

Research on pregnant women suspected of having COVID-19 in the epidemic outbreak area

Hui YANG

Huazhong University of Science and Technology

Fan XIE

Huazhong University of Science and Technology

Yun Zhao (✉ zhao020060@163.com)

Huazhong University of Science and Technology

Guoqiang SUN

Huazhong University of Science and Technology

Yao CHENG

Huazhong University of Science and Technology

Dongmei CAO

Huazhong University of Science and Technology

Jing PENG

Huazhong University of Science and Technology

Ruobing LI

Huazhong University of Science and Technology

Hui XIE

Huazhong University of Science and Technology

Research

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Abstract

Background

COVID-19 has become a major public health problem around the world. There are limited data on maternal and neonatal outcomes of pregnant women with COVID-19 pneumonia. The purpose of this study is to investigate and analysis the clinical features, imaging findings, related laboratory indicators, treatments and outcomes of maternal-fetal for cases of suspected infection COVID-19 pregnant women in outbreak area in order to provide reference for clinical work.

Methods

A case-control study was conducted to compare clinical features, treatment, maternal and neonatal outcomes of pregnant women with and without COVID-19 pneumonia.

Results

One confirmed patient who was discharged from hospital after a negative RT-PCR result, was readmitted and subsequently tested positive on RT-PCR. The vaginal delivery rate and gestational week of confirmed case group showed significantly lower than 2019 control group. Pulmonary CT images were initially same between confirmed group and suspected group, but changed over time with different trends. The two case groups shared similar dynamic profiles on blood routine test. Four confirmed cases which had COVID-19 antibody test were all positive for IgG antibody and negative for IgM antibody, via both umbilical cord blood and the newborns. Fifteen of newborns (three confirmed and twelve suspected cases) at nearly three months old were tested negative by antibodies.

Conclusions

Pulmonary CT images showed different trends with the extending of time between confirmed group and suspected group. Blood test results weren't strong enough to make differential diagnosis between two case groups. Perform antibody test can understand the antibody responses mounted in response to the virus, and to identify individuals who are potentially immune to re-infection. Infant obtain COVID-19 IgG antibody from maternal that only may last for less than three months.

Introduction

COVID-19 as a pandemic disease and has become a major public health problem around the world. The global are facing a terrible virus with greater infectivity than the SARS-CoV pandemic occurred in 2003. The current pneumonia outbreak of COVID-1, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has become a major public health problem around the world and has been declared a global pandemic¹ by the World Health Organization (WHO) on March 11th, 2020.

According to the latest statistics of COVID-19 Dashboard by the Center for Systems Science and Engineering(CSSE) at Johns Hopkins University in the United States, as of 07:30 (Beijing time) on the 14th, the number of confirmed COVID-19 cases worldwide has exceeded two million, reaching 2019320. In addition, there are nearly 120000 deaths of COVID-19 worldwide, which is 118966 as an accurate number. The COVID-19 outbreak is still a major challenge for clinicians. There are insufficient data to investigate the effect of COVID-19 on pregnant women and their outcomes. During the outbreak period, prevention and control of COVID-19 infection in pregnant women and newborns becomes increasingly important. The aim of this study is to investigate on the outcome of mothers and newborns during the epidemic.

Methods

Study design and participants

Maternal and Child Health Hospital of Hubei Province, as one of top-three maternity hospitals in China, has an annual delivery volume of nearly 30000, which is assigned to be a non-designated hospital for accepting pregnant women infected by COVID-19. It was already been described in my last article.² From January 20 to April 15 in 2020, seventy-nine pregnant women in our hospital who were admitted to an isolated suite in our hospital (at Maternal and Child Health Hospital of Hubei Province, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China) for obvious lung changes, accompanied by fever, cough, chest tightness or gastrointestinal symptoms were considered as suspected cases of COVID-19. All selected women were Chinese pregnant women living in Wuhan. Those with non-Chinese nationality and non-pregnant women were excluded. A total of seventy-nine cases were selected in this study, including the confirmed COVID-19 group containing nineteen cases and the suspected group containing sixty cases. Moreover, pregnant women without pneumonia during hospital stay were randomly selected as control group, and their medical records were selected. Only those aged 25–35 years were selected to match the age range of cases. We selected thirty women who were admitted during the same period (hereinafter referred to as 2020 control group). Considering the potential adverse effects of mental stress caused by city lockdown and severe epidemics, we also included the second control group consisting of thirty women admitted during January 20 to April 15, 2019 (hereinafter referred to as 2019 control group) and their blood test results were also retrieved from medical records. Two case groups underwent blood tests every one to three days but two control groups only took once on admission. It is

worth noticing that collection and utilization of relevant information fully protected the privacy of patients and complied with ethical standards (Record number IRB00001052-20029).

Data collection

Basic information, clinical characteristics, laboratory test results, maternal and neonatal outcomes were collected from medical records.

Medical imaging of pulmonary CT scan was collected. The topical involvement in lung computed tomography scan was multiple patch-like shadows (early stage), ground-glass opacity (middle stage), and consolidation shadow (late stage).³

Laboratory test results were compiled, including standard blood counts (absolute white blood cells, neutrophils and lymphocytes), cell ratio of neutrophils and lymphocytes, and C-reactive protein. Biochemical indicators including the ALT, AST, ALB, BUN, CREA, CK, CK-MB, LDH were measured. Some cases had COVID-19 antibody test which results were also collected.

Other data collected included maternal and infant treatment progress, recovery and discharge information, and treatment mode information.

Data analysis

Statistical analysis was done using SPSS, version 20.0. The normal distribution data used the mean and standard deviation, while the non-normal data used the median and quartile spacing. Chi-square was used to compare the sample rates of the two groups of counting data, T test was used to compare the mean of measurement data, and Wilcoxon rank sum test was used if it did not conform to the normal distribution. If the prenatal and postpartum paired T test was used in the same group, the paired rank sum test was used if it did not conform to the normal distribution. If p value < 0.05 , the difference was considered statistically significant.

Results

According to the standard of Treat Plan for Novel Coronavirus Pneumonia (Trial Version 7),⁴ these 79 suspected cases of COVID-19 infection. Three cases had the history of close contacting with a confirmed COVID-19 infection in confirmed group and one case had a history of close contact in suspected cases. All of the cases underwent the test of SARS-CoV-2, 16 cases of nasopharyngeal swabs were tested positive for nucleic acid, three cases were tested positive for COVID-19 serological antibody but tested negative for pharyngeal swabs. During delivery umbilical cord blood was collected for COVID-19 antibody testing in four confirmed cases, and the results were positive for IgG antibody but negative for IgM antibody. After follow-up, we found one COVID-19 patient who was discharged from the hospital with a negative RT-PCR result was readmitted and subsequently tested positive on RT-PCR. Then, the COVID-19 serological antibody test was carried out, and results showed positive for both IgM antibody and IgG antibody. Moreover, RT-PCR test of rectal swabs was negative.

There were 16 cases of prenatal fever (3 confirmed cases and 13 suspected cases), of which only one case (suspected case) was high fever with body temperature reaching 38.5°C, other cases were ranged from 37.3°C to 38.0°C in body temperature. It is worth noting that the fever lasted for two or three days without special treatment. There were 41 cases of postpartum fever (11 confirmed cases and 30 suspected cases), with body temperature ranging from 37.3°C to 39.2°C, among which, there were 17 cases with temperature above 38°C (6 confirmed cases and 11 suspected cases). There were 7 cases of cough (5 confirmed cases and 2 suspected cases). Of these 5 confirmed cases, 2 cases exhibited cough before delivery and three exhibited cough after delivery. Also among the 5 cough cases, there was one patient accompanied by chest tightness before delivery and another one was after. In contrast, the 2 suspected cases had cough after delivery. Basic information and clinical manifestation of two case groups and two control groups are shown in Table 1. Except that the length of hospital stay of confirmed case group was statistically longer than the suspected group and the control groups, there was no statistical difference among the four groups in maternal age, BMI of pregnant women, delivery mode, volume of postpartum hemorrhage, newborn gender and birth weight ($p > 0.05$). Compared with the suspected case group and 2020 control group, the vaginal delivery rate and gestational week of confirmed case group showed no significant statistical difference, but significantly lower than 2019 control group.

Pulmonary CT Imaging findings

Pulmonary CT scan on admission was carried out for all 79 cases, and the results were found abnormal in different degrees including ground-glass opacity, patch-like shadows, fiber shadow, pleural effusion and pleural thickening. Among these cases, eight patients whose pulmonary CT were normal had no fever at the admission, but had fever after delivery, with signs of patchy shadows, pleural effusion and pleural thickening in CT scan. There was no difference between confirmed case group and suspected case group ($p > 0.05$) as shown in Table 2. From Figure 1A, it can be seen the trend of pulmonary CT imaging changed over time in both groups. There were three important indicators including patchy shadow, ground glass shadow and fiber strip shadow. For confirmed cases, the degree of patchy shadow decreased at first and then increased, while for suspected cases, it increased at first and then showed a downward trend. The degree of ground glass shadow gradually increased with time for confirmed cases, reaching the peak in 9-13 days, and then decreased; in contrast, it gradually decreased for suspected cases. The degree of fiber cord shadow reached the peak in the confirmed cases earlier for the suspected cases, and then showed a downward trend, as shown in Figure 1B.

Laboratory inspection

Blood indexes including white blood cell count (WBC), Neutrophil ratio, Neutrophil count, Lymphocyte count and Lymphocyte ratio were analyzed on admission and every 1~5 day after delivery. There was no difference between the two groups no matter on admission or after delivery. Compared to the control groups, two case groups had slightly lower counts of WBC, neutrophils, CRP on admission, as shown in Table 3. There was no significant difference in biochemical indicators testing results including ALT, AST, BUN, CREA, CK, LDH on admission between two case groups and two control groups ($p > 0.05$) except for ALB and CK-MB, as shown in Table 4.

In the first postpartum blood test, confirmed case group and suspected case group exhibited increased WBC count, Neutrophil ratio and count. However in the next postpartum test, these indexes gradually decreased. Similarly, confirmed case group and suspected case group exhibited decreased Lymphocyte count and Lymphocyte ratio in the first postpartum blood test, but exhibited slight increase in these indexes in the next postpartum test. Nevertheless, the Lymphocyte count and Lymphocyte ratio remained at the lower end of normal range for confirmed case group and suspected case group. Details are shown in Figure 2 and Figure 3.

The Ab, IgM antibody and IgG antibody test

The umbilical cord blood of four of the confirmed cases was collected for Ab, IgM antibody and IgG antibody test and their newborns had this test as well. The results were all positive for IgG antibody but negative for IgM antibody for both umbilical cord blood and the newborns.

Drug treatment

All patients in the two case groups were treated with antibiotics, and the utilization rate of antibiotics was 100%. Among the confirmed cases, 14 patients were treated with antiviral drugs (7 cases were treated with single drug; 7 cases were treated with combination of two antiviral drugs). From the perspective of antibiotics, 1 case was treated with one antibiotic drug, 10 cases with two antibiotic drugs and 8 cases with three antibiotic drugs. 17 cases were treated with Traditional Chinese medicine. In the suspected case group, 10 cases were treated with antiviral drugs (5 cases were treated with single drug, 5 cases were treated with two antiviral drugs), 39 cases were treated with 2 types of antibiotics and 21 cases were treated with three types of antibiotics, as shown in Table 5.

Neonatal outcomes

82 newborns, including 3 pairs of twins, were delivered by these 79 pregnant women. 26 of these newborns were transferred to the neonatal intensive care isolation suite immediately after birth, and nucleic acid test were tested negative (including eight confirmed cases and eighteen suspected cases). 3 of the confirmed patients' newborns had the Ab, IgM antibody and IgG antibody against SARS-CoV-2 test after born. The results were tested negative for IgM antibody and positive for IgG antibody. All the eight-two newborns were followed up by telephone, and fifteen of whom had the IgM antibody and IgG antibody against SARS-CoV-2 test when they were nearly three months old (including three confirmed cases and twelve suspected cases). The results of the Ab test were all negative.

Discussion

From this study conducted in a non-designated hospital of Wuhan, we found that of nineteen confirmed COVID-19 cases, there were thirteen cases in mild degree and six asymptomatic cases. Among these patients, 3 out 19 cases (15.8%) showed prenatal fever less than 37.5°C, and 11 out of 19 (57.9%) showed postpartum fever up to 39.2°C. Two cases had chest tightness, and one occurred before delivery and the other occurred after delivery. Though there was no serious patient, the length of hospital stay were up to eighteen days on average.

One confirmed patient was healed and discharged from the hospital after with negative RT-PCR result was readmitted and subsequently tested positive on RT-PCR. Though similar re-infection reports have already been reported, but a recent study by Bao L et al⁵ on non-human primates showed that re-infection, at least in the small number of animals used in the study, does not occur once antibody responses have been mounted. It is unclear from the available information if these were true reinfections or the tests were falsely negative at the time of initial discharge. Asim Biswas et al⁶ believe that a virus may reinfect a person with preexisting immunity, either in its present form (which is very unlikely), or with acquired mutations to persist in the circulation. SARS-CoV-2 recovered populations may enable the selection of mutant viruses, and their spread in the community. Bin Zhang, et al⁷ suggest the positive RT-PCR after recovery doesn't mean disease relapse or virus reinfection. It is necessary to conduct RT-PCR test of rectal swabs to determine whether to the patient can be discharged or whether the quarantine should be discontinued.

Physiologic dyspnea due to increased maternal oxygen demands from heightened metabolism, gestational anemia and fetal oxygen consumption are common in pregnancy.⁸ Shortness of breath occurs in 18% of patients with COVID-19.⁹ Perinatal COVID-19 infection may negatively affect the newborn babies, causing problems such as fetal distress, premature delivery, respiratory distress, thrombocytopenia and associated liver abnormalities.¹⁰ In response to this unprecedented COVID-19 outbreak in Wuhan, COVID pneumonia has become one indication for caesarean section, but we observed the five patients undergoing vaginal delivery showed no adverse pregnancy outcomes for both mothers and children. Similar to two previous reports of nine and one pregnant women with confirmed COVID-19 infection,^{11,12} we did not find any evidence to support the vertical transmission of SARS-CoV-2 from mother to fetus no matter via placenta, vaginal delivery or cesarean delivery. The mode of delivery is determined by obstetric factors and clinical urgency. Despite of any delivery mode, respiratory precautions, full personal protective equipment (PPE) and rooms with negative pressure ventilation are advised.¹³

Pulmonary CT scan plays an important role in diagnosis of COVID-19 infection and in observation of therapeutic effect, and the imaging abnormalities presented even in asymptomatic patients.^{14,15} Although there was no significant difference in pulmonary CT scan findings between the suspected and confirmed cases at first, the three important indicators including patchy shadows, ground glass shadows, and fibrous cord shadows, showed different trends in the two groups. Moreover, CT involvement score is of reference value in evaluation of the severity and extent of the disease.

The predominant manifestations of COVID-19 in pregnant women are lymphopenia and slightly lower counts of WBC, which is consistent with that in non-pregnant patients. In our study, there was no difference in white blood cell count, Neutrophil granulocyte count & proportion, lymphocyte count & proportion, and CRP between COVID-19 confirmed case group and control group before and after delivery. Compared to two control groups, two case groups had slightly lower counts of WBC, neutrophils, CRP on admission, although none reached statistical significance and most were marginally beyond the normal range. The

count of Lymphocyte was lower in the confirmed case group, but there was no change in the normal cases, which indicates that Lymphocyte is a susceptible index for progress of COVID-19 infection. We noticed that confirmed cases and suspected cases shared similar dynamic profiles, suggesting that laboratory test results might not be very useful in making differential diagnosis.

Once mother was infected by the COVID-19 and produced anti-SARS-CoV-2 antibody, the fetal could obtain the IgG antibody from mother, but the effect of such antibody may last for less than three months since born.

All patients infected with COVID-19 pneumonia received antibacterial agents, 90% received antiviral therapy, and 45% received methylprednisolone.¹⁶ In our study, our medication was basically the same. Some traditional Chinese medicine has been widely used during the COVID-19 outbreak in China and plays an important role in treating patients. Based on the historical records and anecdotal evidence of SARS and H1N1 pdm09 prevention, Chinese herbal drugs were also considered as an alternative approach for prevention of COVID-19 in high-risk populations. However, rigorous clinical trials on large populations should be conducted to confirm the potential preventive effect of Chinese medicine.^{17,18} Currently, there has been no specific antiviral drugs, and the treatment is normally "encirclement" therapy, such as antiviral, antibacterial, enhanced immunity, glucocorticoid anti-inflammation, Chinese herbal drugs and so on. There is presently no vaccine or documented specific anti-SARS-CoV-2 drug regimen to critically heal such disease. Most of the potential drugs for treatment of COVID-19 are being investigated for safety and efficacy against SARS-CoV-2.

Conclusion

During the epidemic outbreak, COVID pneumonia has become one indication for caesarean section and panic among people may be reason leading to early delivery. In this study, we found no different findings on pulmonary CT scan between the suspected case group and confirmed case group at first on pulmonary CT scan, but the three important indicators including patchy shadows, ground glass shadows, and fibrous cord shadows showed different trends between the two groups. Confirmed case group and suspected case group shared similar dynamic profiles in blood routine test, suggesting that laboratory blood test results might not be very useful in making differential diagnosis. Combining RNA and antibody detections significantly improved the sensitivity of pathogenic diagnosis for COVID-19 in the early phase of infection. It is necessary to perform COVID-19 serological antibody test which also can understand the antibody responses mounted in response to the virus, and to identify individuals who are potentially immune to re-infection. Infant could obtain COVID-19 IgG antibody from maternal, but the effect of such antibody lasted for less than three months since born. There are no specific drugs for the treatment of the COVID-19. Clinical trials are underway to investigate the efficacy of drugs such as antiviral, antibacterial, enhanced immunity, glucocorticoid anti-inflammation, Chinese herbal drugs and so on.

Ethics Approval And Consent To Participate

The study was approved by the Peking University Biomedical Ethics Committee (Record number: IRB00001052-20029).

Consent For Publication

Not applicable.

Availability Of Data And Materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Declarations

Competing interests

All authors declare no competing interests.

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Authors' Contributions

HY, FX, YZ, and GS conceived and design the study. YC, DC, JP, RL and HX collected the data. HY, FX, YZ and GS analysed and interpreted the data. HY and FX draft the article. YZ and GS edited the article. Each of us was involved in the writing and revision of the manuscript. All authors read and approved the final version.

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Tables

Table 1
Basic Information and Clinical Manifestation for two case groups and two control groups

Groups	Confirmed group (n=19)	Suspected group (n=60)	Control group(2020) (n=30)	Control group(2019) (n=30)	Pvalue []-[]	Pvalue []-[]	Pvalue []-[]
Age(y) X ± s	30.37±2.712	30.00±4.00	28.80±2.483	29.87±2.956	0.712	0.043	0.553
Body mass index (kg/m ²) X ± s	20.74±2.400	22.00±3	20.50±1.575	21.90±2.524	0.128	0.902	0.116
Prenatal fever (n%)	2(10.5)	14(23.3)	2(6.7)	3(10)	0.377	1.000	1.000
Postpartum fever (n%)	13(68.4)	40(66.7)	6(20)	3(10)	0.887	0.001	0.000
Delivery mode(n%)							
Vaginal delivery	5(26.3)	14(23.3)	15(50)	18(60)	1.000	0.100	0.021
Cesarean delivery	14(73.7)	46(76.7)	15(50)	12(40)			
Newborn gender (n%)							
Male	10(47.6)	39(63.9)	14(46.7)	13(43.3)	0.189	0.947	0.762
Female	11(52.4)	22(36.1)	16(53.3)	17(56.7)			
Newborn weight (g, X ± s)	3146.05±564.96	3310.25±529.75	3280±404.87	3283.67±437.74	0.250	0.339	0.343
gestational week of newborn (w, X ± s)	38.00±3	39.00±2	38.90±1.109	39.00±1	0.173	0.061	0.015
Volume of postpartum hemorrhage(mL, X ± s)	350.0±100.0	300±50	320±80	320±105	0.061	0.226	0.590
Days of hospital stay	18±9.701	5.00±3.000	5.00±2.00	5.00±2.000	0.000	0.000	0.000

Student's test, Chi- square test and wilcoxn were used

Time	Confirmed group					Suspected group					X ² []-[]	P []-[]	X ² []-[]	P []-[]	
	Admission	2~5d	5~9d	9~13d	13~20d	Admission	2~5d	5~9d	9~13d	13~20d					
Number of cases	19	13	12	9	10	7	60	55	22	8	1				
Normal (n, %)	2, 10.5	1, 7.7	1, 8.3	0, 0	3, 30.0	1, 14.3	6, 10.0	4, 7.3	2, 9.1	2, 25.0	0	0.004	0.947	0.003	0.958
Patch-like shadow (n, %)	9, 47.4	2, 15.4	3, 25.0	3, 33.3	3, 30.0	5, 71.4	18, 30.0	22, 40.0	7, 31.8	2, 25.0	1, 100	1.935	0.164	2.79	0.095
Ground-glass opacity(n, %)	9, 47.4	7, 53.8	8, 66.7	8, 88.9	7, 70.0	5, 71.4	33, 55.0	27, 49.1	10, 45.5	3, 37.5	1, 100	0.338	0.561	0.095	0.758
Patch-like shadow (n, %)	4, 21.1	5, 38.5	3, 25	2, 22.2	3, 30.0	0	9, 15.0	11, 20.0	8, 36.4	1, 12.5	0	0.385	0.535	1.992	0.158
Pleural effusion (n, %)	7, 36.8	4, 30.8	4, 33.3	1, 11.1	1, 10.0	0	14, 23.3	21, 38.2	7, 31.8	1, 12.5	0	1.349	0.245	0.249	0.618
Pleural thickening (n, %)	1, 5.3	2, 15.4	0	0	0	1, 14.3	3, 5.0	5, 9.1	0, 0	1, 12.5	0	0.002	0.964	0.451	0.502

Table 2
Imaging of pulmonary CT scan between in the confirmed and in the suspected groups at the different time

Chi- square test and Fisher's exact test were used

Table 3
Comparison of Blood routine and CRP on Prenatal and Postpartum(at the second day after delivery) between two case groups and two control groups.

	Reference range	Confirmed group		Suspected group		Control group (2020)		Control group (2019)		P value							
		Mean (SD)/Medians(IQR)		Mean (SD)/Medians(IQR)		Mean (SD)/Medians(IQR)		Mean (SD)/Medians(IQR)									
		Prenatal	Postpartum	Prenatal	Postpartum	Prenatal	Postpartum	Prenatal	Postpartum	□-□	□-□	□-□	□-□	□-□	□-□	□-□	□-□
WBC,*10 ⁹ /L	3.5~9.5	8.39 (1.97)	13.23 (3.38)	9.26 (4.19)	13.65 (4.20)	9.06 (3.84)	11.89 (2.74)	8.81 [3]	11.70 [8]	0.000	0.000	0.000	0.000	0.273	0.250	0.410	0.80
Neutrophil%	40~75	77.32 (5.98)	87.57 (6.23)	77.39 (7.91)	85.59 (5.75)	76.5 [6.58]	80.74 (4.60)	76.1 [8.04]	81.33 [5.96]	0.001	0.000	0.000	0.000	0.979	0.669	0.591	0.28
Neutrophil, *10 ⁹ /L	1.8~6.3	6.55 (1.81)	11.73 (3.66)	6.69 (3.89)	10.70 (5.69)	7.22 (1.18)	9.70 (2.63)	6.85 [3]	9.00 [8]	0.000	0.000	0.000	0.000	0.448	0.194	0.967	0.90
Lymphocyt,*10 ⁹ /L	1.1~3.2	1.27 (0.37)	0.98 (0.43)	1.51 (0.52)	1.12 (0.56)	1.71 [0.48]	1.55 (0.33)	1.59 [0.48]	1.54 [0.50]	0.034	0.000	0.002	0.004	0.003	0.000	0.002	0.36
Lymphocyte%	20~50	16.38 (4.92)	8.15 (4.72)	16.80 (7.09)	9.74 (4.55)	16.94 [6.71]	13.29 (3.71)	17.44 [6.43]	12.92 [4.99]	0.001	0.000	0.000	0.000	0.551	0.746	0.561	0.29
CRP, mg/L	0~4.0	3.12 (7.02)	30.50 (31.66)	3.29 (5)	24.23 (48.99)	2.81 [3.17]	86.09 (35.51)	4.56 [2.83]	72.78 [47]	0.019	0.000	0.000	0.000	0.787	0.780	0.522	0.48

s in the table were the mean, if they did not meet the normal distribution, they would be changed to the median and been marked in blue.

2. Paired T test or rank sum tests were used for prenatal and postpartum in the same group, and the rest were used for independent T tests or independent rank sum tests.

Table 4

Comparison of biochemical indicators testing results on admission between two case groups and two control groups.

	Reference range	Confirmed group	Suspected group	Control group (2020)	Control group (2019)	P value		
		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)			
		[n=19]	[n=60]	[n=30]	[n=30]	□-□	□-□	□-□
ALT, U/L	0~35	14.53[19.49]	11.60[6.36]	12.73[9.42]	9.43[2.71]	0.258	0.259	0.959
AST, U/L	0~35	21.06[15.62]	17.83(6.41)	19.51[7.42]	16.33[3.56]	0.823	0.622	0.412
ALB, g/L	35~52	35.27[3.06]	34.96(3.82)	35.58[3.31]	37.31[2.64]	0.792	0.579	0.026
BUN, mmol/L	2.8~7.2	3.28[1.07]	3.04[0.83]	3.41[0.89]	3.66[1.92]	0.429	0.518	0.511
CREA, umol/L	45~84	49.44[9.31]	50.51[12.38]	51.44[12.21]	49.87[11.45]	0.659	0.566	0.805
CK, U/L	0~145	52.70[21.90]	80.40[108.45]	71.37[52.62]	51.65[31.29]	0.122	0.4	0.473
CK-MB, U/L	0~24	22.28[25.64]	19.90[16.49]	15.90[12.53]	13.15[5.36]	0.305	0.081	0.006
LDH, U/L	140~271	193.99[30.95]	191.64[45.53]	184.46(36.31)	175.52[26.84]	0.383	0.3	0.051

P value of Fisher's exact tests and Mann-Whitney U tests

Table 5

Treatment of patient among in the confirmed, the suspected groups and the two control groups.

	Confirmed group n=19	Suspected group n=60	Control group (2020) n=30	Control group (2019) n=30	P value		
Antiviral therapy							
Lopinavir (n, %)	1[5.3%]	1[1.7%]	0	0	0.384	0.388	0.388
Traditional Chinese medicine (n, %)	10[52.6%]	0	0	0	0.000	0.000	0.000
Lotus qingwen capsule (n, %)	7[36.8%]	0	0	0	0.000	0.002	0.002
Interferon inhalation (n, %)	10[52.6%]	5[8.3%]	0	0	0.000	0.000	0.000
No antiviral drug(n, %)	5[26.3%]	50[83.3%]	0	0	0.000	0.013	0.013
1 antiviral drug	7[36.8%]	5[8.3%]	0	0	0.008	0.002	0.002
2 antiviral drug	7[36.8%]	5[8.3%]	0	0	0.008	0.002	0.002
Other treatment							
Antibiotic therapy							
1 antiibiotic drug	1[5.3%]	0	0	0	0.241	0.388	0.388
2 antiibiotic drug	10[52.6%]	39[65%]	18[60%]	22[73.3%]	0.333	0.612	0.138
3 antiibiotic drug	8[42.1%]	21[35%]	0	0	0.576	0.000	0.000
Glucocorticoid (n, %)	2[10.5%]	0	0	0	0.056	0.145	0.145
Gamma globulin (n, %)	1[5.3%]	0	0	0	0.241	0.388	0.388
Hydroxychloroquine (n, %)	2[10.5%]	0	0	0	0.056	0.145	0.145
Intranasal oxygen inhalation (n, %)	17[89.5%]	37[61.7%]	0	0	0.023	0.000	0.000
Non-invasive and invasive mechanical ventilation (n, %)	0	0	0	0	—	—	—
ECMO (n, %)	0	0	0	0	—	—	—

ECMO: extracorporeal membrane oxygenation

Figures

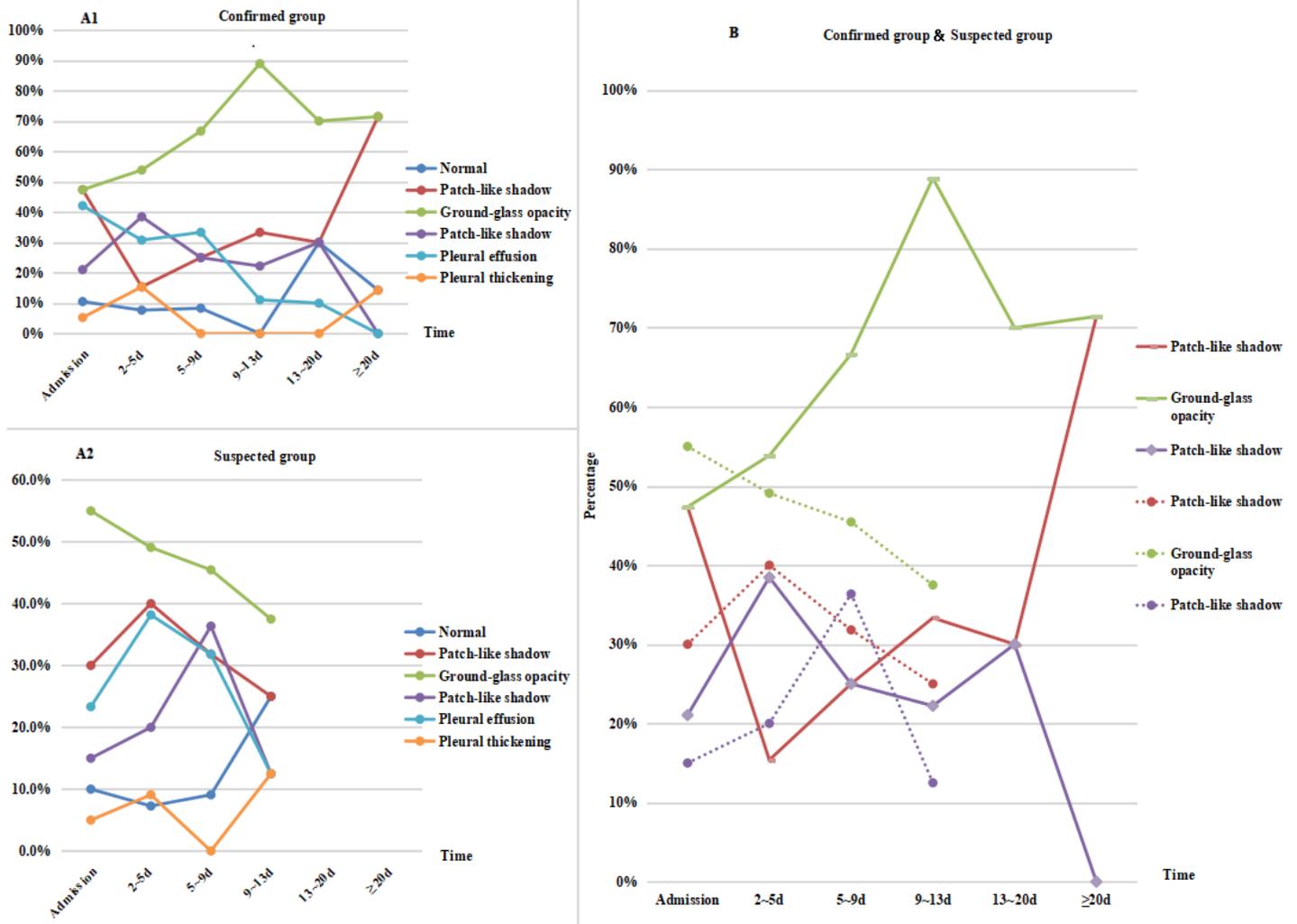


Figure 1

The trends of pulmonary CT images changing with time between confirmed group and suspected group

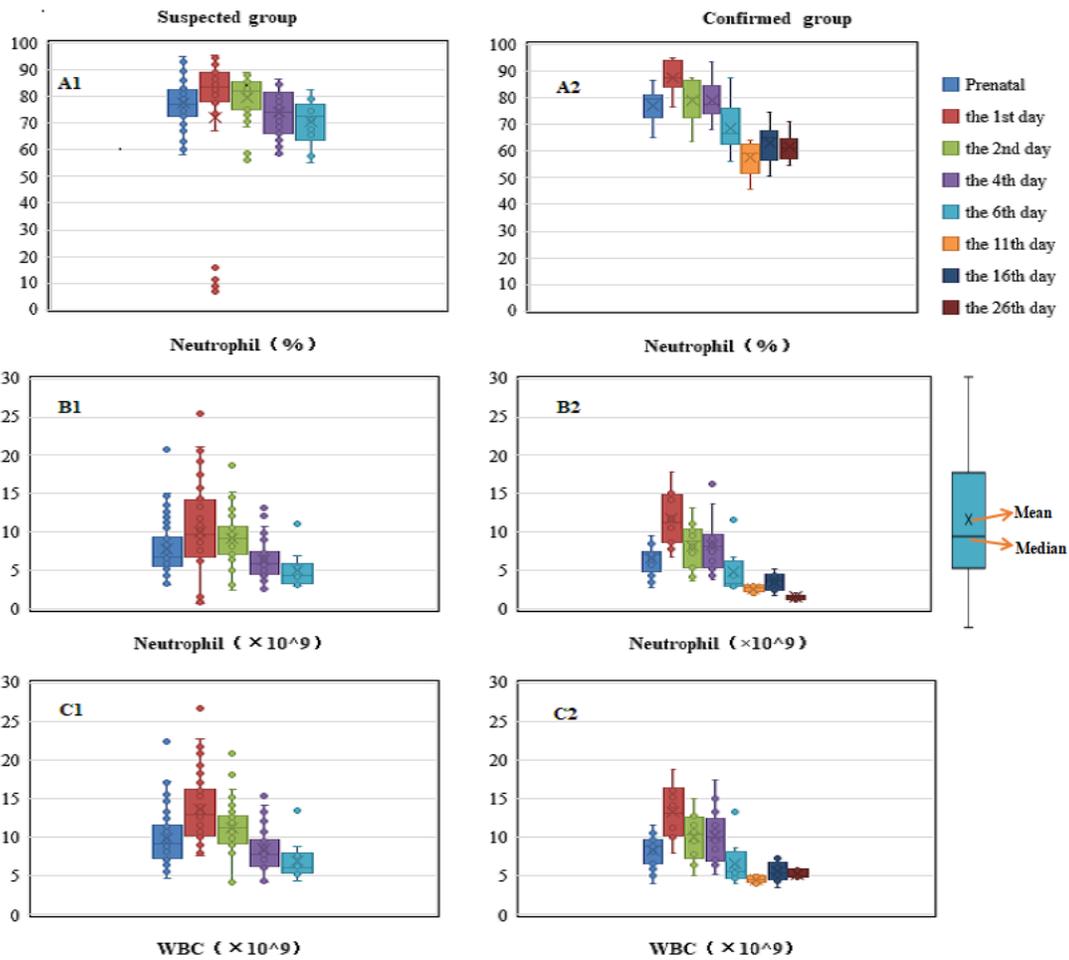


Figure 2

The dynamic characteristics of suspected group and confirmed group in routine blood tests.

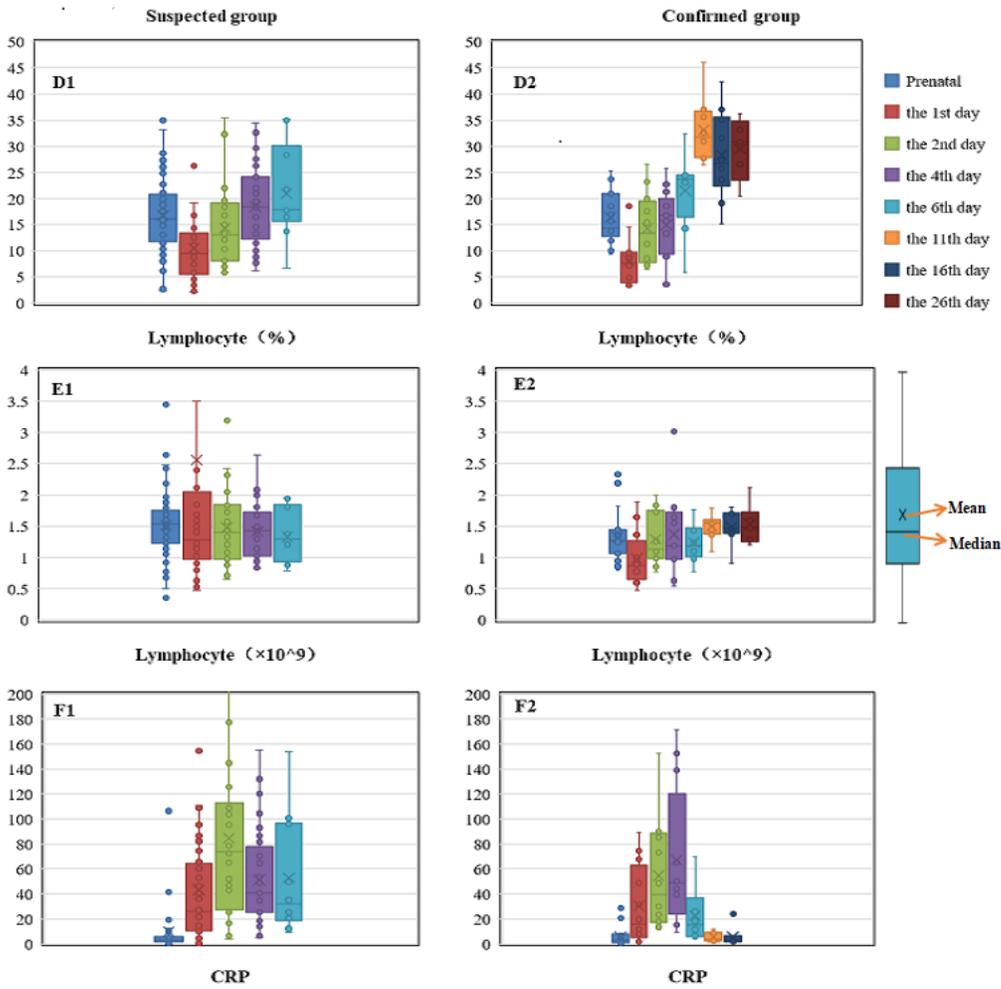


Figure 3

The dynamic characteristics of suspected group and confirmed group in routine blood tests.