Successful Intervention with Traditional Chinese Medicine for Severe Coronavirus Disease 2019: A Case Report

Wei Lu1*, Wen Zhang2*, Xiangru Xu2, Quan Guo2, Bangjiang Fang2,3
Departments of 1Nursing and 2Emergency, Longhua Hospital, 3Institute of Emergency and Critical Care Medicine, Shanghai University of Traditional Chinese Medicine, Shanghai, China.

Abstract
Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus-2, is a major public health threat worldwide. However, there are no clinically approved antiviral drugs for COVID-19. Traditional Chinese medicine (TCM) is an important part of complementary and alternative medicine. Based on the TCM principles of pathogenesis, our team proposed “San Tong strategies” (san tong liao fa) and the “Truncation and Reversion strategy” (jie duanniu zhuan ce lve) and developed a Chinese herbal medicine formula to dispel external pathogens, clear heat, drain fire, and detoxify. A 50-year-old man with severe COVID-19 was admitted and received our oral Chinese herbal formula, acupoint plaster application, and moxibustion for 14 days. The computed tomography manifestations of COVID-19 showed marked improvements, and the patient achieved complete remission of fever, cough, fatigue, dizziness, nasal congestion, and rhinorrhea. This case provides a specific TCM treatment plan and effective reference for the treatment of COVID-19.

Key words: Traditional Chinese medicine; acupoint application; moxibustion; coronavirus disease 2019

BACKGROUND
The outbreak of coronavirus disease 2019 (COVID-19) caused by novel severe acute respiratory syndrome coronavirus-2 has overwhelmed most countries. The incidence and mortality rates of COVID-19 are rising alarmingly, and on 22nd April 2022 there were more than 505817953 confirmed cases and 6213876 deaths worldwide.1 The common symptoms of COVID-19 include fever, fatigue, cough, expectoration, anorexia, et al.2 There is currently no specific medication available to prevent COVID-19, and the effectiveness of antiviral medications is controversial. Traditional Chinese medicine (TCM) is a widely used as an adjuvant therapy in the management of infectious diseases. This report aimed to evaluate the effectiveness of TCM in treating a patient with severe COVID-19.

CASE REPORT
A 50-year-old man developed a fever, followed by coughing, fatigue, dizziness, nasal congestion, and rhinorrhea for 7 days. Computed tomography (CT) performed in the outpatient department of another hospital showed obvious lesions in the bilateral lower lung fields. Nucleic acid testing was positive for COVID-19 on 22nd February 2020. The patient was diagnosed with severe COVID-19 and admitted to Wuhan

*These authors contributed equally to this study.
Address for correspondence: Prof. Bangjiang Fang,
Department of Emergency, LongHua Hospital, Shanghai University of Traditional Chinese Medicine, Shanghai 200032, China
E-mail: fangbji@163.com
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Lei Shen Shan Hospital on 22nd February 2020.

On admission, he had a cough, fatigue, nasal congestion, dyspnea, and rhinorrhea. Physical examination revealed tachypnea (20 breaths/min), fever (39.1°C), and tachycardia (128 beats/min). The accessory examination findings are shown in Table 1. Chest CT performed on 24th February 2020 showed multiple patchy and ground-glass opacity shadows in both lungs [Figure 1A].

**treatment and clinical outcomes**

The TCM diagnosis was “exterior evil inward invasion” and “dampness-warm toxin constraint in the lung pattern.” A Chinese herbal medicine (CHM) decoction was prescribed [Table 2]. The herbs were bathed in 400 mL of cold water, and then boiled and concentrated to approximately 200 mL. The decoction was taken orally twice daily. The patient also received acupoint herbal plaster treatment. The herbal paste comprised *Psoralea corylifolia Linn.* (Bu gu zhi) (10 g), *Taxillus sutchuenensis* (Lecomte) Danser (Sang ji sheng) (15 g), and *Epimedium brevicornu Maxim.* (Yin yang huo) (15 g) ground into powder and mixed with ginger juice. A sterile gauze was used to apply the paste to the acupoints Feishu (BL 13) and Zusanli (ST 36). The paste was retained on the acupoints for 45 minutes per day for 2 weeks. Moxibustion was administered at Geshu (BL 17) for 15 minutes once daily for 2 weeks. The patient also received nasal oxygen to improve pulmonary oxygenation, moxifloxacin hydrochloride in sodium chloride (0.4 g/day intravenously) to prevent infection, doxofylline (0.1 mg/day intravenously) to attenuate asthma, and reduced glutathione (2.4 g/day intravenously) to protect against liver injury.

After 5 days of treatment, the cough and fever were markedly reduced, and the sputum volume had clearly decreased. The laboratory examination findings are shown in Table 1. After 14 days of treatment, the symptoms of COVID-19 had markedly improved. The patient had a mild cough with white phlegm, but no fever, dyspnea, or fatigue. The body temperature changes are shown in Figure 2. Chest CT performed on 4th March 2020 showed that the pulmonary lesions had markedly improved [Figure 1B]. On 7th March 2020, the abnormal indexes had improved, the patient was discharged on 8th March 2020 [Table 1].

The patient was followed up by phone in April and May 2020. He was free of fever, productive cough, dyspnea, and sputum, and was able to work and exercise. There was no fever recurrence at final follow-up in May 2020.

**DISCUSSION**

We report a patient with severe COVID-19 who experienced...
Table 1: Clinical laboratory results before and after treatment.

| Laboratory values                                      | 2020-2-22 | 2020-2-28 | 2020-3-7 |
|--------------------------------------------------------|-----------|-----------|----------|
| Erythrocyte sedimentation rate (mm/H)                  | 61        | /         | 34       |
| Alanine transaminase (IU/L)                            | 129       | 85        | 28       |
| Aspartate aminotransferase (IU/L)                      | 115       | 39        | 15       |
| Total protein (g/L)                                    | 63.5      | 62.1      | 65.6     |
| Albumin (g/L)                                          | 33.7      | 33.0      | 35.5     |
| Globulin (g/L)                                         | 29.8      | 29.1      | 30.1     |
| Albumin / globulin                                     | 1.13      | 1.13      | 1.18     |
| Total bilirubin (μmol/L)                               | 9.3       | 8.0       | 8.7      |
| Direct bilirubin (μmol/L)                              | 4.5       | 3.4       | 2.5      |
| Indirect bilirubin (μmol/L)                            | 4.8       | 4.6       | 6.2      |
| Blood glucose (mmol/L)                                 | 4.88      | 4.62      | 4.63     |
| Urea nitrogen (mmol/L)                                 | 4.0       | 4.4       | 5.0      |
| Creatinine (μmol/L)                                    | 68.4      | 67.6      | 76.3     |
| Uric acid (μmol/L)                                     | 169       | 217       | 272      |
| Alkaline phosphatase (IU/L)                            | 75        | 71        | 77       |
| Gamma-glutamyltransferase (IU/L)                       | 131       | 112       | 68       |
| K (mmol/L)                                              | 4.12      | 5.13      | 4.88     |
| Na (mmol/L)                                             | 137.5     | 139.9     | 141.0    |
| Ca (mmol/L)                                             | 2.07      | 2.07      | 2.20     |
| P (mmol/L)                                              | 0.79      | 0.99      | 1.26     |
| Creatine kinase (IU/L)                                 | 122       | 35        | 36       |
| Lactic dehydrogenase (IU/L)                            | 512       | 260       | 181      |
| Hydroxybutyrate Dehydrogenase (IU/L)                   | 345       | 185       | 150      |
| Total cholesterol (mmol/L)                              | 4.64      | 4.72      | 4.92     |
| Triglyceride (mmol/L)                                  | 1.22      | 1.69      | 2.64     |
| High-density lipoprotein - cholesterol (mmol/L)        | 1.03      | 0.74      | 0.85     |
| Low Density Lipoprotein - cholesterol (mmol/L)         | 3.12      | 3.31      | 3.27     |
| Apolipoprotein A (g/L)                                 | 0.95      | 0.90      | 1.24     |
| Apolipoprotein B (g/L)                                 | 1.31      | 1.20      | 1.21     |
| Carbon dioxide (mmol/L)                                | 26.2      | 27.2      | 26.8     |
| Procalctonin (nmol/L)                                  | 0.09      | 0.03      | 0.03     |
| Creatine kinase-MB (ng/mL)                             | 0.91      | 1.06      | 1.04     |
| Myohemoglobin (ng/mL)                                  | 10.00     | 3.66      | 3.56     |
| Sensitive troponin (ng/mL)                              | 0.012     | 0.010     | 0.014    |
| White blood cell (10⁹/L)                               | 5.99      | 5.12      | 4.93     |
| Red blood cell (10⁹/L)                                 | 4.32      | 4.19      | 4.28     |
| Hemoglobin (g/L)                                       | 130       | 127       | 129      |
| Hematokrit (%)                                         | 39.10     | 39.10     | 40.00    |
| Mean hemoglobin (pg)                                   | 30        | 30        | 30       |
| Mean hemoglobin concentration (g/L)                    | 332       | 325       | 323      |
| Platelet count (10⁹/L)                                 | 273       | 528       | 305      |
| Medial plaque volume (fL)                              | 10.6      | 10.2      | 10.2     |
| The percent of neutrophile granulocyte %               | 74.0      | 61.7      | 51.2     |
| Percentage of lymphocytes %                            | 16.9      | 24.6      | 32.0     |
| Neutrophil (10⁹/L)                                     | 4.43      | 3.16      | 2.52     |
| Lymphocytes (10⁹/L)                                    | 1.01      | 1.26      | 1.58     |
| Brain natriuretic polypeptide (pg/mL)                  | <10       | 0.01      | 0.02     |
| Prothrombin time (s)                                   | 11.7      | 11.9      | 11.8     |
| Activated partial thromboplastin time (s)              | 30.9      | 27.8      | 26.1     |
| Fibrinogen (g/L)                                       | 6.38      | 4.29      | 4        |
| Thrombin time (s)                                      | 17.6      | 17.7      | 17.1     |
| D-Dimer (mg/L)                                         | 0.75      | 1.71      | 1.11     |
rapid and substantial improvements in his symptoms and imaging findings following adjuvant TCM treatment. In TCM theory, COVID-19 belongs to the category of “pestilence”. COVID-19 is caused by a dampness-warm toxin that is likely to trap Qi, causing symptoms such as fever, cough, fatigue, dizziness, nasal congestion, and rhinorrhea. Based on the TCM principles of pathogenesis, our team proposed “San Tong strategies” to relieve the exterior syndrome, diarrhea, and diuresis, and the “Truncation and Reversion strategy” (jie duan niu zhuan ce lve) to clear the large intestine to rapidly treat the disease. We prescribed a CHM formula, an optimized combination of Maxing Shigan decoction and our hospital’s experiential prescription Jinhong decoction for the pestilence. Maxing Shigan decoction ventilates the lungs, clears heat, and alleviates asthma, while Jinhong decoction dispels external pathogens, clears heat, drains fire, and detoxifies. The components of our CHM formula are listed in Table 2.

Jinhong decoction inhibits the concentrations of some inflammatory cytokines, and protects against excessive inflammatory responses. Maxing Shigan decoction is a classic TCM formula with antipyretic, anti-inflammatory, antiviral and antitussive that has been used to treat COVID-19. We chose Ephedra equisetina Bge. (Ma Huang), gypsum fibrosum (Shi Gao), talcum powder (Huashi), and Rheum palmatum L. stem (Da huang) as the major components of our CHM because of their effects in discharging heat and detoxifying. We added Verbena officinalis L. (Ma bian cao) and Beauveria bassiana (Bals.) Vuill. (Jiang can) to increase the effects of clearing heat and resolving toxicity. Scutellaria baicalensis (Huang qin), Atractylodes lancea (Thunb.) DC. (Cang zhu), and Eupatorium fortunei Turcz. (Pei Lan) act to clear heat, dry dampness, and eliminate exopathogens. Belamcanda chinensis (L.) Redouté (She gan), and Aster tataricus L. f. (Zi wan) strongly reduce phlegm and clear the lungs.

Severe COVID-19 often leads to Qi deficiency, which hinders recovery, as Yang Qi is considered the root of life. Non-pharmacological interventions stimulate the acupoints on the body surface, thereby dredging the meridians and regulating the balance of Yin and Yang to relieve disease. Previous studies have revealed that electroacupuncture at Zusanli (ST 36) can reduce the lung inflammatory response and improve lung function in chronic obstructive pulmonary disease. The application of Chinese herbs at Feishu (BL 13) and Geshu (BL 17) reportedly achieve greater absorption into the blood circulation and distribution in target tissue compared with application at other acupoints.

CONCLUSION

We report a case in which severe COVID-19 was successfully managed using TCM with antipyretic, anti-inflammatory, antitussive, purgation, and diuretic effects. Further investigations are warranted to verify the effectiveness and mechanism of TCM treatments for COVID-19.

Conflicts of interest

There are no conflicts of interest.

Authors contribution

Lu W drafted the manuscript and searched the literature. Zhang W and Xu X contributed to manuscript revision. Guo Q treated and followed up the patients. Fang B contributed

Table 2: Ingredients of the Chinese herbal medicine formula

| Latin Name | Chinese Name | Individual Dosage (g) |
|------------|--------------|-----------------------|
| Scutellaria baicalensis Georgi. | Huang qin | 30 |
| Gypsum fibrosum | Shi gao | 30 |
| Amygdalus Communis Vas | Xing ren | 12 |
| Ephedra equisetina Bge. | Ma huang | 9 |
| Atractylodes lancea (Thunb.) DC. | Cang zhu | 15 |
| Belamcanda chinensis (L.) Redouté | She gan | 9 |
| Beauveria bassiana(Bals.) Vuill. | Jiang can | 12 |
| Eupatorium fortunei Turcz. | Pei lan | 18 |
| Aster tataricus L. f. | Zi wan | 12 |
| Verbena officinalis L. | Ma bian cao | 30 |
| Talcum powder | Hua shi fen | 30 |
| Rheum palmatum L. stem | Da huang | 9 |
| Eriobotrya japonica Thunb. | Pi pa ye | 12 |
| Glycyrrhiza uralensis Fisch. | Gan ca | 9 |
| Taraxacum mongolicumHand.-Mazz. | Pu gong ying | 15 |
| Sargentodoxa cuneata (Oliv.) Rehd. et Wils. | Hong teng | 15 |
to writing the manuscript and searching the literature, treating and evaluating the patients. All authors read and approved the final manuscript for publication.

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**Ethics approval and consent to participate**
This trial complies with the principles of Declaration of Helsinki and the regulations of quality management of clinical trials in China. The study has been approved by the Medical Ethics Committee of Huangshi Hospital of Traditional Chinese Medicine (approval number HSZY-PJ-2020-001-01) and registered with the Chinese Clinical Trial Registry (ChiCTR2000029777). Signed informed consent forms will be obtained from all qualified participants before enrollment.

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