

CASE REPORT

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Spontaneous pneumothorax in a pregnant woman with COVID-19: a case report

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Abstract: Numerous symptoms and complications of COVID-19 include pneumothorax as a rare but potentially-lethal condition. The present case report involved a pregnant woman with COVID-19 presenting with pneumothorax. A 30-year-old pregnant woman with COVID-19 and a gestational age of 32 weeks presented to our hospital with dyspnea, coughs and fever. The rales initially heard in both lungs continued to be heard only in the left lung after 24 hours. Pneumothorax was confirmed through radiology. The emergency cesarean section performed to avoid the potential detrimental effects of the infection on the fetus caused no breathing episodes in the biophysical profile. The patient recovered postpartum without complications and both the mother and the newborn were discharged 12 days later. Spontaneous pneumothorax is a rare complication in COVID-19 pregnant patients that can emerge at any stage of the disease.

Keywords: COVID-19; Pandemics; Parturition; Pneumothorax; Pregnancy

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1. Introduction

An outbreak of an unexplained pneumonia was reported in China in late December 2019. Examining the samples taken from the lower respiratory tract revealed an unknown disease, which was then named COVID-19 by the World Health Organization (WHO) (1). Pregnant women are at high risks for severe COVID-19 and its adverse pregnancy outcomes (2, 3). COVID-19 caused intensive care unit (ICU) admission in 16% of pregnant women, mechanical ventilation in 8% and death in 1% (4). Hollingshead and Hanrahan pioneered the reporting of pneumothorax as a complication of COVID-19 one month after treating a patient (5). The overall incidence of spontaneous pneumothorax was reported as 1% (6). However, the incidence of this complication in pregnant women is much rarer. The present case report involved a pregnant patient with COVID-19 who developed pneumothorax during her hospital stay. The presentation was provided after asking the patient to announce her consent and was approved by the Ethics Committee of Jahrom University of Medical Sciences (IR.JUMS.REC.1400.001). Written informed consent was obtained from the patient for publishing this case report and any accompanying images.

2. Case presentation

This report focused on a 30-year-old woman, G2L0D1, with a gestational age of 32 weeks, 8-year history of secondary infertility and no history of systemic or autoimmune disease other than diet-controlled gestational diabetes mellitus. The patient became pregnant after losing her 9-year-old child duo to a car accident. She suffered from fever, body aches, coughs and shortness of breath 5 days prior to admission. Her reverse transcription polymerase chain reaction (RT-PCR) test was found positive for SARS-CoV-2 after presenting to a hospital near her place of residence. She was then immediately referred with dyspnea and nausea to the emergency department (ED) of a COVID-19 specialized hospital in Jahrom, Iran. Her vital signs were measured upon admission as follows: blood pressure: 117/81 mmHg, pulse rate: 104 beats/min, respiratory rate: 20/min, oral temperature: 37°C, O₂ saturation in room air: 86%.

Her lung examinations showed fine bilateral rales, which were more intense on the right side. According to national guidelines at the time of patient admission, she was prescribed with atazanavir, azithromycin, dexamethasone, atorvastatin, enoxaparin, zinc, famotidine, vitamin C, vitamin D3 and oxygen via masks as needed. High-resolution computed tomography (HRCT) was not, however, performed due to her pregnancy and the patient's unwillingness. Moni-

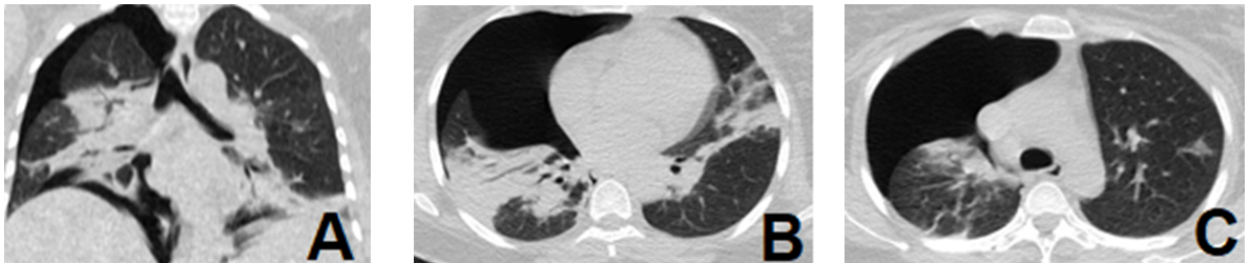


Figure 1 A) Coronal and B) axial sections of low dose HRCT taken after the chest x-ray to confirm the diagnosis and follow up for other potential complications. The chest X-ray showed diffuse and bilateral consolidation, pneumonia and pneumothorax on the right side, which caused the collapse of the right lung C). Lower lobe predominant ground-glass opacities caused by COVID-19

toring the fetal status showed 6 accelerations in 20 minutes in the non-stress test (NST), a biophysical profile score of 8/8 and an amniotic fluid index (AFI) of 18 cm.

Deterioration of the patient's general health on her admission day caused the establishment of a care committee comprising a pediatrician, an obstetrician/gynecologist, an infectiologist, an internist, a cardiologist, a radiologist and a psychiatrist. This committee was in charge of declaring the need for termination of pregnancy and ordering diagnostic imaging modalities especially HRCT. On 2nd day of admission, a sudden shortness of breath and a sharp and sudden chest pain were observed in the patient. The rales heard in both lungs continued to be heard only in the left lung after a while. The low-dose HRCT ultimately performed confirmed pneumothorax (Figure 1), which deteriorated the patient's status. Thereafter, tube thoracostomy was performed, and the patient was transferred to ICU. One gram of vancomycin was also prescribed every 12 hours and 1 gram of meropenem every 8 hours, given the generally-poor health status and pneumonia of the patient. She was provided with an oxygen mask rather than undergoing mechanical ventilation. The NST and blood sugar measurement were performed on a daily basis. Insulin was administered due to pregnancy-induced hyperglycemia. Psychiatric counseling was also performed to improve the emotional status of the patient.

on the 2nd day of admission to the ICU, due to decreased fetal activity, NST repeated after hydration that showed fatal tachycardia, negative beat-to-beat variability and no acceleration. The biophysical profile also suggested fine limb movements, no breathing and a score of 6/8. A renewed lung HRCT scan was performed (Figure 2), enoxaparin discontinued and the patient underwent an emergency cesarean section to terminate her pregnancy at the discretion of the care committee. Cesarean section was performed under spinal anesthesia with vertical and transverse incisions made on the abdominal wall and the uterus, respectively. The preterm infant in transverse lie born at the gestational age of 32 weeks was then transferred to the neonatal intensive care unit (NICU). Although the RT-PCR was negative for COVID-19 in the neonate, she was isolated from her mother throughout the hospitalization.

Twelve hours after the operation, enoxaparin and remdesivir



Figure 2 HRCT was performed before cesarean section and after tube thoracostomy to help manage the patient during her operation. The intervention caused subcutaneous emphysema around the chest tube



Figure 3 Chest X-ray; this modality was taken three hours after clamping the chest tube. The chest tube was later removed as there was no further evidence for air in the chest. The posteroanterior view showed trachea in the midline and no mediastinal rotation and consolidation in the lung parenchyma

were administered based on national guidelines. Remdesivir and vancomycin were discontinued with the improvement in the patient's general condition two days after her cesarean section. Moreover, a chest x-ray was performed three hours after clamping the chest tube, which was removed after 4 days (Figure 3). The patient was then transferred to the ward to regulate her blood sugar. Despite lower daily needs

for insulin after the cesarean section, NPH insulin was administered until the patient was discharged. After 12 days of ICU admission, the patient was discharged with a proper general health and prescribed with olanzapine, sertraline, enoxaparin, famotidine, prednisolone and insulin. The neonate was also discharged in normal conditions four days after her birth.

3. Discussion

COVID-19 is a respiratory disease involving the lower respiratory tract, most often caused by close contact with an infected person (7). Pregnant women are at risk, and the number of cases is constantly growing (2, 8). Physiological changes such as elevated hemidiaphragm, increased oxygen consumption and inflammation of the mucous membranes of the respiratory tract increase the vulnerability of pregnant women to respiratory diseases, including pneumonia (3, 9). Although pregnant women are not immune-compromised in the classical sense, their immunologic changes increase their vulnerability to intracellular pathogens, especially viruses such as severe acute respiratory syndrome (SARS) (10).

The outcomes in the second and third trimester of pregnancy have rarely been addressed in literature; nevertheless, preterm premature rupture of membranes, preterm labor, fetal distress, and intrauterine fetal death were reported in pregnant women with COVID-19 (2, 11). Other complications include different types of organ dysfunction, shocks, acute respiratory distress syndrome (ARDS), arrhythmia and thrombosis as well as spontaneous pneumothorax in rare cases were also reported (11-14). Research suggests a prevalence of 1%-2% for pneumothorax in patients with COVID-19 (15). Alveolar rupture was reported as the cause of pneumothorax despite its yet-unknown relationships with SARS-CoV-2 and inadequate evidence for its mechanism and physiopathology (14, 16). This complication can rapidly progress and even cause death. Early diagnosis of this disease and its continuous monitoring are therefore crucial for a successful treatment.

Early diagnosis of COVID-19 mainly through laboratory tests such as RT-PCR and lung CT scan and appropriate treatments are crucial for reducing its complications and mortality (11). In pregnant women according to guidelines, the final diagnosis of COVID-19 is a nasal and throat swab for RT-PCR. Also, low dose CT-scan can be used as a screening test because the dosages are relatively safe during pregnancy when abdominal shielding is used. Although this radiation is low enough not to be harmful for the fetus, especially when protected by a lead protection; Albeit, the exposure of breast tissue to radiation can still be harmful and may increase breast cancer risk in the future (17-21). On the other hand, failing to accurately diagnose the disease in time most likely causes dire consequences.

Performing appropriate management and follow-up had recovered several pregnant women with COVID-19 in the hos-

pital. This experience helped adopt optimal strategies in the face of the emerging complication of COVID-19 and ultimately save both the mother and her neonate despite high stress levels in the woman and the birth of the premature baby.

4. Conclusion

Spontaneous pneumothorax is a rare complication in COVID-19 pregnant patients that can emerge at any stage of the disease. Given the rapid and terminal course of this complication, its early diagnosis is vital for providing adequate care and treatment for the patients.

5. Declarations

5.1. Acknowledgment

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5.2. Authors' contribution

All the authors met the standards of authorship based on the recommendations of the International Committee of Medical Journal Editors.

5.3. Conflict of interest

None declared.

5.4. Funding

None declared.

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