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CLINICAL STUDY

Effect of electroacupuncture on muscle state and infrared thermogram changes in patients with acute lumbar muscle sprain

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Abstract

OBJECTIVE: To observe the effect of electroacupuncture (EA) on force-displacement value (FDV) of muscle state and the temperature index of infrared thermogram in patients with acute lumbar muscle sprain.

METHODS: Patients with acute lumbar muscle sprain were randomly divided into a medication group and an EA group. The medication group (n = 60) were treated with diclofenac sodium dual release enteric-coated capsules, 75 mg per day for 7 days. The EA group (n = 60) received EA at bilateral Houxi (SI 3), Jiaji (EX-B2), and Ashi points, at 20-30 mm depth and 10-25 Hz frequency for 20 min daily for 7 days. Muscle states were determined by measuring FDVs of the bilateral lumbar muscle with a Myotonometer fast muscle state detector. The temperature index of the lumbar skin was measured before and after treatment with a Fluke Ti30 non-refrigerated focal plane infrared thermal imaging detector.

RESULTS: There were no significant pre-treatment differences between the medication group and the EA group in mean FDV (P = 0.052) or temperature index of the lumbar skin (P = 0.25). The cure rate was 63.3% in the EA group and 53.3% in the medication group. The total efficacy in the EA group (93.3 %) was not significantly different from that in the medication group (86.6 %, P = 0.204). After treatment, the mean FDV of the lumbar muscle significantly increased in both groups ($P < 0.05$ for both groups); the FDV increase in the EA group was significantly higher than in the medication group (P = 0.015). The temperature index was also significantly increased in both groups ($P < 0.05$ for both groups); the infrared thermogram in the EA group indicated significantly greater recovery compared to the medication group (P = 0.026).

CONCLUSION: Both EA and diclofenac sodium markedly improved acute lumbar sprain, but EA better improved the rehabilitation and regeneration of FDVs and temperature index of infrared thermogram of the muscle.

Key words: Lumbar sprain; Electroacupuncture; Force-displacement value; Muscular state; Infrared thermogram

INTRODUCTION

Acute lumbar sprain is an acute injury of the lumbar soft tissue caused by improper lumbar activity. Clinically it manifests as inability to stretch the lumbar area, difficulty in lumbar activity, lumbar stiffness and myospasm.[1] This disease may occur at any age, but clinically it occurs mainly in the young and the middle-aged. Acupuncture is an important non-pharmaceutical treatment option. It can relieve the pain caused by acute lumbar muscle sprain and recover muscle movement function. Electroacupuncture (EA) has shown a significant effect in the treatment of pain. A number of previous experiments have shown that the therapeutic effect of EA is possibly related to its effect on muscle condition.[2] In this study, we measured muscle state, temperature index of infrared thermogram, and curative effect to quantify the severity of muscle tension caused by acute lumbar muscle sprain, as well as to determine the effect of EA therapy on muscle biomechanics. This study will provide a reference for further studies on the mechanism of action of EA.

MATERIALS AND METHODS

General materials

All subjects were outpatients from Shanghai Jiao Tong University Affiliated Sixth People's Hospital between September 2009 and December 2012. A total of 120 cases in conformity with the inclusion criteria were selected according to the criteria of acute lumbar sprain in the Criteria of Diagnosis and Curative Effects of Traditional Chinese Medicine Diseases and Syndromes issued by the State Administration of Traditional Chinese Medicine (Table 1).

Randomization and grouping

One hundred and twenty patients were divided using a simple random number table into two equal groups, an EA group (n = 60) and a medication group (n = 60). The scheme of random grouping was concealed in envelopes and the random numbers were generated by EXCEL. That is, using sealed randomized envelopes with computerized serial numbers, the patients enrolled were randomly allocated to either the EA or the medication group by professionals at the Acupuncture, Tuina and Traumatology Research Center in the Shanghai Jiao Tong University Affiliated Sixth People's Hospital. An attending doctor screened and grouped patients, and recommended the trial plan for them. The patients could participate in the project after signing written, informed consent.

Initially, 128 cases were randomly allocated to an EA group and a medication group in a ratio of 1 : 1, giving 64 cases in each group. However, two of the subjects allocated to the EA group refused the randomized distribution, thus 62 subjects entered the EA group of this study, with two cases discontinuing the trial and becoming lost to follow up. Similarly, three of the subjects allocated to the medication group refused the randomized distribution, thus 61 cases entered the medication group of this study, with one case discontinuing the trial. The doctors only gave treatment according to the patient grouping. The patients and the acupuncturists performing the treatment were not blinded due to the nature of the trial in which the patient obviously knew whether they received acupuncture treatment or medicine. The researcher performing outcome assessments and statistical analysis of the study data was blinded to the group allocation (Figure 1).

Ethical considerations

All patients signed written informed consent prior to study commencement. The trial was approved by the Ethics Committee of the Shanghai Jiao Tong University Affiliated Sixth People's Hospital.

Diagnostic criteria

Diagnosis of acute lumbar sprain was made according to the relevant criteria in the Criteria of Diagnosis and Curative Effects for Traditional Chinese Medicine Diseases and Syndromes issued by the State Administration of Traditional Chinese Medicine:[3] (a) history of lumbar sprain and frequent occurrence in the young and the middle-aged; (b) severe pain on one or both sides of the waist, limitation of lumbar activity with inability to turn over, sit, stand and walk, and often keeping a forced posture for pain relief; (c) spasm of lumbar muscle and gluteus, or palpable cord-like mass, obvious tenderness on the injured part and a change in the spinal physiological curvature.

Inclusion criteria

Patients included were: (a) patients conforming to the diagnostic criteria of acute lumbar sprain with the duration of illness within three days; (b) patients aged 25 to 60 years of either sex; (c) patients who did not receive any other treatment during the present trial; (d) patients that signed written informed consent.

Exclusion criteria

The following patients were excluded: (a) patients with lumbar intervertebral disc protrusion or acute lumbar sprain accompanied with lumbar spondylolisthesis, rachiopathy, sacroiliac disease, coxarthropathy, or peripheral angiopathy; (b) patients with systemic collagenous immunopathy and other acute or chronic infection who received treatment with glucocorticoids; (c) patients who were unwilling to participate in the trial, dropped out during treatment or were lost to follow-up; (d) patients whose condition was continuously aggravated or who had serious complications during the trial.