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THE EFFICACY OF THE LASER ACUPUNCTURE METHOD COMBINED WITH MASSAGE AND ACUPRESSURE IN THE TREATMENT OF CERVICAL SCAPULOHUMERAL SYNDROME DUE TO CERVICAL SPONDYLOSIS

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ABSTRACT

Objectives: *To evaluate the therapeutic effectiveness of laser acupuncture combined with acupressure massage in treatment cervical scapulohumeral syndrome due to cervical spondylosis.*

Subjects and methods: *A prospective, pre- and post-intervention comparative study was conducted on 40 patients with cervical scapulohumeral syndrome due to cervical spondylosis, treated at Traditional Medicine Department, Military Hospital 103. The patient group (n = 20) received laser acupuncture in conjunction with therapeutic massage acupressure. The control group (n = 20) underwent electroacupuncture with the same adjunct therapy. Pain intensity was evaluated using the Visual Analog Scale (VAS). Cervical range of motion was assessed by the Zero method using a standard goniometer ROM. Functional disability was measured using the Neck Disability Index (NDI).*

Results: *After 14 days of treatment, the average pain level in the patient group decreased from 6.53 ± 0.76 to 1.52 ± 0.87 VAS score; the control group declined from 6.35 ± 0.91 to 1.48 ± 0.81 VAS score, the difference before and after treatment was statistically significant with p < 0.05. Cervical spine range of motion and daily activity limitations (NDI) significantly improved before and after treatment within each group (p < 0.05).*

Conclusions: *The treatment of cervical scapulohumeral syndrome using the combination of laser acupuncture and acupressure massage was comparable to electroacupuncture combined with acupressure massage.*

Keywords: Laser acupuncture, acupressure massage, cervical scapulohumeral syndrome.

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1. INTRODUCTIONS

Cervical scapulohumeral syndrome refers to a spectrum of clinical manifestations associated with cervical spine pathologies, characterized by dysfunction of the cervical spinal nerve roots and/or cervical spinal cord, in the absence of inflammatory etiologies [1]. The disease typically presents neck pain accompanied by radiating pain to the upper limb, sensory disturbances, motor impairment and altered reflexes distributed along specific dermatomes. The reported incidence has been established to be between 63,5 and 107,3 per 100.000 individuals per year, with the C6 and C7 spinal segments being the most frequently affected. Clinical guidelines in treatment cervical radiculopathy between 2011 and 2018 recommend immobilization (using a cervical brace), exercise, manual therapy and nonsteroid anti-inflammatory as the first line of treatment. If this first treatment option gives no relief within 4 to 8 weeks, recurring to surgery if necessary [2]. However, it requires specialized technical expertise, involves considerable healthcare costs and carries a risk of potential complications.

According to traditional medicine, treatment includes both pharmacological and non-pharmacological methods (acupuncture, electroacupuncture, hydro-acupuncture, acupressure massage, cupping, moxibustion and qigong…). In recent years, the integration of two medical paradigms in treatment cervical scapulohumeral syndrome has garnered considerable attention, with more combined techniques being applied, including laser acupuncture (LA). Several recent reports have confirmed the effectiveness of LA in treatment cervical scapulohumeral syndrome and suggested that it is a reliable treatment method. Leveraging the biological stimulation effects of laser light combined with acupuncture point theory according

to traditional medical theory, LA helps unblock meridians, harmonize Qi and relieve pain. However, further research is essential to support its broader application in clinical practice.

Thus, we conducted the research as an initial step to evaluate the efficacy of laser acupuncture combined with acupressure massage in treatment cervical scapulohumeral syndrome due to cervical spondylosis.

2. SUBJECTS AND METHODS

2.1. Subjects

40 patients diagnosed with cervical scapulohumeral syndrome due to cervical spondylosis were treated at Traditional Medicine Department, Military Hospital 103 from June 2024 to December 2024.

Patients with a history of allergies, pregnant women, spinal tuberculosis, cancer or severe chronic diseases (liver, kidney, heart failure, severe hypertension, diabetes, …); patients did not adhere to treatment or experienced adverse effects (increased pain, skin redness, itching, burning, infection, …); patients refused to continue were excluded.

2.2. Methods

- Research design: a prospective, controlled trial, comparing effectiveness before and after the treatment.

- Sample size: convenience sampling (40 patients met the inclusion criteria).

- Materials: laserneedle Touch (manufactured and developed by the Laserneedle GmbH Company of the Federal Republic of Germany), consisting of 10 laser emitters, including 7 red light emitters with a wavelength of 658 nm and 3 blue light emitters with a wavelength of 405 nm; Measuring tape; VAS pain scale; Electroacupuncture device, Acupuncture needle (compliant with technical requirements); Cotton balls, 70^{o} alcohol.

- Procedure: clinical examination and imaging (X-ray of the cervical spine). Patients were thoroughly informed about the importance of adhering to the prescribed treatment regimen. Patients were pair-matched based on age, sex, cervical spine range of motion, pain intensity (assessed by the Visual Analog Scale - VAS) and functional impairment in daily activities (evaluated using the Neck Disability Index - NDI):

+ The patient group: 20 patients, laser acupuncture continuously for 15 minutes/day x 14 days (except Saturdays and Sundays), using 7 red light emitters with a wavelength of 658 nm at a frequency of 935,5 Hz and a power density of 4,07 W/cm^2 (using eye protection glass for both patients and medical staff). Acupuncture formula: Ashi point, Fengchi (GB20), Dazhu (BL11), Jianyu (LI15), Jianjing (GB21) and Quchi (LI11).

+ The control group: electroacupuncture continuous time for 15 minutes/day x 14 days (excluding Saturdays and Sundays). The prescribed acupuncture points included: Ashi points, Fengchi (GB20), Dazhu (BL11), Jianyu (LI15), Jianjing (GB21) and Quchi (LI11).

Both groups treated acupressure massage according to the Traditional Medicine Technical Process of The Ministry of Health in 2013, including rubbing, squeezing, rolling, pressing, acupressure massage, distribution and lumbar spine exercise continuously for 15 minutes/day x 14 days (except Saturday, Sunday).

- Clinical criteria (conducting evaluation at pre-treatment - D0 and after 14 days of treatment - D14).

+ Evaluating the pain levels according to the Visual Analogue Scale (VAS), with 5 levels: no pain (0-1 VAS score), mild pain (2-4 VAS score), moderate pain (5-6 VAS score), severe pain (7-8 VAS score), and very severe pain (9-10 VAS score).

+ Cervical range of motion (assessing the Zero method established by the American Academy of Orthopedic Surgeons, in conjunction with a joint range of motion measurement (ROM) according to Ho Huu Luong's technique, with varying degrees of general range of motion limitation: no limitation (0 point); mild limitation (1-6 points); moderate limitation (7-12 points); severe limitation (13-18 points) and complete limitation (19-24 points).

+ Daily living activity limitation (measuring the Neck Disability Index (NDI) questionnaire), were classified as follows: no disability (0-4 points); mild disability (5-14 points); moderate disability (15-24 points); severe disability (25-34 points) and severe disability (≥ 35 points).

+ Observing any adverse effects of patient's treatment process.

- Ethics: this study was conducted in accordance with the instructions of The Department of Traditional Medicine at Military Hospital 103, did not affect the patient's treatment process. Patient personal information was used solely for research purposes.

- Statistical analysis: the data analysis in this study was conducted by SPSS version 27.0. The results are presented in the form: average value ± standard deviation and percentage. The results are considered statistically significant when $p < 0.05$.

3. RESULTS

Table 1. Classification of patient pain intensity before and after treatment

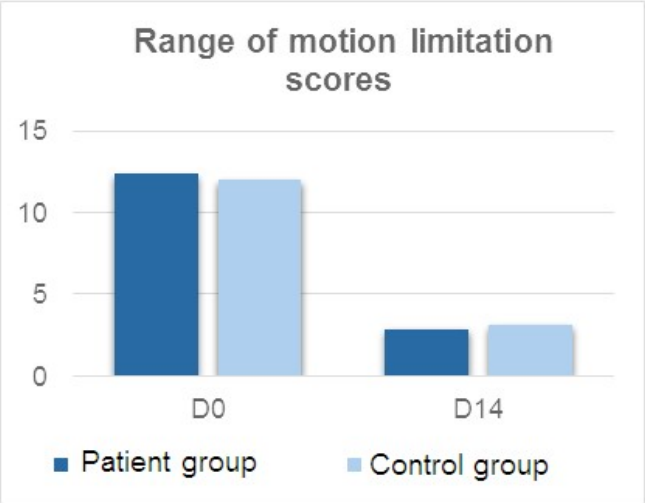
VAS score	Pain levels	Patient group[a]				Comparison group[b]			
		D0[1]		D14[2]		D0[1]		D14[2]	
		n	%	n	%	n	%	n	%
0-1	No pain	0	0	16	80	0	0	15	75
2-4	Mild pain	6	30	3	15	5	25	5	25
3-6	Moderate pain	11	55	1	5	12	60	0	0
7-8	Severe pain	3	15	0	0	3	15	0	0
Total		20	100	20	100	20	20	20	100
p		$p_{a(1-2)} < 0.05$				$p_{b(1-2)} < 0.05$			
		$p_{a-b} > 0.05$							

Before treatment, all patients exhibited pain symptoms of varying intensities, with moderate and severe pain accounting for the majority in both groups. There was no statistically significant difference in baseline pain levels between the two groups ($p > 0.05$). After 14 days of treatment, the reduction on pain intensity compared to baseline was statistically within both groups ($p < 0.05$). The change in pain levels indicates a clear trend of pain reduction. The proportion of patients with the same pain level after treatment between the patient group and the control group showed no statistically significant difference ($p > 0.05$).

Table 2. Average VAS and NDI before and after treatment

Criteria		VAS ($\bar{X}$ ± SD)	NDI ($\bar{X}$ ± SD)	p
Patient group[a]	D0[1]	6.53 ± 0.76	24.47 ± 2.14	$p_{a(1-2)} < 0.05$; $p_{b(1-2)} < 0.05$; $p_{a-b} > 0.05$
	D14[2]	1.52 ± 0.87	11.62 ± 1.98	
Control group[b]	D0[1]	6.35 ± 0.91	23.76 ± 2.23	
	D14[2]	1.48 ± 0.81	11.43 ± 1.86	

Within each group, the average VAS and NDI scores after treatment considerably reduced compared to before treatment, with statistically significant differences ($p < 0.05$). The average VAS and NDI scores between the patient group and the control group were no statistically significant difference ($p > 0.05$).



Graph 1: Functional limitation score before and after treatment

Prior to treatment, the functional limitation score in both groups was at an average level. After 14 days of treatment, the functional limitation score in the experimental group and the control group were mild limitation (0-6 points), with the difference being statistically significant ($p < 0.05$). There was no statistically significant difference between two treatment groups with $p > 0.05$.

Table 3. The degree of functional limitation before and after treatment

Degree of functional limitation	Patient group[a]		Control group[b]	
	D0[1]	D14[2]	D0[1]	D14[2]
No limitation	0	11 (55.0%)	0	12 (60.0%)
Mild limitation	4 (20.0%)	9 (45.0%)	6 (30.0%)	7 (25.0%)
Moderate limitation	13 (65.0%)	0	12 (60.0%)	1 (5.0%)
Severe limitation	3 (15.0%)	0	2 (10.0%)	0
Complete limitation	0	0	0	0
Total	20 (100%)	20 (100%)	20 (100%)	20 (100%)
p	$p_{a(1-2)} < \pm 0.05$		$p_{b(1-2)} < 0.05$	
	$p_{a-b} > 0.05$			

Before treatment, most patients in both groups exhibited moderate levels of functional limitation. This level improved after 14 days of treatment and no patient had severe functional limitations. The change before and after treatment in each group was statistically significant with $p < 0.05$. A comparison of treatment outcomes between the experimental group and the control group showed a comparable level of improvement, with no significant difference in efficacy between the two modalities ($p > 0.05$).

- The adverse effects: throughout the treatment process, no cases of adverse effects were observed.

4. DISCUSSIONS

For patients with cervical scapulohumeral syndrome resulting from cervical spondylosis, pain is the most prominent and distressing symptom, significantly impairing daily activities, work and overall quality of life, and ultimately driving them to seek medical treatment. Cervical pain often triggers muscle spasms in the neck and these spasms further exacerbate the pain. When pain is accompanied by rigidity of the paravertebral musculature, it results in a marked restriction of cervical motion. Consequently, pain alleviation becomes the primary objective of the therapeutic process.

In this study, prior to the study, over 70% of patients in both groups presented with moderate to severe pain. After 14 days of treatment, no patients continued to experience severe pain, only 5% of patients in the patient group were recorded as having moderate pain; the average VAS score in the patient group decreased significantly from 6.53 ± 0.76 to 1.52 ± 0.87; the control group declined from 6.35 ± 0.91 to 1.48 ± 0.81, the difference before and after treatment within each group was statistically significant with $p < 0.05$. However, there was no statistically significant difference in pain levels or average VAS scores between the two groups ($p > 0.05$). These findings indicate that both laser acupuncture and electroacupuncture are effective in reducing pain in cervical radiculopathy.

From a traditional medicine perspective, this syndrome is described within the scope “Bi Syndrome” with disease name “Jian Tong”. The primary etiology is a deficiency of vital energy, often compounded by a lack of consistent health-promoting practices or after prolonged illness. This results in weakened Qi and blood, impaired meridian function and reduced defensive Qi, thereby facilitating the invasion and retention of external pathogenic factors such as wind, cold and dampness in the muscles and meridians. The resultant obstruction of Qi and blood flow ultimately manifests as pain.

In cases of cervical spondylosis, pain-induced paravertebral muscle spasms and the consequent contraction of connective tissues including fascia, ligaments and joint capsules further compromise cervical range of motion and negatively impact the quality of life and daily functioning of the patient. Therefore, prompt and effective management of pain symptoms is of paramount importance for the process.

A randomized clinical trial conducted by Cohen demonstrated that electroacupuncture (EA) provided analgesic effects comparable to

those achieved with pharmacological therapy, establishing EA as a safe and acceptable modality for pain relief [3]. The analgesic mechanism of EA is believed to involve modulation of both peripheral and central neural sensitivity. Specifically, EA has been shown to inhibit the interaction between peripheral TRPV1 and P2X3 receptors. Moreover, within the central nervous system, EA may activate the IL-10/β-endorphin pathway in spinal microglia and suppress synaptic vesicle protein expression in the spinal cord, thereby producing analgesic effects [4].

The mechanism underlying laser acupuncture is attributed to the photo biomodulation effect. Laser irradiation influences the activity of connective tissue cells (fibroblasts), accelerates tissue repair and exerts anti-inflammatory effects by reducing prostaglandin synthesis. Upon absorption of laser energy, cellular processes are reorganized, triggering a cascade of beneficial responses that include the inhibition of peripheral nerve activity, suppression of central synaptic transmission, modulation of central neurotransmitters, reduction of muscle spasm and edema and overall anti-inflammatory action. The study demonstrated that laser acupuncture has comparable therapeutic efficacy to electroacupuncture in pain reduction. These findings are consistent with the work of Ljubica M. Konstantinovic and colleagues (2010), who reported significant pain reduction in 60 patients treated with low-level laser therapy (LLLT) [5]. Several researchers have posited that the primary anti-inflammatory effect of LLLT is due to its ability to downregulate prostaglandin activity during inflammation. Prostaglandins cause vasodilation at the site of inflammation, thereby facilitating the infiltration of inflammatory cells into surrounding tissues [6]. Additionally, a systematic review by Chow and colleagues demonstrated the benefits of LLLT in both acute and chronic neck pain over short- and intermediate-term periods [7].

Furthermore, acupressure massage, a form of physical stimulation applied directly to the skin, muscles, and cutaneous sensory receptors, elicits positive effects on multiple systems, including the integumentary, muscular, tendinous, articular, nervous, circulatory, digestive, respiratory, and metabolic systems. Acupressure massage enhances cutaneous blood flow and nerve activity, improves muscle nutrition, reduces muscle spasm, promotes muscle relaxation, increases the elasticity of tendons and ligaments, dilates peripheral blood vessels, and ameliorates local ischemia and hypoxia. It also reduces tissue inflammation and edema, stimulates synovial fluid secretion, and enhances pericapsular circulation, thereby offering therapeutic benefits in musculoskeletal disorders. Thus, both theoretical and clinical practice indicate that the combination of laser acupuncture with acupressure massage produces marked clinical improvements in pain relief.

5. CONCLUSIONS

A study was conducted on 40 patients suffering from cervical scapulohumeral syndrome due to cervical spondylosis (20 patients treated with laser acupuncture combined with acupressure massage and 20 patients in the control group treated with electroacupuncture combined with the same manual therapy), the results demonstrated that laser acupuncture combined with massage acupressure was equally effective as electroacupuncture in managing clinical symptoms. No adverse effects were reported during the study.

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