

# Therapeutic observation of Fu's subcutaneous needling for scapulohumeral periarthritis

## 浮针疗法治疗肩关节周围炎疗效观察

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### Abstract

**Objective:** To observe the therapeutic efficacy of Fu's subcutaneous needling (FSN) in treating scapulohumeral periarthritis (SP).

**Methods:** Eighty patients with SP were randomly divided into an observation group and a control group, 40 cases in each group. Patients in the observation group received FSN treatment while those in the control group received conventional acupuncture treatment. Visual analogue scale (VAS) and range of motion (ROM) were observed before and after the treatment, and the therapeutic efficacy was also evaluated.

**Results:** After the treatment, the VAS scores decreased significantly in the two groups, and the VAS score in the observation group was significantly lower than that in the control group ( $P < 0.01$ ). After the treatment, the ROM increased significantly in both groups (both  $P < 0.01$ ), and the ROM in the observation group was significantly higher than that in the control group ( $P < 0.01$ ). The recovery rate and the total effective rate in the observation group were respectively 40.0% and 95.0%, significantly higher than 12.5% and 77.5% in the control group ( $P < 0.01$ ,  $P < 0.05$ ).

**Conclusion:** FSN can effectively relieve pain and improve the joint motion in treating SP, thus offering a novel option to the treatment of this kind of musculoskeletal disorder.

**Keywords:** Acupuncture Therapy; Fu's Subcutaneous Needling; Frozen Shoulder; Shoulder Pain; Periarthritis; Pain Measurement; Range of Motion, Articular; Visual Analogue Scale

**【摘要】目的:** 观察浮针疗法治疗肩周炎的临床疗效。**方法:** 将80例肩周炎患者随机分为观察组和对照组, 每组40例。观察组予浮针疗法, 对照组予传统针刺治疗。观察治疗前后疼痛的视觉模拟量表(VAS)评分和肩关节活动度(ROM)的变化情况并进行疗效评价。**结果:** 治疗后, 两组患者 VAS 评分较治疗前均显著降低(均  $P < 0.01$ ), 观察组 VAS 评分显著低于对照组( $P < 0.01$ )。治疗后, 两组患者 ROM 较治疗前均显著升高(均  $P < 0.01$ ), 观察组 ROM 显著高于对照组( $P < 0.01$ )。观察组痊愈率和总有效率分别为40.0%和95.0%, 显著高于对照组的12.5%和77.5% ( $P < 0.01$ ,  $P < 0.05$ )。**结论:** 浮针疗法能够有效缓解肩周炎患者的疼痛程度并恢复其肩关节活动范围, 从而为该类肌肉骨骼疾病的治疗提供一种新的选择。

**【关键词】** 针刺疗法; 浮针; 肩凝症; 肩痛; 关节周围炎; 疼痛测评; 关节活动度; 视觉模拟量表

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Fu's subcutaneous needling (FSN)<sup>[1]</sup>, a novel acupuncture method developed from wrist-ankle acupuncture, was invented in 1996. For decades, FSN has been widely accepted and adopted for its distinct features such as simple operation, safety, rapid therapeutic effect and broad indications, especially in pain management. In this study, the therapeutic result of FSN in treating scapulohumeral periarthritis (SP) was objectively evaluated by the randomized controlled study. The result is reported as follows.

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## 1 Clinical Materials

### 1.1 Diagnostic criteria

The chief manifestations of SP include: pain around the shoulder; sleep-disturbing night pain; normal or mild restriction of the shoulder joint function.

### 1.2 Inclusion criteria

Those who conformed to the diagnostic criteria of SP; aged from 18 to 70 years old, no gender preference; willing to participate in this trial and sign the informed consent form.

### 1.3 Exclusion criteria

Critical physical or mental condition; febrile condition; systemic dermatological conditions; neoplasms; referred pain from neck or thorax; rupture of tendons

or bone fractures; pregnancy; no intention to participate or follow the instructions.

#### 1.4 Statistical methods

All data in this study were processed by SPSS 17.0 version statistical software. The measurement data were expressed as mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ) and *t*-test was adopted to compare when equal variances assumed, and corrected *t*-test was adopted when equal variances not assumed, and Chi-square test was used to assess the therapeutic efficacy. A *P* value of less than 0.05 was considered a statistical significance.

#### 1.5 General data

Eighty patients with SP diagnosed by Acupuncture-moxibustion Department of Tongde Hospital of Zhejiang Province were randomly divided into an observation group and a control group by SPSS 17.0 statistical software, and there were 40 patients in each group. All the patients had signed the informed consent before enrollment. Ethical approval for this study was given by the Ethics Committee of Tongde Hospital of Zhejiang Province. There were no significant differences in the baseline data (including gender, age and illness duration) between the two groups, so they were comparable (Table 1).

**Table 1. Comparison of the baseline data between the two groups**

Group	<i>n</i>	Gender (case)		Average age ( $\bar{x} \pm s$ , year)	Illness duration ( $\bar{x} \pm s$ , week)
		Male	Female		
Observation	40	22	18	42.1 $\pm$ 9.2	12.8 $\pm$ 10.9
Control	40	25	15	44.4 $\pm$ 8.6	13.2 $\pm$ 9.0

## 2 Treatment Methods

### 2.1 Observation group<sup>[2]</sup>

#### 2.1.1 FSN

The disposable FSN needle (Figure 1) consists of three parts (Figure 2): protective plastic casing, stainless steel needle and neilsbed, soft tube and its affiliated hard tube. The steel needle is 3 mm longer than the soft tube in order to penetrate skin.

#### 2.1.2 Insertion points

Based on the experience and rules in FSN treatment, the tender points were usually located on the anterior, lateral and posterior aspects of shoulder. Thus, the insertion points were determined in the middle region of the upper arm, below the corresponding tender points.

#### 2.1.3 Manipulation

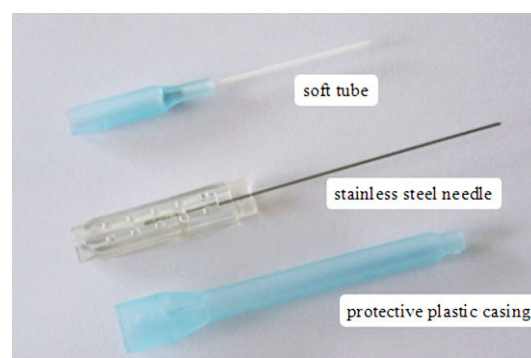
The patients were in sitting position. The disposable FSN needle (middle size, produced by Nanjing FSN Medical Appliances Co. Ltd., China) was obliquely inserted into skin by FSN needle insertion device (produced by Nanjing FSN Medical Appliances Co. Ltd.,

China), then drew back the needle to the subcutaneous layer, make the needle parallel to the skin surface, and then pushed forward the needle till the whole soft tube was under skin and then left the needle in the subcutaneous layer. Drew the steel needle back by 3 mm to make the steel tip wrapped in the soft tube to prevent hurting blood vessels or other organs during the following swaying manipulation. Then swayed the needle smoothly and rhythmically from one side to the other horizontally, 200 times in 2 min.

The treatment was performed 3 times in a week (Monday, Wednesday and Friday), 10 consecutive sessions in total.



**Figure 1. The general look of FSN needle**



**Figure 2. The separated parts of FSN needle**

### 2.2 Control group<sup>[3]</sup>

#### 2.2.1 Acupoints

Ashi points (tender points), Jianyu (LI 15), Jianliao (TE 14), Jianzhen (SI 9), Yanglingquan (GB 34) and Zhongping [1 cun below Zusanli (ST 36)].

#### 2.2.2 Manipulation

The patients were in sitting position. Disposable needles (0.25 mm in diameter and 40 mm in length, produced by Suzhou Jiachen Medical Apparatus Co., Ltd., China) were perpendicularly inserted into the points by 1.0-1.5 cun in depth. After the arrival of qi, the needles were manipulated with even method once every 10 min to strengthen the needling sensation. The affected shoulders were warmed by electromagnetic therapeutic apparatus (produced by Chongqing Zhongzhi Medical Device Co., Ltd., China) during the

treatment. The needles were removed after 30-minute retention.

The treatment course was same as that in the observation group.

### 3 Therapeutic Efficacy Observation

#### 3.1 Criteria of therapeutic efficacy

##### 3.1.1 Visual analogue scale (VAS)

The pain intensity was scored by a 10 cm plastic ruler, 0 representing 'no pain at all' and 10 cm representing 'the most intensive pain'. VAS was assessed before the first treatment and immediately after the last session.

##### 3.1.2 Range of motion (ROM)<sup>[4]</sup>

The shoulder function evaluation index adopted in this study included internal rotation, external rotation, excessive abduction (reach the ear of the other side) and posterior extensions (lift hands up to the mid-line of the back). ROM was assessed at the same time as VAS.

##### 3.1.3 Therapeutic effects<sup>[5]</sup>

Cure: The pain in the shoulder disappeared; the function of shoulder joint was completely or substantially restored.

Improved: The pain in the shoulder was relieved; the function of shoulder joint was improved.

Invalid: The symptoms remained unchanged.

#### 3.2 Results

##### 3.2.1 Comparison of VAS

Before the treatment, there was no difference in VAS between the two groups ( $P > 0.05$ ), so they were comparable. After the treatment, the VAS scores significantly decreased in both groups (both  $P < 0.01$ ), which indicated that both FSN and conventional acupuncture can relieve the pain in SP; VAS score in the observation group was significantly lower than that in the control group ( $P < 0.01$ ), which suggested that FSN can relieve the pain more effectively than conventional acupuncture (Table 2).

##### 3.2.2 Comparison of ROM

Before the treatment, there was no significant difference in ROM between the two groups ( $P > 0.05$ ), so they were comparable. After the treatment, the ROM significantly increased in both groups (both  $P < 0.01$ ), which indicated that both FSN and conventional acupuncture can improve the shoulder function in SP; ROM in the observation group was significantly higher than that in the control group ( $P < 0.01$ ), which suggested that FSN can improve shoulder function more effectively than conventional acupuncture (Table 3).

**Table 2. Comparison of VAS ( $\bar{X} \pm s$ , point)**

Group	<i>n</i>	Before treatment	After treatment
Observation	40	7.14±0.63	1.61±0.76 <sup>1)</sup>
Control	40	7.03±0.53	2.55±1.01 <sup>1)2)</sup>

Note: Intra-group comparison, 1)  $P < 0.01$ ; compared with the observation group after the treatment, 2)  $P < 0.01$

**Table 3. Comparison of ROM ( $\bar{X} \pm s$ , °)**

Group	<i>n</i>	Before treatment	After treatment
Observation	40	224.50±24.31	309.63±15.71 <sup>1)</sup>
Control	40	227.88±28.44	273.50±24.84 <sup>1)2)</sup>

Note: Intra-group comparison, 1)  $P < 0.01$ ; compared with the observation group after the treatment, 2)  $P < 0.01$

##### 3.2.3 Comparison of therapeutic effect

The cure rate and the total effective rate in the observation group were respectively 40.0% and 95.0%, versus 12.5% and 77.5% in the control group, and the between-group differences were statistically significant ( $\chi^2 = 7.81$ ,  $P < 0.01$ ;  $\chi^2 = 5.16$ ,  $P < 0.05$ ), which indicated that FSN worked more effectively than conventional acupuncture (Table 4).

**Table 4. Comparison of therapeutic effect (case)**

Group	<i>n</i>	Cure	Improved	Invalid	Cure rate (%)	Total effective rate (%)
Observation	40	16	22	2	40.0	95.0
Control	40	5	26	9	12.5 <sup>1)</sup>	77.5 <sup>2)</sup>

Note: Compared with the observation group after the treatment, 1)  $P < 0.01$ , 2)  $P < 0.05$

### 4 Discussion

SP is a common musculoskeletal disorder. About half the population has at least one episode of shoulder pain yearly<sup>[6]</sup>. Patients usually complain about pain, movement restriction, sore, and loss of flexibility and function<sup>[7]</sup>, which significantly affect their activities of daily living (ADL) and quality of life (QOL). Thus, the treatment usually aims to relieve pain and stiffness and

to improve the motion. Conservative management includes nonsteroidal anti-inflammatory drugs (NSAIDs), narcotics, oral steroids, intra-articular and subacromial injection of glucocorticosteroids, physiotherapy, and manipulation under anesthesia<sup>[8]</sup>. Unfortunately, patients may not respond well to those conservative treatments or may prefer a treatment with a lower risk of side effects.

Acupuncture, dated back to 4 000 years ago, has

been widely used for pain<sup>[9]</sup>, and its efficacy for SP has been testified by numerous researches<sup>[10-12]</sup>. Many SP patients prefer acupuncture for help, especially in China. As a new type of modern acupuncture, FSN has been introduced to our clinic for musculoskeletal disorders for nearly 10 years, and the author has found that FSN works well in many cases for such illnesses.

In this study, the therapeutic results demonstrated that both FSN and conventional acupuncture can relieve pain and improve joint function in patients with SP, and FSN can produce a more significant effect.

Regarding the underlying mechanism, there are some points should be taken for consideration. The first is the organic layer that FSN works on. FSN needles are penetrated and swayed only in the subcutaneous fascia instead of muscular layer. This loose connective tissue is commonly involved and influenced by mechanical force during the manipulation in different needling therapies. In recent research, collagen and elastic fibers were found to wind and tighten around needle when the rotation manipulation was performed<sup>[13]</sup> and shape change of fibroblast was also observed during needling manipulation<sup>[14]</sup>, which strongly suggested that the subcutaneous layer should play a crucial role in needling therapies. FSN needles are manipulated just in this organic tissue layer. The second is the manipulation of FSN. FSN needles are moved smoothly and rhythmically from one side to the other during the treatment, but 'rotation and up-down' movement is not performed, which should be the characteristic of this treatment. So, there will be more subcutaneous fascia involved by the special movement during the FSN treatment. The third is the size of the FSN needle. The diameters of acupuncture needles used in this study were usually 0.25 mm in diameter, but the FSN needles used in this study had a diameter of 0.6 mm, much thicker than the former. Regarding this, we should notice that there are only a few of nerve ends in subcutaneous shallow fascia, so FSN produces no pain or only a little pain during the manipulation. As we all know, therapeutic effect is closely linked with the quantity of stimulus in needling treatment. The thicker needles always produce a stronger stimulation and get better therapeutic effect. Therefore, in our opinion, it's due to the above three elements that FSN worked more effectively than conventional acupuncture in this study.

However, this study has some limitations. Needling therapy is difficult to establish placebo or sham controls that are both inert and indistinguishable, so the patients cannot be blinded to the treatment. Besides, the long-term therapeutic effect of FSN needs observing, and all the patients should be followed up after the treatment. What's more, the physical exercises of the affected joint play an important role in the recovery of motion function for SP patients, but did not get enough attention in this study. Hence, further researches are

expected to solve these problems in the future.

To sum up, the results of this study showed that FSN can relieve pain and improve motion function in treating SP, which strongly suggests that FSN may provide a good alternative to musculoskeletal disorder.

#### Conflict of Interest

The authors declared that there was no potential conflict of interest in this article.

#### Statement of Informed Consent

Informed consent was obtained from all individual participants included in this study.

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