Retrospective analysis of screening for SARS-CoV-2 in obstetrics and gynecology outpatients after the peak of the outbreak in Wuhan

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May 11, 2020

Abstract

Objective: To analyze covid-19-associated test results and optimize screening procedure for obstetrics and gynecology outpatients Design: Single center retrospective study. Setting: Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei province, P.R. China. Population or Sample: A total of 1,051 obstetrics and gynecology outpatients were included in the study from March 12 to April 26, 2020. Methods: We collected medical records, COVID-19-associated test results and reported the visit procedure for obstetrics and gynecology outpatients. Main outcome(s) and measure(s): We analyzed covid-19-associated test results and followed up the patients. Results: After reviewing the visit procedure, a total of 1051 obstetrics and gynecology outpatients were included in the study, and a series of COVID-19 tests were conducted, which included the SARS-CoV-2 nucleic acid test, chest CT scan and SARS-CoV-2-specific serological test. The SARS-CoV-2 nucleic acid test was negative in all 1051 patients. None of the patients admitted to the hospital experienced SARS-CoV-2 infections during hospitalization. Seventy-six cases were diagnosed with abnormal uterine bleeding-related disease (excluding endometrial malignancy), 2019-nCoV antibody positive rate was 6.579%, which is greater than the average positive rate of 3.974%, and the positive rate among patients with other diseases. No nucleic acid positivity was found in the follow-up of 9 IgM+ (and IgG+) patients. Conclusions: As the peak of the epidemic has passed, a more optimized screening procedure is required to avoid hospital infections.

Tweetable abstract

As the peak of the epidemic passed,a more optimized screening procedure is required to avoid hospital infections in obstetrics and gynecology outpatient.

Introduction

In December 2019, a series of pneumonia cases of unknown etiology emerged in Wuhan, China [1,2]. This condition was later confirmed to be coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). On March 11, 2020, the World Health Organization characterized COVID-19 as a pandemic considering its alarming levels of spread and severity. COVID-19 poses a great public health and clinical burden worldwide. By April 28, 2020, 82,858 confirmed cases and 4,633 deaths related to COVID-19 had been reported in mainland China. Among them, 50,333 confirmed cases and 3,869 deaths were from Wuhan alone.

As the peak of the epidemic passed, the daily confirmed cases of SARS-CoV-2 infections in Wuhan dropped to single digits beginning March 11, 2020. Wuhan city ended their lockdown, and people have been allowed to gradually return to normal working and living conditions since April 8, 2020. As one of the largest medical centers in Wuhan, our hospital also takes on the medical needs of other non-COVID-19 patients. The general outpatient obstetrics and gynecology department of Wuhan Union Hospital has received female patients as usual since March 12. To avoid hospital infections, a visit procedure was developed, and a series

of COVID-19-associated tests, including the SARS-CoV-2 nucleic acid test (NAT) of throat swabs, chest CT scan and SARS-CoV-2 specific serological test, are conducted.

Here, to optimize outpatient screening methods after the peak of the epidemic, we performed a retrospective analysis of COVID-19-associated test results and reported the visit procedure for obstetrics and gynecology outpatients from March 12 to April 26, 2020, at our hospital.

Methods

Visit

procedure and participants

As shown in Figure 1, a total of 5,866 persons were treated in the outpatient obstetrics and gynecology department at Wuhan Union Hospital from March 12, 2020, to April 26, 2020. A total of 1,054 persons received "online" telemedicine services, and 4,812 persons received "offline" outpatient services. All "offline" outpatients were required to test their temperature and collect a medical history before their visit. Those who had the following were transferred to designated outpatient clinics: body temperature greater than 37.3, respiratory symptoms, and a COVID-19 or exposure history. Eligible patients entered the waiting area and signed a notification confirming that they had no symptoms of or exposure history to COVID-19. If any of the outpatients need inpatient treatment or outpatient surgery, such as diagnostic scraping, cervical biopsy, etc., a series of COVID-19-associated tests were carried out, including SARS-CoV-2 NAT of throat swabs, chest CT scan and a SARS-CoV-2-specific serological test. Others volunteered to undergo these tests to be able to get back to work or escort hospitalized family members. All outpatients who were tested were included in the study. If the test results had a positive finding, the patients were sent to the designated outpatient clinics, and an infection card was reported for the first time. Patients with negative test results were admitted to the hospital or outpatient clinics for follow-up treatment. Emergency patients were placed in segregated wards or underwent emergency surgery under protective measures in cases that were too critical to wait for the results of the COVID-19 tests. If the tests were negative, the emergency patients were then transferred to a regular ward. All enrolled patients were followed up until discharge from the hospital or May 8, 2020 (for patients had not been discharged or admitted). The requirement for informed consent was waived due to the retrospective data collection and the urgency to collect data on the emerging SARS-CoV-2. This study was approved by the Ethics Committee of Wuhan Union Hospital, Tongji Medical College, Huazhong University of Science and Technology [approval No.2020(0218)].

Data Collection

Outpatient medical records, laboratory findings and radiological characteristics were reviewed by three obstetricians and gynecologists. Demographic characteristics, clinical manifestations and diagnostics, the results of the COVID-19-associated tests, laboratory findings, treatment, and outcomes were extracted from electronic medical records.

Throat swab samples were collected by professional swab-sampling staff members, and the NAT was performed using real-time reverse transcription-polymerase chain reaction according to the manufacturer's protocol (DAAN Gene Co., Ltd. Of Sun Yat-sen University). The serological SARS-CoV-2 test kits were performed according to the manufacturer's instructions (Tangshan Innovita Biological Technology Co., Ltd., 2019-nCoV Ab Test (Colloidal Gold)).

Statistical analysis

Continuous variables are presented as the median (interquartile range, IQR) and categorical

variables are presented as n (%).

Results

A series of COVID-19 tests, including SARS-CoV-2 NAT of throat swabs, chest CT scan and a SARS-CoV-2-specific serological test, were conducted on a total of 1,054 obstetrics and gynecology outpatients. Three

cases of COVID-19 discovered in the recovery period (2 cases of NAT positive of SARS-CoV-2, 1 case of IgM and IgG positive of SARS-CoV-2) were excluded because of the concealment of the infection history, and 1,051 patients were included in the study. The median age was 38 years old (49-30). A total of 398 patients were admitted to the hospital for further treatment, 96 patients underwent outpatient surgery, and 557 persons required health check-ups due to re-employment and hospital escort requirements. The test result statistics for all patients are presented in Table I. The SARS-CoV-2 nucleic acid test was negative in all 1051 patients. Nine (9/1051, 0.856%) patients had IgM+ (and IgG+), which provided a hint of possible asymptomatic infection. The IgG+ individuals (33/1051, 3.140%) with no history of COVID-19 probably had recovered asymptomatic SARS-CoV-2 infections.

Seventy-six cases were diagnosed with abnormal uterine bleeding-related disease (excluding endometrial malignancy), and 5 of these patients were 2019-nCoV antibody positive (see Table 1); the positive rate was 6.579%, which is greater than the average positive rate of 3.974%, and the positive rate among patients with other diseases (2.770%, 3.604%, 4.453%), indicating that such patients may be more susceptible to SARS-CoV-2. Of 325 patients who were pregnant, the 2019-nCoV antibody positive rate was 2.770% (9/325), and the IgM positive rate was 0.615% (2/325), which was the lowest in the classification of diseases (see Table 1).

No signs of viral pneumonia were found on chest CT scans in the 1051 patients. In 9 patients who were IgM+ (and IgG+), only one patient had a chest CT scan that indicated ground glass nodules in the right lower lobe (see Supporting information). All IgM-positive patients were tested at least twice, and no nucleic acid positivity was found; one case of IgM positivity turned negative one week later (see Supporting information). All IgM-positive patients had no fever and no symptoms of COVID-19, and no SARS-CoV-2 infection was found in the 9 patients' families. None of the patients admitted to the hospital experienced SARS-CoV-2 infections during hospitalization.

Discussion

Main findings

A total of 1051 outpatients in this study underwent COVID-19-associated tests, and no NAT positivity was found. Seventy-six cases were diagnosed with abnormal uterine bleeding-related disease (excluding endometrial malignancy), 2019-nCoV antibody positive rate was 6.579%, which is greater than the average positive rate of 3.974%, and the positive rate among patients with other diseases. No nucleic acid positivity was found in the follow-up of 9 IgM-pisitive (and IgG-positive) patients, and no SARS-CoV-2 infection was found in any of the 9 patients' families.

Strengths and Limitations

The peak of the epidemic will eventually pass and preventing the repeated outbreaks is our common goal. This is the first study which focused on the optimized screening procedure to avoid hospital infections after the peak of the COVID-19 outbreak in obstetrics and gynecology outpatient. There are some limitations. First, the sample size of outpatients was relatively small. Second, for positive IgM test, quantitative tests should also be conducted to dynamically observe the changes in its level. Third, for patients with IgM positive, we should extend the follow-up time.

Interpretation

Since the peak of the outbreak, methods effectively prevent COVID-19 recurrence have been the focus. Studies have shown that asymptomatic infections are contagious [3]. Asymptomatic carriers can also be a source to propagate the outbreak. The literature reports SARS-CoV-2 test that turned positive in a discharged patient with COVID-19 [4]. Hospital outpatient clinics, which are specialized for epidemic prevention, are the first barrier to prevent infection in the hospital because inpatients are diagnosed here and admitted to the hospital. Officially released information from Wuhan indicated that there were still asymptomatic infections found every day as of May 8, 2020. The fact that no NAT-positive cases were found in our study may be related to our visit procedure, which includes monitoring body temperature and seriously inquiring about

past histories. Three patients with COVID-19 discovered in the recovery period had concealed a history of infection at the time of their visit. When the test results indicated abnormalities (2 patients were NAT positive, 1 patient was IgM-positive and IgG-positive), the patients confessed their medical history. Patients are required to sign a notification form confirming that they have are no COVID-19 symptoms or exposure history. It is worth mentioning that online telemedicine has played an important role in the diagnosis and treatment of obstetrics and gynecology patients. Our online clinic services cover video consultations, text-picture counseling, and medicine delivery. This approach reduced the number of people congregating in the hospital after the peak of the outbreak.

The IgG-positive individuals with no history of COVID-19 probably had recovered asymptomatic SARS-CoV-2 infections. A previous study reported that 10.26% of patients in the hospital were IgG positive but were all IgM and NAT negative [5]. In this study, the IgG positive rate of 3.140% (33/1051) was lower than that in other reports. The possible cause is that the patients were all female, and most of them had infrequent social interaction because they were unwell. Studies have reported that 13.5% of pregnant women in New York were SARS-CoV-2-positive but asymptomatic at the peak of the outbreak [6]. No NAT positivity was found, and the IgM positivity rate in the 325 patients who were pregnant in our study was 0.615% (2/325). At the same time, our study suggests that abnormal uterine bleeding and gynecological tumor patients may be more susceptible to COVID-19 and deserve our research attention. Despite the low number of cases, follow-up information suggests that IgM-positive patients are less contagious.

Current methods of screening for SARS-CoV-2 infection are the NAT, chest CT scan and serological testing. Our results suggest that CT has limited performance accuracy for SARS-CoV-2 infection screening in obstetrics and gynecology outpatients without a medical or exposure history of COVID-19 or suspected symptoms. In areas where testing resources are limited, a strict visit procedure is even more important, and a primary screening with serological testing alone or in combination with the NAT might be sufficient to triage the obstetrics and gynecology outpatients without a contact history or symptoms of SARS-CoV-2 infection.

Conclusion

After the peak of the outbreak, there is still a certain amount of asymptomatic COVID-19 infection in discharged patients and among the citizens. It is particularly important for outpatients to monitor their body temperature and exclude relevant medical histories before their outpatient medical visits. A more optimized screening procedure is required to avoid hospital infections.

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Conflict of Interest Disclosures: The authors report no conflict of interest.

Funding/Support: This work was supported by the National Natural Science Foundation of China [grant number 81672573].

Ethics approval: This study was approved by the Ethics Committee of Wuhan Union Hospital, Tongji Medical College, Huazhong University of Science and Technology [approval No.2020(0218)].

Acknowledgements: We wish to thank patients, and clinical staff who provided significant contributions to this study.

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Figure Legends

Figure 1. Visiting procedure and triage of obstetrics and gynecology outpatients.

5866 patients were treated in the outpatient department of obstetrics and gynecology from March 12, 2020 to April 26, 2020. Among them, 1054 patients received online treatment. The first step of visiting procedure was to measure the body temperature of 4812 patients. 6 patients whose body temperature was greater than 37.3 were transferred to designated outpatient clinics. The second step was to collect the medical history of 4806 patients. 15 patients with a COVID-19 or exposure history and 8 with respiratory symptoms were transferred to designated clinics. The third step of visiting procedure for the 4,778 patients was to sign a notification. A total of 3,724 patients went home at the end of their visit because of their mild condition. 1054 patients conducted a series of COVID-19-associated tests for inpatient treatment, outpatient surgery or physical examination. Step 4 confirm again that there is no COVID-19 or exposure history. 3 patients were excluded because of the concealment of the COVID-19 history, and 1051 patients were included in the study.

Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results
classification of patients	total	NAT+	IgG+ IgM-	IgM+ IgG-	IgM+ IgG+
all outpatients	1051	0	33	3	6
Patients with pregnancy	325	0	7	0	2
Gynecologic tumor patients	111	0	2	1	1
abnormal uterine bleeding patients#	76	0	3	1	1
other patients	539	0	21	1	2

Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results	Table 1. statistics of NAT and SARS-CoV-2-specific serological test results
#excluding endometrial malignancy