Original Article

Epidemiology, diagnosis and treatment of early COVID-19 patients in Jiaxing City, Zhejiang Province, China, January to March 2020

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Background: Imported Coronavirus disease 2019 (COVID-19) patients pose a huge challenge to the prevention and control of the epidemic in prefecture-level cities in China. However, the treatment strategies at that time were mainly empirical and far from perfect. Hence, this study aims to summarize the clinical characteristics, diagnosis and treatment of all COVID-19 patients in Jiaxing City in 2020.

Methods: The clinical data of 42 patients diagnosed with COVID-19 in Jiaxing City, Zhejiang Province from January 23, 2020 to March 4, 2020 were retrospectively analyzed. Epidemiological history and sociodemographic data were collected. Laboratory parameters, imaging and disease progression, treatment methods, efficacy and adverse reactions of COVID-19 cases were recorded. Then, the clinical characteristics as well as diagnosis and treatment were statistically analyzed.

Results: The median age of 42 patients was 47 years old, including 24 males (57.1%) and 18 females (42.9%). There were 21 first-generation cases, 29 cases (69%) of clustering onset related to first-generation cases, and 28 cases without any underlying diseases. Radiographic progression was reported in 17 patients (40.5%) (progression duration, 2–11 days; median progression duration, 3.8 days; average progression duration, 4.59–2.48 days). The main clinical symptoms include fever (78.6%) and cough (64.3%). A total of 37 patients (88.10%) received arbidol combined with lopinavir/ritonavir or darunavir/cobicistat. Of these, 22 patients (52.4%) took a combination with moxifloxacin tablets, and 20 patients (47.6%) took combined hormone therapy. Seventeen patients (40.48%) reported diarrhea, nausea, vomiting, rash, and other adverse drug reactions. A total of 38 patients improved (90.5%). The hospital stays of 36 patients ranged from 7 to 33 days, with a median of 19 days (19.00–7.33 days on average). The virus nucleic acid test result return time was 1 to 32 days, with a median of 15.5 days (14.41–8.61 days on average).

Conclusions: Most of the imported COVID-19 patients in Jiaxing City were of the first generation, mainly cluster onset, and the epidemiological characteristics were relatively simple. Arbidol combined with lopinavir/ritonavir or darunavir/cobicistat was the main treatment strategy for the initial treatment of COVID-19.

Keywords: COVID-19; epidemiology; clinical characteristics; diagnosis; treatment

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Introduction

In late December 2019, several local health agencies successively reported incidents of unexplained pneumonia related to a seafood market in Wuhan City, Hubei Province, China. The study found that the causative pathogen was a new coronavirus strain (1). On January 10th, 2020, the virus genome was released. On February 11th, 2020, the Coronavirus Study Group (CSG) of the International Committee on Taxonomy of Viruses (ICTV) announced on its official website that the new coronavirus was officially named "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)" (2). On the same day, the World Health Organization (WHO) named the pneumonia Coronavirus disease 2019 (COVID-19). On February 21st, 2020, the National Health and Medical Commission also issued articles where the English name of "New Coronavirus Pneumonia" was revised to "COVID-19", while the Chinese counterpart remained unchanged (3-5). In about just 3 months, SARS-CoV-2 swept through all 34 provinces, municipalities, and autonomous regions (including Hong Kong, Macao, and Taiwan) in China. By 10:00 am on March 4th, 2020, a total of 80,304 COVID-19 cases were diagnosed nationwide, with an overall death toll of 2,948 and cured cases of 47,606 (6).

As a rapidly spreading pandemic virus, SARS-CoV-2 can be transmitted from person to person and between cities (7-9). In recent years, as an important net population inflow area, the population in Shanghai and Zhejiang has continued to increase. The population mobility will increase the risk of human exposure to infectious sources and transmission environments. Most of the COVID-19 cases in Zhejiang Province had the track of work, study or travel to Wuhan (10).

Highlight box

Key findings

- The incidence is relatively high among young and middle-aged men, and the vast majority of patients have imaging changes.

What is known and what is new?

- The reported diseases mainly occur in clusters and are highly contagious. Isolation measures are the key to block the infection.
- Patients' condition was mild on admission, and half of the patients showed elevated CRP. There is a certain probability of imaging progress in the short term with timely review of chest CT.

What is the implication, and what should change now?

- The key warning indicators of severe disease are found from the test indicators or imaging features.

On January 17th, 2020, the first case of COVID-19 in Zhejiang Province was reported in Wenzhou. One week later, Jiaxing confirmed its first local case of COVID-19. Jiaxing is one of the 11 prefecture-level cities in Zhejiang Province. It is located in the northeast of Zhejiang Province and borders Hangzhou, Shanghai, and Suzhou. On January 23rd, the Zhejiang government urgently initiated a first-level response plan for major public health emergencies. In the following more than a month, a total of 45 diagnoses were confirmed in Jiaxing, and 3 of the 45 were not treated locally for special reasons, while the rest were treated at designated hospitals locally (6 patients were transferred to higher-level hospitals to proceed with treatment due to the exacerbation of disease during the treatment). As of March 4th, 2020, except for 2 patients who were still positive for nucleic acid tests in the entire Jiaxing area, the remaining patients improved and were discharged. Of the 6 critically ill patients who were transferred to higher-level hospitals for treatment (except for 2 patients who remained positive for nucleic acid tests), the remaining 4 all tested negative, indicating that the epidemic situation in Jiaxing was basically at the end.

Despite the 50% similarity between SARS-CoV-2 and Middle East Respiratory syndrome coronavirus (MERS-CoV), treatment for SARS-CoV-2 is based solely on its epidemiological symptoms, and the effective treatment strategy is not well defined (11). Therefore, to provide insights into the diagnosis and treatment of COVID-19 in similar areas and regions outside Hubei Province, we summarized the clinical data of all 42 patients with COVID-19 in the local hospital, hoping to summarize the experience for the treatment of COVID-19 and develop more effective treatment methods. We present the following article in accordance with the STROBE reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-22-1084/rc).

Methods

Research subjects

This is a cross-sectional study of the clinical data of all confirmed COVID-19 patients admitted to designated hospitals in Jiaxing from January 23rd to March 4th, 2020 was conducted. Inclusion criteria: (I) COVID-19 patients confirmed by quantitative reverse transcriptase polymerase chain reaction (qRT-PCR); (II) patients who received computed tomography (CT) scan before treatment.

Epidemiological history, demographic data, clinical symptoms, laboratory indicators, imaging progression, severe disease progression, efficacy (length of hospital stay) and adverse reactions were collected and statistically analyzed. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of the Affiliated Hospital of Jiaxing University (No. LS2020-010) and individual consent for this retrospective analysis was waived.

The diagnosis and release standards

According to the real-time update of the National Health and Medical Commission's COVID-19 Diagnosis and Treatment Plan (referred to as the Plan) issued by China: the version from January 23rd–January 26th, 2020 refers to the third edition of the Plan (12); the version from January 27th–February 3rd, 2020 refers to the fourth edition of the Plan (13); the version from February 4th–February 17th, 2020 refers to the fifth edition of the Plan (14); the version of February 18th, 2020 refers to the sixth edition of the Plan (15).

Treatment strategies

According to the real-time updated plan, first of all, COVID-19 infections were classified into mild (mild clinical symptoms, no imaging findings of pneumonia), moderate (symptoms such as fever and respiratory, imaging findings of pneumonia), severe [respiratory distress, RR ≥30 times/min; oxygen saturation ≤93% at rest; arterial partial pressure of oxygen (PaO_2)/oxygen-absorbed concentration (FiO_2) ≤300 mmHg] and critical [respiratory failure requiring mechanical ventilation; onset of shock; complicated with other organ failure requiring intensive care unit (ICU) care] according to whether there were clinical symptoms, whether there was pneumonia, the severity of pneumonia, whether there were respiratory failure, shock, and other organ failures.

Secondly, the treatment place should be determined according to the severity of the disease. Suspected (single room) and confirmed cases (more than one person could be admitted to the same ward) should be given isolated treatment in designated hospitals with effective isolation and protection conditions. Critical cases should be admitted to ICU as soon as possible. Bed rest was required to ensure adequate energy and nutrient intake. Vital signs (oxygen saturation) and disease monitoring (including blood routine, urine routine, biochemical indicators, chest imaging, etc.) were performed as well. In addition, standard effective oxygen therapy was given according to the patients' condition.

For antiviral therapy, the generally used drugs included Recombinant Human Interferon α-2b (IFN-α-2b, 10 mL: 1 million international units (120 spray)/bottle, Tianjin Sinobioway Biomedicine Co., Ltd.), lopinavir and ritonavir (100 mg/25 mg, AbbVie Deutschland GmbH & Co.KG), ribavirin (0.1 g, Zhejiang Zhebei Pharmaceutical Co., Ltd.), arbidol (0.1 g, CSPC Pharmaceutical Group Co., Ltd.), oseltamivir (15 mg, Yichang HEC Changjiang Pharmaceutical Co., Ltd.), darunavir/cobicistat (800 mg darunavir/150 mg cobicistat, Xi'an Janssen Pharmaceutical Co., Ltd.) or ASC09/ritonavir tablets (ASCO09F tablets, ASC09/ritonavir: 300 mg/100 mg, Ascletis Pharma Inc.). Drug combinations could be used if there was a history of endemic epidemiology or other risk factors associated with infection, including travel history or exposure to animal influenza viruses. The antimicrobial agent moxifloxacin tablets (0.4 g $C_{21}H_{24}FN_3O_4$, Chongqing Huapont Pharm Co., Ltd.) should be used with caution.

In addition, for severe cases, early intravenous infusion of immunoglobulin (2.5 g/5%, Guangdong Shuang Lin Biopharmacy Co., Ltd.) could be appropriately used. For severe and critical cases, the glucocorticoid methylprednisoloe (20 mg $C_{22}H_{30}O_5$, Sinopharm Rongsheng Pharmaceutical Co., Ltd.) could be used in the short-term (3–5 days) according to the degree of dyspnea and the progress of chest imaging. At the same time, attention should be paid to the adverse reactions and contraindications of various drugs, as well as interactions with other drugs. COVID-19 is a disease belongs to the category of traditional Chinese medicine, which can be treated dialectically according to the condition, local climate characteristics and different constitutions.

Nucleic acid test methods

Real-time fluorescent RT-PCR was used for the local new SARS-CoV-2 nucleic acid test (16,17), and the test kit was provided by Shengxiang Biotechnology Co., Ltd. Positive verdict: (I) samples with typical s-type amplification curves detected for 6-carboxyl fluorescein (FAM) or carboxy-X-Rhodamine (ROX) channels and cycle threshold (Ct) ≤40 were reported as 2019-nCoV virus positive; (II) samples with no typical s-type amplification curve (NoCt) detected for FAM and ROX channels, or samples with Ct >40 and

amplification curves for hexachlorofluorescein (HEX) channels were reported as 2019-nCoV negative; (III) samples with no typical s-type amplification curve (NoCt) detected for FAM, ROX, and HEX channels or Ct >40 indicated that the cell content was too low or there was interference inhibiting the response. The test result of this sample was invalid, and the test would need to be repeated. The minimum test limit of the test kit was 200 copies/mL. The requirements of internal standard genes for our results were more stringent based on the instructions to promote a successful test rate and avoid missing low-virus load samples: internal standard gene Ct <30 was regarded as a reliable and effective test result. Endogenous internal standard Ct <30 and ORF1ab and N genes Ct <40 were regarded as positive. Endogenous internal standard gene Ct >30 or no typical s-type amplification curve detected was considered as unqualified or indicated that some genes had an inhibiting reaction, and resampling was required.

The division of generations of COVID-19 patients

The first generation comprised patients who developed symptoms after returning to Jiaxing from Hubei. The second generation comprised infected patients who were in direct contact with those who travelled from Hubei to Jiaxing. The third generation comprised patients with other epidemiological history (such as contact with those diagnosed in Jiaxing).

Statistical analysis

Statistical Product Service Solutions (SPSS) software, version 26.0 (International Business Machines Company, USA) was used to analyze the data, and data conforming to the normal distribution were expressed as mean ± standard deviation (SD). The *t*-test was performed to compare 2 sample means, and the variance test was conducted for the comparison of 2 or more samples. Non-normally distributed measurement data were described by the median, and the rank sum test was adopted. The χ^2 test was adopted for count data, and $P<0.05$ was considered statistically significant.

Results

Demographic and epidemiological characteristics

A total of 42 patients were included in this analysis, including 24 males (57.1%) and 18 females (42.9%). The median age was 47 years for those aged between 16 to 72 years old, with an average of 48.43±13.63 years old. There were 21 cases (50%) in the first generation, 15 cases in the second generation (35.7%), and 6 cases in the third generation (14.3%). The case origins were as follows: 25 cases (59.5%) in the local prefecture-level city, 6 cases (14.3%) in Jiashan County, 4 cases (9.5%) in Tongxiang, 4 cases (9.5%) in Pinghu, 2 cases (4.8%) in Haining, and 1 case (2.4%) in Haiyan County. The onset modes were as follows: 29 clustering cases (69%) and 13 non-clustering cases (31%), 28 cases without underlying diseases (66.7%), 6 cases with combined hypertension (14.3%), 3 cases with simple combined type 2 diabetes (7.1%), 2 cases with both hypertension and type 2 diabetes (4.8%), 2 cases with combined chronic hepatic disease (4.8%), and 1 case with combined malignant tumor (2.4%). The remaining characteristics are shown in *Table 1*.

The main clinical characteristics

Fever was the most common symptom in the 42 patients, occurring in 28 patients (66.7%), followed by 18 patients with cough (42.9%), including 7 with fever and cough (16.7%) and 1 with chest tightness and cough (2.4%). Additionally, there was 1 patient with pharyngeal discomfort (2.4%). Among all the patients, there were 33 cases with fever (78.6%), 27 cases with cough (64.3%), 5 cases with chest tightness (11.9%), 3 cases with hemoptysis (7.1%), and 1 case with chest pain (2.4%). Other symptoms included fatigue, involving 9 cases (21.4%), pharynx discomfort, involving 5 cases (11.9%), anorexia, involving 4 cases (9.5%), systemic soreness, involving 3 cases (7.1%), headache, involving 2 cases (4.8%), dizziness, involving 1 case (2.4%), diarrhea, involving 1 case (2.4%), nasal congestion, involving 1 case (2.4%), and eye discomfort, involving 1 case (2.4%). Two cases (4.8%) did not have any symptoms. When patients were admitted without oxygen absorption, the oxygen saturation was 95–100%, with an average of 97.62%±1.34%.

The main laboratory indicators

Among the 42 patients, 6 cases (14.3%) had decreased routine blood leukocytes, 35 cases (83.3%) had normal levels, and 1 case (2.4%) had an increased level. Four cases (9.5%) had decreased neutrophil counts, 34 cases (81%) had normal counts, and 4 cases (9.5%) had increased counts. A total of 24 cases (57.1%) had decreased lymphocyte counts,

Table 1 Demographic and epidemiological characteristics of 42 patients with COVID-19

Characteristics	Cases, n (%)
Age (years)	
Average age, mean ± standard	48.43±13.63
0–20	1 (2.4)
20–40	12 (28.6)
40–60	20 (47.6)
>60	9 (21.4)
Gender	
Male	24 (57.1)
Female	18 (42.9)
BMI (kg/m^2), mean ± standard	24.31±3.19
Smoking history	1 (2.4)
Generation division	
First-generation of cases	21 (50.0)
Second-generation cases	15 (35.7)
Third-generation cases	6 (14.3)
Case source	
Prefecture-city level	25 (59.5)
Jiashan county	6 (14.3)
Tongxiang	4 (9.5)
Pinghu	4 (9.5)
Haining	2 (4.8)
Haiyan county	1 (2.4)
Onset	
Clustering onset	29 (69.0)
Non-clustering onset	13 (31.0)
Underlying disease	
No	28 (66.7)
Hypertension	6 (14.3)
Type 2 diabetes	3 (7.1)
Hypertension + type 2 diabetes	2 (4.8)
Chronic hepatic disease	2 (4.8)
Malignant tumor	1 (2.4)

BMI, body mass index.

while 18 cases (42.9%) had normal counts. A total of 39 cases (92.9%) had normal monocyte counts, and 3 cases (7.1%) had increased counts. A total of 25 cases (59.5%) had decreased eosinophil counts, while 17 cases (40.5%) had normal counts. Ten cases (23.8%) had normal basophil count and 32 cases (76.2%) had increased counts. Ten cases (23.8%) had decreased hemoglobin and 32 cases (76.2%) had normal hemoglobin. One case (2.4%) had a decreased level of the biochemical indicator alanine aminotransferase, 35 cases had normal (83.3%) levels, and 6 cases (14.3%) had increased levels. A total of 37 cases (88.1%) had normal aspartate aminotransferase levels and 5 cases (11.9%) had increased levels. Five cases (11.9%) had decreased albumin levels and 37 (88.1%) had normal levels. Eleven cases (26.2%) had decreased creatinine levels, 29 cases (69%) had normal levels, and 2 cases (4.8%) had increased levels. Nine cases (21.4%) had decreased urea nitrogen levels, 31 cases (76.2%) had normal levels, and 1 case (2.4%) had an increased level. A total of 21 cases (50%) had normal C-reactive protein (CRP) levels and 21 cases (50%) had increased levels.

Imaging features

Among the 42 patients, 3 cases (7.1%) had no imaging changes, while the remaining 39 cases (92.9%) had imaging changes, including 36 cases (92.3%) of multiple lesions in 2 lungs (*Figure 1*) and 3 cases (7.7%) with a single lesion (*Figure 2*). There were 36 cases (92.3%) with subpleural involvement (*Figure 3*), 3 cases (7.7%) without subpleural involvement, 12 cases (30.8%) with 5 lung lobes involved, 5 cases (12.8%) with 4 lung lobes involved, 8 cases (20.5%) with 3 lung lobes involved, 11 cases (28.2%) with 2 lung lobes involved, 3 cases (7.7%) with 1 lung lobe involved, 33 cases (84.6%) without pleural effusion, 3 cases (7.7%) with bilateral pleural effusion, 2 cases (5.1%) with right pleural effusion, and 1 case (2.6%) with left pleural effusion. During hospitalization, 17 patients (40.5%) had imaging progression, and the imaging progression time ranged from 2 to 11 days, with a median of 3.8 days and an average of 4.59±2.48 days. Six of the 42 patients had no follow-up imaging data due to transfer to a higher-level hospital, 3 patients had no imaging changes, and the remaining 32 patients showed improvement in imaging time within 2 to 26 days, with a median of 7.5 days and an average of 8.72±5.33 days.

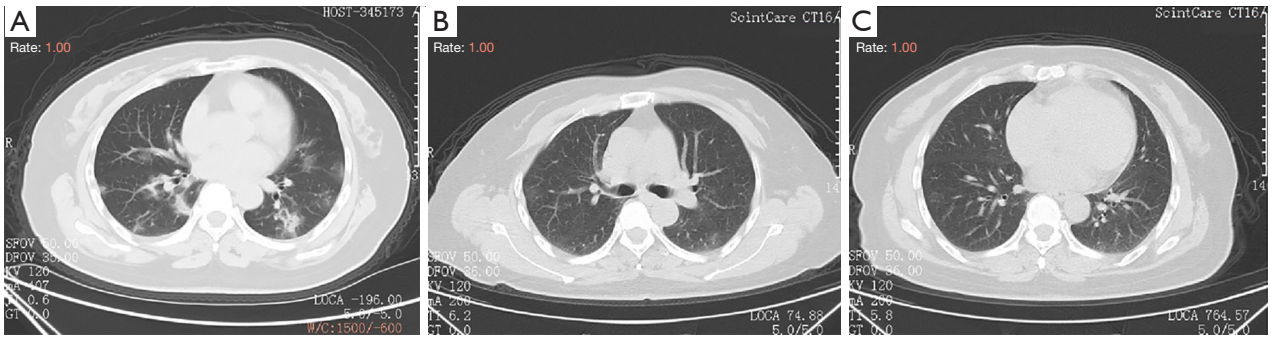

Figure 1 A 56-year-old female patient with COVID-19 pneumonia. (A) Axial CT image shows multiple small patchy ground-glass opacity in both lungs with thickening and blurring of small blood vessels and air bundles on the first day of admission; (B) the first follow-up CT image (29 days after the initial CT) shows a decrease in the number and density of multiple ground-glass opacity in both lungs; (C) the second follow-up CT image (44 days after the initial CT) is the pre-discharge CT image, which shows that the ground glass lesions of both lungs have been basically absorbed. CT, computed tomography.

Figure 2 A 70-year-old female patient with COVID-19 pneumonia. (A) Axial CT image shows a small patchy ground-glass opacity in the right lower lobe of the lung with thickening and blurring of small vessels on the first day of admission; (B) the first follow-up CT image (12 days after the initial CT) shows decreased density of ground-glass opacity in the lower lobe of the right lung; (C) the second follow-up CT image (21 days after the initial CT) is the pre-discharge CT image, which shows that the ground glass lesions in the lower lobe of the right lung are less dense than those in the first CT, but still not fully absorbed. CT, computed tomography.

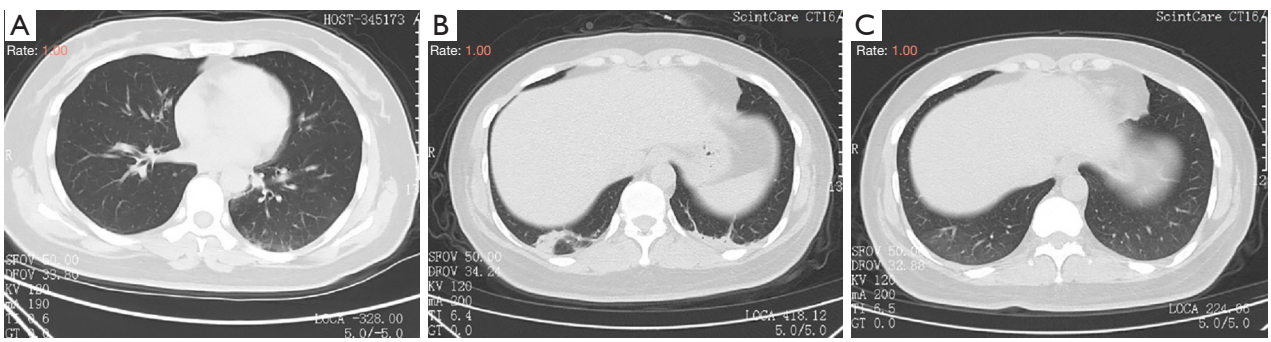

Figure 3 A 39-year-old female patient with COVID-19 pneumonia. (A) Axial CT image shows thickened pleura with blurred margins in the dorsal lower lobe of both lungs on the first day of admission; (B) the first follow-up image (7 days after the initial CT) shows thickened pleura in the dorsal lower lobe of both lungs, with patchy high-density shadows in the lower pleura, and blurred edges; (C) a second follow-up CT image (23 days after the initial CT) shows complete absorption of both dorsal pleural and subpleural lesions. CT, computed tomography.

Treatment status and prognosis

The main antiviral drugs used in the 42 patients were oseltamivir, lopinavir/ritonavir, arbidol, darunavir/cobicistat, recombinant human IFN-α spray, ribavirin, and ASC09/ ritonavir tablets. The combination of 4 drugs was used in 5 patients (11.9%), the combination of 3 drugs was used in 32 patients (76.2%), and the combination of 2 drugs was used in 5 patients (11.9%). The most frequently used drug was arbidol, which was taken by all 42 cases (100%), followed by recombinant human interferon α2b spray in 40 cases (95.2%), lopinavir/ritonavir in 22 cases (52.4%), darunavir/ cobicistat in 15 cases (35.7%), oseltamivir in 6 cases (14.3%), ribavirin in 2 cases (4.8%), and ASC09/ ritonavir tablets in 2 cases (4.8%). Additionally, the combination of moxifloxacin was taken by 22 cases (52.4%), the combination use of methylprednisoloe therapy was taken by 20 cases (47.6%), and the combination use of human immunoglobulin injection was taken by 5 cases (11.9%). All patients were treated with Chinese medicine.

Diarrhea occurred in 8 cases (19%), nausea and vomiting occurred in 5 cases (11.9%), and rash occurred in 4 cases (9.5%) during treatment. The condition of 10 cases (23.8%) progressed to severe disease, including 6 cases (14.3%) who were transferred to higher-level hospitals for treatment after progression to a severe level, and the time to progress to a severe level ranged from 3 to 11 days, with a median of 9 days and an average of 8.20±2.94 days. Among the 10 cases of severe patients, 6 (60%) underwent non-invasive ventilator-assisted treatment. After treatment, 38 patients (90.5%) improved and were discharged (including 4 of the 6 patients transferred to higher-level hospitals). The hospitalization days of the 36 patients who were treated in our hospital ranged from 7 to 33 days, with a median of 19 days and an average of 19.00±7.33 days. The time that the SARS-CoV-2 virus nucleic acid test returned a negative result in the 34 patients who had been discharged from the hospital ranged from 1 to 32 days, with a median of 15.5 days and an average of 14.41±8.61 days.

Discussion

As of March 4th, 2020, a total of 1,215 cases were confirmed, 1,141 cases were cured, and 1 case died in Zhejiang Province, while there have been no new cases for 14 consecutive days except for 2 cases with positive nucleic acid test results that are still in treatment. This shows that the spread of this epidemic has been effectively controlled in Jiaxing, and the local COVID-19 epidemic can hopefully be eradicated by the end of March if the current prevention method is maintained.

In this study, we analyzed and summarized the clinical data of 42 confirmed cases of COVID-19 who were treated at designated hospitals in Jiaxing. Based on the demographic characteristics and the morbidity in each age group, most of the local patients were young and middle-aged. Most were healthy without a smoking history and had normal-range body mass index (BMI) values, indicating that the combination of underlying diseases does not necessarily indicate susceptibility to COVID-19. In addition, there were more male patients than female patients locally, which is consistent with multiple literature reports (18-20). In light of the epidemiological characteristics, most cases in Jiaxing were in the first generation-having returned from Wuhan-and most of the onset of the disease was also caused by clustering relevant to the first-generation cases. This is basically in accordance with the epidemic characteristics of Hubei, and it also suggests that the first-generation cases are highly contagious. Therefore, the current epidemic prevention and control measures, such as the Wuhan lockdown and quarantine of returnees from Hubei for 14 days, are very necessary (21). The local practice has also proven that strict quarantine measures for personnel from Hubei to Jiaxing have played a key role in blocking further local spread from the first generation.

Additionally, there were no characteristic clinical symptoms in these patients. Most of the symptoms were observed in the respiratory tract and digestive tract, and the most common symptoms were fever and cough. Common symptoms of influenza virus infections such as dizziness, headache, and systemic soreness were rarely observed. Therefore, during the epidemic, nucleic acid screening for patients with fever, especially with respiratory or digestive symptoms, was an important measure for the early diagnosis of COVID-19 (22). In addition, the condition of locally admitted patients was relatively mild, and the oxygen saturation was basically in normal ranges when no oxygen was taken. In terms of blood indexes, white blood cell, neutrophil, monocyte, and hemoglobin levels were mostly normal. Lymphocyte count and eosinophil count mostly decreased, while basophil counts mostly increased. There was no obvious specificity in blood biochemical indicators, most indicators were normal, and half of the patients had increased CRP levels.

In the imaging analysis of the 42 COVID-19 patients, it was found that the majority of patients had imaging

changes, and the most common one was multiple exudative changes in both lungs. The lesions involve two or more lobes, and most of them have subpleural involvement. The imaging results were consistent with those of Fu *et al.* (23). Furthermore, a total of 17 patients experienced imaging progression during hospitalization, with a median progression of 3.8 days, suggesting that COVID-19 can result in imaging progression in a short time with a certain probability, and the imaging appeared more severe. Li *et al.* (24) found that a higher severity score of CT images within the first week was a potential predictor of death in adult COVID-19 cases. Therefore, patients with less obvious clinical symptoms such as fever and cough after treatment, especially those with chest tightness and breath shortness with unstable oxygen saturation during the treatment process, should be checked with chest CT to determine whether the condition has progressed to a severe level or indicates this trend. Treatment strategies should then be adjusted rapidly, which is key to reducing mortality (25). In addition, the image absorption time of patients with COVID-19 was relatively long, with a median improvement of 7.5 days, which lagged behind the improvement of clinical symptoms. Therefore, clinical symptoms, laboratory indicators, viral nucleic acid test results, and images needed to be combined comprehensively to determine prognosis (26).

The clinical treatment plan for COVID-19 in Jiaxing mainly relied on the execution of the Plan issued by the National Health Commission, and the most commonly used drugs were arbidol combined with lopinavir/ritonavir and arbidol combined with darunavir/cobicistat (27). Based on the global spread of COVID-19, the virus is rapidly mutating, and the Plan is constantly being updated and improved. According to the seventh edition of the Plan, tocilizumab was used for immunotherapy in patients with extensive lesions in both lungs, in patients with severe COVID-19 disease and in patients with elevated interleukin 6 (IL-6) levels monitored by laboratory (28). In addition, the use of arbidol tablets has been eliminated in the latest ninth version of the Protocol because it in combination with β-receptor antagonistscan cause adverse reactions such as slow heart rate, nausea and diarrhea (27). At the same time, the ninth version of the plan added anticoagulant therapy for moderate, severe and critical patients with severe risk factors and rapid disease progression (29). In this study, more than half of the patients had used respiratory quinolone antibiotics in combination, as the understanding of COVID-19 was not comprehensive, and whether it is caused by a combined bacterial infection or not cannot be ruled out. After the analysis of medications, it was found that the combination of antibiotics was mainly for early-stage COVID-19 patients and patients with relatively severe conditions. In addition, we also found that adverse reactions such as diarrhea, nausea and vomiting, rashes, seemed to appear more frequently, and the prognosis was not improved when moxifloxacin was used in combination. Therefore, we believe that antiviral and symptomatic treatment should be the main treatment for COVID-19, and antibiotic use indication should be strictly controlled. For patients with a clear diagnosis of COVID-19 and whose white blood cells, neutrophils, and CRP levels are not high, blind or inappropriate use of antibiotics should be avoided. For viral nucleic acid detection positive, CRP and other inflammatory indicators have increased, the imaging does not rule out bacterial infection, should improve the bacteriological examination, and strengthen the bacteriological monitoring (30,31). Consider prudent use of sensitive antibiotics when there is clear evidence of secondary bacterial infection (32). Nearly half of the 42 patients had used hormone therapy due to constant high fever, rapid imaging progression, and respiratory failure symptoms. Although the use of hormones could relieve clinical symptoms such as fever, dyspnea, to a certain extent, regarding treatment outcomes, it had no significant effect on the improvement of imaging features and long-term prognosis. Therefore, the timing, dose, and course of hormone use are worthy of further research.

In terms of disease recovery, the proportion of exacerbation was 23.8%, slightly lower than the current proportion of patients with severe conditions in China. Of the 10 severe patients, 60% had become critically ill. Therefore, it was important to determine critical warning indicators for exacerbation from test indicators or imaging signs and prevent the disease from developing into exacerbation in time to reduce mortality (33). As for the treatment outcome, the cure rate of patients in this group was 90.5%, and the median length of hospitalization stay was 19 days (34). The long duration of disease is consistent with the slow disappearance of pneumonia images. In addition, our hospital has implemented a more stringent method for testing viral nucleic acids, and test kits with a minimum test limit of 200 copies/mL (most test kits on the market have a minimum test limit of 1,000 copies/mL) have been used, resulting in a higher positive rate of nucleic acid tests, which has also objectively prolonged the hospitalization stay of patients (35,36). Using a test kit with a minimum detection limit of 200 copies/mL can ensure that the viral load is at a low level when the patient

is discharged (37) to the greatest extent, which is very necessary before the pathogenesis of SARS-CoV-2 is fully understood.

Conclusions

The 42 COVID-19 cases in Jiaxing City showed the epidemiological characteristics of clustered onset, and the treatment strategies were determined according to the national real-time diagnosis and treatment plan, combined with the clinical symptoms and disease severity of the patients. The COVID-19 epidemic in Jiaxing is close to its end, and the nationwide epidemic has been effectively controlled. However, globally, the epidemic outside China has shown a clear growth trend, and the WHO has even warned that COVID-19 may progress to a global pandemic (38). At this time, summing up and promoting China's successful experience in epidemic prevention and control may help other countries better combat the COVID-19 epidemic. As for the local treatment of COVID-19 cases, in addition to the existing experience summarized by researchers (20), the following empirical conclusions are worthy of clinical reference based on the recent Plan and clinical experience: (I) clinically, COVID-19 patients should be diagnosed, treated and isolated as early as possible in clinical practice; (II) in the differential diagnosis, apart from asking for the epidemiological history and carrying out viral nucleic acid tests, it is necessary to pay attention to parameters such as lymphocyte count, eosinophil count, basophil count, and CRP levels, and a comprehensive result should be determined based on clinical symptoms and imaging characteristics; (III) when considering treatment options, antibiotics should be used with caution to minimize drug-related adverse reactions; (IV) hormones can improve clinical symptoms, but do not affect treatment outcomes, and attention should be paid to side effects; (V) the imaging progression of certain patients can be faster, such as clinical symptoms not alleviating or worsening, and chest CT should be reviewed in time, dynamic observation of disease progress should be performed; (VI) identification of patients with a tendency towards early exacerbation is key to improving the cure rate as it prevents progression from general to severe (critical) disease; (VII) the disease stays relatively longer, and highly sensitive viral nucleic acid test kits can be used to effectively reduce the re-appearance rate of positive results on nucleic acid test reviews of discharged patients; (VIII) COVID-19 patients usually have tension and anxiety. Dynamic monitoring of patients' psychological status, timely intervention, and drug treatment should be conducted if necessary.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-22-1084/rc

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of the Affiliated Hospital of Jiaxing University (No. LS2020-010). Individual consent for this retrospective analysis was waived.

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