JTCM
中医杂志
Journal of Traditional Chinese Medicine

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J Tradit Chin Med 2014 June 15; 34(3): 261-266
ISSN 0255-2922

CLINICAL STUDY

Therapeutic effect of electroacupuncture, massage, and blocking therapy on external humeral epicondylitis

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Accepted: January 3, 2014

Abstract

OBJECTIVE: To compare two therapeutic methods: electroacupuncture + massage + blocking therapy, and blocking therapy alone in the treatment of external humeral epicondylitis.

METHODS: Eighty-six patients were randomized into two groups with 43 in each. The treatment group received electroacupuncture + massage + blocking therapy, while the control group received blocking therapy only. A course of electroacupuncture treatment included therapy once a day for 10 days. There were 10 treatments in a massage course and massage was given once a day, with a 1-week interval given before the next course. A course of blocking treatment included therapy once a week, for two total treatments, and generally no more than three times. The therapeutic effects were evaluated with the visual analog scale (VAS), grip strength index (GSI) score, and Mayo elbow performance score (MEPS) before treatment and at 0, 6, 12, and 24 months after treatment to observe the total effective rate.

RESULTS: In the treatment and control groups before treatment and at 0, 6, 12, and 24 months after treatment, the VAS scores were: 6.5±1.9 and 6.4±1.6; 4.6±1.3 and 4.6±1.7; 4.8±1.3 and 4.8±1.2; 4.6±1.2 and 6.6±1.6; and 6.5±1.6 and 6.5±1.3, respectively. The GSI scores were 63±8 and 63±8; 84±6 and 82±7; 82±7 and 82±6; 84±6 and 62±8; and 64±6 and 64±7, respectively. The MEPS of both groups were 65±7 and 66±8; 85±6 and 84±7; 84±5 and 84±7; 80±7 and 66±6; and 65±6 and 65±7, respectively. The total effective rates of the treatment and control groups at 0, 6, 12, and 24 months after treatment were 87.5% and 85.0%; 85.0% and 82.5%; 80.0% and 12.5%; and 2.5% and 5.0%, respectively. Compared with the treatment group, the control group had greater joint function, better therapeutic effect, and lower pain intensity ($P<0.01$), indicating a high recurrence rate in the 12th month after treatment. There were no differences in VAS, GSI, or MEPS at 0, 6, and 24 months after treatment ($P>0.05$) between the two groups.

CONCLUSION: We found that both methods were effective for external humeral epicondylitis. After 6 months of treatment, the effects were good in both groups. However, in the 12th month, the control group had a relatively severe relapse. After 24 months, both groups relapsed. The effect of electroacupuncture, massage, and blocking therapy used in combination lasted longer, delaying the recurrence of the disease.

Key words: Electroacupuncture; Massage; Blocking therapy; Treatment outcome; External humeral epicondylitis

INTRODUCTION

External humeral epicondylitis, known as tennis elbow, is common in tennis players. It is caused by chronic strain or injury of the elbow joint, especially the common extensor tendon of the lateral epicondyle of the humerus.[1] Traditional Chinese Medicine (TCM) hypothesizes that tennis elbow is the result of chronic strain damaging the normal circulation of *Qi* and blood in the local channels and collaterals. Therefore, *Qi* stagnation and blood stasis cause pain and impair the functions of the elbow joint.[2] While many methods like drugs, acupuncture, massage, or operations are currently used to treat tennis elbow, blocking therapy is the main method used in clinical practice.[3] However, previous studies have demonstrated that blocking therapy is most effective for short periods when compared with the effective duration of other methods for treating tennis elbow.[4] Electroacupuncture and massage are specified TCM treatment methods based on the principles of regulating *Yin* and *Yang* and removing *Qi* stagnation and blood stasis of the channels and collaterals. We have achieved promising results in our clinical practice using electroacupuncture, massage, and blocking therapy in combination to treat tennis elbow.

MATERIALS AND METHODS

General data

Eighty-six outpatients (44 males and 42 females) from the Tennis Department, Institute of Competitive Sports, Beijing Sport University were included in this study from April 2011 to April 2013. The study protocol was approved by the Institutional Review Board of Beijing Sport University Hospital and written informed consent was obtained from every patient. Random numbers were generated using Microsoft Office Excel, with a single designated person responsible for the allocation table. Using the treatment sequence, 43 subjects were assigned to the treatment group and 43 subjects to the control group. In the treatment group, there were 28 males and 15 females aged 18 to 22 years [average (19 ± 2) years]. Treatment patient disease course lasted 3 to 18 months. In the control group, there were 30 males and 13 females aged 19 to 21 years [average (19 ± 1) years]. Control patient disease course lasted 4 to 15 months. There were no obvious differences in sex, age distributions, or disease course between the two groups (P>0.05). Six patients dropped out, with three in each group. Eighty patients completed the study.

Inclusion criteria

Patients who met the following criteria were included. (a) Pain was located at the lateral epicondyle of humerus, radial head, annular ligament, or humeroradial joint gap, with or without radiation to the upper arm or forearm. (b) Patients felt pain when they were wringing a towel, sweeping the floor, or knitting, and there was tenderness in the affected joint. (c) Positive Mill's test: the elbow was straightened, the hand was made into a fist, the wrist was flexed, and the forearm was pronated on the affected side. If any elbow pain was induced, then Mill's test was positive. (d) There were generally no abnormal findings on X-ray. In prolonged cases, there were occasionally periosteal effects, including calcium deposition in the nearby lateral epicondyle of the humerus.

Exclusion criteria

Those who met the following were excluded. (a) Unable to finish the treatment plan. (b) Previously accepted operation or needle-knife treatment. (c) Having other diseases, such as cardio- or cerebrovascular diseases, liver, kidney, or gastrointestinal diseases. (d) The elbow pain was caused by cervical spondylosis, injury of the brachial plexus, fracture, or neoplasm.

Criteria for termination of study

Patients were removed from the study if they: (a) had poor compliance influencing effect or safety; (b) were unable to bear treatment, and quit by themselves; (c) had serious adverse reactions or other unexpected events during the study; (d) had received treatment with drugs, acupuncture, or other methods 1 month prior to the study; or (e) final data were incomplete, affecting the effect evaluation.

Observation indexes

Pain intensity measurement was performed using a 100-mm visual analog scale (VAS). The relative strength of the forearm and hand muscles was measured using the grip strength index (GSI). GSI=grip (kg)/weight (kg)×100.

The Mayo elbow performance score (MEPS) was used to observe the effect of treatment. Of the 100 points, 45 are for pain, 20 are for motor function, 10 are for stability, and 25 are for daily activities. A comprehensive analysis was made on joint pain, activity, stability, and advanced distributed learning ability. A total score of >90 indicated excellent; a total score of 75-89 indicated good; a total score of 60-74 indicated passable; and a total score of <60 indicated poor.

Criteria for effect evaluation

The effect on pain, tenderness, and dysfunction of the elbow joint was evaluated with the Nimodipine method. Formula: efficacy index=[(score before treatment – score after treatment)/score before treatment]×100%.

The total effective rates at 6, 12, and 24 months after

treatment were compared to evaluate the effect of the two groups. Cured indicated that the pain disappeared completely, the elbow joint function was normal, and the MEPS score improved by 96%-100%. Markedly effective indicated that the pain mostly disappeared, the movement of the elbow joint mostly returned to normal with slight tenderness, and the MEPS score improved by 75%-95% . Improved indicated that the pain disappeared partially, the movement of the elbow joint was improved, and the MEPS score improved by 30%-74%. Ineffective indicated that there was no obvious relief of the elbow pain, no improvement of the functional movement, and the MEPS score improved by less than 30%.

Treatment methods

Electroacupuncture + massage + blocking therapy group: during electroacupuncture, the patient was in a sitting position. Filiform needles, 0.35 mm × 75 mm (batch number 2008-2270626, Suzhou Medical Supplies Company, Jiangsu, China), were used for acupuncture. The electroacupuncture apparatus (batch number 2005-2260581) was from Guangzhou Lanhui Medical Supplies Company, Guangdong, China. Selected points were Ashi, Quchi (LI 11), Zhouliao (LI 12), Shousanli (LI 10), Waiguan (SJ 5), and Hegu (LI 4). A continuous wave was used and the intensity of currents depended on the patient's tolerance. After arrival of *Qi* (Deqi), three pairs of points, Ashi and Quchi (LI 11), Zhouliao (LI 12) and Shousanli (LI 10), and Waiguan (SJ 5) and Hegu (LI 4), were alternately selected for connection to the electroacupuncture apparatus. Needles were retained for 30 min. The elbow region was also treated with Teding Dianci Pu (TDP) lamp (CQ-27, made in Chongqing, China) radiation during acupuncture. A course of treatment included therapy once a day for 10 days.

During massage, the patient was sitting with the affected arm in a supine position. The doctor held the wrist of the affected arm of the patient with one hand, and the other hand was massaged with Rou (kneading) and Nie (pinching) from the forearm to the upper arm, especially on the lateral side. Then, the doctor massaged with An (pressing) with the thumb on the external epicondyle of the humerus and around the humeroradial joint gap, Tui (pushing) and Bo (plucking) up and down and left and right for 1-2 min, while flexing the elbow joint and extending five times, and Dian'an (one finger pressing) the points Quchi (LI 11), Shousanli (LI 10), and Waiguan (SJ 5). Finally, the patient was massaged with Cuo (rubbing) repeatedly on the forearm and upper arm with both hands. The massage lasted for about 30 min. There were 10 treatments in a course and massage was given once a day, with a 1-week interval before the next course. The massage was performed in accordance with the instructions given by MASSAGE by Yan *et al.*[6]

During blocking, a mixture of 2.5 mL of 2% lidocaine hydrochloride, 1 mL of vitamin B_{12}, and 0.5 mL (20 mg) of triamcinolone acetonide acetate was injected subcutaneously into the most obviously painful areas and their surroundings. A course of treatment included therapy once a week, for two total treatments, and generally no more than three times.

Control group

The control group was given blocking therapy as described for the treatment group.

Statistical analysis

Statistical analysis was performed with statistical software SPSS 17.0 (SPSS, Chicago, IL, USA). The measurement of clinical efficacy is expressed as a percentage, while all other data are expressed as mean ± standard deviation (*SD*). The independent samples *t*-test was used to compare between the two groups for measurements before and after treatment. $P<0.05$ was considered statistically significant.

RESULTS

Comparison of VAS scores between groups before and 0, 6, 12, and 24 months after treatment

This was a prospective, small-sampled, randomized, and controlled study (Figure 1). VAS scores were significantly lower in the treatment group at 0, 6, and 12 months, compared with those before treatment ($P<0.05$). However, after 24 months, the VAS score was not significantly different ($P>0.05$), indicating the combined treatment of electroacupuncture, massage, and blocking therapy greatly relieved pain up to the 24th month (Table 1).

VAS scores were significantly lower in the control group after treatment at 0 and 6 months compared with those before treatment ($P<0.05$). However, after 12 and 24 months, the VAS score was not significantly different ($P>0.05$), indicating that blocking therapy alone could relieve elbow pain for up to 12 months. After 12 months, the pain relapsed or was worse than before treatment.

The VAS scores were not significantly different before treatment and 6 and 24 months after treatment between the two groups ($P>0.05$). However, after 12 months, the VAS score of the treatment group was significantly lower than that of the control group ($P<0.05$), indicating that the combined treatment was better than that of blocking therapy only.

Comparison of GSI scores between groups before and 0, 6, 12, and 24 months after treatment

Table 2 shows that GSI scores were significantly higher in the treatment group after 0, 6, and 12 months compared with those before treatment ($P<0.05$). However, after 24 months, the GSI score was not significantly different ($P>0.05$), indicating that combined treatment

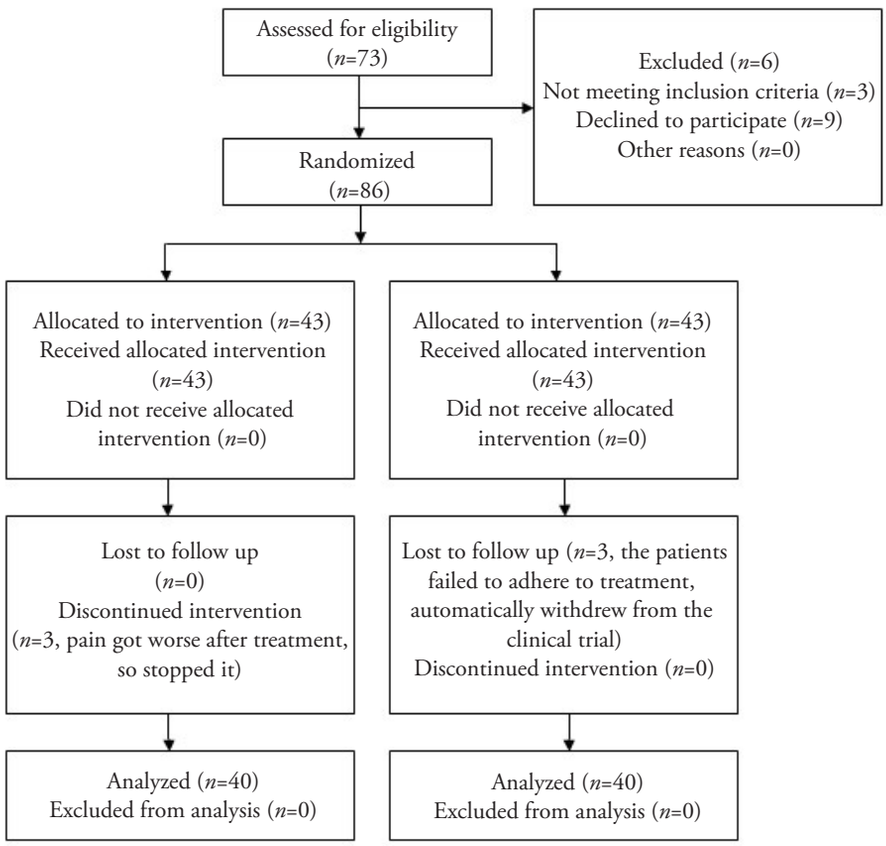

Figure 1 Flow diagram of the clinical indicators

Table 1 Comparison of VAS scores between groups before and 0, 6, 12, and 24 months after treatment ($\bar{x} \pm s$)

Group	Before treatment	After treatment			
		0 month	6th month	12th month	24th month
Treatment	6.5±1.9	4.6±1.3[a]	4.8±1.3[a]	4.6±1.2[ab]	6.5±1.6
Control	6.4±1.6	4.6±1.7[a]	4.8±1.2[a]	6.6±1.6	6.5±1.3

Notes: treatment group received electroacupuncture+massage+blocking therapy; the control group received blocking therapy only. VAS: visual analog scale. [a]P<0.05, compared with before treatment in the same group; [b]P<0.05, compared with control group.

improved muscular strength of the forearm and hand greatly up to 12 months, but the effect was lost by 24 months.

GSI scores were significantly higher in the control group after 0 and 6 months compared with those before treatment (P<0.05). However, after 12 and 24 months, the GSI score was not significantly different (P>0.05), indicating that blocking therapy improved muscular strength of the forearm and hand up to 6 months, but the effect was lost by 12 months.

The GSI scores were not significantly different before and 0, 6, and 24 months after treatment between the treatment and control groups (P>0.05). The control group was significantly lower than that of the treatment group at 12 months (P<0.05), indicating that the combination treatment was better than that of the blocking therapy alone.

Comparison of MEPS scores between groups before and 0, 6, 12, and 24 months after treatment

As shown in Table 3, the MEPS scores were significantly higher in the treatment group after 0, 6, and 12 months compared with those before treatment (P< 0.05). However, after 24 months, the MEPS score was not significantly different (P>0.05), indicating that the combined treatment improved the function of the elbow joint greatly up to 12 months, but the effect was lost by 24 months.

The MEPS scores were significantly higher in the control group after 0 and 6 months compared with those before treatment (P<0.05). However, after 12 and 24 months, the MEPS score was not significantly different (P>0.05), indicating that the blocking therapy could improve elbow joint function up to 6 months, but the effect was lost by 12 months.

The MEPS scores were not significantly different before treatment and 6 and 24 months after treatment between the two groups (P>0.05). However, after 12 months, the MEPS score of the treatment group was significantly lower than that of the control group (P< 0.05), indicating that the combined treatment was better than that of blocking therapy alone.

Comparison of total effective rates between groups after treatment at 0, 6, 12 and 24 months

Table 4 shows that the total effective rates of the treatment group after 6 and 12 months were not significantly different from those immediately after treatment (P> 0.05). However, after 24 months, the total effective rate was significantly lower than that at 0 months after treatment (P<0.01), indicating that the combined treatment improved function of the affected elbow joint up to 12 months, but the effect was lost by 24 months.

The total effective rate in the control group after 6 months was not significantly different from that at 0 months after treatment (P>0.05). However, after 12 and 24 months, the total effective rates were significantly lower than that at 0 months after treatment (P< 0.01), indicating that blocking therapy improved the function of the affected elbow up to 6 months, but the effect was lost by 12 months.

The total effective rates were not significantly different after 0, 6, and 24 months between the two groups (P>0.05). However, at 12 months after treatment, the total effective rates in the control group were significantly lower than those in the treatment group (P<0.01), indicating that the combined treatment was better than that of blocking therapy alone. The tennis elbow of both groups began to relapse 24 months after treatment.

DISCUSSION

External humeral epicondylitis is a type of Bi syndrome, Zhoulao (elbow strain), and Shangjin (injury of tendons) according to TCM. It is mainly caused by chronic strain or injury that damages the *Qi* and blood circulation in the channels and collaterals in the elbow area, resulting in *Qi* stagnation and blood stasis, which manifest as pain and motor impairment of the elbow joint. The treating principle is to regulate *Qi* and blood circulation, resolve stasis, and remove channel and collateral obstructions to stop pain.

The main clinical treatment method is blocking therapy,[7] which uses the principle of blocking sympathetic nervous excitement to improve local blood circulation so that the muscles and tendons can get adequate nutrition. Then, the pain can be controlled and the joint movement promoted during activity.[8] Although it is effective, quick, and simple, there is a high rate of recurrence after blocking therapy.[9]

Electroacupuncture dredges channels and collaterals and promotes circulation of *Qi* and blood. Local pain

Table 2 Comparison of GSI scores between groups before and 0, 6, 12, and 24 months after treatment ($\bar{x} \pm s$)

Group	Before treatment	After treatment			
		0 month	6th month	12th month	24th month
Treatment	63±8	84±6[a]	82±7[a]	84±6[ab]	64±6
Control	63±8	82±7[a]	82±6[a]	62±8	64±7

Notes: treatment group received electroacupuncture + massage + blocking therapy; the control group received blocking therapy only. GSI: grip strength index. [a]P<0.05, compared with before treatment in the same group; [b]P<0.05, compared with control group.

Table 3 Comparison of MEPS scores between groups before and 0, 6, 12, and 24 months after treatment ($\bar{x} \pm s$)

Group	Before treatment	After treatment			
		0 month	6th month	12th month	24th month
Treatment	65±7	85±6[a]	84±5[a]	80±7[ab]	65±6
Control	66±8	84±7[a]	84±7[a]	66±6	65±7

Notes: treatment group received electroacupuncture+massage+blocking therapy; the control group received blocking therapy only. MEPS: mayo elbow performance score. [a]P<0.05, compared with before treatment in the same group; [b]P<0.05, compared with control group.

Table 4 Comparison of total effective rates between groups after treatment at 0, 6, 12, and 24 months

Item	0 month		6th month		12th month		24th month	
	Treatment group	Control group	Treatment group	Control group	Treatment group	Control group	Treatment group	Control group
Cured (n)	9	7	9	7	8	0	0	0
Markedly effective (n)	18	11	18	10	19	1	1	1
Improved (n)	8	16	7	16	5	4	0	1
Ineffective (n)	5	6	6	7	8	35	39	38
Total effective rate (%)	87.5	85.0	85.0	82.5	80.0[a]	12.5	2.5	5.0

Notes: [a]P<0.01, compared with control group.

and motor impairment of the elbow joint can be cured with treatment that eliminates *Qi* stagnation and blood stasis.[10,11] Acupuncture for the treatment of external humeral epicondylitis is quick, cheap, and safe. Massage functions to promote harmonization between *Qi* and blood, warm channels and collaterals and expel cold, and remove blood stasis to help eliminate the pathological changes.[12,13] By using electroacupuncture, massage, and block therapy in combination, greater effects can be achieved because they supplement each other in overcoming their respective shortages.

In the treatment and control groups 12 months after treatment, the GSI scores were 84±6 and 62±8, respectively; the MEPS was 80±7 and 66±6; the VAS score was 4.6±1.2 and 6.6±1.6; and the total effective rate was 80.0% and 12.5%. Compared with the treatment group, the control group had a lower joint function, therapeutic effect, and higher pain intensity (P<0.01), indicating a high recurrence rate 12 months after treatment. However, there were no differences in VAS, GSI, and MEPS 0, 6, and 24 months after treatment (P> 0.05) between the two groups. This result indicates that the effect 0, 6, and 24 months after treatment in both groups was equivalent. Therefore, electroacupuncture, massage, and blocking therapy used together can make the therapeutic effect last longer or delay the recurrence of the disease.

This study is preliminary and has a small sample size. Additionally, the experiment was not completely randomized or double-blinded, so bias and error are inevitable. Future trials with larger sample sizes will help obtain more comprehensive long-term effects and more reliable results.

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