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Clinical characteristics of patients diagnosed with COVID-19 in Beijing

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ABSTRACT

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This study aimed to determine the clinical characteristics of patients diagnosed with the coronavirus disease 2019 (COVID-19). Clinical data of COVID-19 patients diagnosed between January 28, 2020 and February 23, 2020 at the Beijing You'an Hospital were summarized and analyzed. Overall, 45 (18 men and 27 women) patients were included in this study. The average age of patients was 58 years (range, 7–94 years). Furthermore, 21 patients (47%) experienced underlying chronic diseases, with another four patients (9%) having three or more chronic diseases simultaneously. The first symptoms appeared at the onset of illness onset include fever in 36 patients (80%), cough in 23 patients (51%), and expectoration in 15 patients (33%), respectively. Patients may experience hepatic and renal injury as well as abnormal myocardial enzymes in varying degrees. Senior patients (≥58) and accompanying chronic diseases were considered as independent predictors for developing a severe and critically ill population with increased mortality. Laboratory results regarding the NEU percentage, NLR, ALC, and C-reactive protein levels were considered significant in predicting clinically critical disease or for prognosis assessment and thus require further studies. COVID-19 may affect multiple organs of the human body. Glucocorticoid is considered effective in the treatment of patients diagnosed with severe COVID-19.

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1. Introduction

Coronavirus disease 2019 (COVID-19) is a global public health problem. Defined by the World Health Organization, COVID-19 is caused by a novel coronavirus named as 2019-novel coronavirus (2019-nCoV) [1]. However, the International Committee on Taxonomy of Viruses named the novel coronavirus as “severe acute respiratory syndrome coronavirus 2” (SARS-CoV-2) thereafter [2]. On February 23, 2020, a total of 77,262 confirmed cases (12,510 severe cases) of COVID-19 were reported nationwide, including 2,595 deaths [3] with a 20.7% mortality rate. During this time, because the number of COVID-19 patients in several countries continued to increase, global outbreaks were at a critical juncture. In a study published in The Lancet by Nanshan Chen et al., 99 patients with novel coronavirus pneumonia were reported. Among them, 17 patients (17%) developed acute respiratory distress syndrome (ARDS), and 11 patients (11%) died [4]. The clinical features and characteristics regarding the diagnosis and treatment of COVID-19 patients in our hospital are summarized and analysed.

2. Materials and methods

2.1. General data

The clinical data of COVID-19 patients admitted to the Beijing You’an Hospital from January 28, 2020 to February 23, 2020 were summarized, including age, sex, disease course, epidemiological history, underlying comorbidities, incubation period, clinical symptoms, laboratory tests, chest imaging, treatment, and clinical outcomes. The clinical results were followed up until February 23, 2020. A total of 45 COVID-19 patients were eligible for the study, including 1 mild case (2%), 24 moderate cases (53%), 11 severe cases (24%), and 9 critically ill cases (20%). We divided these cases into two groups, the mild to moderate group including mild and moderate patients, and the severe group including severe and critical patients.

2.2. Diagnostic criteria

COVID-19 diagnosis is established based on the diagnostic criteria of the Diagnostic and Therapeutic Program of Novel Coronavirus Pneumonia (6th Version for Trial Implementation) [5]. Details are as follows:

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2.2.1. Mild type
The clinical symptoms are mild, and pneumonia is not observed on imaging.

2.2.2. Moderate type
Clinical symptoms include fever and respiratory tract symptoms, and pneumonia is observed on imaging.

2.2.3. Severe type
According to the confirmed cases, any of the following criteria are met: respiratory distress as evidenced by respiratory rate ≥ 30 breaths/min, oxygen saturation ≤ 93% at rest, and arterial blood oxygen partial pressure/oxygen concentration ≤ 300 mmHg (1 mmHg = 0.133 kPa), with the lesions significantly progressing >50% within 24–48 h on pulmonary imaging and with the patients considered severe during management and treatment.

2.2.4. Critical type
Meeting one of the following criteria: respiratory failure requiring mechanical ventilation, presence of shock, and combined failure of other organs requiring intensive care unit (ICU) monitoring and treatment.

2.3. Statistical analysis
Statistical analysis was performed using the Statistical Package for the Social Sciences software version 22.0. Normally distributed measurement data are expressed as $\bar{x} \pm s$ and compared using t-test; non-normally distributed measurement data are expressed as median (interquartile range) and compared using rank-sum test and count data are compared using chi-squared test.

3. Results
3.1. General characteristics and epidemiological data
A total of 45 patients were included in this study and divided into two groups. The percentages of patients were 2% for the mild type, 53% for the moderate type in the mild to moderate group, 25% for the severe type, and 20% for the critical type in the severe group. The age distribution ranged from 7 to 94 years, with an average age of 58 years. The ages ranged from 58 to 94 years (mean, 74 years) in the severe group and 7 to 84 years (mean, 46 years) in the mild and moderate group. The difference in age between these two groups was statistically significant ($P < 0.001$). A total of 18 men (40%) and 27 women (60%) were included in the study. Based on the epidemiological investigation of these patients, the incubation period of COVID-19 appeared as 1–14 days, with a predominance of 3–7 days. Duration between symptom onset and presentation to the hospital were 2 h to 14 days with a median of 5 days in this study. Among these patients, 4 patients (9%) were from Wuhan, 38 patients (84%) had been in close contact with confirmed patients (19 patients from family gatherings, three patients from other hospitals, and two nursing staff from the above hospital), and 3 patients (7%) had no relevant epidemiological history.

Table 1
General characteristics, disease course, and underlying diseases of the patients.

| Age Range (years) | Total (n = 45) | Severe to critically ill type (n = 20) | Mild to moderate type (n = 25) | $P$ value |
|-------------------|----------------|---------------------------------------|-------------------------------|-----------|
| Mean (years, $\bar{x} \pm s$) | 58.8 $\pm$ 20.1 | 74.7 $\pm$ 10.7 | 46.0 $\pm$ 17.0 | $<0.001$ |
| Range (years) | 7–94 | 58–94 | 7–84 | 0.036 |
| <20 | 1 (2%) | 0 | 1 (4%) | 0.366 |
| 20–39 | 9 (20%) | 0 | 9 (36%) | 0.002 |
| 40–59 | 11 (24%) | 2 (10%) | 9 (36%) | 0.044 |
| 60–69 | 10 (22%) | 6 (30%) | 4 (16%) | 0.262 |
| 70–79 | 9 (20%) | 8 (40%) | 1 (4%) | 0.002 |
| ≥80 | 3 (6%) | 2 (10%) | 0 | 0.043 |
| 2 (4%) | 2 (10%) | 0 | 0.106 |
| Sex | Male | 18 (40%) | 10 (50%) | 8 (32%) | 0.221 |
| Female | 27 (60%) | 10 (50%) | 17 (68%) | 0.221 |
| Disease course (days) | | | | |
| <3 | 13 (29%) | 6 (30%) | 7 (28%) | 0.838 |
| 3–7 | 19 (42%) | 7 (35%) | 12 (48%) | 0.380 |
| ≥8 | 13 (29%) | 7 (35%) | 6 (24%) | 0.419 |
| Time from onset to ARDS (days) | | | | |
| Mean (days) | 7 | 7 | 7 | 0.106 |
| Epidemiological history | | | | |
| History of residence in Wuhan | 4 (9%) | 4 (20%) | 0 | 0.019 |
| Close contact with confirmed patients | 38 (84%) | 14 (70%) | 24 (96%) | 0.017 |
| No clear epidemic history | 3 (7%) | 2 (10%) | 1 (4%) | 0.423 |
| Combined chronic diseases | 21 (47%) | 15 (75%) | 6 (24%) | <0.001 |
| Health | 24 (53%) | 5 (25%) | 19 (76%) | <0.001 |
| Hypertension | 17 (38%) | 12 (60%) | 5 (20%) | 0.006 |
| Diabetes mellitus | 5 (11%) | 2 (10%) | 3 (12%) | 0.832 |
| Coronary heart disease | 4 (9%) | 4 (20%) | 0 | 0.019 |
| Previous anterior myocardial infarction | 2 (4%) | 2 (10%) | 0 | 0.106 |
| Cardiac insufficiency | 4 (9%) | 4 (20%) | 0 | 0.019 |
| Arrhythmia | 3 (7%) | 3 (15%) | 0 | 0.045 |
| Chronic obstructive pulmonary disease | 3 (7%) | 3 (15%) | 0 | 0.045 |
| Postoperative lung cancer | 1 (2%) | 1 (5%) | 0 | 0.258 |
| Postoperative basal cell carcinoma of the epicanthus | 1 (2%) | 1 (5%) | 0 | 0.258 |
| Hyperlipaemia | 3 (7%) | 2 (10%) | 1 (4%) | 0.423 |
| Chronic renal disease | 2 (4%) | 2 (10%) | 0 | 0.106 |
| Accompanied with $>3$ underlying diseases | 4 (9%) | 4 (20%) | 0 | 0.019 |

Note: $P$ values of the mean age comparing Severe to critically ill type and Mild to moderate type are from t-test, and the rest are from $\chi^2$ test.
total of 21 patients (47%) had chronic diseases, including cardiovascular and cerebrovascular disorders, endocrine disorders, respiratory disorders, digestive disorders, and malignant tumours (Table 1). Among them, 75% and 24% of the patients in the severe and mild to moderate groups were accompanied with chronic underlying diseases, respectively, and the difference between these two groups was statistically significant (P < 0.001). Moreover, 4 patients (3%) were accompanied with more than 3 underlying diseases.

### 3.2. Main symptoms and signs

The first symptom presented at illness onset was fever in 36 patients (80%). The highest and lowest body temperatures were 39.6 °C and 37.5 °C, respectively. There was cough in 23 patients (51%), and expectoration in 15 patients (33%). Eight patients (17%) experienced asthenia and eight patients (17%) had symptoms of dyspnoea. Other symptoms included muscle soreness, dry throat, pharyngeal dryness and pharyngalgia, poor appetite, shortness of breath, nausea, vomiting, nasal obstruction, and rhinorrhoea (Table 2). The body temperature of patients with mild illness usually returned to normal within 1 week. For patients with severe illness, the course of the disease was characterised by continuous or repeated fever, even high fever, aggravation of cough symptoms, or shortness of breath and dyspnoea.

### 3.3. Laboratory tests

Statistical data indicated that, at the first visit, the median absolute white blood cell (WBC) count and absolute neutrophil count (ANC) of patients were in the normal ranges in terms of routine blood tests, both in the severe group and in the mild to moderate group. No significant differences were observed in the total WBC count, platelet count, and haemoglobin level, between these two groups. Statistically significant difference was seen in ANC between the severe group (4.7 (2.5–5.8) × 10^9/L) and the mild to moderate group (2.9 (2.2–3.9) × 10^9/L) (P = 0.024). The neutrophil (NEU) percentage was significantly higher in the severe group (75.7% (69.5%–83.8%)) compared to the mild to moderate group (63.4% (58.0%–70.1%)) (P < 0.001). The absolute lymphocyte count (ALC) in the severe group (0.8 (0.5–0.9) × 10^7/L) was significantly lower than that in the mild to moderate group (1.2 (0.9–1.5) × 10^7/L) (P < 0.001). Neutrophil-to-lymphocyte ratio (NLR) was found to be significantly higher in the severe group (5.9 (3.2–10.3)) than those in the mild to moderate group (2.6 (1.9–3.5)) (P < 0.001). Nineteen (42%) patients had differing degrees of liver function abnormality (11 (58%) in the severe group and 8 (42%) in the mild to moderate group). One patient, who eventually died, had experienced serious hepatic impairment at the later stage of the disease, which was categorized as Class C according to Child’s classification (alanine aminotransferase, 4,837 U/L; aspartate transaminase, 5,416 U/L; total bilirubin, 94.6 μmol/L; and direct bilirubin, 61 μmol/L). There were abnormal myocardial enzymes reported in 13 patients (28%). Creatine kinase isoenzyme level in the severe group (1.09 (0.60–2.42) ng/mL) was significantly higher than that in the mild to moderate group (0.31 (0.10–0.41) ng/mL) (P < 0.001). Eleven patients (24%) (seven (63%) in the severe group and four (37%) in the mild to moderate group) had differing degrees of renal impairment (including decreased blood urea nitrogen and serum creatinine levels and the glomerular filtration rate). Regarding the infection index, there was no statistically significant difference in the level of procalcitonin between the two groups.

Table 2

| Symptoms on admission | Severe critically ill type (n = 20) | Mild to moderate type (n = 25) | P value |
|-----------------------|-----------------------------------|-------------------------------|---------|
| Fever                | 18 (90%)                          | 18 (72%)                      | 0.134   |
| Cough                | 13 (68%)                          | 10 (40%)                      | 0.095   |
| Expectoration        | 10 (53%)                          | 5 (20%)                       | 0.034   |
| Polyneesa            | 2 (11%)                           | 1 (4%)                        | 0.423   |
| Dyspnoea             | 8 (42%)                           | 0                             | < 0.001 |
| Asthenia             | 2 (11%)                           | 6 (24%)                       | 0.222   |
| Poor appetite        | 2 (11%)                           | 3 (12%)                       | 0.852   |
| Nausea               | 2 (11%)                           | 0                             | 0.106   |
| Vomiting             | 1 (5%)                            | 0                             | 0.258   |
| Rhinorrhoea          | 1 (5%)                            | 0                             | 0.258   |
| Nasal obstruction    | 1 (5%)                            | 1 (4%)                        | 0.566   |
| Pharyngeal dryness and pharyngalgia | 4 (8%) | 4 (16%) | 0.061 |
| Muscle soreness      | 7 (15%)                           | 7 (28%)                       | 0.010   |

| Treatment            | Severe critically ill type (n = 20) | Mild to moderate type (n = 25) | P value |
|----------------------|-----------------------------------|-------------------------------|---------|
| Oxygen uptake        | 9 (45%)                           | 23 (92%)                      | < 0.001 |
| Ventilator           | 10 (50%)                          | 0                             | < 0.001 |
| Non-invasive         | 3 (15%)                           | 0                             | 0.045   |
| Invasive             | 7 (35%)                           | 0                             | 0.001   |
| CRRT                 | 3 (15%)                           | 0                             | 0.045   |
| EMCO                 | 3 (15%)                           | 0                             | 0.258   |
| Hormone              | 12 (60%)                          | 5 (20%)                       | 0.006   |
| Gamma globulin       | 4 (20%)                           | 0                             | 0.019   |
| Antibiotics          | 4 (20%)                           | 1 (4%)                        | 0.089   |
| Interferon atomisation | 20 (100%)                       | 25 (100%)                     | /       |
| Traditional Chinese medicine/Chinese patent medicine | 20 (100%) | 25 (100%) | /       |

| Clinical outcomes (in February 23) | Severe critically ill type (n = 20) | Mild to moderate type (n = 25) | P value |
|-----------------------------------|-----------------------------------|-------------------------------|---------|
| Still in the ICU                  | 4 (20%)                           | 0                             | 0.191   |
| Recovered/discharged              | 11 (55%)                          | 25 (100%)                     | < 0.001 |
| Clinical death                    | 5 (25%)                           | 0                             | 0.008   |
| Respiratory failure due to novel coronavirus pneumonia | 1 (5%) | / | / |
| Coronary heart disease, heart failure | 3 (15%) | / | / |
| Acute myocardial infarction       | 1 (5%)                            | /                             | /       |

Note: P values comparing Severe to critically ill type and Mild to moderate type are from χ^2 test.
mental decoction, Chinese patent medicine such as Jinhua Qinggan over, all 45 patients (100%) were administered traditional Chinese medicine. Five patients (11%) were treated with extracorporeal membrane oxygenation (ECMO) (Table 2). Five patients (11%) received antibiotic therapy for serious abdominal infections, chronic obstructive pulmonary disease, or other bacterial infections (Table 2). Antibiotics used generally covered common pathogens and some atypical pathogens, including quinolones, carbapenems, tigecyclines, and anticoagulants such as vancomycin and linezolid.

3.4. Chest imaging of patients with COVID-19

CT scan showed patchy shadows in the right lower lobe at first evaluation in one patient with moderate illness (Fig. 1A, transverse section and Fig. 1B, coronal section). Another patient with moderate illness presented more serious chest imaging signs showed bilateral multiple patchy shadows (Fig. 2A, transverse section and Fig. 2B, coronal section). In one case of severe illness, large areas of bilateral ground-glass opacities were observed and the lesions advanced manifested as “white lung” which were confirmed a rapidly progressive pneumonia showed in Fig. 3A (Coronal section of CT scan) and Fig. 3B (Bedside chest X-ray).

3.5. Treatment

All patients were treated closely in isolation. Because there are currently no definitive and effective antiviral treatment drugs for COVID-19, all 45 patients (100%) were treated with interferon atomisation according to the recommendations of the Diagnostic and Therapeutic Program of Novel Coronavirus Pneumonia (trial version 6) [5]. Moreover, all 45 patients (100%) were administered traditional Chinese medicine. Seventeen patients (37%) were administered hormone therapy with methylprednisolone for 3–7 days (median, 5 days), of whom, 13 patients recovered. Four patients (8%) were treated with gamma globulin. Three patients (6%) used noninvasive ventilator mechanical ventilation, and seven patients (15%) used an invasive ventilator to assist ventilation. Moreover, three patients (6%) received continuous renal replacement therapy, and three patients (6%) were treated with extracorporeal membrane oxygenation (ECMO) (Table 2). Five patients (11%) received antibiotic therapy for serious abdominal infections, chronic obstructive pulmonary disease, or other bacterial infections (Table 2). Antibiotics used generally covered common pathogens.

4. Discussion

The clinical data of 45 patients reported showed that most confirmed cases of COVID-19 in Beijing were related to in Hubei, with a few symptoms and imaging changes highly suspected but no definite history of epidemics.
The early symptoms of the disease course were mainly fever, cough, and expectoration. Some patients may have diarrhoea during the course of the disease, but it is unclear whether the cause of diarrhoea is associated with COVID-19 or with the drugs administered. At present, it has been found that SARS-CoV-2 can be isolated from faeces, indicating that the virus can infect the digestive tract. Continuous repeated high fever often indicates the progression of the disease. Hence, a close monitoring of the patient’s pulmonary imaging result is required, and healthcare staff should pay careful attention to respiratory failure. Most of the severe patients developed ARDS after 1 week of illness onset. Partial diseases progressed significantly rapidly, and the minimum time from illness onset to ARDS was 2 days. Moreover, multiple organ failure was immediately observed after illness onset. Therefore, disease conditions in special populations should be closely monitored and early intervened, and a 5–10-day disease course was considered critical.

Humans are generally susceptible to COVID-19. The elderly and individuals with chronic diseases are more likely to develop severe and critically ill pulmonary disease compared to young individuals or individuals with no chronic diseases. Moreover, severe and critically ill patients are at significantly higher risk of mortality than mild and moderate patients. One study involved 1,590 COVID-19 patients in 31 provinces in China, with almost 40% of them were inpatients from Hubei Province. It was found that the combined chronic disease was associated with a worse prognosis. Any one of the combined chronic diseases was associated with a 79% higher risk of adverse outcomes while a 1.59-fold higher risk was with more than two chronic diseases [6]. In this study, 5 patients died. The analysis of the cause of death indicated that 80% of the patients died of cardiovascular diseases, with their myocardial enzymes significantly abnormal. Currently, acute myocardial injury associated with COVID-19 has been

Fig. 1. CT scans of the lungs of a 31-year-old patient with COVID-19. AB, CD, and EF represent days 7, 11, and 14 of the disease course, respectively. The increase in density of multiple patchy and ground-glass opacities was observed in both the lungs, predominantly focusing on the right lower lung (A and B). The density of the partial lesions was slightly lower after imaging than before imaging (C and D). The lesions were more significantly absorbed after imaging than before imaging (E and F).
reported [7], but its pathogenesis remains unclear. The autopsy pathology reported by Fusheng Wang team and Liang Liu team showed no evidence of myocardial injury caused by viral infection [8,9].

The analysis of laboratory results showed that NEU percentage, NLR, ALC, and C-reactive protein levels were significantly higher in severe and critically ill patients than those in mild and moderate patients, but the albumin level and ALC were significantly lower in severe and critically ill patients than those in mild and moderate patients. We observed that in critically ill patients, including death cases, during the disease course progression, ALC decreased progressively, while the NLR and C-reactive protein level increased progressively, suggesting that these indicators present an early warning effect on the progression of the disease. Although myocardial injury has not been supported by pathology, several clinical studies have reported the abnormality of myocardial enzymes in COVID-19 patients. Patients showed differing degrees of hepatic and renal impairment. Liver biopsy specimens showed moderate microvascular steatosis and mild active inflammation in the hepatic lobular tract. The level of blood urea nitrogen in the severe group was significantly higher than that in the mild and moderate group, but it may be affected by factors as age and nutritional status. There is no conclusive pathological evidence to support the presence of virus-related damage. According to the existing clinical reports, combined with the analysis of the laboratory test results, SARS-CoV-2

Fig. 2. CT scans of the lungs of a 63-year-old patient with COVID-19. AB, CD, and EF represent days 7, 11, and 16 of the disease course, respectively. The multiple patchy and ground-glass opacities and linear opacities were observed in both the lungs and mostly distributed along the subpleural area (A and B). Partial lesions were narrower after imaging than before imaging (C and D). The lesions were more continuously absorbed after imaging than before imaging (E and F).
may attack multiple organs of the human body, including the lungs, heart, liver, kidneys, and digestive tract. Multiple organ failure may occur in the later stage of patients with COVID-19, which is difficult to treat for the critically ill patients. Although glucocorticoid is not a conventional treatment, hormone therapy has been proposed for severe and critically ill patients based on the several versions of the Diagnostic and Therapeutic Program of Novel Coronavirus Pneumonia, which is also supported pathologically. It has been reported that glucocorticoid is considered effective in the treatment of patients diagnosed with severe COVID-19 [10]. This study showed that 13 of the 17 patients receiving hormone therapy improved markedly, suggesting that hormone therapy may be beneficial for COVID-19 patients. However, this hypothesis requires further studies.

**Ethics statement**

This study has been approved by the ethics committee of Beijing You'an Hospital. The ethical number is LL-2020-034-K.

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Conflict of interest statement

The authors declare that there are no conflicts of interest.

Author contributions

A. Jin, B. Yan, W. Hua, D. Feng, B. Xu provided necessary materials. W. Hua performed the data analysis. L. Liang and C. Guo contributed to fruitful discussions and key ideas. A. Jin and C. Guo contributed to the overall concept and hypothesis, and wrote the manuscript.

References

[1] World Health Organization, Clinical Management of Severe acute Respiratory Infection when Novel Coronavirus (2019-nCoV) Infection is Suspected: Interim Guidance, 28 January 2020, https://apps.who.int/iris/handle/10665/330893, 2020 (accessed 23 February 2020).

[2] Coronaviridae Study Group of the International Committee on Taxonomy of Viruses, The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2, Nat. Microbiol. 5 (4) (2020) 536–544, https://doi.org/10.1038/s41564-020-0695-z.

[3] National Health Commission of the People’s Republic of China, The Latest Situation of Novel Coronavirus Pneumonia up to 24 February 23rd (in Chinese), http://www.nhc.gov.cn/xcs/yqtb/202002/945bd98a9d884aeeb54d7fafa02ca813.sht, 2020 (accessed 24 February 2020).

[4] N. Chen, M. Zhou, X. Dong, et al., Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study, Lancet 395 (2020) 507–513, https://doi.org/10.1016/S0140-6736(20)30211-7.

[5] National Health Commission of the People’s Republic of China, The Notification of Printing and Distributing New Coronavirus Pneumonia Management (Trial Version 6) (in Chinese), http://www.nhc.gov.cn/ycyyj/s7653p/202002/6854e325c2894f529df355d7a8a6c2.sht, 2020 (accessed 24 February 2020).

[6] W. Guan, W. Liang, Y. Zhao, et al., Comorbidity and its impact on 1590 patients with Covid-19 in China: a nationwide analysis, Eur. Respir. J. 55 (2020), in press, https://dx.doi.org/10.1183/13993003.00547-2020.

[7] C. Huang, Y. Wang, X. Li, et al., Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China, Lancet 395 (10223) (2020) 497–506, https://doi.org/10.1016/S0140-6736(20)30183-5.

[8] Z. Xu, L. Shi, Y. Wang, et al., Pathological findings of COVID-19 associated with acute respiratory distress syndrome, Lancet Respir. Med. 8 (4) (2020) 420–422, https://doi.org/10.1016/S2213-2600(20)30076-X.

[9] X. Liu, S. Wang, G. Qu, et al., An autopsy report of patient with COVID-19 [J], Chin. J. For. Med. 36 (1) (2020) 1–3, https://doi.org/10.12116/j.jissn.1004-5619.2020.01.00.

[10] Jin Aihua, Jia Lin, Yan Benyong, et al., Clinical features of 19 severe cases of COVID-19 in Beijing, Chin. J. Exp. Clin. Virol. 34 (2020), Epub ahead of print, http://dx.doi.org/10.3760/cma.j.cn112866-20200224-00030.