Radiographic and Clinical Features of COVID-19 Pneumonia Patients in Border Yanbian Minority, Autonomous Prefecture, China: A Case Report

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1. Abstract

In this case report, we collected five confirmed COVID-19 patients. We collected epidemiological data of patients, and according to typical clinical symptoms, laboratory test, myocardial enzyme, C-reactive protein and chest CT scanning results evaluation of patient's condition and treatment effect. Here we used the low flow oxygen (1-3 L/min), antiviral, interferon inhalation treatment, patients' symptoms, laboratory indexes improved, SARS-CoV-2 turn negative PCR results, CT in patients with lesions absorption at the same time. After 16 days of hospitalization, all the patients were improved and discharged from hospital. At present, all discharged patients have no fever, virus repositive, and no treatment side effects. Although there is no specific drug for SARS-CoV-2, the active use of antiviral drugs at the early stage can effectively slow down the progression of mild COVID-19 disease. Familiarity with the clinical manifestations of patients will contribute to both evaluations of affected patients' condition and treatment effects.

2. Introduction

There have been two outbreaks of corona virus disease in the past two decades: one was severe acute respiratory syndrome (SARS) in 2002, and the other was Middle East Respiratory Syndrome (MERS) in 2012. Although experimental and clinical studies have made a number of important findings that contribute to our understanding of a causal role of SARS-CoV-2 in corona virus disease 2019 (COVID-19) under various pathological conditions and developing available vaccinations [1], its mechanism underlying COVID-19-related SARS remain uncertain.

COVID-19 has spread in China and worldwide with substantial morbidity and mortality since December 2019. Considering the rapid increase in confirmed cases in China and other countries, the World Health Organization announced a public health emergency of international scope. This novel corona virus continues to spread globally, but no specific therapeutic drugs or other treatments have been found to be sufficiently effective against the virus, and there is great urgency to identify safe and effective methods to prevent, control, and cure the disease.

Yanji is a city in Jilin Province, China bordering North Korea, South Korea, and Russia. Due to the serious epidemic situation abroad, the pressure to prevent COVID-19 cases from being imported into Yanji from abroad is enormous. Here, we describe the epidemiological and clinical characteristics of these patients and provide new information about the prevention and treatment of COVID-19.

3. Study Population

We did an observational cohort study at Yanbian University Hospital. We recruited all patients (aged 30–64 years) with laboratory confirmed COVID-19 from January 24 to April 8. The diagnosis of COVID-19 was based on guidelines issued by the National Health Commission of the People's Republic of China [2]. We screened all patients who had cough, fever, and radiographic presentation at the initial assessment, or who underwent epidemiological investigation

because of a history of exposure to epidemic areas or close contact with an infected individual. We confirmed SARS-CoV-2 infection by RT-PCR of samples taken from Throat-swab specimens. All the patients previous are healthy subjects, no lung disease or febrile related diseases.

This study was approved by the ethics committee of Yanbian University Hospital. Written consent was obtained from the guardians of the patients.

4. Data Collection

We collected clinical charts, nursing records, laboratory results and chest CT features of all patients. At the same time we collected epidemiological, clinical, serological and imaging records as well as treatment and outcome data. To ensure the accuracy of the data, two independent researchers were arranged to check the data. Sample collection, RT-PCR, and interpretation of results were done as previously described [3]. Two sets of primers were used for two target genes (ie, open reading frame 1ab [ORF1ab] and nucleocapsid protein [N]) according to the protocol issued by the National Institute for Viral Disease Control and Prevention in China [4].

5. Result

From January to April, 2020, a total of 5 hospitalized adults were enrolled in a respective study of respiratory infections at The affiliated Hospital of Yanbian University, which is located Yanbian Minority Autonomous Prefecture (population approx. 2.27 million) of Jilin Province, China bordering Russia, and North Korea (Figure 1).

Informed consent was obtained from the parents or guardians of the patients with COVID-19 for the publication of their clinical data. The dates of illness onset in the five patients with COVID-19 were between January 24 and April 8, and the patients were hospitalized for two weeks (Table 1).

Five cases of COVID-19 were reported in the city of Yanji: two men and three women; three patients were aged ≥50 years (Table 1). We divided the patients into two groups based on their residences at the time of their admission: The Local cases without clear epidemiological history (n=1) and the Imported cases (n=4). On admission, frequent symptoms were fever with a body temperature at 37.5°C–39°C (n=5, duration of fever ≥ 8 days) and tussiculation (n=5). Other symptoms were recorded infrequently, including sore throat (n=1, 20%), anorexia (n=1, 20%), fatigue (n=1, 20%) (Table 1). All five patients had pulmonary ground-glass pathological changes, after admission with antiviral treatment, the chest CT results of most patients showed the resolution of bilateral ground-glass opacities or healing of the ground-glass opacities nine days later (Figure 2).

(Table 1) summarizes the results of laboratory tests related to antiviral response, revealing different degrees of myocardial and liver injury (local or clinical type). The abnormal findings were as follows: decreased white blood cells (WBC) (n=1, 100%) in the Local group compared to the Imported group (n=1, 25%), and among all five patients, decreased lymphocyte blood cells (n=1, 20%), increased monocyte% (n=1, 20%), increased C-reactive protein (CRP) (n=3, 60%), increased lactic dehydrogenase (n=5, 100%), and increased alpha-hydroxybutyric dehydrogenase (n=4, 80%).

On admission, all patients were treated with oxygen inhalation (1–3 L/min), oral lopinavir/ritonavir (200 mg/50 mg) 2×/day for 7–14 days, oral oseltamivir 75 mg 2×/day for 6–13 days, and nebulized inhalation: interferon (IFN) 5 million units/day aerosolized inhalation for approx. 10–16 days, and then IFN spray 2×/day into the nasal cavity for approx. 10–16 days. At 4–10 days after the initiation of treatment, improvement was observed in all five patients. Each patient's RT-PCR results for SARS-CoV-2 became negative after a mean of 12.4 (SD 0.9) days of treatment. The mean number of days in hospital was 16 days (Table 1). After the above treatment, the condition of all the patients was significantly relieved, without fever, fatigue, dry cough and other symptoms. Chest CT indicated inflammatory absorption, followed by no viral reactivation, fever and treatment side effects.
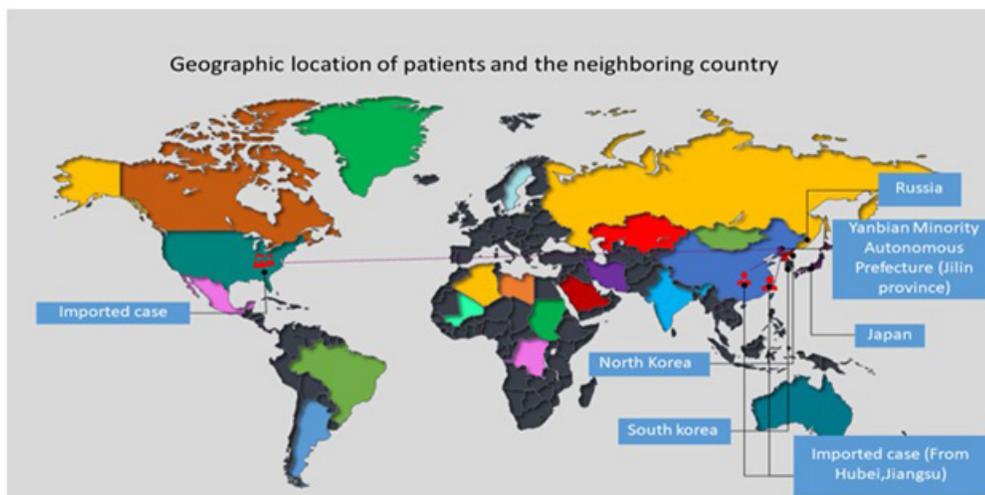

Figure 1: Border Yanbian Minority Autonomous Prefecture is close to Korea, Russia, and Japan. During the outbreak, two patients were from the United States, one from Jiangsu and one from Hubei. One local case has no clear epidemiological history.
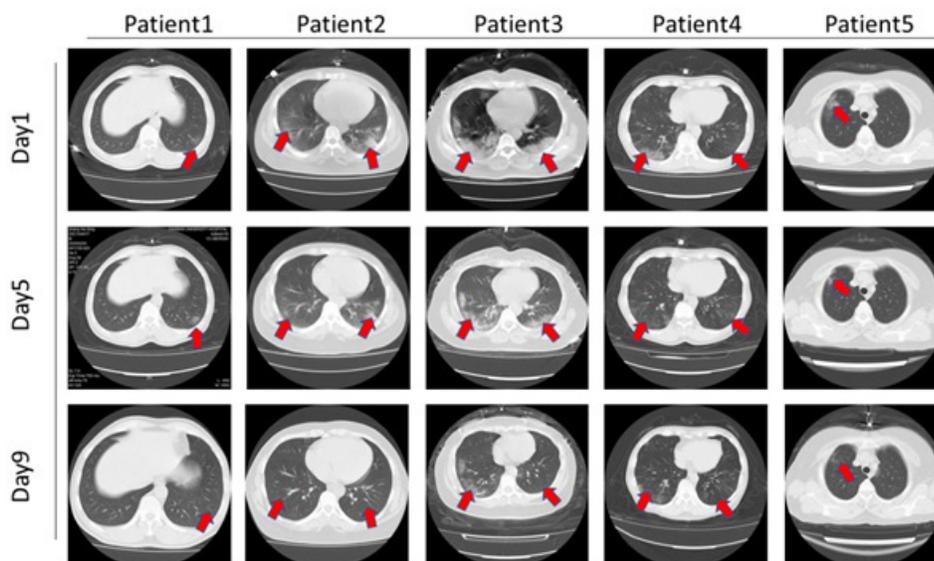
Figure 2: Chest CT scans of the five Covid-19 patients during their hospitalization. On admission day 1, a single lung or both lungs showed multiple ground-glass opacities changes (arrows). On days 5 and 9, the pathological changes in the lungs were gradually absorbed.

Table 1: Epidemiological and clinical features of the five patients with Covid-19.

	Total (n=5)	Local Cases (n=1)	Imported Cases (n=4)
Epidemiological data			
Male	2 (40%)	0 (0%)	2 (50%)
Female	3 (60%)	1 (100%)	2 (50%)
Age, yrs; SD (range)	48.6 (13.8)	30	53.3 (10.6)
Age ≥50 yrs	3 (60%)	0 (0%)	3 (75%)
Symptoms			
Fever	5 (100%)	1 (100%)	4 (100%)
Duration of fever ≥8 days	5 (100%)	1 (100%)	4 (100%)
Tussiculation	5 (100%)	1 (100%)	4 (100%)
Anorexia	1 (20%)	1 (100%)	0 (0%)
Fatigue	1 (20%)	1 (100%)	0 (0%)
Sore throat	1 (20%)	0 (0%)	1 (25%)
Serological tests (reference values)			
WBCs, 4–10×10^9 cells/L	4.4 (1.7)	2.6	4.8 (1.6)
Decrease	2 (40%)	1 (100%)	1 (25%)
Lymphocyte blood cells, 0.8–4×10^9 cells/L	1.2 (0.6)	0.8	1.3 (0.7)
Decrease	1 (20%)	0 (0%)	1 (25%)
Monocyte%, 3%–12%	12.5 (4.2)	10.6	12.9 (4.7)
Increase	1 (20%)	0 (0%)	1 (25%)
C–reactive protein, <10 mg/L	32.7 (27.5)	64.4	24.7 (24.3)
Increase	3 (60%)	1 (100%)	2 (50%)
Lactic dehydrogenase, 115–220 IU/L	350.4 (148)	278	368.5 (164.3)
Increase	5 (100%)	1 (100%)	4 (100%)
Alpha-hydroxybutyric dehydrogenase, 72–182 IU/L	254.8 (66.4)	238	259 (76)
Increase	4 (80%)	1 (100%)	3 (75%)
Radiography			
Pulmonary ground–glass opacities	5 (100%)	1 (100%)	4 (100%)
Treatment			
Oxygen inhalation, 1–3L/min	5 (100%)	1 (100%)	4 (100%)
Lopinavir/ritonavir/oseltamivir	5 (100%)	1 (100%)	4 (100%)
IFN-γ inhalation	5 (100%)	1 (100%)	4 (100%)
Time taken to become SARS-CoV-2 PCR-negative, days; SD, (range)	12.4 (0.9)	12	12.5 (1)
Duration of hospitalization, days	16	16	16

6. Discussion

Therapies that have been used for COVID-19 include antiviral agents, antimalarial drugs, immunosuppressants, immune modulators, prine removal, plasma-based therapy, inhaled gas, antifibrotics, antioxidants, microbiome-based treatment, organ support, and ozonated autohemotherapy; there are also ongoing clinical trials for the prevention of COVID-19 examining vaccines, antiviral and antimalarial medications, and the effectiveness of personal protective equipment [5]. At present, lopinavir, ritonavir, and IFN play important roles in the treatment of COVID-19 [6, 7], but glucocorticoid, non-steroidal, and anti-inhibitory drugs delay the clearance of SARS-CoV-2 and show certain side-effects; consequently, cautious use of these agents is required in clinical practice. In this study, although all the five patients recovered well, but the cases were short of severe patients and special groups (pregnant women, children and the elderly). This study was approved by the Ethics Committee of Yanbian University Hospital and obtained the written consent of the patient's guardian. In our study all five patients were given lopinavir/ritonavir, oseltamivir, and IFN-α. Two of the patients were given oral moxifloxacin tablets 0.4 g/day due to an increased level of CRP. After 10–16 days of treatment, all patients' conditions were improved as reflected by the negative nucleic acid tests from three throat swabs.

It has been shown that the typical chest CT manifestations of ICU-admitted COVID-19 patients on admission are bilateral multiple lobules and subsegmental consolidation areas, while the typical chest CT features of non-ICU mild COVID-19 patients were bilateral ground glass opacity and submental consolidation areas [8]. The chest CT of the present five hospitalized patients showed multiple patches-like and ground glass shadows in many parts of both lungs, but with treatment the lesions were gradually absorbed or the number of lesions decreased in all five cases. At 9 days after admission, the lesions were basically completely absorbed, and only one patient had a small amount of pulmonary fibrosis. It is the first time to report COVID-19 patients in Border Yanbian Minority, Autonomous Prefecture, China. These studies will help analyze these environmental factors. This project includes molecular studies of malaria. These studies will help analyze these environmental factors. This project includes molecular studies of malaria.

In summary, during COVID-19 pandemic, we have only experienced the five cases treatment of COVID-19 patients in the Yanbian Minority Autonomous Prefecture of Jilin Province, Border city. After antiviral treatment and anti-inflammatory treatment, all five patients showed negative results on viral PCR tests for three times, cardiac injury markers (lactate dehydrogenase, alpha-hydroxybutyrate dehydrogenase) and inflammatory indicators (CRP), and the patients' chest CT lesions were significantly absorbed; none of the patients' conditions worsened, and none was transferred to the ICU. There was also no cross-infection between the medical staff and patients. The above-described treatment significantly prevented the progression of COVID-19, and these results hold significance for the treatment of patients with mild and modulate COVID-19 and the control of the re-ignition of imported cases.

7. Funding

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