

Meta-Analysis on Treatment of Cervical Spondylotic Radiculopathy with Electroacupuncture

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Abstract

Objective: To have a systematic review on the effectiveness and safety of electroacupuncture therapy for cervical spondylotic radiculopathy.

Methods: RCTs of electroacupuncture treatment for cervical spondylotic radiculopathy were searched widely by computer. Cochrane Reviewer's Handbook 5.1 was applied to evaluate the quality of literatures. Software RevMan 5.3 was used to conduct Meta-analysis.

Results: 6 RCTs with 614 cases were finally included and analyzed. Electroacupuncture therapy was applied on Jiaji point in the 6 RCTs performed and waveform is alternatively rare wave or dilatational wave. the combined RR value was 0.15, 95% CI (0.10, 0.20), the test value of synergic efficacy $Z=5.93$, $P<0.01$, there is statistical significance between electroacupuncture group and control group, the efficacy of electroacupuncture treatment group was better than the control group.

Conclusions: Electroacupuncture treatment on Jiaji point for cervical spondylotic radiculopathy has superiority, but the quality of literatures included is generally lower, thus conclusions were unreliable.

Keywords: Electroacupuncture therapy, Cervical spondylotic radiculopathy, Computer retrieval, Meta-analysis.

Introduction

Cervical spondylotic radiculopathy (CSR) approximately accounts for 60% among cervical spondylosis, the disease is caused from the cervical intervertebral disc herniation on rear side, uncovertebral joint or zygapophyseal joint hyperplasia or hypertrophy, nerve stimulation or compression¹ and clinically reflected in radioactive numbness and pain of neck, shoulder and arm mainly. The disturbance of upper limb movement and sensory is the most common complication, having a great influence on living quality of patient.

Currently, the effective treatment measures for the disease are limited clinically and symptomatic treatments such as nourishing nerve, dilating vessel, improving brain tissue

metabolism are generally adopted in the aspect of western medicine, but it is easy to recur.

With significant effect and few adverse reactions, electroacupuncture therapy for CSR is widely applied. Recently, the studies on electroacupuncture treatment for the disease at home have become increasingly prominent, but the advantages of electroacupuncture in its clinical treatment haven't been verified by evidence-based medicine. Therefore this paper provides reliable basis for the clinical treatment of cervical spondylotic radiculopathy through systematic review.

Material and Methods

Standard for inclusion: ① Study types: Randomized controlled trial (RCT). ② Objects of study: Patients diagnosed with CSR regardless of sex, race and age group. ③ Standard of diagnosis: Tests were based on definite diagnosis standard regardless of its source or self-made standard. ④ Intervention measures: Electroacupuncture therapy or electroacupuncture combining with other therapies was applied in test group, while they were unlimited for control group. ⑤ Outcome indexes: Effective rate is considered as primary outcome index, and the adverse reaction occurred in the process of electroacupuncture therapy is considered as secondary outcome index.

Standard for exclusion: ① Repetitive publication ② Non-randomized controlled trial ③ No definite standard of diagnosis for CSR ④ Different wave length, frequencies or point selection methods are considered as comparison between test group and control group

Literature retrieval strategy: Database: PubMed, Cochrane Database, Chinese Journal Full-text Database, Chinese Biomedical Literature Database, and VIP Journal Full-text Database. Retrieval period was limited from January 1995 to April 2016. Retrieval type: "Electric", "Electroacupuncture", "Electrical stimulation", "Low frequency pulse", "Cervical spondylosis" as retrieval words for Chinese database. Retrieval type in English ((electric) OR (electroacupuncture) OR (electrical stimulation) OR (low frequency pulse)) AND (cervical spondylosis)

Data collection and management: Two reviewers were responsible for: Independently searching literature abstract or headline to exclude the tests that were obviously inconsistent with standard for inclusion and read through the whole text of residual tests which may possibly be

consistent with standard for inclusion; independently and respectively carrying out data extraction including study methods, number of cases, intervention and control measures, outcome indexes, random assignment method, blinding method with respect to all studies consistent with standard for inclusion, and carrying out the cross checking; resolving differences between literature inclusion and data extraction through arbitration, negotiation and other methods.

Quality evaluation method of literature: “Bias risk evaluation tool” recommended by Cochrane Reviewer’s Handbook 5.0 was applied into the methodological quality standard evaluation² of studies included, including ① Random assignment method; ② Allocation scheme concealment; ③ Implementation of blinding method; ④ Integrity of result data; ⑤ Selective report of study results; ⑥ Other bias sources. The specific descriptions were made about the above 6 items regarding each study result.

Statistical analysis: RevMan5.3 statistical software provided by Cochrane’s collaboration network was carried out for meta-analysis. Heterogeneity test was respectively carried out on individual study by χ^2 . In case of statistical heterogeneity among studies, it is going to analyze the source of heterogeneity, but in case of no clinical or methodological heterogeneity, the random effect model will be utilized for combined analysis. If various studies are free of statistical significance, the fixed effect model will be utilized for combined analysis. The outcome indexes of binary variable and continuous variable are respectively based on relative risk (RR) and weighted mean difference (WMD). Effect quantity of both groups is expressed by 95% CI, and there is statistical significance when $P < 0.05$.

Results

Retrieved results: There were a total of 747 relevant literatures retrieved including 74 literatures in English by computer retrieval, of which 732 unqualified literatures were excluded according to the standard for exclusion, the 15 literatures also included 9 low-quality literatures, and finally 6 literatures (5 in Chinese and 1 in English) published from 2003 to 2015 were included into standard.

Basic characteristics of studies included: 43 – 200 cases were respectively included into each study, with a total of 614 cases included into 6 studies. Of which there were 3 studies^{3,6,7} on electroacupuncture for the test group, 1 study⁴ on electroacupuncture + traction for the test group, 1 study⁵ on electroacupuncture + massage + traction for test group and 1 study⁸ on electroacupuncture + microwave treatment for the test group. There were 2 studies^{3,4} on traction therapy for the control group, 2 studies^{6,7} common acupuncture for the control group, 1 study⁵ on massage + traction for the control group and 1 study⁸ on microwave treatment for the control group, which were shown in table 1.

Quality evaluation of studies included: Results are shown in table 2, of which 5 studies^{3-6,8} showed that was is random number table and 1 study⁷ showed that it was random based on visiting sequence, the scheme allocation concealment and the implementation of blinding method were not referred in these 6 studies, drop-out and withdrawal were referred in only 2 studies^{4,8} and the quality of 6 studies included was poorer.

Effect evaluation: We carried out Meta analysis on 6 RCTs, and divided them into 3 subgroups (see Figure 1) on the basis of control group. Meta analysis results show that combined RR value is 0.15,95%CI (0.10,0.20), the test value of synergic efficacy $Z=5.93$, $P<0.01$, and there is statistical significance for the differences between the two groups. Analysis results of subgroups show that: ① Electroacupuncture therapy is superior to massage therapy; ② Electroacupuncture therapy is superior to western drug therapy; ③ There is no sufficient evidence to prove that electroacupuncture therapy is superior to microwave therapy.

Analysis on point selection and electroacupuncture frequency: Jiaji point was selected as major treatment points and its electroacupuncture points in 6 studies included, of which rare wave treatment was applied into 4 studies³⁻⁶, and dilatational wave treatment was applied into 2 studies^{7,8} (See Table 3).

Adverse reaction: there was not adverse reaction referred in these 6 studies.

Table 1
Basic Characteristics of Studies Included

Studies included	Number of cases (Test / Control group)	Intervention measures		Outcome indexes
		Test group	Control group	
Zhang Honglai ³	60/60	Electroacupuncture	Traction	Total effective rate
Xue Jin ⁴	36/35	Electroacupuncture + traction	Traction	Total effective rate
HUA YU ⁵	60/60	Electroacupuncture + massage + traction	Massage + traction	Total effective rate
Tian Hongzhao ⁶	30/30	Electroacupuncture	Acupuncture	Total effective rate
Yang Yaozhou ⁷	100/100	Electroacupuncture	Acupuncture	Total effective rate
Gao Xing ⁸	22/21	Electroacupuncture + microwave	Microwave	Total effective rate

Table 2
Quality Evaluation on Clinical RCTs of Electroacupuncture Therapy for Cervical Spondylotic Radiculopathy

Studies included	Generation of random series	Concealment of random allocation scheme	Blinding method	Description of incomplete information	Selective report	Other bias
Zhang Honglai ³	Random number table	Unclear	Not described	Not referred	None	Insufficient
Xue Jin ⁴	Random number table	Unclear	Not described	Not referred	None	Insufficient
HUA YU ⁵	Random number table	Unclear	Not described	Not referred	None	Insufficient
Tian Hongzhao ⁶	Random number table	Unclear	Not described	Not referred	None	Insufficient
Yang Yaozhou ⁷	Visiting sequence	Unclear	Not described	Not referred	None	Insufficient
Gao Xing ⁸	Random number table	Unclear	Not described	Insufficient	None	Insufficient

Table 3
Point Selection and Electroacupuncture Frequency in Literatures Included

Studies included	Major points	Electroacupuncture contact	Electroacupuncture waveform	Electroacupuncture frequency
Zhang Honglai ³	Cervical Jiaji point	3 pairs of Jiaji points surrounding the diseased centrum	Rare wave	Not referred
Xue Jin ⁴	C4-C7 Jiaji point	Jiaji point	Continuous wave	100 – 150 times / min
HUA YU ⁵	Cervical Jiaji, Fengchi, Fengfu, Tianzhu points	Jiaji and Fengchi points	Rare wave	Not referred
Tian Hongzhao ⁶	Jiaji point	3 pairs of Jiaji points surrounding the diseased centrum	Rare wave	Not referred
Yang Yaozhou ⁷	Cervical Jiaji points (2, 4, 6)	Cervical Jiaji points (2, 4, 6)	Dilatational wave	Not referred
Gao Xing ⁸	Jiaji, Quchi on affected side, Shousanlu, Hegu points	Jiaji point	Dilatational wave	Insufficient

Discussion

Cervical spondylotic radiculopathy belongs to the field of “cervical paralysis”, “rigid neck”, “cervical shoulder pain”, “cervical muscle contraction” described in traditional Chinese medicine. It is mostly caused from bowing the neck for long-term work, excessive fatigue, the deficiency of liver and kidney or deficiency of qi and blood, invasion of wind-cold damp pathogen into meridians which further results in the pain and impassability of meridians. Its pathogenesis is closely related to governor meridian and bladder meridian, which Jiaji points are located at both sides of governor meridian, acupuncturing Jiaji point can make the governor meridian and bladder meridian smooth and regulate qi and blood. Modern anatomical studies show that acupuncturing

Jiaji points can improve microcirculation and tissue hypoxia-ischemia, thus mitigating or relieving nerve root stimulation symptom. ⁹ Electroacupuncture therapy is an important treatment means for the conservative treatment of cervical spondylosis, rare wave applied can make muscle jump obviously, loose intervertebral joints, recover the protruding intervertebral disc and expand the volume of vertebral canal by muscle stretching centrum. It can relieve the compressed spinal cord or spinal nerve root, thus relieving or healing spinal diseases ¹⁰; Dilatational wave applied can overcome the adaptability of single waveform, and regularly contract muscle, promote blood circulation, improve histotrophic nutrition and eliminate inflammatory edema under huge dynamic effect.

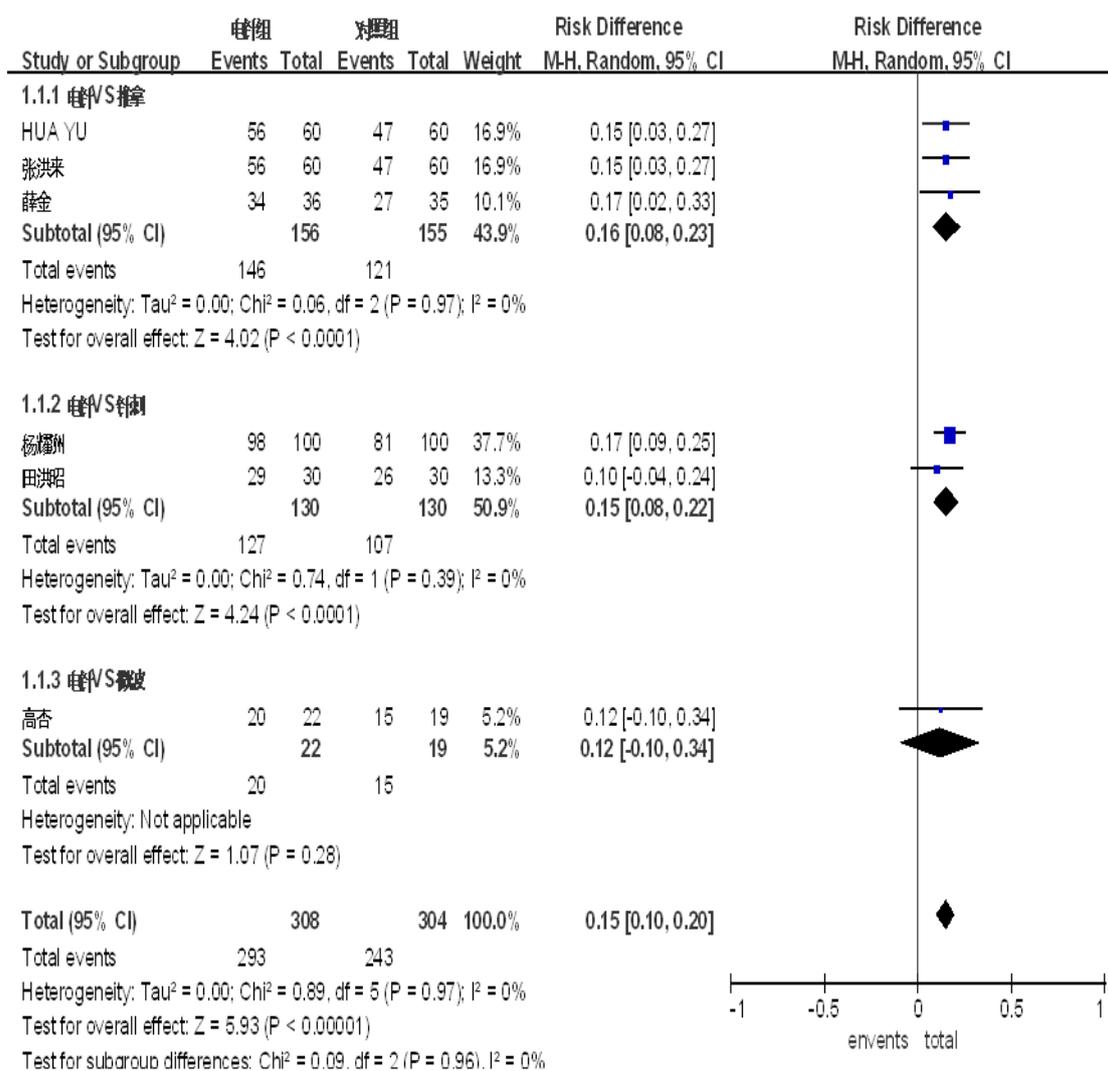


Figure 1: Forest Graph of Meta-Analysis on Curative Effect

All literatures in Chinese and English from 1995 to September 2016 were retrieved for the systematic review, Meta-analysis results show that electroacupuncture therapy is superior to that of control group and has advantages in the treatment of cervical spondylotic radiculopathy. But there are the following problems in this study: no high-quality evidence in these 6 RCTs included, mainly including ① Insufficient safety evaluation ② Insufficient allocation and blinding method implementation ③ Insufficient description of drop-out and withdrawal ④ Insufficient studies on multi-center large samples. Therefore, it is still necessary to carry out more large-sample, strict methodology designs and quality control studies clinically in the future and truthfully report adverse reactions in order to obtain more reliable conclusions.

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