



Coronavirus (COVID-19) Infection in Pregnancy: Does Non-contrast Chest Computed Tomography (CT) Have a Role in Its Evaluation and Management?

Swati Francis¹  · Rishi Philip Mathew²  · Zareena A. Khalid¹ 

Received: 9 April 2020 / Accepted: 15 June 2020 / Published online: 29 June 2020
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Abstract

The outbreak of COVID-19 has become a globally concerning pandemic having affected more than 5 million people worldwide. The disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is highly contagious. Only limited literature exists on the evaluation and management of pregnant women with suspected or confirmed COVID-19. In this short commentary, we inform the readers of the potential role of chest CT in symptomatic COVID-19 pregnant women and the related limitations.

Keywords COVID-19 · Coronavirus · Chest CT · Pregnancy · Severe acute respiratory syndrome coronavirus-2 · SARS-CoV-2

An outbreak of pneumonia of unknown etiology occurred in Wuhan, Hubei province in China, in December 2019. By various molecular analytical methods, the pathogen was identified as a novel enveloped RNA beta-corona virus, named by the World Health Organization (WHO) as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), and the disease caused by it as Corona Virus Disease 2019 or COVID-19 [1]. COVID-19 is highly contagious and as of May 30, 2020, the WHO reports 5,775,043 confirmed COVID-19 cases worldwide and 361,220 related deaths.

Pregnant women, due to their immunosuppressive state as well as from the adaptable physiological changes during

this period (e.g. increased heart rate, stroke volume, oxygen consumption, decreased lung capacity and edema of respiratory tract mucosa etc.), are particularly prone to respiratory pathogens and severe pneumonia, and COVID-19 is no exception [2]. As per international guidelines followed around the world, the diagnosis of COVID-19 must be confirmed by reverse transcription polymerase chain reaction (RT-PCR) assay. However, the test is limited by sample collection, transportation and kit performance. RT-PCR kit availability is also an issue in some centres. In addition, although the RT-PCR tests have a high specificity, studies have shown that the sensitivity is only around 30–70% at initial presentation [3, 4].

Chest CT plays a crucial role in the initial evaluation, management and follow-up of COVID-19 patients, and several studies have shown the sensitivity of chest CT to be superior to that of RT-PCR for the early detection of COVID-19 [1, 5]. In one of the largest studies on COVID-19 patients conducted till date, involving 1014 patients, Ai et al. [5] evaluated the diagnostic value and consistency of chest CT in comparison with RT-PCR assay. They found that the sensitivity, specificity and accuracy of chest CT were 97%, 25% and 68%, respectively, while the positive and negative predictive values were 65% and 83%, respectively. Additionally, 60–93% had initial positive chest CT findings before the initial positive RT-PCR tests, also 42% of the showed improvement on follow-up CT much before

Swati Francis, MBBS, MS, FMAS is a Specialist in the Department of Obstetrics and Gynaecology, Aster Medcity, Cheranelloor, Kochi, Kerala, India; Rishi Philip Mathew, MBBS, DMRD, EDiR is an Assistant Consultant in the Department of Radiology, Rajagiri Hospital, Chunangamvely, Aluva, Kochi, Kerala, India; and Zareena A. Khalid, MBBS, MD, MRCOG (UK) is a Senior Consultant in the Department of Obstetrics and Gynaecology, Aster Medcity, Cheranelloor, Kochi, Kerala, India.

✉ Rishi Philip Mathew
dr_rishimathew@yahoo.com

¹ Department of Obstetrics and Gynaecology, Aster Medcity, Cheranelloor, Kochi, Kerala, India

² Department of Radiology, Rajagiri Hospital, Chunangamvely, Aluva, Kochi, Kerala, India

the RT-PCR results turned negative. But more interestingly, chest CT was positive in 75% of the patients with negative RT-PCR results.

Panahi et al. [6] conducted a literature search in various reputable databases including PubMed, Scopus, Embase, Science Direct, and Web of Science using MeSH-compliant keywords such as COVID-19, Coronavirus 2019, Pregnancy, SARS-CoV-2 and 2019-nCoV from December 2019 to March 18, 2020; and came across 13 articles in English related to pregnant women with COVID-19 which they reviewed. Based on the combined available literature, a total of 37 pregnant women with COVID-19 and 38 newborns (two were twins) were studied. All of the 37 pregnant women prior to delivery underwent chest CT which revealed ground glass opacity (GGO) with progressive to consolidations, findings that were highly characteristic for COVID-19 [6].

In view of the findings based on the above study as well as from similar ones, some experts consider chest CT without contrast to be a useful investigation to confirm or exclude viral pneumonia in symptomatic pregnant women, considering the fact that radiation exposure to the foetus is very small. As per the information provided by the American College of Radiology and the American College of Obstetrics and Gynaecology, when a pregnant woman undergoes a CT examination, the fetal radiation dose is 0.01–0.66 milli Gray (mGy). Routine diagnostic imaging doses are much less than 1 Gy which is the threshold for early embryonic injury (while the minimum dose that can cause developmental delay is > 610 mGy). Taking into account the risk versus benefit ratio, CT may be used as clinically applicable in suspected or confirmed symptomatic COVID-19 pregnant women, after obtaining informed consent [7]. In fact, as per the Royal College of Obstetricians and Gynaecologists (RCOG) information for health professionals for COVID-19 infection in pregnancy (version 9: May 13, 2020) clearly states that “chest imaging, especially chest CT, is essential for the evaluation of the unwell patient with COVID-19 and should be performed when indicated, and not delayed because of fetal concerns” [8]. Techniques such as abdominal and pelvic shielding using lead sheets and limiting exposure times can be employed to reduce the radiation exposure. As per the assessment and management algorithm put forward by the American College of Obstetrics and Gynecologists (ACOG) for the management of suspected or confirmed COVID-19 pregnant women, CT (with abdominal shielding) can be used as an optional imaging tool if clinically indicated in pregnant women under moderate risk category (i.e. those with respiratory compromise) [9].

We felt the urgent need to apprise the members of the OB-GYN community of India, the potential role of chest CT in symptomatic suspected or confirmed COVID-19 pregnant women. Nevertheless, one must keep in mind that chest CT should not be used as a screening tool for COVID-19 disease, as the currently accepted test both for diagnosing and screening COVID-19 infection worldwide still remains RT-PCR. Although chest CT has good pickup of COVID-19 pulmonary lesions, its widespread use has cost constraints especially for a developing country like India, limitations from technical know-how, feasibility, as well as maintenance issues, not to mention the risk of radiation. Chest CT may be best reserved for those COVID-19 pregnant women who are not responding to treatment, as a lifesaving measure to look for an alternate diagnosis or to diagnose complications, there by changing the management protocols. Additionally, one must keep in mind that COVID-19 is a rapidly evolving situation and current guidelines may become out-of-date as new information on COVID-19 in pregnant women becomes available.

Funding None.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Statement The manuscript follows the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

About the Author



Dr. Swati Francis is currently working as a specialist in the Department of Obstetrics and Gynaecology at Aster Medcity Hospital, Kochi, Kerala, India. Her areas of interest are in maternal-fetal medicine and high-risk pregnancy. She is also a passionate researcher and has presented at national and international conferences.