

Severe COVID-19 in cardiopath young pregnant without vertical transmission: a case report

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Case Report

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Abstract

Background: The new betacoronavirus known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of COVID-19, and has spread rapidly around the world, reaching more than 200 countries, around 7 million people and causing more than 400.000 deaths according to the World Health Organization.

Case presentation: A 26-year-old female at 28 weeks of gestation with regular prenatal care, a heart disease condition and no previous history of recent national or international traveling presented to a cardiology hospital, in Northern Brazil, with dry cough, sustained/continuous high fever, which quickly evolved to respiratory failure. Once stabilized an emergency cesarean was performed to preserve the fetus life. After surgery both patient and newborn were in Intensive Care Unit, then both patient and newborn nasopharyngeal and oropharyngeal secretion were obtained to test for respiratory viral infections, such as SARS-CoV-2, also blood samples were collected for laboratory exams. The patient's tested positive for SARS-CoV-2 however her newborn SARS-CoV-2. And during treatment due patient's conditions and severity the case evolved to death.

Conclusion: This report highlights the relevance of comorbidities for the unfavorable clinical course of COVID-19, despite the adequate treatment used for patients affected by COVID-19, especially among the risk groups, as well as demonstrating the absence of vertical transmission of SARS-CoV-2.

Background

On December 2019, in Wuhan city a Hubei province, cases of a new severe acute respiratory syndrome emerged, later named COVID-19 and having the SARS-CoV-2 as its etiological agent [1-3]. COVID-19 usually starts with mild respiratory symptoms, which can progress to severe pneumonia, respiratory failure and/or cardiovascular complications and, especially in risk groups such as heart diseases and diabetes, it can lead to death [4-7]. On June 9, 2020, in Brazil there are a total of 719,449 confirmed cases with 37,840 confirmed deaths by SARS-CoV-2 making Brazil the third country with most deaths by COVID-19 worldwide [8]. This report describes the clinical characteristics of a severe case of SARS-CoV-2 infection in a young cardiopath pregnant woman, without SARS-CoV-2 vertical transmission to the newborn.

Case Presentation

A 26-year-old female at 28 weeks of gestation with regular prenatal care, a heart disease due to rheumatic fever history and no previous history of recent national or international traveling. On 03/09/2020 she was presented to a cardiology hospital in Belém, Pará, Northern Brazil, with a ventricular tachyarrhythmia without any acute and/or chronic respiratory infection symptoms. While checking into the hospital, the patient put on a mask in the waiting room. After waiting approximately 15 minutes, she was taken into an examination room and underwent evaluation by a physician. She reported a replacement heart valves surgery in 2011 due to mitral valve stenosis and due to her condition, she remained hospitalized until day 03/25/2020 when she was discharged from the hospital.

However, on 03/30/2020, she returned to the same hospital presenting dry cough, sustained/continuous high fever of 39.0°C, which quickly evolved to respiratory failure, heart rate 145 beats per minute (bpm), blood pressure 147/95 mmHg, respiratory rate 44 incursion per minute (ipm) and oxygen saturation 72%. The patient underwent Endotracheal intubation (ETI) invasive mechanical ventilation (IMV) and stabilized. Due to the severity of patient's clinical symptoms and conditions, nasopharyngeal and oropharyngeal secretion were obtained to test for respiratory

viral infections, such as influenza A and B, parainfluenza, respiratory syncytial virus, rhinovirus, adenovirus and SARS-CoV-2, also blood samples were collected for laboratory exams. Then she was moved to a surgery room where an emergency cesarean was performed and considering the newborn prematurity, it was referred to the Neonatal Intensive Care Unit (NICU), also demanding IMV.

After emergency cesarean the patient was transferred to the Intensive Care Unit (ICU), on 03/31/2020, where all contact precautions were continued and all hospital's staff caring for the patient wore appropriate personal protective equipment (PPE). After patient's stabilization, a thoracic computer tomography scan showed multiple ground-glass parenchymal opacities, predominantly in the upper lobes, presenting pulmonary involvement greater than 60%. Such findings are consistent with differential diagnosis of COVID-19 (Fig.1). She began therapy with Tazocin + Osetalmivir, Chloroquine + Azithromycin and Dobutamine (03/31/2020). On 03/31/2020, the patient evolved to septic shock, which was reversed within 24 hours, then she presented clinical improvement, her temperature was 37.5°C, heart rate 82 bpm, the blood pressure 130/80 mmHg, respiratory rate 20 ipm and oxygen saturation 96% while IMV. On 01/04/2020 a IMV extubation was performed due to respiratory stabilization.

On 04/02/2020, new blood samples were collected for laboratory exams and from this day a daily routine of laboratory exams were performed during patient's hospitalization (Table 1). On 4th hospitalization day patient's nasopharyngeal and oropharyngeal swabs tested positive for SARS-CoV-2 by real-time reverse transcriptase polymerase chain reaction (rRT-PCR) assay. After confirmed diagnosis the patient remained hemodynamically stable, without vasoactive or eupneic drugs use, persistent dry cough, breathing ambient air, 90 mmHg invasive blood pressure (IBP), heart rate 80 bpm and oxygen saturation 95%. On 04/03/2020, the patient remained hemodynamically stable and conscious, however she reported persistent dry cough and mild breath pain. The vital signs were within normal ranges although oxygen saturation was varying between 93% and 98%, so nasal catheter with oxygen was executed.

On days 04/04/2020 and 04/05/2020, 5th and 6th hospitalization days patient's vital signs remained stable, apart from the development of intermittent drowsiness, periods of motor agitation, fevers and dry cough accompanied by periods of ventricular tachyarrhythmia. Later on, 04/05/2020 Amiodarone was administered by continuous infusion pump, to improvement in patient's arrhythmia and she complained about mastication and deglutition difficulties, so subsequently an enteral diet was started. On 04/06/2020, patient underwent a physical examination which revealed a moderate drowsiness, eupneic and breathing ambient air, 95 mmHg IBP, heart rate 70 bpm and oxygen saturation 95% appearing fatigued and leukocytosis. At night on 7th hospitalization day, the patient referred a diarrheal episode and abdominal discomfort.

On 04/07/2020, patient's the clinical symptoms increased presenting tachycardia (132 bpm), hypertension (141/110 mmHg) and respiratory failure, requiring ETI and IMV. On 08/04/2020, the patient remained intubated, with continuous sedation and it was administrated Noradrenaline and Dobutamine, during her stabilization, clinical parameters were PaO₂/FiO₂ ratio of 163 mmHg and leukocytosis. The lung auscultation revealed bilateral rhonchi on pulmonary bases. On days 04/09/2020 and 04/10/2020, 10th and 11th hospitalization days patient's clinical condition had a severe decreased, she presented ventricular tachycardia with hemodynamic instability (163 bpm), hypotension (83/44 mmHg), PaO₂/FiO₂ ratio of 80 mmHg and respiratory failure. During the patient's stabilization procedures, the medical team performed ventilation in a prone position, which was maintained for 12 hours, improving the PaO₂/FiO₂ ratio in 130mmHg.

On 11/04/2020, the patient respiratory conditions and parameters decreased rapidly, oxygen saturation 56%. Lung auscultation showed coarse breath sounds, wheezes and medium coarse crackles, then hemodynamic stabilization

procedures were performed with no success and later she progressed for cardiorespiratory arrest, evolving to death, despite all attempts of cardiopulmonary resuscitation.

During her mother's hospitalization, the newborn was entirely assisted by NICU staff. Right after the cesarean physical examinations were performed to check the newborn health due to her prematurity. As well as nasopharyngeal and oropharyngeal secretion were obtained to test for respiratory viral infections, such as influenza A and B, parainfluenza, respiratory syncytial virus, rhinovirus, adenovirus and SARS-CoV-2. During her stay in the NICU, there was no leukocytosis episodes and the newborn remained asymptomatic the entire internment. Therefore, no additional treatment was needed in the NICU, the respiratory viral infections rRT-PCR assay, was performed in the first 24 hours of life, with a negative result to respiratory viral infections. As standard procedure she remained under observation in the NICU for 8 days until she discharged home; pediatric follow-up shows absence of vertical transmission of SARS-CoV-2.

Specimen Collection and Diagnostic Testing for SARS-CoV-2

Clinical materials were taken from nasopharynx, oral mucosa and oropharynx for fluids and skin surface from both patient and newborn, the samples were obtained with mini swabs by ICU professionals and placed in 2mL universal viral transport media. Both samples were submitted to rRT-PCR assay following the Charité protocol for influenza A and B, parainfluenza, respiratory syncytial virus, rhinovirus, adenovirus and SARS-CoV-2 as recommended by the World Health Organization (WHO) and by Brazilian Ministry of Health [9]. The testing consisted by extraction of nucleic acid on the QIAamp Diagnostics platform, followed by RT-PCR on Applied Biosystems 7500 Real-Time PCR System [10].

Patient's labor and PPE:

As mentioned before, the patient's labor course was in a surgery room on the ICU floor, close to the obstetrics/neonatology unit and even being an emergency cesarean all safety protocols for the procedure were followed and before surgery the neonatal intensive care physician consulted her obstetrician and it was informed she had a regular prenatal care. The surgical environment and its surfaces were disinfected using 2% chlorhexidine and all healthcare personnel that participated of her labor obeyed the hospital's guidelines for proper PPE to prevent COVID-19, including eye protection, gloves, masks N95, in addition to a cloak, disposable surgical cap and knee-high shoe covers.

The labor was assisted by a team composed of obstetricians, pediatricians and nurses, it occurred without obstetric complications. To prevent COVID-19 dissemination social distancing between mother and newborn was implemented and immediate clamping of the umbilical cord was performed. The newborn was at 28 weeks, weighing 1534 grams, presented an Apgar score of 5 in the first and fifth minutes. she was then placed in an VMI incubator, due to significant respiratory distress, resulting from moderate prematurity and transferred to the NICU, where he remained under constant observation until discharge.

SARS-CoV-2 Specimen Testing

Due to case urgency, the results of rRT-PCR assay were released approximately 72 hours after samples collection and the pathogens investigated were, as previously mentioned, were influenza A and B, parainfluenza, respiratory syncytial virus, rhinovirus, adenovirus and SARS-CoV-2. The result of the patient's sample was positive for SARS-CoV-2, however the newborn's result was negative for SARS-CoV-2.

Discussion And Conclusions

This paper reports a fatal case of a young pregnant woman with heart disease, who had a confirmed diagnosis of COVID-19 during her 28th week of pregnancy and had a severe clinical evolution. This case report illustrates and confirms some aspects of this emerging viral outbreak that are not yet fully understood, including community transmission dynamics, implications among risk groups and COVID-19 clinical aspects in these specific groups, which can develop to severe conditions and perhaps death [11,12]. According to the patient and her husband, during her initial evaluation, she had no recent national and international traveling history or had been in contact with people from regions affected by SARS-CoV-2. Although the source of her infection is unknown, her case shows that in Brazil, community transmission was already active, requiring control and prevention measures by the Brazilian Ministry of Health, as well as monitoring and testing possible cases [13,14].

Initially, pregnant women, as well as cardiopath, elderly, obese and diabetics patients were classified as risk groups to SARS-CoV-2 and might evolve to unfavorable clinical conditions given the risks inherent to their clinical status and specific in the pregnant women risk group the possibility of vertical transmission to the fetus [12-14]. Therefore, an increasing number of studies sought to assess possible maternal risks in pregnant women positive for COVID-19. The literature has described and reported that the majority of pregnant women presented asymptomatic or mild infection and just a minority of cases among pregnant women infected by SARS-CoV-2 required ICU admission and mechanical ventilatory support. During the analysis of these studies, there were no reports of vertical transmissions. To date, it is not known how immune regulation related to pregnancy alters the course of COVID-19 or how the mother's immune system inhibits transmission of the virus to the fetus [15].

The young woman case presented in this report had a history of heart disease due to rheumatic fever, which resulted in a replace heart valves surgery performed in 2011 due to mitral valve stenosis, condition that might being a risk factor for COVID-19. Therefore, the patient's death may be related to her comorbidity, as it is known that, in addition to pulmonary complications, SARS-CoV-2 is capable of causing cardiovascular disorders. Studies also indicate that the use of PPE and social distancing decreases the transmission rates of SARS-CoV-2 to the fetus. However, there is still insufficient evidence that cesarean is indeed a more protective method than normal labor for the newborn [16,17].

The risk of vertical transmission still remains unknown and, to date, there are no proven reports of this type of transmission¹⁷. A relevant data in this report is that the nasopharyngeal swab sample was collected for RT-qPCR within the first 24 hours of the newborn's life, which showed a negative result for SARS-CoV-2. It is believed that in addition to the action of the maternal immune system, preoperative care in cesarean sections, such as wearing a mask by the mother, sterility of the environment and isolation measures implemented immediately after birth, decreased the chances of contagion of the newborn [18].

Among the main relevant clinical aspects of this case, we mention the patient's initial visit to the emergency department due to a condition of ventricular tachyarrhythmia, being hospitalized for the first time for 16 days and without signs and symptoms of acute and / or chronic respiratory infection. However, just 5 days after her hospital discharge, she returned with severe dyspnea and a fever of 39°C, rapidly evolving during her care for severe respiratory failure, which reaffirms the unfavorable prognosis of patients belonging to the so-called risk groups for COVID-19, given the severe and accelerated evolution of the disease. It is also worth noting the importance of monitoring the rules of social distancing and lockdown during the pandemic by the responsible federal entities, since cases of community transmission are increasingly common [15-18].

It is concluded that SARS-CoV-2 infection in the pregnant woman in the study was severe due to its previous comorbidity, differing from other cases described in the literature in this specific population who are free of

comorbidities. It is suggested that the clinical and laboratory worsening may be related to the patient's pre-existing cardiac condition. In addition, the absence of vertical transmission of SARS-CoV-2 was evidenced in the presented report, reinforcing the idea that this type of transmission for this virus is unlikely, although more studies need to be carried out to confirm this finding.

Declarations

Ethics approval and consent to participate

Written informed consent was obtained by the patient publication of this case report.

Consent for publication

As mentioned above, consent for publication was obtained by the patient. Written informed consent was obtained from the patient for publication of this report and any accompanying images and informations. A copy of the written consent is available for review by the Editor of this journal.

Availability of data and materials

The data referred to this case during the current study was available on request to the corresponding author.

Competing interests

The authors declare that they have no competing interests.

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None.

Authors' contributions

All read and approved the final manuscript. APFMF, DVP, EVR, FNV, KSM were involved in the care of the patient. LFAM, APFMF was involved in the article conceptualization. APFMF, PAN, RRSF were involved in data curation. APFMF, PAN, RRSF were involved in writing and original draft. PAN, RRSF, LFAM were responsible for translation. LFAM were involved in review & editing. RRSF was responsible for submission.

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Table

Table 1- Laboratory Results

*Troponin I was not requested during internment/ **D- dimer was requested twice without notable results/ AST[‡] aspartate aminotransferase/ ALT[†] alanine aminotransferase.

Figures

Test	Table 1. Pregnant woman with COVID-19 clinical laboratory results										
	Reference range	Hospital internment days (2020)									
		02/04	03/04	04/04	05/04	06/04	07/04	08/04	09/04	10/04	11/04
C reactive protein (mg/dl)	<1.0	0,5	2.0	7.42	4.6	9.0	-	-	15.6	9.0	-
Troponin I* (ng/ml)	-	-	-	-	-	-	-	-	-	-	-
D-dimer** (ng/ml)	-	-	-	-	-	-	-	-	-	-	-
Sodium (mmol/L)	137 - 145	146	149	150	147	148	-	-	147	146	149
Potassium (mmol/L)	3.5 - 5.1	3.4	3.2	3.9	2.4	2.7	-	-	3.0	4.1	4.9
pCO2 (mmhg)	35 - 45	76	34	36	32.4	100	-	-	44.4	47	44
pO2 (mmhg)	75 - 100	76	165	191	78.4	107	-	-	56	130	139
Urea (mg/dl)	15 - 36	25	48	45	26	28	-	-	24	33	-
Creatinine (mg/dl)	0.52 - 1.04	0,3	0,3	0,2	0,2	0,3	-	-	0,2	0,2	-
Calcium (mg/dl)	8,4 - 10,2	7.8	7.3	8.0	7.4	-	-	-	7.2	6.9	-
Hemoglobin (g/dl)	12 - 18	9.1	8.6	8.9	8.6	8.9	-	-	8.5	7.8	-
Hematocrit (%)	36 - 55	27.7	23.6	27	26.2	28.1	-	-	24.1	25	-
Leukocytes (per mm ³)	4.000 - 10.000	9022	6771	11.570	12.030	13.400	13.550	-	10.430	9985	-
Segments (per mm ³)	5.232	4739	3564	8.625	11.517	-	-	-	-	-	-
Lymphocyte (per mm ³)	1.160 - 4.100	3069	1355	1339	1004	1221	-	-	627	1011	-
Lactic acid (mmol/L)	0.5 - 2.0	2.3	0.6	0.7	0.9	0.7	-	-	1.0	1.5	4.9
Total bilirubin (mg/dl)	0.2 - 1.3	0.32	0.29	0.25	0.20	0.70	-	-	-	-	-
Platelets (per mm ³)	150.000 - 440.000/	162.800	161.600	197.900	259.00	-	-	-	233.100	206.300	-
AST [†] (U/L)	14 - 36	71	39	69	-	-	-	-	86	95	-
ALT [†] (U/L)	<35	23	19	16	-	-	-	-	15	16	-

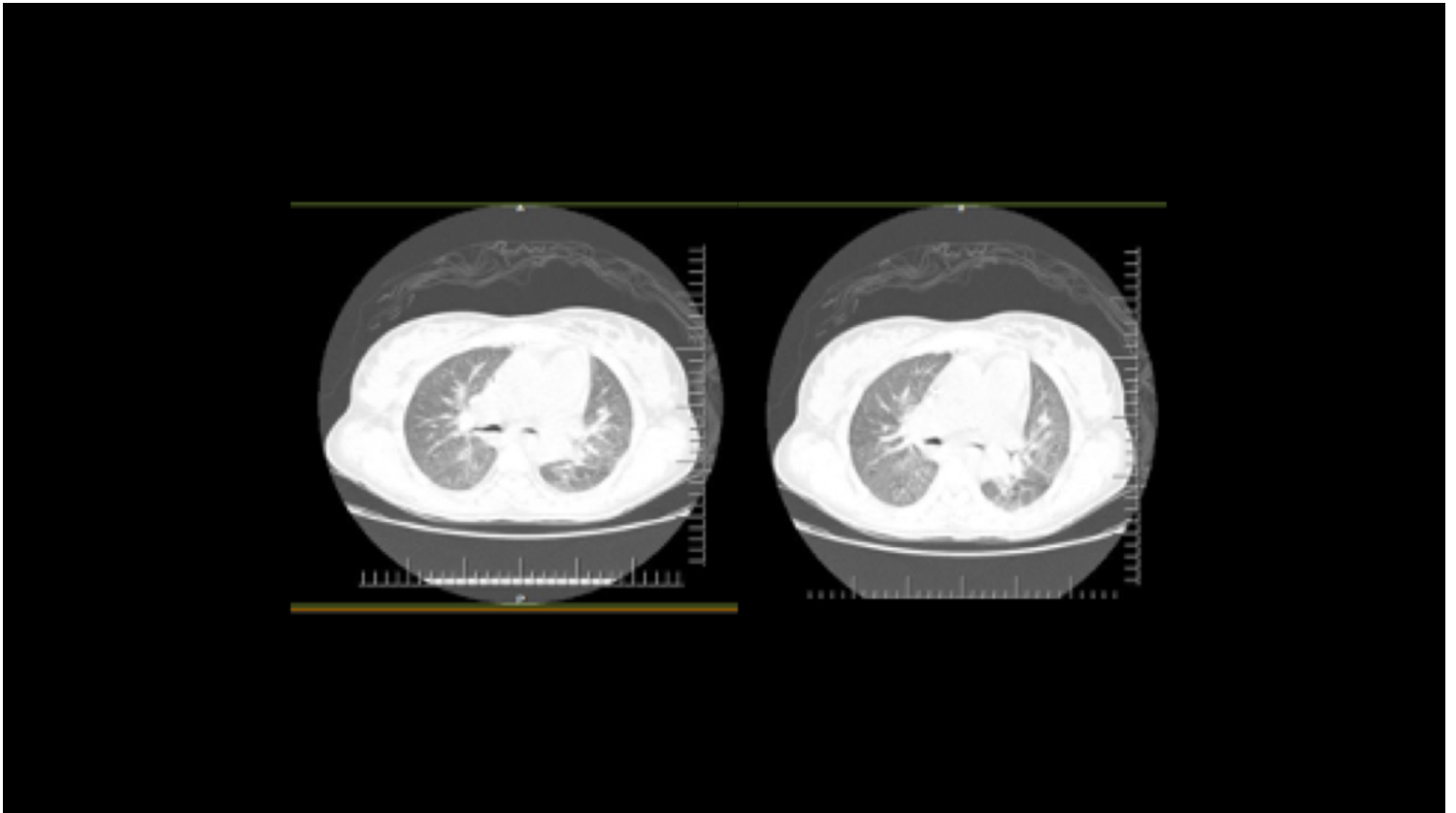


Figure 1

Thoracic computer tomography scans showing multiple ground-glass parenchymal opacities, predominantly in the upper lobes, presenting bilateral pleural effusion with parenchymal consolidations and bilateral multifocal distribution with the estimated extent of pulmonary involvement greater than 60%. Such findings are consistent with viral pneumonia and differential diagnosis of COVID-19 (03/31/2020, day 2 of the onset of symptoms).