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Protecting Pregnant Women and Their Infants From COVID-19: Clues From Maternal Viral Loads, Antibody Responses, and Placentas

Denise J. Jamieson, MD, MPH; Sonja A. Rasmussen, MD, MS

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Author affiliations and article information are listed at the end of this article.

The study by Edlow and colleagues[1] carefully characterizes several key biologic parameters of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection during pregnancy, including maternal viral load and antibody response, transplacental antibody transfer, and placental pathology in 64 pregnant women with reverse transcription–polymerase chain reaction (RT-PCR)-confirmed SARS-CoV-2 infection. Women were prospectively enrolled at 3 Harvard-affiliated hospitals in Boston, Massachusetts, (ie, Massachusetts General Hospital, Beth Israel Deaconess Medical Center, and Brigham and Women's Hospital) during the first wave of the pandemic in the Northeast during April 2, 2020 through June 13, 2020. A major strength of this study is that it included 2 comparison groups that were enrolled contemporaneously at the same hospitals as the cases: pregnant women with RT-PCR results negative for SARS-CoV-2 infection, as well as nonpregnant women of reproductive age.[1] For characterizing viral load and antibody response in pregnancy, a control group of nonpregnant women of reproductive age with SARS-CoV-2 infection is most appropriate. For characterizing differences in transplacental antibody transfer and placental pathology, a control group of pregnant women without SARS-CoV-2 infection is most appropriate. In addition, as a comparison for evaluation of mother-to-neonate transfer of anti–SARS-CoV-2 antibodies, Edlow et al[1] included measurement of mother-to-neonate transfer of anti-influenza antibodies. These careful studies with inclusion of appropriate control analyses bring us closer to understanding not only the characteristics of SARS-CoV-2, but the characteristics of other viruses during pregnancy; these could provide insight to the characteristics of viruses that might emerge in the future.

The study by Edlow et al[1] found no evidence of vertical transmission of SARS-CoV-2 among 64 pregnant patients with SARS-CoV-2 infection, including no evidence of placental infection. This supports previous studies that have found that while intrauterine transmission is possible,[2] it is not common.[3] Most viral infections can be transmitted transplacentally; however, why some viruses are transmitted relatively easily across the placenta (eg, HIV, Zika, herpes simplex virus), while others, such as influenza, are transmitted rarely is not well understood. Edlow and colleagues[1] suggest that the inefficiency of vertical transmission of SARS-CoV-2 may be explained by low levels of maternal viremia, as well as reduced placental expression of the angiotensin-converting enzyme 2 receptor and the serine protease transmembrane serine protease 2, both required for entry of SARS-COV-2 into host cells. This finding of reduced placental expression[4] contrasts with other viral pathogens, such as Zika and cytomegalovirus, in which viral receptors are highly expressed in the placenta. Careful studies of the placenta with appropriate controls, such as performed in the study by Edlow et al,[1] are critical to furthering our understanding of intrauterine transmission and may provide clues for prevention of viruses that readily cross the placenta and cause fetal damage.

The other major finding from the study by Edlow et al[1] is the inefficient transfer of SARS-COV-2 maternal antibodies to the infant, in contrast to vaccine-induced influenza antibodies. A critical benefit to vaccinating pregnant women for influenza is that the vaccine protects the infant for several months after birth by the transplacental transfer of anti-influenza–specific serum immunoglobulin G. In this way, antenatal vaccination helps protect not only the mother but also provides neonatal protection. Although it is not known whether the inefficient transplacental transfer of antibodies observed by Edlow et al[1] will also extend to antibodies elicited by future SARS-CoV-2 vaccines, it underscores the susceptibility of infants, particularly since it is unlikely that young infants will be

eligible for SARS-CoV-2 vaccination. While children have been shown to be more mildly affected by SARS-CoV-2 infection compared with adults, infants are at higher risk for severe coronavirus disease 2019 (COVID-19) than children of other ages. There are some reassuring data that suggest that infants born to mothers with SARS-CoV-2 infection can be protected from infection through strict hygiene measures. In a study of 116 mothers with RT-PCR–confirmed SARS-COV-2 infection and 120 neonates in New York, New York,[5] all mothers breastfed their babies wearing surgical masks and practicing careful hand and breast hygiene, and all infants roomed in with their mothers in a closed isolette. All infants had negative test results for SARS-CoV-2 and were asymptomatic.[5]

As the number of SARS-CoV-2 infections continue to increase across the country and as vaccine development continues at a rapid pace, it will be critical to ensure that the populations at the highest risk are not left behind. The study by Edlow et al[1] adds important information to our understanding of vertical transmission and raises concerns about the lack of impact that a vaccine given to women during pregnancy might have on protecting neonates. It now appears that, like influenza, COVID-19 is more severe in pregnant women[6] and may be associated with preterm birth.[7] These findings underscore the importance of ensuring that pregnant women are included in SARS-CoV-2 vaccine clinical trials so they have the opportunity to receive SARS-CoV-2 vaccines once they are found to be safe and effective. It also highlights the importance of protecting pregnant women and their newborns from exposure to SARS-CoV-2 infection. We have learned much about the transmission of SARS-CoV-2 since its emergence approximately 1 year ago; it is essential that these lessons learned be used to protect pregnant women and their newborns.

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Corresponding Author: Denise J. Jamieson, MD, MPH, Department of Gynecology and Obstetrics, Emory University School of Medicine, Woodruff Memorial Research Building, 101 Woodruff Cir, Ste 4208, Atlanta, GA 30322 (djamieson@emory.edu).

Author Affiliations: Department of Gynecology and Obstetrics, Emory University School of Medicine, Atlanta, Georgia (Jamieson); Department of Pediatrics, Obstetrics and Gynecology, University of Florida College of Medicine, Gainesville (Rasmussen); Department of Epidemiology, University of Florida College of Public Health and Health Professions, Gainesville (Rasmussen).

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