

## Acupuncture Research

# Analgesic Effect of Sinew Acupuncture for Patients with Soft-Tissue Injuries: A Pilot Trial

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**ABSTRACT** **Objective:** To investigate the immediate analgesic effect of sinew acupuncture for patients with soft-tissue injuries (STIs). **Methods:** Two hundreds eligible adult patients suffering from STIs were recruited and received sinew acupuncture with flexible treatment schedules. The number of treatment sessions was pragmatically decided by each patient on the basis of their pain relief. The outcome measurement was the change of pain rating in the Visual Analogue Scale (VAS) during the first 5 sessions. The adverse effect was also observed. **Results:** Of the 200 patients recruited, 7 were excluded due to incomplete data. In total, 888 sinew acupuncture treatments were administered to patients at 14 injury sites (including head, neck, shoulder, arm, chest, elbow, wrist, hand, waist and hip, knee, thigh, calf, ankle, and foot) where pain was felt. Compared with the baseline, the VAS rating after the first and last treatments were both significantly reduced at all the injury sites ( $P < 0.01$ ). The VAS rating was also significantly reduced after each session of treatment in the first five sessions ( $P < 0.01$ ). No serious adverse effect was observed. **Conclusion:** Sinew acupuncture had not only an immediate analgesic effect for STIs, but also an accumulated analgesic effect during the first 5 treatment sessions.

**KEYWORDS** sinew acupuncture, soft-tissue injury, analgesic effect, pain, Visual Analogue Scale

Soft-tissue injuries (STIs) are injuries to muscles, tendons, ligaments, fascia, and fibrous tissues that can be caused by acute injuries (e.g., sprains, strains and contusion) or overuse injuries (e.g., tendinitis and bursitis). Pain and disability are the most common manifestations of STIs.<sup>(1)</sup> Analgesic agents, nonsteroidal anti-inflammatory drugs, and corticosteroids are commonly used for pain management.<sup>(2)</sup> Their adverse effects, such as nausea, vomiting, dizziness, and gastrointestinal disturbance,<sup>(3-5)</sup> have prompted many patients to seek alternative regimens.

Acupuncture has been used for pain management for thousands of years. Sinew acupuncture is a new style that was recently developed.<sup>(6)</sup> In sinew acupuncture, the painful points of the injured and/or adjacent tissue are used as the acupoints, and are treated with the superficial insertion of needles at these points at a 5° angle to the skin. It potentially reduces the risks of internal organ injuries. Sinew acupuncture generally causes less pain than traditional acupuncture as it requires neither the deep insertion of needles nor stimulation of the Deqi sensation by manipulation.<sup>(7)</sup>

Sinew acupuncture has been adopted for various diseases and disorders, e.g., hoarseness, tennis elbow, frozen shoulder, knee osteoarthritis,

and pelvic diseases.<sup>(8-10)</sup> Our previous study showed that sinew acupuncture had promising and immediate analgesic effects on STIs.<sup>(11)</sup> However, the effect of sinew acupuncture on STIs over a longer observation time has not yet been studied. Thus, the present prospective clinical observation study was conducted to assess the accumulated analgesic effect of sinew acupuncture for patients with STIs.

## METHODS

### Inclusion and Exclusion Criteria

The study protocol was approved by Institutional Review Board of the University of Hong Kong/Hospital Authority Hong Kong West Cluster (No. HKU/HA HKW IRB UW 12-501). Patients who had STIs according to the Guidelines of Clinical Research of New Drugs of Traditional Chinese Medicine,<sup>(12)</sup> aged above 18 years old, and signed the informed consent forms were

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included. Those who had a traumatic injury accompanied with fracture or ligament rupture or had serious heart, brain, liver, or kidney diseases were excluded.

### Patients

Totally 200 eligible patients with STIs were recruited from December 1, 2012 to November 30, 2014 at the Clinical Centre for Teaching and Research (Central) and Specialist Clinical Centre for Teaching and Research, affiliated to the School of Chinese Medicine, The University of Hong Kong.

### Intervention

The treatment was administered to the patients by an acupuncturist with over 40 years' experience (Prof. Liu NY). The skin was disinfected with a 70% alcohol pad. One to three acupoints around/on the injured tissue were selected according to the principles of sinew acupuncture and were punctured subcutaneously with 30 mm × 0.3 mm or 40 mm × 0.3 mm disposal sterile needles (Taichi™, Suzhou Shenlong Medical Apparatus Co., Ltd., Suzhou, China). If the pain of the STI in patient was not relieved to any extent when the needle was inserted, the acupuncturist adjusted the needle(s) until the pain was reduced. If the pain was reduced, the needles were kept at the acupoints for 5 min and the session of treatment was completed. If the pain was not sustainably reduced during a treatment session, the acupuncturist adjusted the needle(s) once more and kept them inserted for 20 min. All patients were advised to receive 2–3 sessions of sinew acupuncture treatment per week and stop treatment if the pain was completely relieved. Neither incentives nor waiver of charge were offered to the patients in the study. The number of treatment sessions was pragmatically determined by each patient individually. If a patient experienced pain relief at the STI site(s), he/she stopped receiving sinew acupuncture treatment.

### Primary Outcome

The primary outcome was the change of Visual Analogue Scale (VAS) rating during the acupuncture treatments. Patients were instructed to mark their pain intensity on a scale of 0 mm (indicating no pain) to 100 mm (indicating the worst pain) at baseline, before and after each acupuncture treatment. If patients had pain in more than 2 sites (ankle, elbow, knee, neck, shoulder, wrist, hip, or others), they were offered treatment at each affected injury site. These patients

were required to give a VAS rating for each site. The clinical data from the first 5 sessions of sinew acupuncture treatment were collected.

### Safety

The adverse effect of sinew acupuncture was observed and recorded.

### Statistical Analysis

The data were reported as mean ± standard deviation ( $\bar{x} \pm s$ ) unless otherwise specified and were analyzed using SPSS 22.0 software (SPSS, Chicago, IL, USA). The analyses were performed by the intention-to-treat method. The paired *t*-test was used to determine the significance of the differences between the first and last sessions or before and after a single session. A level of  $P < 0.05$  was considered statistically significant.

## RESULTS

### Baseline Clinical Characteristics

Of the 200 eligible patients, 7 were excluded due to incomplete data. The data from the remaining 193 patients, including 124 females (64.2%) and 69 males (35.8%), were collected and analyzed. The average age of the patients was  $50.2 \pm 13.9$  years, with ages ranging 19–88 years. All patients received up to 5 sessions of sinew acupuncture.

### VAS Rating

Compared with baseline, the sinew acupuncture significantly reduced the VAS rating of neck, shoulder, elbow, wrist, knee, ankle, waist and hip, and other sites in patients with STIs after the first treatment (all  $P < 0.01$ , Table 1), with pain reductions of 27.5%–51.0% (Figure 1). The pain intensity of patients in the first treatment session was significantly reduced immediately by 21.5 [20.0, 23.1] at a 95% confidence interval of the difference ( $P < 0.001$ ).

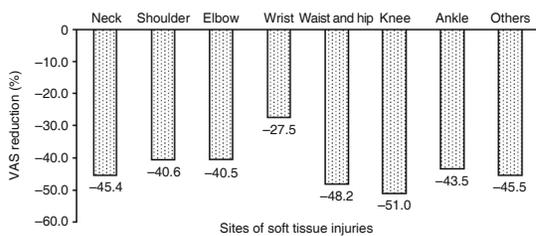
Compared with the baseline, the VAS following the last treatment was significantly reduced in the STIs at all individual sites (all  $P < 0.01$ , Table 1). When considering all sites together, the pain intensity of the patients was significantly reduced by 24.3 [22.5, 26.1] at a 95% confidence interval of the difference ( $P < 0.001$ ).

As shown in Table 2, the VAS rating was significantly reduced after each session of sinew acupuncture (all  $P < 0.01$ ). The VAS rating after the 2nd,

**Table 1. Changes in VAS Rating after Sinew Acupuncture in 193 Patients (mm,  $\bar{x} \pm s$ )**

STI site	Baseline		After the first treatment		After the last treatment	
	VAS	Treatment frequency (%)	VAS	Treatment frequency (%)	VAS	Treatment frequency (%)
Neck	49.1 ± 14.7	79 (23.7)	26.8 ± 13.4*	208 (23.4)	24.1 ± 11.5*	
Shoulder	54.7 ± 18.0	32 (9.6)	32.5 ± 15.9*	90 (10.1)	28.3 ± 15.1*	
Elbow	42.7 ± 12.8	22 (6.6)	25.5 ± 13.0*	63 (7.1)	27.7 ± 18.4*	
Wrist	47.7 ± 19.3	31 (9.3)	34.7 ± 19.9*	87 (9.8)	26.5 ± 15.6*	
Waist and hip	49.6 ± 15.5	71 (21.3)	25.8 ± 13.2*	202 (22.7)	24.2 ± 14.4*	
Knee	47.8 ± 17.8	44 (13.2)	23.4 ± 11.4*	111 (12.5)	22.2 ± 9.9*	
Ankle	49.0 ± 17.3	30 (9.0)	27.7 ± 15.8*	81 (9.1)	21.4 ± 11.8*	
Others	46.2 ± 19.3	24 (7.2)	25.2 ± 13.3*	46 (5.2)	25.2 ± 13.3*	
Total	48.8 ± 16.6	333 (100)	27.3 ± 14.5*	888 (100)	24.5 ± 13.4*	

Notes: STI: soft-tissue injury; VAS: Visual Analogue Scale. Others: including head, arm, chest, hand, thigh, calf, and foot. \* $P < 0.01$  vs. baseline

**Figure 1. Reduction of VAS Rating in the First Session of Sinew Acupuncture**

3rd, 4th, and 5th sessions was significantly reduced compared with that after the 1st session (all  $P < 0.01$ ).

**Table 2. Changes in VAS Rating in the First Five Sessions of Sinew Acupuncture in 193 Patients (mm,  $\bar{x} \pm s$ )**

Session	Treatment frequency	VAS	
		Before treatment	After treatment
1st	333	48.8 ± 16.6	27.3 ± 14.5*
2nd	217	41.4 ± 17.5	26.0 ± 13.9* <sup>△</sup>
3rd	149	39.2 ± 17.4	24.2 ± 12.5* <sup>△</sup>
4th	104	34.9 ± 16.7	22.9 ± 11.2* <sup>△</sup>
5th	85	37.1 ± 16.5	23.4 ± 10.9* <sup>△</sup>

Notes: \* $P < 0.01$  vs. before treatment of the same session; <sup>△</sup> $P < 0.01$  vs. after treatment of the 1st session

### Adverse Effect

In this study, the sinew acupuncture did occasionally cause bruised skin and slight bleeding, like traditional acupuncture. However, these minor unpleasant symptoms were relieved within 2 days. No serious adverse effect was found in any patients.

## DISCUSSION

The reduction in pain intensity measured for sinew acupuncture in this study is comparable to that

of analgesics (oxycodone, naproxen, and diclofenac epolamine topical patches) in STI.<sup>(5,13)</sup> Fathi, et al<sup>(5)</sup> showed that oxycodone and naproxen reduced pain intensity in STI patients by around 20 and 25 mm on the VAS scale at 30 and 60 min, respectively after oral administration. In the present study, sinew acupuncture significantly reduced the pain intensity from  $48.8 \pm 16.6$  mm to  $27.3 \pm 14.5$  mm at 20 min in the first session, with few adverse effects. This is consistent with other findings that acupuncture has analgesic effects for chronic and acute pain without serious adverse effects.<sup>(14,15)</sup> Although a few studies have found that acupuncture may not be effective for pain management,<sup>(16)</sup> our study at least demonstrated that sinew acupuncture had an immediate analgesic effect for STIs at various sites. Moreover, sinew acupuncture continually reduced pain from the 1st to the 5th sessions of treatment, indicating a promising accumulated analgesic effect for STIs.

Sinew acupuncture has several potential advantages.<sup>(6,9,11)</sup> First, it is less painful due to the superficial needling, and safer as the oblique and superficial insertion minimizes the risk of injuries, e.g., pneumothorax and cervical spinal cord injury. Second, it is easier to manipulate as it does not require the patient to experience needling sensations. Last, it is more technically feasible than electroacupuncture as no electrical stimulator is needed.

Several limitations of this study must be acknowledged. First, both acute and chronic pain were included in the study. Patients with acute pain generally received fewer treatments than patients with chronic pain. In the late period of treatment, the patients with chronic pain had significant reduction in pain, but no complete pain disappearance. This may explain there is no significant reduction of pain intensity in the 5th session, in contrast to the first 4 sessions. Second, we did not separately analyze the effects on tissue injuries at different sites for each session. Our findings showed that sinew acupuncture significantly reduced pain at various STI sites, especially the neck, shoulder, knee, ankle, waist, and hip, the pain reduction in the wrist was relatively small. Third, VAS is a subjective measurement, although it has been validated in studies of pain. As there was no control group in the study, the self-remission of STIs may have contributed to the outcome. Last, this study did not investigate sinew acupuncture treatment in conjunction with the essential

elements of Chinese medicine (e.g., tongue and pulse diagnosis, differentiated symptoms, and meridian distribution and pathways). These essential elements will be studied in future.

In conclusion, our findings showed that sinew acupuncture not only immediately reduced the pain of STIs in the neck, shoulder, lower back, and all four limbs after each individual treatment, but also had an accumulated analgesic effect during the first 5 treatment sessions. It can be considered a feasibility study providing preliminary data for a more comprehensive investigation. A large scale of randomized controlled trial is needed to assess the efficacy of sinew acupuncture for pain relief in STIs.

### Conflict of Interest

The authors declare that they have no competing interests.

### Author Contributions

Liu NY supervised the study, conducted acupuncture treatment and revised the manuscript. Chen HY collected and analyzed data and wrote the manuscript. All the authors approved the final version for publication.

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