Persistence of infection-induced SARS-CoV-2 seropositivity throughout gestation

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Persistence of infection-induced SARS-CoV-2 seropositivity throughout gestation

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Objective: Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) immunoglobulin G (IgG) antibodies increase approximately 2 to 3 weeks after viral infection. How long these antibodies persist and how rapidly they decay has been the subject of several studies in non-pregnant patients, sometimes with differing results.[1-4] One study in pregnant women observed that neutralizing antibody titers remained stable throughout gestation.[5] Our study evaluated qualitative IgG antibody responses to SARS-CoV-2 infection longitudinally throughout pregnancy in an unselected cohort, shortly after the peak of the outbreak in New York, to determine the frequency of waning seropositivity.

Study Design: This retrospective cohort study evaluated all patients who had first and second trimester biochemical screening to detect fetal aneuploidy between May 2020 and June 2020 at three hospitals within a large integrated health system in New York, and subsequently had SARS-CoV-2 antibody testing during hospitalization for delivery. During the study period, health system policy was to perform SARS-COV-2 polymerase chain reaction (PCR) testing on all hospitalized obstetrical patients and to offer, but not require, SARS-CoV-2 antibody testing. All patients were pregnant at the start of the coronavirus disease 2019 (COVID-19) pandemic and delivered prior to availability of SARS-CoV-2 vaccination. For each included patient, dried blood specimens collected in the first trimester and serum blood specimens collected in the second trimester were retrieved from storage at -20 degree C and tested for SARS-CoV-2 IgG antibodies to the nucleocapsid protein using an ELISA assay (Gold Standard Diagnostics Inc, Davis, CA). The Elecsys Anti-SARS-CoV-2 immunoassay (Roche Diagnostics International Ltd, Rotkreuz, Switzerland) was used to detect IgG antibodies to the spike protein for specimens collected during the delivery hospitalization. Laboratory technicians who performed

immunoassays on first and second trimester specimens were blinded to results of antibody testing at delivery. Medical records were reviewed to obtain clinical characteristics. Descriptive statistics were used to evaluate the data. The Institutional Review Board approved the study protocol.

Results: A total of 149 patients were included for analysis. None of these patients were characterized as chronically immunosuppressed (e.g. HIV/AIDS, organ transplantation, autoimmune disorders) and none received long-term immunosuppressive medications such as corticosteroids during pregnancy. Overall seropositivity ranged from 12.1% to 16.1% in each trimester. Of the 18 patients with detectable SARS-CoV-2 IgG antibodies in the first trimester, 12 (66.7%) remained seropositive at delivery. Of the 24 patients with detectable SARS-CoV-2 IgG antibodies in the second trimester, 7 (29.2%) remained seropositive at delivery. Of the 21 patients who were positive at delivery, 15 (71.4%) were positive in the first, second, or both trimesters. Of this group (n=15), 4 (26.7%) were positive in both the first and second trimester, 8 (53.3%) were positive only in the first trimester, 3 (20.0%) were positive only in the second trimester. Based on chart review from delivery hospitalization, only one patient reported symptomatic COVID-19. Results are presented in Table 1.

Conclusion: One-third of patients who tested positive for SARS-CoV-2 IgG in the first trimester and two-thirds of those who tested positive in the second trimester did not have detectable IgG antibodies when admitted for delivery. These findings differ from those of Cosma et al. which may be attributable to the higher proportion of symptomatic patients evaluated in that study.[5] Positive first and third trimester antibody testing with a negative second trimester result may be

attributable to test limitations, sample degradation, or reinfection. Antibodies that target the receptor binding domain of the spike protein of SARS-CoV-2 are associated with neutralization, reducing the risk of reinfection. Asymptomatic or mild SARS-CoV-2 infection is associated with lower peak antibody titers.[6] Waning antibody levels during pregnancy may render patients susceptible to reinfection. For patients who cite past infection as justification to defer vaccination, this may be an important talking point as higher antibody titers are generated after vaccination than after natural infection.[7] However, it must be acknowledged that antibody response alone may not be the best measure of immunity; memory B cells and T cells may persist and offer some protection against reinfection even if serum antibody levels are undetectable.[8] Our study is limited by use of multiple laboratory testing methods, lack of quantitative antibody titers, use of stored specimens, a small sample size, potential for selection and recall bias, and uncertain severity of disease among those with positive antibody testing. Furthermore, the lower level of detection for these qualitative antibody assays is unknown; they are not calibrated to a particular titer cut-off and manufacturer reported sensitivities are based on precise timing after symptom onset or PCR-confirmed infection which are not known in this study. Thus, definitive conclusions about the presence or persistence of immunity cannot be made.

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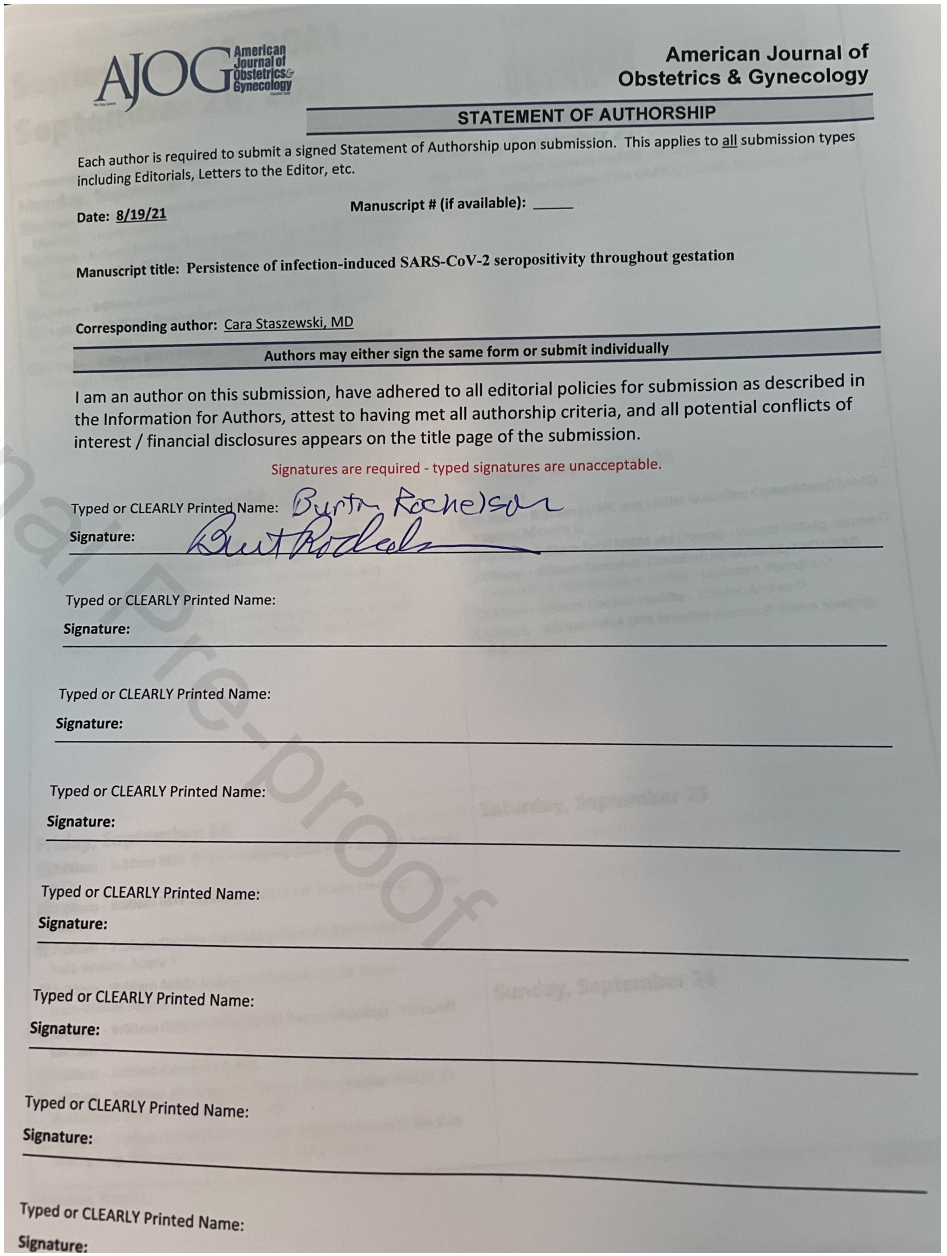
Table 1. SARS-CoV-2 seropositivity throughout gestation

IgG result	Timing of SARS-CoV-2 Antibody Test		
	First Trimester[a] (n=149)	Second Trimester[a] (n=149)	Delivery (n=149)
Positive	18 (12.1)	24 (16.1)	21 (14.1)
Positive at delivery	12/18 (66.7)	7/24 (29.2)	-
Negative at delivery	6/18 (33.3)	17/24 (70.8)	-
Negative	130 (87.2)	122 (81.9)	128 (85.9)
Equivocal	1 (0.7)	3 (2.0)	0

Data are n (%)

[a] First and second trimester blood samples were obtained at 11-14 weeks and 15-20 weeks of gestational age, respectively.



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