

Clinical features of 17 patients with 2019-nCoV

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Abstract. – OBJECTIVE: This study aims to discuss the unique clinical features of patients with 2019-nCoV in Zhengzhou City to provide references for clinical diagnosis and treatment.

PATIENTS AND METHODS: Seventeen patients with 2019-nCoV in Zhengzhou People's Hospital from February to March 2020 were collected. Their epidemiology, clinical symptoms, laboratory examinations, and chest CT images were reviewed. All 17 patients were aged between 12-83 years, with an average age of 47 years, and consisted of 10 males (58.8%) and 7 females (41.2%). Two patients had histories of living or traveling in Wuhan, and 9 patients were attacked locally. The 6 remaining patients were unknown about incidence reasons.

RESULTS: The average incubation period was 10 days, and the average time of the course of the disease was 9 days. Among the participants, 12 patients had fever as the first symptoms and 5 patients had normal body temperature. One patient was symptom-free carrier, and one patient had serious symptoms. One patient developed from mild symptoms to severe symptoms, and 14 patients had mild symptoms. Moreover, 7 patients had complications of cardiovascular and cerebrovascular diseases and hypertension, 1 patient was in the advanced stage of squamous cell lung carcinoma, and 1 patient had diabetes mellitus, renal failure, and late-stage uremia. According to novel coronavirus nucleic acid test, 8 patients were positive, accounting for 47.1%. All patients were negative in the novel coronavirus IgM antibody test and negative in other common respiratory pathogen detection. All 17 patients had ground glass-like high-density shadow or stripped high-density shadow on lung CT images, accompanied with many affected lesions on two lungs. The average stay in hospital was 10 days, and the average time of the course of the disease was 9 days. After hospitalization, 15 patients were discharged from the hospital upon recovery, 1 patient was transferred to superior hospital for continuous treatment, and 1 patient died. Patients with 2019-nCoV in Zhengzhou People's Hospital were mainly attacked in local areas, and most of them had mild symptoms. The positive rate of the nucleic acid test was 47.1%.

CONCLUSIONS: The main clinical characteristics are increased neutrophil granulocytes, increased C-reactive proteins, decreased lymphocytes, ground glass-like or stripped lesions on lung CT image, common complications of cardiovascular and cerebrovascular diseases, and favorable prognosis.

Key Words:
2019-nCoV, Complications.

Introduction

On December 2019, the novel coronavirus epidemic broke out in Wuhan City, Hubei Province. This acute respiratory infectious disease is caused by the newly discovered 2019-nCoV. The epidemic spread quickly to several provinces and cities in China and swept quickly in Italy, Iran, Korea, and other foreign countries; it becomes a great public health issue worldwide¹. Given that 2019-nCoV can spread through spray, contact, and aerosol, it can easily attack the public. Patients with 2019-nCoV have symptoms, including cough, fever, weakness, and chest distress. Most patients had favorable prognosis, and some patients had mild symptoms without evident fever. Seriously ill patients had respiratory distress syndrome and septicopyemia and finally died due to multiple organ failure. At present, 2019-nCoV has been enlisted into Class-B infectious disease regulated by *Law of the People's Republic of China on the Prevention and Treatment of Infectious Diseases* and is managed as Class-A infectious disease. Due to the high morbidity and mortality of 2019-nCoV, Chinese and foreign scholars have studied it deeply. Nevertheless, few studies have focused on the clinical features of 2019-nCoV. Henan Province is next to Hubei Province, and Zhengzhou is a national traffic hub with frequent population flow and is influenced significantly by the epidemic. By 24:00 of March 22, 2020, the cumulative confirmed patients in Henan Province

reached 1,273 and the cumulative deaths were 22. The cumulative confirmed patients in Zhengzhou were 157, and the cumulative deaths were 5².

In this study, the clinical and laboratory data of 17 confirmed patients with 2019-nCoV in our hospital were analyzed to provide references to deepen clinical understanding, diagnosis, and treatment of the epidemic.

Patients and Methods

Respondents

This study enrolled 17 patients (1 dead and 1 transferred to superior fixed-point hospital) diagnosed with 2019-nCoV and treated in Zhengzhou People's Hospital from February to March 2020. All patients signed an informed consent approved by the Institutional Ethics Committee before participation in this study. This study began to collect confirmed patients since February 2020, and the clinical data of 17 patients were reviewed.

Data Acquisition

Clinical data of patients were collected through the electronic case system of the hospital and included gender, age, contacting history with the epidemic, clinical symptoms, and laboratory and image examination results. Blood routine examination was performed, including peripheral white blood cell count, neutrophil count, lymphocyte count, blood platelet, D-dimer, C-reactive protein, IL-6, and γ interferon. Etiological examination covered novel coronavirus, influenza A virus, influenza B virus, respiratory syncytial virus, mycoplasma pneumonia, and chlamydia pneumonia. Imaging examination high-resolution lung CT.

Discharge Standard

The patients were discharged if they satisfied the following criteria: (1) normal body temperature for three successive days; (2) great improvement of respiratory symptoms; (3) evident improvement of acute exudative lesion on the lung CT image; and (4) negative two successive nucleic acid tests of respiratory pathogen (sampling interval is at least 1 day).

Treatments

According to the latest diagnosis and treatment scheme issued by the National Health Commission, individual treatment was offered according

to clinical classification and underlying diseases of patients. Antiviral treatment was adopted, including the following: α -interferon (5 million U or equivalent dose for adults, added with 2 mL of sterile water for injection; administered through aerosol inhalation twice per day), lopinavir/ritonavir (200 mg/50 mg/pc, 2 pcs per time, twice a day for adults, the course of treatment was controlled within 10 days), ribavirin (combined with interferon or lopinavir/ritonavir, 500 mg/time, 2-3 intravenous infusions per day for adults, the course of treatment was no longer than 10 days), chloroquine phosphate (for patients aged 18-65 years; for patients over 50 kg, 500 mg per time, twice a day, 7 days; for patients lower than 50 kg, 500 mg per time in the first and second day, twice a day, and 500 mg per day from the third to seventh day, once per day), and arbidol (200 mg, three times a day for adults, the course of treatment was no longer than 10 days). Treatment with relevant drugs was terminated when the patient manifests intolerant toxic and side effects. Antibacterial drugs, antiviral agents, and traditional Chinese medicine were suggested.

Results

General Information

All 17 patients were aged between 12-83 years, with an average age of 47 years and consisted of 10 males and 7 females. The course of the disease was 1-14 days, with an average of 9 days. The incubation period ranged from 3 to 14 days, with an average of 10 days. The time of incidence up to hospitalization took 3-7 days, with an average of 4 days. The period from the incidence to diagnosis ranged from 2 to 10 days, with an average of 7 days. The length of stay was 8-14 days, with an average of 10 days.

Epidemiology

Two patients had histories of living or traveling in Wuhan, and 9 patients were attacked locally and had come in contact with confirmed patients. The 6 remaining patients were unknown about incidence reasons.

Clinical Symptoms and Classification

Fever, cough, and weakness were the main symptoms of the patients. Some patients had chest distress, chest pain, anhelation, and breathing difficulties. Among the 17 cases, 12 had fever as the first symptom and 5 cases had normal body temperature. Seven patients had complications of

cardiovascular and cerebrovascular diseases and hypertension, 1 patient had advanced-stage squamous cell lung carcinoma, 1 patient had nasopharynx cancer and tongue cancer, and 1 patient had diabetes, renal failure, and late-stage uremia. Clinical classification adopted the standards of “pneumonia diagnosis and treatment schemes for novel coronavirus (7th version for trial)” issued by the National Health Commission³. Among the patients, 14 had mild disease (82.4%), 1 had severe disease (5.88%), 1 developed from mild to severe, and 1 was symptom-free carrier. No complications were observed in the symptom-free carrier and the patient developed from mild to severe. However, severely ill patients had complications of hypertension, diabetes, renal failure, and late-stage uremia.

Laboratory Test

According to novel coronavirus nucleic acid test, eight patients were reported positive, accounting for 47.1%. All patients were negative in the novel coronavirus IgM antibody test and negative in other common respiratory pathogen detection. Seven patients had increased peripheral white blood cell count (41.2%), while 3 patients had decreased peripheral white blood cell count (17.6%). Seven patients had increased neutrophil granulocyte count (41.2%), and 2 patients had decreased neutrophil granulocyte count (11.8%). Ten patients reported a decrease in lymphocytes (58.8%), and 8 patients had reduced blood platelets (47.1%). All 17 patients reported an increase in D-dimer (100.0%). Eight patients had an increase in C-reactive proteins (47.1%), and 7 patients had an increase in the γ interferon level (41.2%). The details are shown in Table I.

CT Images

All 17 patients had chest CT images at admission. All of the patients presented different de-

grees of ground glass-like high-density shadows or stripped high-density shadows, accompanied with many affected lesions at two lungs. Some patients showed flake shadows, and some had nodular lesions without pleural effusion.

Treatment and Prognosis

Chest CT examination was performed to all 17 patients at admission to determine different degrees of ground glass-like high-density shadows or stripped high-density shadows accompanied with many affected lesions at two lungs. Some patients showed flake shadows, and some had nodular lesions without pleural effusion.

Treatment and Prognosis

All 14 mild patients and 1 symptom-free carrier were discharged from the hospital upon recovery. They were negative in two successive nucleic acid tests conducted by collecting throat swab samples and had normal chest CT images without lung lesions. All indices in blood routine examination recovered to the normal levels (Table II). One patient developed from mild to severe and was transferred to the ICU of a superior fixed-point hospital for further treatment. One patient had complications of hypertension, diabetes mellitus, renal failure, and late-stage uremia and finally died.

Discussion

The 2019-nCoV epidemic has achieved a staged victory under the collaborative efforts of the whole country. By 24:00 of March 21, 2020, the number of confirmed patients (including 1,845 severe patients) was 5,549. A total of 72,244 cumulative patients were discharged from hospital upon recovery, and 3,261 cumulative deaths, 81,054 cumulative confirmed patients, and 118 suspected patients were recorded⁴. At present,

Table I. Blood routine examination results of all patients at admission.

Blood routine examination	Number of cases (n)	Proportion (%)
Increased peripheral white blood cell count	7	41.2
Decreased peripheral white blood cell count	3	17.6
Increased neutrophil granulocyte count	7	41.2
Decreased neutrophil granulocyte count	2	11.8
Decreased lymphocytes count	10	58.8
Decreased blood platelets	8	47.1
Increased D-dimer	17	100.0
Increased C-reactive proteins	8	47.1
Increased IL-6 and γ -interferon	7	41.2

Table II. Blood routine examination level of 15 discharged patients at 1 d of admission and discharge.

Blood routine examination	1d at admission	Discharge
White blood cell count ($\times 10^9/L$)	38.33 \pm 11.34	7.98 \pm 0.33
Neutrophil granulocyte count (%)	80.63 \pm 5.21	60.47 \pm 2.32
Lymphocytes count (%)	5.30 \pm 0.87	33.41 \pm 5.91
Blood platelets ($\times 10^9/L$)	51.60 \pm 11.32	295.47 \pm 50.89
D-dimer (mg/L)	7.47 \pm 1.21	0.176 \pm 0.02
C-reactive protein ($\mu g/L$)	9686.29 \pm 113.27	2807.47 \pm 94.16
IL-6 (ng/L)	10.91 \pm 1.33	0.404 \pm 0.09
γ -interferon (ng/L)	21.12 \pm 10.17	3.60 \pm 1.31

the number of confirmed patients in China does not increase. Summarizing data and experiences from the clinical fight against the epidemic in different regions in China timely is important. A clinical study on 99 patients with 2019-nCoV in Wuhan City reported that the number of male patients diagnosed was higher than female patients (67/32) and that men were more vulnerable than women⁵. In this study, the participants consisted of 10 males (58.8%) and 7 females (41.2%), indicating some but not significant differences in gender. The sample size should be expanded for statistical analysis of gender differences. Moreover, all 17 patients were aged between 12-83 years, with an average of 47 years. Ten patients were aged below 60 years, and 7 patients were aged older than 60 years. In general, scholars' studies believe that elderly with basic diseases or groups with complications are more vulnerable to the epidemic and are easy to be developed into severe patients or died⁶. However, two severe patients in the present study were younger than 50 years; one was aged 47 years, and the other one who developed mild to severe symptoms was only 32 years. Other old patients or patients with common complications had mild symptoms and recovered. This finding proves that all age groups can be easily attacked by the 2019-nCoV epidemic and that severe symptoms or death might occur in young patients. These deserve great attention. According to epidemiological investigation, 2 patients had history of living or traveling in Wuhan and 9 patients were attacked locally. This phenomenon reflects that contacting with confirmed patients or potential carriers is the main method of the spread of the epidemic. Therefore, quarantine and disinfection are the key means to control epidemic spreading.

Viral nucleic acid test in laboratory is the main method used to diagnose 2019-nCoV³. Among 17 patients, only 8 were positive in the nucleic acid

test and the 9 remaining patients were negative. Some false negative results may have occurred due to sample quality or sampling time. Hence, diagnosis based on epidemiological survey and lung CT examination is an important auxiliary method for diagnosis. It can recognize suspected patients in time and assists in fast quarantine, diagnosis, and treatment in clinics. Only 1 of 17 patients had close contact with confirmed patients, but no evident clinical symptoms were observed throughout the course of the disease. These patients are known as symptom-free infected persons⁷, which bring a great challenge to the epidemic control. As a result, strengthening epidemiological survey and tracking of contactors is important.

In laboratory examination, 7 patients had increased peripheral white blood cell count (41.2%), while 3 patients had decreased peripheral white blood cell count (17.6%). Seven patients had increased neutrophil granulocyte count (41.2%), and 2 patients had decreased neutrophil granulocyte count (11.8%). Ten patients reported a decrease in lymphocyte count (58.8%). Eight patients had reduced blood platelets (47.1%). All 17 patients reported an increase in D-dimer (100.0%). Eight patients had an increase in C-reactive protein (47.1%), and 7 patients had an increase in the γ interferon level (41.2%). Existing research on clinical treatment of 2019-nCoV found lymphopenia. The virus might damage immune lymphocytes after entering into the human body through receptors on the cell surface, resulting in malfunction of the immune system⁸. Moreover, 8 patients had reduced blood platelets (47.1%). All 17 patients reported an increase in D-dimer (100.0%). Eight patients had an increase in C-reactive proteins (47.1%), and 7 patients had an increase in the γ interferon level (41.2%). IL-6 and C-reactive protein are important inflammatory markers that

can be used as early auxiliary indicator for the diagnosis of acute infection and reflect the inflammatory responses of the human body caused by the 2019-nCoV⁹. IL-6 occupies the central position during acute inflammatory reaction and is directly related to inflammatory diseases and infection degree. The *Consensus of Interpretation Experts of Clinical Significance of Infection-related Biomarkers (2017)*¹⁰ pointed out that IL-6 can be used to assist early diagnosis of acute infection, and it is applicable to evaluate severe degree of infection and judge prognosis. According to dynamic observation, IL-6 level is conducive to understand the progress of infectious diseases and the responses to treatment. γ -IFN, or called as immune interferon, is generated when mitogen stimulates T-lymphocytes and has many functions, including anti-virus, cell proliferation suppression, immunity adjustment, and anti-tumor.

Severely ill patients as well as their treatments are the primary concern of clinics¹¹. In this study, most of the patients were mild and ordinary types, and they recovered upon receiving anti-virus and nutrient supports after hospitalization. However, one severe patient died after treatment sparing no effort possibly due to complications. This patient is a 47-year-old woman with complications of hypertension, diabetes, renal failure, and late-stage uremia, which caused insufficient resistance of the body. According to the laboratory examination results, the counts of leukocytes and lymphocytes decreased, while the levels of IL-6 and C-reactive proteins increased significantly; these findings also reflected poor immunity and strong immune reactions¹²⁻¹⁷. Excessive immune responses might intensify existing diseases and weaken the resistance of the patient, finally leading to her death. One patient who developed from mild to severe symptoms was a 32-year-old man without complications. He presented increased white blood cell count and decreased lymphocytes and a sharp increase in the C-reactive protein level in the laboratory examination. The disease outcome was unknown, which was speculated to be related to excessive immune stress. He has been transferred to the superior fixed-pointed hospital for further treatment. The remaining patients had no complications of cardiovascular and cerebrovascular diseases and hypertension and showed good prognosis, indicating that common diseases could not influence the clinical outcome of 2019-nCoV¹⁷⁻²⁰.

Conclusions

Patients with 2019-nCoV in Zhengzhou People's Hospital were mainly attacked in local areas, and most of them had mild symptoms. The positive rate of the nucleic acid test was 47.1%. The main clinical characteristics are increased neutrophil granulocyte, increased C-reactive protein, decreased lymphocyte, ground glass-like or striped lesions on lung CT image, common complication of cardiovascular and cerebrovascular diseases, and favorable prognosis.

Strict epidemiological investigation should be performed on suspected patients who might come in contact with confirmed patients or had traveled to Wuhan to avoid missing symptom-free infected persons. In addition to the nucleic acid test, epidemiological investigation and CT images shall be combined in diagnosis to prevent missing of false-negative patients in the test. Attention shall be paid to all age groups of patients rather than to the old only, especially to patients with serious complications. Laboratory immune examination results and clinical performance should be closely observed and preventing the worsening of the disease and making positive responses should be prioritized.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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