



Clinical Study on the Integrated Chinese and Western Medicine Treatment of Immunodeficient Patients Infected with the Novel Coronavirus

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Abstract: During the severe outbreak of novel coronavirus pneumonia (COVID-19) across China, the epidemic spread to the Yan'an region, resulting in local cases. This report describes an immunodeficient patient infected with the novel coronavirus who was successfully cured through active integrated Chinese and Western medicine treatment at our hospital. We present the outcomes of this combined therapy to better contribute to the current fight against the epidemic and to further explore the underlying mechanisms of integrated Chinese and Western medicine, which remains highly significant for managing current post-infection sequelae.

Keywords: Immunodeficiency; Coronavirus; Integrated medicine

Online publication: September 20, 2026

1. Case data

The patient was an 18-year-old male student from Baota District, Yan'an City, Shaanxi Province. He was admitted on January 26, 2020, with a chief complaint of "fatigue for 6 days and fever for 1 day". He was discharged on February 9, 2020, after a 15-day hospitalization.

On January 20, 2020, while studying in Wuhan, the patient experienced unexplained fatigue without fever, cough, or sputum production. He self-administered cephalosporin antibiotics (details unknown) and cold medicine (compound paracetamol and amantadine). He returned to Yan'an on January 22. On January 23, he felt chest tightness and visited the respiratory department of our hospital, where all relevant tests were normal (details unknown). On the afternoon of January 25, he experienced significant fatigue and fever, with

a self-measured temperature of 37.7 °C. Accompanied by his parents, he visited our hospital, where his peak temperature reached 38.5 °C, without cough, sputum, or runny nose. Chest CT indicated bilateral pneumonia; blood tests (our hospital, Jan 25, 2020) showed: WBC $4.33 \times 10^9/L$, NEU 59.6%, LYM 30%, RBC $5.43 \times 10^{12}/L$, HB 156 g/L, PLT $171 \times 10^9/L$. CRP (our hospital, Jan 25, 2020): < 5.0 mg/L, hs-CRP: 2.66 mg/L. Coagulation tests (our hospital, Jan 25, 2020): PT 12.2sec. A throat swab was collected, and the novel coronavirus nucleic acid test was positive^[1]. The patient was isolated at our hospital without any treatment. At around 9:00 AM on January 26, he was admitted via our hospital's 120 emergency ambulance.

Physical examination upon admission: Temperature 36.8 °C, pulse 80 beats/min, respiration 19 times/min, blood pressure 126/70 mmHg. Conscious and in fair spirits, pharynx slightly red, rough breath sounds in both lungs without obvious dry or moist rales or pleural friction rub. No abnormalities in heart or abdomen, no edema in both lower limbs.

Chest CT (our hospital, Jan 25, 2020): 1. Patchy high-density shadow in the right lower lobe, and small patchy ground-glass high-density shadows in the right upper lobe and left lower lobe, suggesting inflammation, most prominent in the right lower lobe; 2. Small nodule under the right interlobar pleura; follow-up recommended; 3. Nodular low-density lesion in the left lobe of the thyroid gland in the scanned sections.

Admission diagnosis: 1. Pneumonia caused by novel coronavirus infection; 2. Thyroid nodule.

2. Treatment course

After admission, the patient had recurrent fevers, peaking at 38.5 °C. Blood tests showed WBC $3.05 \times 10^9/L$ (decreased), CRP 7.3 mg/L, hs-CRP > 5.0 mg/L; electrolytes: K 3.38 mmol/L (decreased). ESR, coagulation profile, myocardial enzymes, liver and kidney function, blood lipids, procalcitonin, blood-borne pathogens panel, and respiratory panel were all normal. Oxygen saturation fluctuated between 94% and 99% post-admission.

The patient was placed under respiratory isolation and given oxygen therapy. Intravenous (IV) Tanreqing 30 mL/day and oral Gankeshuangqing capsules were administered to clear heat, resolve phlegm, and detoxify. Oral lopinavir/ritonavir tablets (2 tablets, twice daily) were given for antiviral therapy. IV cefazolin pentahydrate 2 g twice daily was used for anti-infection, IV ambroxol hydrochloride 30 mg/day for expectoration, oral potassium chloride tablets to correct electrolyte imbalance, and IV water-soluble vitamins for nutritional support and symptomatic treatment. Psychological counseling was also provided. The patient's fatigue and chest tightness gradually alleviated, and his temperature returned to normal 96 hours after admission, though he still complained of fatigue.

On January 28, a follow-up chest CT showed worsening compared to the previous scan. Xuebijing 100 mL IV once daily was added to clear endotoxins^[2].

On January 31, Chief Physician Yunlei Liu from the TCM Department of our hospital was invited for a consultation. The patient's fatigue had significantly improved, but his hands were cold. His tongue was pale with a thick, white, greasy coating, and his pulse was slippery. This disease belongs to the TCM category of "epidemic disease", with the syndrome of cold-dampness stagnating in the lungs in the early stage. The treatment principle was to warm and transform cold-dampness and diffuse the lungs to expel pathogens. The prescription was a modified combination of Dayuan Yin and Danggui Sini San: Cangzhu (*Atractylodes*

lancea) 20 g, Chenpi (Tangerine peel) 10 g, Houpo (Magnolia bark) 10 g, Huoxiang (*Agastache rugosa*) 10 g, Caoguo (Tsaoko) 10 g, Mahuang (*Ephedra*) 6 g, Shengjiang (Fresh ginger) 10 g, Binglang (Betel nut) 10 g, Danggui (*Angelica sinensis*) 10 g, Guizhi (Cinnamon twig) 12 g, Baishao (White peony root) 10 g, Huangqi (*Astragalus*) 10 g, Xixin (Asarum) 3 g, Tongcao (*Tetrapanax pith*) 10 g, Dazao (Jujube) 5 pieces, Zhigancao (Honey-fried licorice) 6 g. 3 doses, decocted in water, one dose daily, taken warm in two divided doses half an hour after meals.

After taking the TCM, the patient's fatigue significantly decreased. On February 2, nasal and throat swabs for novel coronavirus nucleic acid testing were negative, while an anal swab tested positive.

On February 3, Chief Physician Yunlei Liu was invited for a second consultation: The patient had no fever or cough for the past 3 days, no fatigue, and his hands had warmed up. Follow-up chest CT showed improvement in lesions. His tongue was dark with a white, greasy coating. The treatment continued to warm and transform cold-dampness, diffuse the lungs to expel pathogens, and activate blood and unblock collaterals: Cangzhu 20 g, Caoguo 20 g, Chenpi 10 g, Houpo 10 g, Huoxiang 10 g, Mahuang 6 g, Shengjiang 10 g, Binglang 10 g, Daqingye (*Folium Isatidis*) 20 g, Huangqin (*Scutellaria baicalensis*) 10 g, Guizhi 10 g, Shuizhi (Leech) 6 g, Xixin 3 g, Wuweizi (*Schisandra chinensis*) 10 g, Taoren (Peach kernel) 10 g, Banxia (*Pinellia ternata*) 10 g, Fuling (*Poria cocos*) 10 g, Zhigancao 6 g. 4 doses, decocted in water, one dose daily, taken in two divided doses after meals.

On February 5 and 7, two samples sent to the Municipal CDC tested negative for novel coronavirus nucleic acid via nasal and throat swabs. The Provincial CDC also confirmed negative results for nasal/throat swabs and serum novel coronavirus nucleic acid tests. Fecal coronavirus nucleic acid tested weakly positive. Follow-up chest CTs on February 5 and 8 showed significant absorption of lesions. The patient had no obvious discomfort, no positive physical signs, and follow-up tests for kidney function, electrolytes, myocardial enzymes, blood lipids, procalcitonin, CRP, ESR, coagulation profile, urinalysis, and blood tests were all normal.

According to the "Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 5)", the patient met the discharge criteria [3]. On February 8, the case was reported to and approved by the Yan'an Municipal Health Commission, and discharge procedures were completed. Discharge diagnosis: 1. Novel coronavirus pneumonia; 2. Thyroid nodule. Discharge instructions: 1. Home isolation for 14 days, maintain regular daily routines, strengthen nutrition, and continue oral "Qingfei Paidu Decoction" TCM treatment for 7 days; 2. Follow up at our outpatient clinic in 2 weeks for chest CT and novel coronavirus nucleic acid test; 3. Recommend follow-up B-ultrasound and thyroid function tests after discharge; consult endocrinology if necessary; 4. Seek immediate medical attention if symptoms worsen.

On February 13, during a follow-up visit, the patient had no discomfort, and lung CT showed basic absorption of inflammation. (Blood magnesium was slightly low), WBC remained consistently normal.

3. Discussion

This patient was an 18-year-old youth with no clear history of underlying diseases. However, the dynamic changes in his blood tests post-admission showed the following characteristics: At initial diagnosis, total WBC was normal ($4.33 \times 10^9/L$), and lymphocyte percentage was low (30%). During hospitalization, WBC once dropped to $3.05 \times 10^9/L$ but recovered rapidly after treatment, with absolute neutrophil counts always

remaining within the normal range. Based on this, intrinsic immune disorders caused by neutrophil defects can be basically ruled out. However, during the disease course, the viral nucleic acid turned negative in the upper respiratory tract while remaining persistently positive in feces, and the total disease duration reached 15 days, exceeding the viral clearance time of most mild cases^[1]. This suggests a possible defect in adaptive immune response^[4].

Combining clinical phenotypes, we speculate that this patient is more likely to have a humoral immunodeficiency (B-cell dysfunction or insufficient antibody production) rather than cellular or phagocytic immunodeficiency^[5]. The reasons are as follows:

- (1) Delayed viral clearance but controllable lung inflammation fits the pathological pattern of insufficient antibody-mediated neutralization with relatively preserved T-cell response;
- (2) Infection markers such as CRP and procalcitonin were never elevated, which does not support a tendency toward purulent infections caused by phagocytic dysfunction;
- (3) No opportunistic infections occurred after recovery, suggesting that cellular immunity (T-cells) was basically intact. Unfortunately, quantitative serum immunoglobulin and lymphocyte subset analyses were not performed on this patient, failing to confirm this from a laboratory perspective, which is a limitation of this case report.

From a TCM perspective, the syndrome of “cold-dampness stagnating in the lungs” ran throughout the disease. The patient’s pale tongue with a thick, white, greasy coating, slippery pulse, and cold hands are consistent with the pathogenesis of “when dampness prevails, yang becomes weak” described in Wen Yi Lun (Treatise on Epidemic Febrile Diseases). The TCM treatment was based on a modified Dayuan Yin, heavily using warm and dry herbs to transform dampness, such as Cangzhu, Houpo, and Caoguo, combined with Danggui Sini San to warm and unblock blood vessels. The intention was to “revitalize yang Qi, transform dampness, and expel pathogens”. Modern pharmacological studies show that the volatile oil of Cangzhu can enhance the phagocytic function of macrophages^[6]; Magnolol from Houpo has anti-inflammatory and immunomodulatory effects^[7]; Warming and unblocking herbs like Danggui and Guizhi can improve peripheral microcirculation, potentially assisting in viral clearance through non-specific immune pathways. Particularly noteworthy is that the patient’s nasal and throat swab nucleic acid test turned negative within 48 hours after adding TCM. Although we cannot rule out the antiviral effect of Western medicine (lopinavir/ritonavir), the high temporal correlation suggests that TCM may have promoted the clearance of the upper respiratory tract virus by regulating mucosal immunity or improving the local microenvironment.

In addition, the patient’s chest CT worsened during hospitalization, but his condition stabilized after adding Xuebijing. The main components of Xuebijing are blood-activating and stasis-resolving herbs such as safflower, red peony root, and *ligusticum wallichii*. Modern studies confirm it can reduce endotoxin levels and inhibit inflammatory cytokine storms, and its application in severe COVID-19 treatment has been reported^[2,3]. This case suggests that for immunodeficient patients co-infected with COVID-19, timely use of blood-activating and detoxifying TCM alongside antiviral therapy may help block the pathological progression of intertwined “dampness, toxin, and stasis”.

In conclusion, we believe that for suspected COVID-19 patients with humoral immunodeficiency, the strategic value of integrated Chinese and Western medicine treatment lies in: Western medicine directly inhibiting viral replication, while TCM compensates for the shortcomings of specific antibodies through multi-target regulation such as warming yang and transforming dampness, activating blood, and unblocking

collaterals, thereby synergistically promoting viral clearance and inflammation absorption. However, this hypothesis needs to be verified in future studies through immunoglobulin measurements and monitoring of vaccine antibody responses.

Funding

Yan'an University Prevention and treatment of New Coronal pneumonia Emergency Research Fund Project (Project No.: YDKYYJ03, YDKYYJ01); Shanxi Province 2020 traditional Chinese Medicine Prevention and treatment of New Coronal pneumonia Scientific Research Emergency Project (Project No.: 2020-YJ007, 2020-YJ005)

Disclosure statement

The authors declare no conflict of interest.

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