclusion criteria of the study. The subjects were further divided into two groups: Group-A (n=15) and Group-B (n =15) respectively and received the treatment for 3 times a week for 3 weeks.

Treatment Protocol: The subjects of Group - A underwent the Cyriax Physiotherapy in addition to pulsed ultrasonic therapy at 20% duty cycle, frequency 3MHz and an intensity of 1.2 W/cm^2 for 5 min, given at the tenoperiosteal junction of the ECRB. Cyriax physiotherapy consisted of 10 minutes of deep transverse friction massage (DTF) followed by a single application of Mill's manipulation. For DTF, the patient was positioned comfortably with the elbow fully supinated and in 90 degree of flexion. The anterolateral aspect of the lateral epicondyle was located (where the ECRB originates and is the most common site of pain in patients with lateral epicondylitis) and the area of tenderness was identified. DTF was applied with the side of the thumb tip applying the pressure in a posterior direction on the teno-osseous junction. This pressure was maintained while imparting DTF in a direction towards the therapist's fingers, which were positioned on the other side of the elbow for counter pressure. DTF was applied for 10 minutes. After the numbing effect was achieved, the tendon was prepared for

Mill's manipulation *(Cyriax & Cyriax, 1983)*. For Mill's manipulation; patients were positioned comfortably in the seating position with the affected extremity in 90^0 of abduction with the medial rotation enough so that the olecranon faced up. The therapist stabilized the patient's wrist in full flexion and pronation with one hand, while other hand was placed over the olecranon. While assuming full wrist flexion and pronation position, the therapist applied high – velocity low – amplitude thrust at the end range of elbow extension.

The subjects of Group – B underwent Manipulation of wrist in addition to pulsed ultrasonic therapy at 20% duty cycle, frequency 3MHz and an intensity of 1.2 W/cm^2 for 5 min given at the tenoperiosteal junction of the ECRB. Thrust technique was performed as follows – Each subject rested the forearm of his or her affected side on a table with the palmar side of the hand facing down. The therapist sat at a right angle to the subject's affected side and gripped the subject's scaphoid bone between his thumb and index finger reinforced by placing the thumb and index finger of the other hand. The therapist then extended the subject's wrist dorsally at the same time the scaphoid bone was manipulated ventrally. This part of the maneuver was repeated approximately 15 times. This procedure was repeated about 20 times, alternated by either forced passive extension of the wrist or extension against resistance. The duration of an intervention session was 15 to 20 minutes. No restrictions in use of the arm were imposed *(Struijis et al., 2003)*. Both the groups also received graduated exercise therapy regimen including stretching exercises and progressive resisted exercises.

Statistics

The data was analyzed using statistical computer software 'SPSS 13 software package (version 13, SPSS Inc. Chicago, USA)'.The paired t – test and unpaired t – test were used. The level of significance was $p<0.05$.

Results & Discussion

The mean age and BMI of the subjects of Group -A and Group-B were 45.87±9.086 years, 46.93±7.324 years, 27.041 ± 1.842 Kg/m^2 and 27.21 ± 2.352 Kg/m^2 respectively. It was found that the difference in the mean values of age and BMI between Group -A and Group-B were not statistical significant (Table 1).

Table 1: Comparison of Age & BMI

	Group A (Mean±SD)	Group B (Mean±SD)	t-value
Age(years)	45.87 ±9.086	46.93±7.324	0.354*
BMI(Kg/m^2)	27.04± 1.842	27.21±2.352	0.229*

*p<0.05

Table 2: Comparison of Scores (Unpaired t - test) of NPRS & Grip Strength between two groups

		Group A	Group B	t-value
NPRS (cm) (Mean±SD)	before	8.20±0.775	7.93±0.961	
	after 3 wks	6.00±0.845	4.20±0.862	5.78*
Grip Strength (kg) (Mean±SD)	before	5.13±0.99	15.00±1.195	
	after 3 wks	17.13±1.13	19.80±1.082	6.61*

*significant p<0.05; NPRS- Numeric Pain Rating Scale

Table 2 shows the comparison of scores of Numeric Pain Rating Scale (NPRS), Grip Strength between Group-A and Group-B before and after three weeks of treatment. It was found that before the start of three week treatment programme

to the subjects of Group-A and Group-B there was no statistical difference in the scores of NPRS and Grip Strength. After three weeks there was statistically significant difference in the scores of NPRS and Grip Strength in both the groups but a greater improvement was observed in Group-B as compared to Group-A (Table 2). Further, it was found that in Group-A there was a statistical significant improvement in the scores of NPRS & Grip Strength after three weeks (Table 3).

Table 3 Paired t-test of NPRS & Grip Strength of Group A

	before	after three week	t-value
NPRS (Mean±SD)	**8.20±0.775**	**6.00±0.845**	**20.58***
Grip Strength (Mean±SD)	**15.13±0.990**	**17.13±1.125**	**14.49***

significant p<0.05

Similarly, it was found that in Group-B there was a statistically significant improvement in the scores of NPRS & Grip Strength after three weeks (Table 4).

Table 4 Paired t-test of NPRS & Grip Strength of Group B

	before	after one week	t-value
NPRS (Mean±SD)	**7.93±0.961**	**4.20±0.826**	**31.59***
Grip Strength (Mean±SD)	**15.00±1.195**	**19.80±1.082**	**27. 50***

significant p<0.05

The results of the present study shows that subjects in both the groups had significant decrease in pain and increase in grip strength. However, out of the two groups, the Group-B receiving wrist manipulation had a higher percentage of change in both grip strength and reduction in pain as compared to Group- A (Cyriax physiotherapy). Therefore the null hypothesis is rejected. The results of this clinical trial are novel as no other studies comparing Cyriax physiotherapy and manipulation of wrist have been identified. Both the groups in the present study had equal number of subjects and there was no significant difference found with respect to their gender distribution, age and body mass index. The reported success of manipulation of wrist in the present study is bolstered by the previously published trials *(Struijis et al., 2003; Manchanda and Grover, 2008)*. Despite its broad application, the mechanism by which manipulation may work is poorly understood. Manual therapy is used quite often for spine and peripheral joints despite of the inability of clinicians to accurately diagnose the pathway at which manipulation is targeted. In people with low back pain and neck pain, spinal manipulation is thought to free motion segments that have undergone disproportionate displacement and to relax muscles by sudden stretching. Unwanted muscle activity in people with low back pain, in theory can cause a limited range of motion to protect against sudden movements. The advantages of the manipulation of wrist are the potential effectiveness over the short term and the ability for patient to maintain his/her daily activities without restrictions. The clinical efficacy of manipulation therapy has been demonstrated in randomized clinical trials which report benefits in term of pain relief and rapid restoration of function. This may be due to direct effects on articular structures, modulation of nociceptive afferent transmission within the CNS and psychological influences *(Struijis et al., 2003)*. The reported success of Cyriax

physiotherapy in the present study conflicts with previously published trials *(Stasinopoulos & Johnson 2004; Verhaar et al., 1996)*. The authors did not offer any description or reference regarding technique; therefore, it is not clear if their application of Cyriax physiotherapy differed from aid physical therapists in making clinical decisions as injections are not delivered as part of physical therapy treatment. Patients included in this study were those clinically identified as having the tenoperiosteal variety of lateral epicondylalgia as it is hypothesized that this form is best managed with Mill's manipulation. The proposed mechanism of Mill's manipulation is the lengthening of scar tissue following the rupture of adhesions due to the manipulation. This increased length decreases tension on the scar leading to less pain, effectively converting a tear shaped like a "V" into one resembling a "U". The resulting gap is filled with fibrous tissue, resulting in permanent lengthening and abolition of pain. The application of friction massage is said to provide the patient with analgesia prior to the manipulation as well as softening the scar. It has been hypothesized that the mechanism of pain relief secondary to friction massage may be due to modulation of nociceptive impulses at the spinal cord level, also known as the gate control theory. Currently, no published evidence exists to prove the proposed mechanism as to what actually occurs during and following manual treatment with Cyriax physiotherapy. Despite the considerable evidence supporting the use of manual therapy techniques in treating musculoskeletal pain, there still exists no consensus as to the exact mechanisms of action there either *(Cyriax & Cyriax, 1983)*. Recent evidence has indicated that the central nervous system may play a role in pain inhibition following joint manipulation. *Vicenzino (1996)* investigated the effects of a non-thrust cervical lateral glide in patients with chronic lateral epicondylalgia. This technique was shown to result in increased pain-free grip, pressure pain threshold, as well as a sympathetic nervous system response as indicated with measures of skin conductance and blood flux. More recently, *Paungmali et al., (2003)* found similar results with improved pain-free grip, pressure pain threshold, and sympatho-excitation following mobilization with movement directed at the elbow. It should be noted that the above studies captured outcomes only immediately following treatment; therefore, no generalization can be made regarding long-term effects. Given the results of these trials, the potential exists for a similar sympathetic nervous system response following the application of Cyriax physiotherapy, which may explain the technique's superiority in decreasing pain and improving pain-free grip strength. The comparisons between present study results and those of previous trials should be made with caution, as it is not possible to determine which intervention made the greatest contribution to the treatment effect. The present study did not assign patients to receive ultrasound, graduated exercise regimen, Cyriax physiotherapy and manipulation of wrist as an isolation treatment. The absence of a true, no treatment control group makes it difficult to differentiate between treatment effect

and the natural course of the disorder, thus threatening the internal validity of the study. No long term follow- up data was collected past 3 weeks; therefore the long-term effects of the interventions in the present study remain unknown. Future research is needed that will determine the long term effects of the interventions used in the present study.

Conclusion

It was concluded that the patients of lateral epicondylitis procured more substantial benefits from wrist manipulation as compared to Cyriax physiotherapy.

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