

ORIGINAL PAPER

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Maternal and perinatal characteristics of pregnant women with COVID-19 in a national hospital in Lima, Peru

Características materno perinatales de gestantes COVID-19 en un hospital nacional de Lima, Perú

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ABSTRACT

Introduction: The pandemic of coronavirus disease 2019 (COVID-19) has spread to more than 100 countries. Specific information about its behavior in pregnancy is still limited. **Objective:** To describe the maternal and perinatal characteristics of pregnant patients infected with COVID-19 and their newborns in a tertiary referral hospital. **Methods:** Descriptive study. Subjects were all pregnant patients admitted to the OB/GYN Emergency Department of the Edgardo Rebagliati Martins National Hospital from March 24 to May 7, 2020, who were diagnosed with SARS-CoV-2 infection by rapid test or by RT-PCR test. Medical and hospital records were reviewed to retrieve sociodemographic data, patient's history, clinical manifestations, maternal serology, obstetric complications, delivery mode and perinatal aspects. **Results:** 41 patients diagnosed with SARS-CoV-2 were identified. 9.2% of all admissions had a positive rapid test. The most common symptoms were cough in 84.6%, fever in 76.9% and sore throat in 61.5%. 68.2% of the patients were asymptomatic, 19.5% had mild illness and 7.3 % moderate. 2 cases progressed to severe pneumonia requiring non-invasive ventilation. No maternal deaths were recorded. 21.7% were vaginal deliveries, while 78.3% were C-sections. One baby born in a vaginal delivery had a positive PCR result on day 8. **Conclusions:** A large percentage of asymptomatic pregnant patients had a positive PCR test. Implementing universal screening among patients in labor as part of the pregnant patient flow protocol is necessary for all institutions.

Key words: Cesarean delivery; COVID-19; Neonatal outcome; SARS-CoV-2; Vaginal delivery.

RESUMEN

Introducción. La pandemia por coronavirus 2019 (COVID-19) se ha extendido en más de 100 países. La información específica sobre su comportamiento en el embarazo y parto sigue siendo limitada. **Objetivo.** Describir las características materno perinatales de pacientes gestantes con COVID-19 en un hospital terciario. **Métodos.** Estudio descriptivo. Se seleccionó todas las gestantes hospitalizadas por el servicio de emergencia de gineco-obstetricia entre el 24 de marzo y el 07 de mayo del 2020 y que tuvieron diagnóstico de infección por SARS-CoV-2, mediante la prueba rápida o la prueba RT-PCR. Se revisó la historia clínica y registros hospitalarios buscando variables sociodemográficas, antecedentes, manifestaciones clínicas, serología materna, complicaciones obstétricas, vía de parto y aspectos perinatales. **Resultados.** Se encontró 41 casos de pacientes con diagnóstico de SARS-CoV-2. Un 9,2% tuvo resultado de prueba rápida positiva, Los síntomas más comunes fueron tos en 84,6%, fiebre en 76,9% y dolor de garganta en 61,5%. Un 68,2% estuvo asintomática, 19,5% tuvo enfermedad leve y 7,3% moderada. Dos casos de neumonía severa requirieron ventilación no invasiva. No se registró muerte materna. 21,7% de los partos fue vía vaginal y 78,3% por cesárea. Hubo un caso de neonato por parto vaginal con PCR positivo al octavo día de vida. **Conclusiones.** Hubo un alto porcentaje de pacientes gestantes PCR positivas asintomáticas. Es necesario implementar el tamizaje universal en parturientas en el protocolo de flujo de gestantes en cada institución. **Palabras clave.** Parto vaginal, Cesárea, Recién nacido, Infecciones por coronavirus.

INTRODUCTION

By the end of 2019, a rise in pneumonia cases in Wuhan, province of Hubei, China, was recorded⁽¹⁾. Epidemiological surveillance detected a common exposition to a wholesale market in the city of Wuhan, where live animals were sold. Transmission and spread of this pneumonia, which caused up to 7 severe cases, was attributed to a new virus of the



Coronaviridae family called SARS-CoV-2, and the disease it causes has been named, by international consensus, COVID-19. Spread during the following months was fast, reaching all inhabited continents soon. On March 11, 2020, the World Health Organization declared the outbreak by the new coronavirus a pandemic, after it spread to over 100 countries worldwide.

In Peru, the index case (or first case) of COVID-19, reported on March 6, 2020, was a Peruvian male who had travelled to Spain, France and the Czech Republic. The virus spread to 8 first-generation confirmed cases (direct contacts), 2 second-generation cases (contacts of a confirmed first-generation case) and 2 third-generation cases (contacts of a confirmed second-generation case). Our country has the second highest infection rate in South America, with estimations of 58 526 laboratory-confirmed cases and 1 627 deaths (2.8% lethality) at the time we submitted this paper⁽²⁾. Currently, our country has regions with high rates of infection and mortality. Lima, with the highest infection rate, is considered a vulnerable or red area due to its large percentage of laboratory-confirmed cases. 35 299 cases and a substantial burden of disease have been reported in the eastern, northern and southern parts of Lima ("conos"), with a positive test rate of 14.9%, which shows a high level of contagion⁽²⁾. The seriousness of the situation caused the Peruvian government to declare a country-wide health emergency by supreme decree.

According to current evidence, the incubation period is 5 days (range 2 to 14 days). The disease affects mainly people over 30 years old, especially patients with comorbidities such as obesity and hypertension⁽³⁾. While new data on COVID-19 continue to help us daily increase our understanding of the disease, specific information about pregnancy is still limited. In previous pandemics like SARS and H1N1 influenza, pregnant women were more susceptible to develop more severe cases and had higher mortality rates than the general population⁽⁴⁾. The clinical profile of pregnant women with SARS-CoV-2 infection remains unclear, with limited data.

The Peruvian Social Health Insurance System (EsSalud) currently manages 32% of all hospitalized cases in the country. Attending circa 6 100 deliveries per year, the Edgardo Rebagliati Martins National Hospital is one of the biggest

health centers in the country belonging to Es-Salud. It is currently one of the main centers for treating COVID-19 at the national level.

We present our experience with pregnant patients diagnosed with COVID-19 by rapid and PCR tests, and their maternal and perinatal characteristics.

METHODS

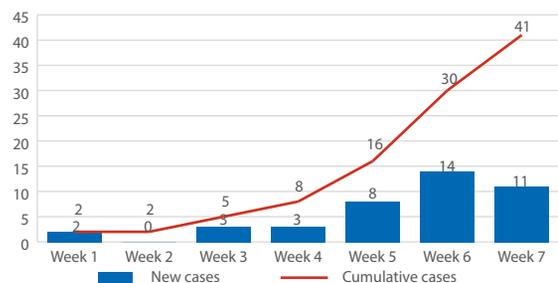
For this study, we selected all pregnant patients hospitalized in the OB/GYN emergency department between March 24 and May 7, 2020 who were diagnosed with SARS-CoV-2 infection by rapid test (Orient Gene COVID-19 IgG/IgM Rapid Diagnostic Test) in maternal blood or by RT-PCR testing of nasopharyngeal swabs after a positive rapid test or in cases with respiratory symptoms, regardless of rapid test status on admission. All pregnant women were evaluated for COVID-19 symptoms (fever, cough, sore throat, dyspnea, headache, muscle pain, diarrhea), upon which they were classified as asymptomatic or with mild, moderate or severe disease, according to the guidelines established in the technical document "Prevention, Diagnosis and Treatment of Persons Infected with COVID-19 in Peru (approved by Ministerial Resolution N° 193-2020 / National Health Ministry MINSAs)⁽⁵⁾. The following maternal variables were considered: age, gestational age, parity, status on admission (pregnant or postpartum), indication for C-section if it was performed, leukocytosis, lymphopenia, platelet count, C-reactive protein, creatinine, liver function tests, imaging findings when appropriate and respiratory and obstetric outcomes. Neonatal variables were delivery mode, sex, weight, Apgar score at birth and RT-PCR results for SARS-CoV-2. The information was entered to a digital data sheet, processed with SPSS v26.0 and presented in tables and figures for further analysis.

RESULTS

During the study period, 41 hospitalized patients were diagnosed with SARS-CoV-2, of which 37 were pregnant women and 4, postpartum mothers (Figure 1). The first infected pregnant woman was diagnosed on March 24; after this, screening was progressively implemented, starting with patients with respiratory symptoms and those undergoing surgery, until universal screening with rapid test was established for all patients admitted to our hospital on April 14.



FIGURE 1. WEEKLY AND CUMULATIVE FREQUENCY OF PATIENTS INFECTED WITH SARS-CoV-2



Maternal clinical characteristics are summarized in Table 1. The most common symptoms were cough in 84.6%, fever in 76.9% and sore throat in 61.5%. 20% of cases (8/41) had mild disease, 7.3% (3/41), moderate disease and 2 cases (4.8%, 2/41) had severe pneumonia that required admission to the intensive care unit (ICU) to receive non-invasive ventilation (Figure 2). No maternal deaths were registered. The prematurity rate

(under 37 weeks) was 18% (7/38); all cesarean sections were due to an obstetric indication except for one patient 32 weeks pregnant, whose indication was COVID-19 pneumonia. 2 pregnant patients aged 30 and 34 developed severe pneumonia. The first was 32 weeks pregnant and had consolidation and an infiltrate in the right hemithorax; she was in the ICU for 9 days and underwent a C-section due to the need to optimize maternal ventilation. The second case presented at 31 weeks gestation with bilateral ground-glass opacity and stayed in the ICU for 8 days. Currently, she is still hospitalized in our hospital's center for COVID-19-infected pregnant patients. Both women had lymphopenia, PCR > 10mg% and mild transaminasemia, and required non-invasive ventilation.

TABLE 1. CLINICAL PARAMETERS IN PREGNANT WOMEN WITH COVID-19.

Maternal age (in years)	
Average	32.3 years
Range	17.0 to 44.0 years
Maternal status on admission	
Pregnant	37/41 (90.2%)
Postpartum	4/41 (9.8%)
Gestational age on admission	
Average	36.3 weeks
Range	12.0 a 41.0 weeks
<37 weeks	7/38 (18%)
>37 weeks	31/38 (82%)
Parity	
Nulliparous	14/41 (34.2%)
Multiparous	27 /41 (65.8%)
Delivery mode	
Vaginal delivery	8/34 (23.5%)
C-section	26/34 (76.5%)
Indication for C-section	
COVID-19 pneumonia	1/38 (2.6%)
Obstetric indication	37/38 (97.4%)
Symptoms	
Asymptomatic	28/41
Cough	11/13 (84.6%)
Fever	10/13 (77%)
Sore throat	8/13 (61.5%)
Dyspnea	3/13 (23%)
Headache	2/13 (15.4%)
Muscle pain	3/13 (23%)
Diarrhea	1/13 (7.7%)

Out of the 41 total patients with SARS-CoV-2, rapid blood tests were carried out in 39 of them, obtaining 32 positive results. Among the 7 patients with a non-reactive blood test, symptoms persisted in 5 of them, 1 had fever during hospitalization and 1 reported having had contact with a case. Because of this, nasopharyngeal swabs were obtained, yielding positive results for SARS-CoV-2 at the RT-PCR test.

Table 2 shows the characteristics of the maternal laboratory and diagnostic tests. Since universal screening was implemented as a requirement upon admission, 316 rapid tests have been

FIGURE 2. SEVERITY OF DISEASE AND PRESENCE OF SYMPTOMS AMONG STUDY PATIENTS

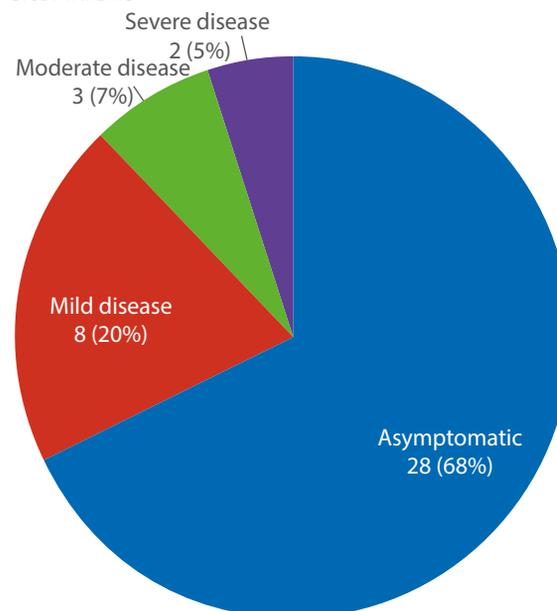




TABLE 2: DIAGNOSTIC TESTS AND LABORATORY RESULTS

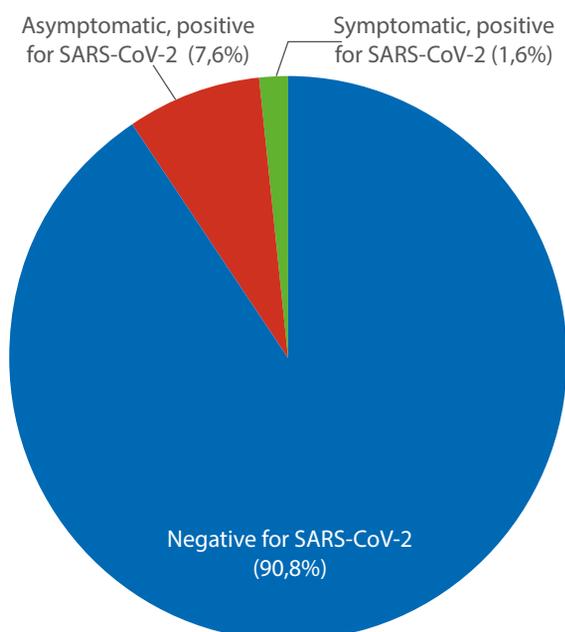
Diagnostic tests for SARS-CoV-2	
Positive rapid test	32/39 (82%)
IgM + and IgG +	18/32 (56,3%)
IgM +	5/32 (15,6%)
IgG +	9/32 (28,1%)
Negative rapid test	7/39 (18 %)
RT-PCR +	24/41 (58,5%)
Laboratory results	
Leukocytosis	11/41 (26,8%)
Leukopenia	2/41 (4,8%)
Lymphopenia	6/41 (14,6%)
Thrombocytopenia	5/41 (12,2%)
C-reactive protein >10 mg/dL	6/20 (30%)
Creatinine >0.9 mg %	1/41 (2,4%)
Transaminasemia	13/41 (31,7%)

* Leukocytosis: over 11 000 leukocytes/mL
 * Leukopenia: less than 5 000 leukocytes/mL
 * Lymphopenia: less than 1 000 lymphocytes/mL
 * Thrombocytopenia: less than 150 000 platelets/mL
 * Transaminasemia: TGO/TGP >35/45 U/L

performed by May 7, obtaining 29 (9.2%) reactive and 287 (90.8%) non-reactive results. Among the reactive cases, only 5 (17.2%) presented symptoms on admission, while 24 (82.8%) were asymptomatic (Figure 3).

Delivery was vaginal in 23.5%, the remaining 76.5% underwent a C-section (Table 2). The most frequent cause for surgery was history of 1 to 3 previous C-sections with 48.3%, followed by malposition and malpresentation with 20.7%, hy-

FIGURE 3. SYMPTOMS AND RESULTS OF SARS-CoV-2 TESTING AMONG OBSTETRIC PATIENTS.



pertensive disorders of pregnancy with 10.3%, and premature membrane rupture with 17.2%. One third of the vaginal deliveries were associated to other obstetric conditions such as previous C-section, preeclampsia and premature membrane rupture.

Regarding neonatal outcomes, the 41 mothers gave birth to 35 newborns either vaginally or by C-section, including one cesarean section due to a twin pregnancy of 34 weeks and severe pre-eclampsia. 71% of newborns were male, with an average weight of 3 200 g (1 775 to 4 625 g). Of the total, only three had a low Apgar score at minute one and all of them recovered fast after 5 minutes. All the newborns were tested for SARS-CoV-2 with RT-PCR, following our institution's protocol and, until submission date, only one baby born vaginally tested positive with a swab sample obtained at day 8. His mother had a negative rapid test on admission and, later, a positive PCR result, performed due to mild symptoms in the postpartum, so horizontal transmission is assumed.

DISCUSSION

The clinical characteristics of pregnant women with COVID-19 pneumonia in our study were similar to those of adults with COVID-19 pneumonia, as previously reported by Guan and Wu^(6,7). 68.2% (28/41) of pregnant women positive for SARS-CoV-2 did not present any symptoms and most were diagnosed on admission with rapid tests. Only 4.8% (2/41) of the infected pregnant women progressed to a severe pneumonia, which required admission to the ICU; none of them died. According to small case series^(8,9) with a total of 38 pregnant women diagnosed with COVID-19 during the second and third trimester, the most common symptoms were fever and cough, like in our study; cough was present in 84.6% and fever in 76.9% of cases.

In Peru, according to the dispositions of the Ministry of Health, positive cases are those with a positive result either to the rapid or to the RT-PCR test. Implementing rapid blood tests as a screening method particularly enables us to identify asymptomatic patients, whose proportion is similar to that reported in New York⁽¹⁰⁾ and double that from London⁽¹¹⁾. This could happen because the socioeconomic characteristics of our population determined the intensity of the



community spread in Lima to resemble that of the American city, where no measures of early confinement were adopted.

This is the first study to use rapid blood tests as a screening method, which is a cost-effective strategy to face the pandemic and, particularly, to detect asymptomatic patients⁽¹²⁾. Benefits consist in the early isolation of the pregnant woman with COVID-19 from her newborn to prevent horizontal transmission, and in the adequate use of the personal protective equipment (PPE) by the health care team during attention, especially in a resource-limited context, such as the current global one⁽¹³⁾.

Nevertheless, one severe case presented symptoms for two weeks and had two negative rapid tests, despite which she was admitted to the ICU as clinically suspicious. Diagnosis was confirmed with the RT-PCR test. There was also a false negative in an asymptomatic patient who tested positive with RT-PCR some days later, which could explain contagion of her newborn. Clinical judgement must always prevail and one must also consider that both tests have a false negative rate with important maternal-fetal implications⁽¹⁴⁾.

Regarding delivery mode, the hospital where the study was performed is a reference center for high risk patients, which could explain the higher rate of C-sections due to an obstetric indication in 96.2% of the cases. This rate is similar to that reported by Mehree⁽¹⁵⁾ of 75% (44/58) and to that by Li⁽¹⁶⁾ of 87% in confirmed cases. Both studies had controls with high C-section rates, 70% and 47.1%, respectively. Regarding etiology, our research's findings are similar to those published. Yang reported that the majority of patients (91%) underwent a C-section due to various indications, such as preeclampsia, fetal distress and previous C-section, as well as lack of knowledge regarding the risk of transmission to the newborn⁽¹⁷⁾. Recently, a case series of 10 infected pregnant women reported that 5 of them had an emergency C-section due to fetal distress, premature membrane rupture and fetal death, and that their COVID-19 severity was considered mild to moderate, except for one case of severe pneumonia⁽¹⁸⁾. Related studies have selection bias, small samples, and varying staging criteria for the infection. Nevertheless, to date, no definitive study about vertical transmission to the

newborn has been found; this missing information would suggest the best delivery mode. Obstetric conditions persist as the main indications for C-section.

This study is the first one in our country to describe a high rate of asymptomatic pregnant women with positive PCR after implementing a universal screening program. We believe that these results can be extrapolated to hospitals and centers with realities similar to ours. The potential benefits of a universal testing approach include the possibility of using a positive result to determine practices of hospital isolation and bed allocation, to inform about neonatal management and to guide the use of personal protective equipment. Access to these tests grants an important opportunity to protect mothers, newborns and health care teams during these hard times combatting the pandemic.

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