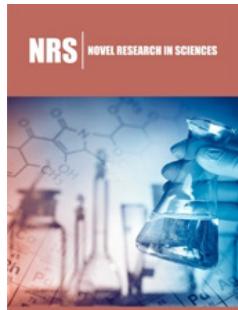


Fu's Subcutaneous Needling for COVID-19-Associated Cough: A Report of Two Cases

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**Qingsong Zhang¹, Fengyi Wang², Kejing Li², Zhonghua Fu^{1,2,3*}**¹Bao'an TCM Hospital Affiliated of Guangzhou University of Chinese Medicine, China²Clinical Medical College of Acupuncture & Moxibustion and Rehabilitation, China³The Institute of Fu's Subcutaneous Needling, China

Abstract

Rationale: COVID-19-associated cough is one of the most common symptoms after a SARS-CoV-2 infection. We used Fu's Subcutaneous Needling (FSN) for two patients with COVID-19-associated cough and achieved satisfactory results.

Patient Concerns: Two patients had severe coughs, poor quality of life, and fatigue due to persistent COVID-19-associated cough.

Diagnosis: Two patients were diagnosed with COVID-19 and persistent cough following SARS-CoV-2 infection.

Interventions: FSN treatment was performed once a day for three days and the needle swayed to pull loose connective tissue surrounding respiratory muscles.

Outcomes: The symptoms of cough were significantly relieved by comparing the visual analoguel scale (VAS) score, Cough Evaluation Test (CET), and Fatigue Scale-14 (FS-14) before and after FSN treatments. All symptoms were reduced, and there was no recurrence during the follow-up period.

Lessons: FSN is a safe, convenient, and immediate non-pharmacological treatment for COVID-19-associated cough

Keywords: Fu's subcutaneous needling; COVID-19-associated cough; Reperfusion approach; Tightened muscle; Case report

Abbreviations: COVID-19= Coronavirus Disease 2019; SARS-CoV-2= Severe Acute Respiratory Syndrome Coronavirus 2; FSN=Fu's Subcutaneous Needling; TM=Tightened Muscle.

Introduction

According to the World Health Organization, the incidence of Coronavirus Disease 2019 (COVID-19)-associated cough is 59-82% after Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infection, while the prevalence of persistent COVID-19-associated cough is 25% [1]. Patients mainly present with a persistent cough, which may be accompanied by pharyngeal itching aggravated by wind, cold, exertion, and other stimuli seriously affect the patient's physical and mental health [2]. Oral cough phlegm drugs or exercise rehabilitation are mainly recommended [3]. However, The side effects of oral medications are more burdensome for some specific populations (e.g., pregnant women and children), and there is still lacking acknowledged therapy for COVID-19-associated cough. Therefore, finding a safe, convenient, and rapid treatment for cough after a SARS-CoV-2 infection is necessary. Fu's Subcutaneous Needling (FSN) is a new technology that uses a needle around the Tightened Muscle (TMs), muscles that remain tense in the body's relaxed state), or adjacent extremity that is causing the pain. It has been reported that FSN is effective for cough. FSN eliminated the tightened respiratory muscles by swaying movement and dispersing the subcutaneous connective

***Corresponding author:** Zhonghua Fu, Clinical Medical College of Acupuncture & Moxibustion and Rehabilitation, Guangzhou University of Chinese Medicine, China

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tissue and reperfusion approach, thereby relieving cough [4-6]. Interestingly, two cases of COVID-19-associated cough were treated with FSN single in the Baoan Traditional Chinese Medicine Hospital. This resulted in a remarkable improvement in cough intensity, frequency, and fatigue (Figure 1). The following case notes are provided to study FSN further.

Case Reports

Case 1

A 22-year-old man complained of a cough for 20 days accompanied by chest pain excited by the cough at the outpatient on January 10, 2022. The man was diagnosed with COVID-19 by a COVID-19 antigen test on December 22, 2022. Fever, cough, sore

throat, and musculoskeletal pain occurred after the infection. After a week, his fever, sore throat, musculoskeletal pain, and other symptoms recovered successively. However, the cough was still persistent. His cough was wild and triggered by pharyngeal itching about 20 times a day, especially in speaking, and a clogged feeling of phlegm in the throat always. In addition, coughing at night made him difficulty falling asleep, then caused mental anguish. Worse, he was accompanied by moderate pain excited by the cough in the tenth intercostal space. Overall, the patient suffered from uncomfortable pain and low quality of life caused by coughing. We evaluated him on the Visual Analog Scale (VAS) score, the Cough Evaluation Test (CET) score, and the Fatigue Scale-14 (FS-14) score to assess his improvement during FSN treatment (Figure 1).

	FSN T1		FSN T2		FSN T3		Follow-up
	Pre-T1	Post-T1	Pre-T2	Post-T2	Pre-T3	Post-T3	
Diagnosed with COVID-19							Time axis
Case 1	VAS score: 8.1 CET score: 20 FS-14 score: 10	VAS score: 6.4	VAS score: 2.5	VAS score: 2.7	VAS score: 2	VAS score: 1.3 CET score: 10 FS-14 score: 8	VAS score: 0.5 CET score: 6 FS-14 score: 2
Case 2	VAS score: 5.4 CET score: 16 FS-14 score: 10	VAS score: 5.4	VAS score: 2.7	VAS score: 2.6	VAS score: 1.8	VAS score: 0 CET score: 6 FS-14 score: 2	VAS score: 0 CET score: 5 FS-14 score: 2

Figure 1: The outcomes of cases. Notes: The Visual Analog Scale (VAS) score ranges from 1 to 10, with a higher score indicating an intense cough. The Cough Evaluation Test (CET) score ranges from 5 to 25, with higher scores indicating a worse cough and lower quality of life. The Fatigue Scale-14 (FS-14) ranges from 0-14, with higher scores indicating more severity of fatigue symptoms. T1: The first FSN treatment. T2: the second FSN treatment. T3: the third FSN treatment.

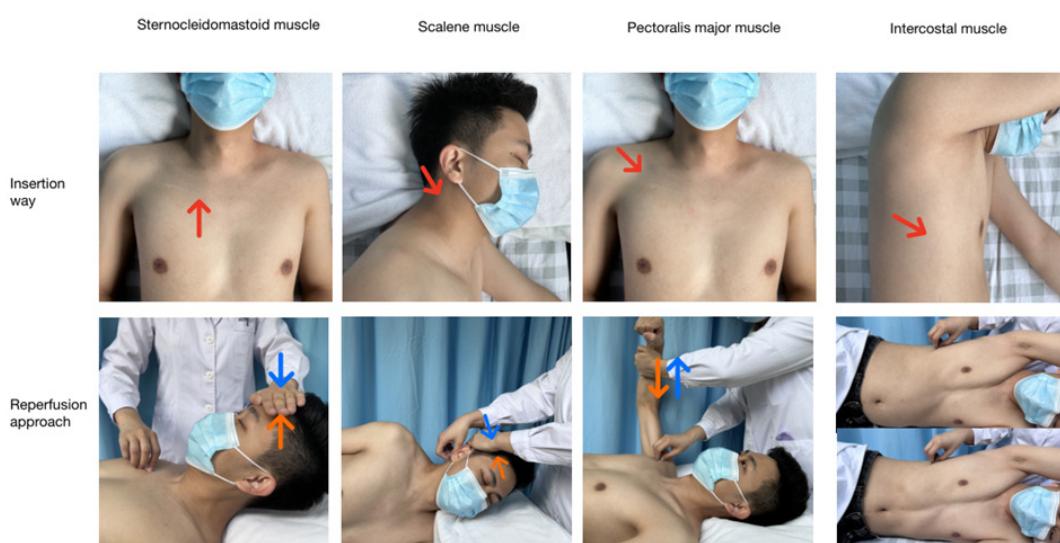


Figure 2: The red arrow in the first line pictures indicates the needle inserting the point of FSN. In the second line pictures, the orange arrow indicates the direction of the patient's active force and the blue indicates the resistance from the acupuncturist.

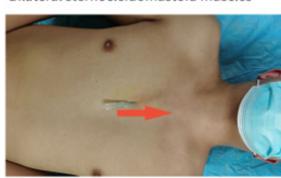
According to the guidance of FSN for COVID-19-associated cough, the bilateral sternocleidomastoid muscles, bilateral scalene muscles, bilateral pectoralis major muscles, and the right intercostal muscle were palpated as the TMs [7]. Firstly, an FSN needle was parallelly inserted into the skin after skin disinfection. The needle tip was retracted to the cannula to avoid injuring blood vessels or other tissues during the swaying movement. Secondly, the needle was horizontally moved under the skin from one side to the other 200 times in 2 minutes. Then, the reperfusion approach was performed in coordination with the patient and acupuncturist, as shown in Figure 2. Moreover, the acupuncturist palpated the TMs

again to definite that the TMs were softer than before. After the first FSN treatment, the cough intensity was immediately relieved, chest pain and pharyngeal itching were approximately half relieved, the throat was refreshing, and no cough was induced when speaking of the patient. After the second FSN treatment, his cough frequency decreased to ten times daily, twice at night, and he has no difficulty falling asleep. The best thing for him is that the chest pain disappeared. After the third FSN treatment, his symptoms were relieved significantly, with only cough 3-5 times a day and no cough at night. During follow-up, the patient was no cough or chest pain and slept well after the last FSN treatment three days later.

Case 2

Insertion way

Bilateral sternocleidomastoid muscles



Needle parallel pierced the skin under the sternal manubrium muscle and from bottom to top.

Bilateral scalenus muscles



Needle parallel pierced the skin lateral to the suprascapular fossa and from the outside to the inside.

Bilateral pectoral major muscles



Needle parallel pierced the skin lateral to the clavicular fossa and from the top outside to the bottom inside.

The upper rectus abdominis muscle



Needle parallel pierced skin lateral to the upper rectus abdominis muscle and from the outside to the inside.

Reperfusion approach



The patient straight flexed his head and neck to resist the force from the acupuncturist for 5-10 seconds.



The patient later flexed his head and neck to resist the force from the acupuncturist for 5-10 seconds.



The patient adducted the shoulder to resist the force from the acupuncturist for 5-10 seconds.



The patient kept abdominal lifting posture for 5-10 seconds.

Figure 3: The red arrow in the first line pictures indicates the needle inserting the point of FSN. In the second line pictures, the orange arrow indicates the direction of the patient's active force and the blue indicates the resistance from the acupuncturist.

A 35-year-old man presented to the outpatient clinic on February 4, 2023, complaining of a persistent unrelieved cough for 13 days. The man was diagnosed with COVID-19 by a COVID-19 antigen test on December 15, 2022. Two weeks later, he still suffered from a persistent cough with each exertion of breath or excessive speech, triggered by the feeling of pharyngeal itching and a variable coughing frequency mainly influenced by daily activity. It is difficult for him to reduce speech because he works as a teacher, and the patient's quality of life and work was poor due to the anxiety caused by the cough. The VAS score, CET score, and FS-14 score were evaluated as well. Before treatment, we palpated the bilateral sternocleidomastoid muscles, bilateral scalene muscles, bilateral Pectoral major muscles, and the upper rectus abdominis muscle as TMs. Then, we softened them by FSN treatment, as in Case 1 and (Figure 3). After the first FSN treatment, the patient felt an improvement in breath depth and a fresh feeling in the throat that did not trigger coughing when we communicated after the first FSN treatment. Therefore, the intensity of the VAS score was the same as the baseline before FSN. However, his VAS score was lowered than before when he came to the clinic for the second FSN treatment, and his cough was reduced to occasional throat tickling.

At the follow-up visit three days after the third FSN, the patient complained of significant improvement in symptoms, with no daily coughs, and recovered to normal life and work conditions.

Discussion

We suspect that the COVID-19-associated cough in the two cases was caused by respiratory muscles around the thorax or the trachea and pharynx and that muscles tightened for vasoconstriction, manifesting as tension. The tightened muscles mechanically stimulate the cough receptors located on the trachea and pleura, which are transmitted to the cough center and reflexively cause the respiratory muscles to contract violently, resulting in coughing, and long-term coughing may also form the affected muscles, thus forming a vicious circle [8-10]. Angiotensin-Converting Enzyme 2 (ACE2) receptor is the way that the SARS-CoV-2 virus enters the host cell and is expressed on vascular endothelium and smooth muscle [11,12]. ACE2 causes vasoconstriction in muscles and causes the muscle to tighten [13,14]. FSN effectively interrupted COVID-19-associated cough by relieving the ischemia and hypoxia of the tightened muscles through swaying movement and reperfusion approach in the subcutaneous superficial fascial layer [15]. The

satisfactory immediate and near-term efficacy provides evidence for FSN in the treatment of COVID-19-associated cough, which is worthy of further study and promotion. Future FSN randomized controlled trials will be designed for COVID-19-associated cough, as well as the cost-effectiveness of rehabilitation.

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