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Clinical effect and safety analysis of long-round needle usage in treating cervical spondylotic radiotelegraphy and its effect on pain and functional recovery

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Abstract.
BACKGROUND: Long-round needle usage can treat muscular pain, but there is little research on cervical spondylotic radiculopathy (CSR).
OBJECTIVE: To explore the efficacy and safety of long-round needle usage in treating CSR.
METHODS: Ninety-eight patients with CSR were randomly divided into control and observation groups. They were treated with filiform needles and long-round needles, respectively. The therapeutic effect, safety, inflammatory factors and neck dysfunction index (NDI), McGill pain questionnaire (MPQ) and Generic Quality of Life Inventory-74 (GQOL-74) scores were compared between the two groups.
RESULTS: After treatment, the effective rate and safety of the observation group were better than those of the control group. The NDI and MPQ scores in the observation group were significantly lower than those in the control group, and the GQOL-74 score was higher than that in the control group. The level of interleukin-8 in the observation group was significantly lower than that in the control group, and the level of interleukin-10 was significantly higher than that in the control group.
CONCLUSIONS: Long-round needle therapy has a good effect on patients with CSR, which can safely improve the quality of life of patients with mild local inflammatory damage.

Keywords: Treatment outcome, inflammation, quality of life

1. Introduction

Cervical spondylotic radiculopathy (CSR) mainly refers to the degenerative changes of the cervical intervertebral disc and intervertebral joint involving the corresponding segments of the cervical nerve root, resulting in root compression and the stimulation of corresponding symptoms and signs. Patients often have symptoms such as shoulder and back pain, radiation

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pain of upper limbs and fingers, numbness and weakness, which seriously disturb patients' quality of life and threaten their health [1]. According to Traditional Chinese medicine (TCM), CSR belongs to the 'arthralgia syndrome' and 'stiff neck' categories. The condition's primary causes are trauma, feeling cold and damp or pulling muscles, leading to a neck tendon injury. Treatment should be based on the principle of harmonising qi and blood and dredging meridians [2,3]. Currently, acupuncture is commonly used to alleviate and eliminate the influence of diseases, but fine needle therapy focuses on regulating qi and blood. The long-round needle combines the long needle (of the ancient nine needles) with the round needle. One end is sharp, and the other is blunt, which has the combined effect of separating and cutting. This 'sharp and blunt separation and relaxation' is conducive to relieving the compression of transverse collaterals. It is safe and effective in treating patients with lumbar muscle strain, scapulohumeral periarthritis and knee joint stiffness [4,5], but, at present, there are few reports on the clinical efficacy of acupuncture in treating cervical spondylosis, and they are not in-depth. Therefore, this study aims to explore the safety and effectiveness of long-round needle therapy by comparing the curative effect, local inflammatory reaction and quality of life of patients with CSR between the long-round needle and filiform needle treatments, hoping to provide better methods for clinical treatment in the future.

2. Data and methods

2.1. General information

This study was a randomised controlled study. Using convenient sampling, 98 patients with cervical cancer admitted from January 2020 to October 2021 were selected as the research objects. The researchers included all patient case numbers in Excel 2019 and generated random numbers ranging from 0 to 1 for each patient. They were sorted according to their size and divided into two groups. According to the random number, the first 48 cases were included in the observation group and treated with a long-round needle. These were code 1. The other 48 cases were the control group, treated with a filiform needle. These were code 2.

Inclusion criteria: (1) patients who met the efficacy criteria for TCM disease certificate diagnosis in the 'arthralgia syndrome' and 'stiff neck' categories [6]. Primary symptoms: numbness and pain in the shoulder, neck and upper limbs. Secondary symptoms: unfavourable neck movement and a tongue that was hard and reddish and had a heavy head and thin coating; (2) cervical X-ray showed hyperplasia of the vertebral body and (3) the patient or family members were informed and signed consent.

Exclusion criteria: (1) patients who had severe periarthritis of the shoulder and mixed cervical spondylosis; (2) patients who had spinal canal space-occupying lesions and cervical spine tumours; (3) patients who had serious immune system diseases or infectious diseases; (4) patients who had liver and kidney insufficiency; (5) patients who had cardiovascular and cerebrovascular diseases; (6) patients who had mental diseases or medical history and (6) patients who had incomplete clinical data or showed poor compliance.

All participants in this study were informed and agreed to participate. The study passed the examination and was approved by the ethics committee of The No. 2 Hospital of Baoding (ethical approval: number. HX2022009). The study was clinically registered under NCT05587075.

2.2. Methods

Control group (filiform needle treatment): Patients were lying or sitting and kept relaxed. Their Jingjiaji, Fengchi, Jianjing, Tianzhu, Houxi, Hegu and Waiguan points were selected. Preoperative marker points were established. Conventional disinfection for the needle was applied. The disposable sterile acupuncture needle met the application specification of 0.35 mm $\times$ 50 mm. Quick needling was applied to the marks subcutaneously, and slow needling was used to search for feelings of acid swelling. The needle was kept in the patients for 30 min. In each course, patients were treated once a day for 5 d. There were a total of four treatment courses.

Observation group (long-round needle therapy): The tendon lesions were marked according to the physical examination results. The patient adopted a proper prone position. Three to five tendon lesion points were selected as acupuncture points. One millimetre of 0.5% lidocaine was injected into the tendon lesion layer by layer. The patient was prepared for needle insertion under local anaesthesia. The long-round needle met the 1.0 mm $\times$ (2.5–3.5) cm specification. The needle was used to detect the tendon lesion point in each layer slowly, and it was inserted in them until the patient felt sour, numb and bloated.

To close the normal knot for treatment: The needle was brought straight to the surface of the tendon le-

Fig. 1. The shape and operation method of long round needle.

sion point and scraped horizontally from left to right. Acupuncture was performed to relieve the surface adhesion. To relieve pain, the tendon adhesion was picked and cut forwards or backwards along the direction of the needle blade using restoring needling. The doctors were careful not to cross the superficial clavicle and the deep sternocleidomastoid muscle. After the needle puncture, the needle hole was covered with a disposable dressing and bandaged for 2 d. In each course, patients were treated once a week. There was a total of four courses (Fig. 1).

2.3. Observation indicators

Patients' treatment effects, safety, inflammatory cytokine levels and neck dysfunction index (NDI), McGill pain questionnaire (MPQ) and Generic Quality of Life Inventory-74 (GQOL-74) scores were compared. Blind researchers conducted data collection. Two doctors with intermediate titles or above led a team to blindly collect the experimental data of the observation and control groups through inspection. They also conducted questionnaire surveys and physical examinations. One deputy chief physician served as the quality controller in the collection process.

Safety evaluation method: Grade 1: The patient had no adverse reactions. Grade 2: The patient had mild adverse reactions, needed no treatment and could continue treatment. Grade 3: The patient had moderate adverse reactions and could continue treatment. Grade 4: The patient had serious adverse reactions, and the study was suspended [7].

Neck function evaluation method: The NDI was used, and it had 10 items. Each item was given 0–5 points, and the total score was 0–50 points. The score value was inversely related to the patient's cervical spine function [8].

Pain degree scoring method: Before and after treatment, a simplified MPQ score was used to evaluate the pain situation of cervical spondylosis, including the existing pain intensity, visual analogy and emotional score. Each was given 0–6 points, and the total score was 0–30 points. The score was positively correlated with the pain degree of cervical spondylosis [9].

Quality of life scoring criteria: Using the comprehensive assessment questionnaire (GQOL-74) scale, mainly including psychological function, social function, physical function and other items, the score value was positively correlated with the quality of life of patients [10].

Inflammatory factor level detection method: Five millilitres of fasting venous blood was extracted from the two groups before and after treatment and was centrifuged at 3000 r/min and 8 cm for 10 min. The supernatant was selected to detect the interleukin-8 (IL-8) and interleukin-10 (IL-10) levels by enzyme-linked immunosorbent method.

2.4. Efficacy evaluation criteria

The treatment's total efficiency judgment criteria: Recovery: After treatment, the patient's shoulder, neck

Table 1
Comparison of baseline data between two groups

	Cases	Gender		Age (years)	Course of disease (years)
		Male	Female		
Observation group	49	27	22	57.00 ± 8.57 (46–86)	4.67 ± 2.57 (1–9)
Control group	49	29	20	56.50 ± 8.56 (45–68)	5.13 ± 1.89 (2–8)
χ^2/t value		$\chi^2 = 0.49$		$t = 1.25$	$t = 1.56$
P value		0.781		0.354	0.671

Table 2
Comparison of treatment effect between two groups

Group	Cases	Recovery (%)	Significant effect (%)	Effective (%)	Ineffectiveness (%)	Total effective efficiency (%)
Control group	49	11 (22.45)	16 (32.65)	13 (26.53)	9 (18.37)	40 (81.63)
Observation group	49	13 (26.53)	18 (36.73)	16 (32.65)	2 (4.08)	47 (95.92)
χ^2 value						5.017
P value						0.025

Table 3
Comparison of safety between two groups

Group	Cases	Level 1 (%)	Level 2 (%)	Level 3 (%)	Level 4 (%)
Control group	49	24 (48.98)	20 (40.82)	4 (8.16)	1 (2.04)
Observation group	49	34 (69.39)	14 (28.57)	1 (2.04)	0 (0.00)
χ^2 value		4.224	1.621	0.843	0.000
P value	0.039	0.202	0.358	1.000	

and upper limb pain and numbness and other clinical symptoms disappeared. Significant effect: After treatment, the patient's numbness and pain in the shoulder, neck and upper limbs were significantly relieved. Effective: After treatment, the clinical symptoms of numbness and pain in the shoulder, neck and upper limbs improved. Ineffective: After treatment, the clinical symptoms, such as numbness and pain in the shoulder, neck and upper limbs, did not improve. Total effective efficiency was the sum of the curative effect, obvious effectiveness and effective efficiency [11].

2.5. Follow-up

All patients were followed for 6 months to monitor recurrence.

2.6. Statistical analysis

SPSS 22.0 software was used for the statistical analysis of data. The measurement data conforming to normal distribution and homogeneity of variance were expressed as mean ± standard deviation. An independent sample t test was used for comparison between the two groups. Qualitative data are expressed as ratios or composition ratios (%). Chi-square analysis was used to compare qualitative data. The test level was $\alpha = 0.05$.

3. Results

3.1. Baseline data comparison

Control group: There were 29 men and 20 women aged 45–68 years (mean: 56.50 ± 8.56), and the disease course was 2–8 years (mean 5.13 ± 1.89); observation group: There were 27 men and 22 women, aged 46–68 years (mean 57.00 ± 8.57), and the disease course was 1–9 years (mean 4.67 ± 2.57); The differences were not statistically significant ($P > 0.05$) (Table 1).

3.1.1. Comparison of the treatment effect between the two groups

The total treatment response rate was 95.92% in the observation group and 81.63% in the control group. The observation group's total treatment response rate was significantly higher than the control group, and the difference was significant ($P = 0.025$) (Table 2). All patients had a recurrence during the follow-up period.

3.2. Safety comparison of the two groups

The safety grade 1 ratio was 69.39% in the observation group and 48.98% in the control group. The observation group's grade 1 ratio was significantly higher than the control group, and the difference between the two groups was statistically significant ($P = 0.039$). The ratios of safety grades 2, 3 and 4 in the observation

Table 4
Comparison of NDI, MPQ and GQOL-74 scores between the two groups

		NDI (score)		MPQ (score)		GQOL-74 (score)	
Group	Cases	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control group	49	30.52 ± 3.85	18.24 ± 3.02	22.65 ± 3.10	18.87 ± 2.04	26.30 ± 5.32	53.68 ± 6.20
Observation group	49	30.55 ± 4.01	10.98 ± 2.54	22.70 ± 2.96	15.40 ± 1.63	26.54 ± 5.35	62.47 ± 6.30
t value		0.038	12.878	0.082	9.302	0.223	6.961
P value		0.970	0.005	0.935	0.07	0.824	0.013

Table 5
Comparison of inflammatory factor levels between two groups

		IL-8 (pg/mL)		IL-10 (μg/L)	
Group	Cases	Before treatment	After treatment	Before treatment	After treatment
Control group	49	61.23 ± 15.54	48.69 ± 12.32	4.25 ± 1.26	7.45 ± 2.03
Observation group	49	62.04 ± 15.42	34.51 ± 10.25	4.23 ± 1.25	8.55 ± 2.01
t value		0.259	6.194	0.097	2.695
P value		0.796	0.013	0.937	0.028

group were lower than that in the control group, but there was no statistical difference (Table 3).

3.3. Comparison of neck dysfunction index, McGill pain questionnaire and generic quality of life inventory-74 scores between the two groups

Before treatment, the NDI, MPQ and GQOL-74 scores were different between the groups ($P > 0.05$); After treatment, the NDI score was 18.24 ± 3.02 in the control group and 10.98 ± 2.54 in the observation group. The score of the observed group was significantly lower than that of the control group ($t = 12.878$, $P = 0.005$) After the treatment, the MPQ score was 15.40 ± 1.63 in the observation group and 18.87 ± 2.04 in the control group. The score of the observed group was significantly lower than that of the control group ($t = 9.302$, $P = 0.007$). After treatment, the GQOL-74 score observation was 62.47 ± 6.30 and 53.68 ± 6.20 in the control group. The score of the observed group was significantly higher than that of the control group ($t = 6.961$, $P = 0.013$) (Table 4).

3.4. Comparison of inflammatory factor levels in the two groups

Before treatment, the levels of inflammatory factors IL-8 and IL-10 were not significantly different ($P = 0.796$). After treatment, the IL-8 level was 48.69 ± 12.32 pg/mL in the control group and 34.51 ± 10.25 pg/mL in the observation group. The observation group's levels were significantly lower than the control group ($P = 0.13$). After the treatment, the IL-10 level was 8.55 ± 2.01 μg/L in the observation group and 7.45 ± 2.03 μg/L in the control group. The observed group's levels were higher compared with the control group, and the difference between the two groups was statistically significant ($P = 0.028$) (Table 5).

4. Discussion

Cervical spondylotic radiculopathy is a common clinical disease type, and it is dominated by early aseptic inflammation with increased vascular permeability and exudation. With the disease's continuous progress, the soft tissue is often overcompensated due to the repair, causing aseptic inflammation in the early stage. The tissue then develops adhesion, fibrosis, scar formation, etc. This further aggravates the degree of inflammatory exudation stimulation of nerve endings and aggravates the pain [12,13]. Therefore, it is important to seek an effective treatment regimen timely.

Traditional Chinese medicine attributed this disease to 'arthralgia syndrome' and other categories. Tendons and bones strain, and there is an invasion of exogenous pathogens, leading to the body qi imbalance, blood stasis stagnation, meridian obstruction, blood that cannot transport, blood stasis qi stagnation and pain that does not pass [14,15]. Lingshu Hailun said, 'Brain is the sea of marrow, the loss in the cover, under the Fengfu, more than the sea of marrow, light and powerful, from the excessive, if the sea of marrow is insufficient, then the brain turn tinnitus, eyes do not see, lazy reclining' [16,17]. Zhang Jingyue scholars believe that 'No nihility for vertigo should be based on the treatment of nihility'. The prerequisite for treating CSR with acupuncture is to remove the organic factors causing qi and blood obstruction and to take the method of breaking, relieving, dispersing and resolving qi and

blood to make the qi and blood smooth and downward, which is the key premise for adjusting qi, blood, Yin and Yang. Professor Xue Ligong uses the long-round needle to combine the long needle (of the ancient nine needles) with the human needle so that on the flat-blade needle, one end is sharp, and the other is round and blunt. Given the pathological characteristics of CSR, when the long-round needle is taken, the tendon is so, with the thorns, thorns and other methods to remove the compression, loose the blood. The treatment effect is rapid, and the patient's pain relief and function are improved significantly.

The results show that the observation group's total effective treatment rate is significantly higher than that of the control group, suggesting that long-round needle therapy is more beneficial to treating CSR. Further analysis shows that the improvement of cervical dysfunction is more obvious, the quality of life after treatment is also significantly improved, and it has higher safety, which is consistent with the conclusions of Wang Lin [4] and others. The possible reason is that the long-round needle therapy mainly follows the neck and shoulder meridian to find the pathological reaction points of the damaged tendon, such as local tenderness, cord and contracture. By using the 'round needle', the needle is combined with dullness, and the surface of the tendon lesion is adhered and separated so that the tendon point's meridians and the arthralgia can be effectively relieved. In addition, by effectively dredging the tendon tissue around the peeled lesion, the spasticity and muscle tension can be effectively improved, and the dynamic biomechanical balance of the cervical spine can be restored.

Interleukin-8 is a cytokine of acute inflammatory reaction and plays an important role in the progression of CSR. Interleukin-10 is an inflammatory suppressor and has an inhibitory effect on the synthesis of various pro-inflammatory cytokines and colony-stimulating factors [18,19]. The data found that the levels of IL-8 and IL-10 in the observed group improved more significantly, suggesting that the long-round needle treatment method could better inhibit the inflammatory response, mainly because dissecting the corresponding tissue of patients can improve muscle tension and promote blood circulation, thus accelerating the absorption of inflammatory exudates and reducing local inflammatory damage.

Meanwhile, the study has the following limitations: There was no stratified study on CSR TCM syndrome, and there was a small sample size and only a single sample source; there were only 6 months of follow-up and no long-term follow-ups to observe the long-term effect of combination therapy. Subsequently, more sample sizes should be included in large sample and multicentre studies to analyse further the clinical efficacy of long-round needle use in treating CSR.

5. Conclusion

Compared with filiform needle therapy, long-round needle therapy has a higher overall effective rate for patients with CSR. It is also better at relieving pain and restoring the function of diseased parts. At the same time, the local inflammatory damage is lighter, and the overall safety is higher during the treatment, which has the value of further clinical promotion.

Ethics approval

This study was conducted in accordance with the Declaration of Helsinki and approved by the ethics committee of The No. 2 Hospital of Baoding (HX2022009).

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Informed consent

Written informed consent was obtained from all participants.

Conflict of interest

None of the authors has any personal, financial, commercial, or academic conflicts of interest to report.

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Author contributions

Study conception and design: LYM and FCB.
Data collection: LYY, QDD and XB.

Data analysis and interpretation: WYF, MS, YWL and XZQ.
Drafting and critical revision of the article: All authors.
All authors read and approved the final manuscript.

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