



# Association of Prenatal Ultrasonographic Findings with Neonatal Outcomes in Pregnant Women with SARS-CoV-2 Infection

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## Background

- Reports on fetal and neonatal effects following SARS-CoV-2 infection in pregnancy have been inconclusive
- At least one ultrasonographic assessment of pregnancies recovering from COVID-19 is recommended but reports on prenatal image findings and its association with neonatal outcomes is limited

## Objective

To describe the sonographic characteristics of pregnancies after confirmed SARS-CoV-2 infection and assess the association of prenatal ultrasound (US) findings with adverse neonatal outcomes.

## Study Design

- Observational prospective cohort study of pregnancies diagnosed with SARS-CoV-2 by RT-PCR between March 2020 and May 2021
- Prenatal US evaluation performed at least once after diagnosis of infection
  - Standard fetal biometric measurements
  - Umbilical artery and middle cerebral artery Dopplers
  - Placental thickness
  - Amniotic fluid volume
  - Anatomic survey for infection-associated findings
- Primary outcome was a composite adverse neonatal outcome defined as one or more of the following: preterm birth, NICU admission, small for gestational age, low birthweight, respiratory distress, or other neonatal complication
- Prenatal US findings were compared with neonatal outcomes using Chi-squared (or Fisher's exact) and t-tests

## Results

- 103 SARS-CoV-2 affected mother-infant pairs with prenatal US evaluation
  - 45 (43.7%) with at least one abnormal prenatal US finding
  - 58 (56.3%) with normal prenatal US results
- Most common abnormal US findings: placentomegaly (27/45, 60%), fetal growth restriction (11/45, 24.4%)
- 93 pregnancies (98 infants) with known neonatal outcomes
  - 26 (26.5%) with composite adverse neonatal outcome
- Abnormal US was not significantly associated with composite adverse neonatal outcome (33.3% vs 23.5%, p=0.36) but was associated with small for gestational age (16.7% vs 3.9%, p=0.02), low birthweight (23.8% vs 9.8%, p=0.04), and neonatal respiratory distress (23.8% vs 9.8%, p=0.04) (Table 1 and Figure 1)
- Fetal growth restriction was associated with a higher rate of a composite adverse neonatal outcome (23.8% vs 2.82%, p<0.001) (Table 2) and the association remained significant when small for gestational age and low birthweight were removed from the composite adverse neonatal outcome
- Placentomegaly was associated with a lower rate of a composite adverse neonatal outcome (3.8% vs 26.1%, p=0.002) (Table 2)

## Conclusion

- An abnormal US was not associated with an increased rate in a composite adverse neonatal outcome but was associated with increased rates of neonatal respiratory distress and small for gestational age and low birthweight infants
- Risk for adverse neonatal outcomes was highest for pregnancies that developed fetal growth restriction after SARS-CoV-2 infection and may require close surveillance

# Abnormal ultrasound findings in SARS-CoV-2 affected pregnancies are associated with increased rates of some adverse neonatal outcomes, especially in the setting of fetal growth restriction

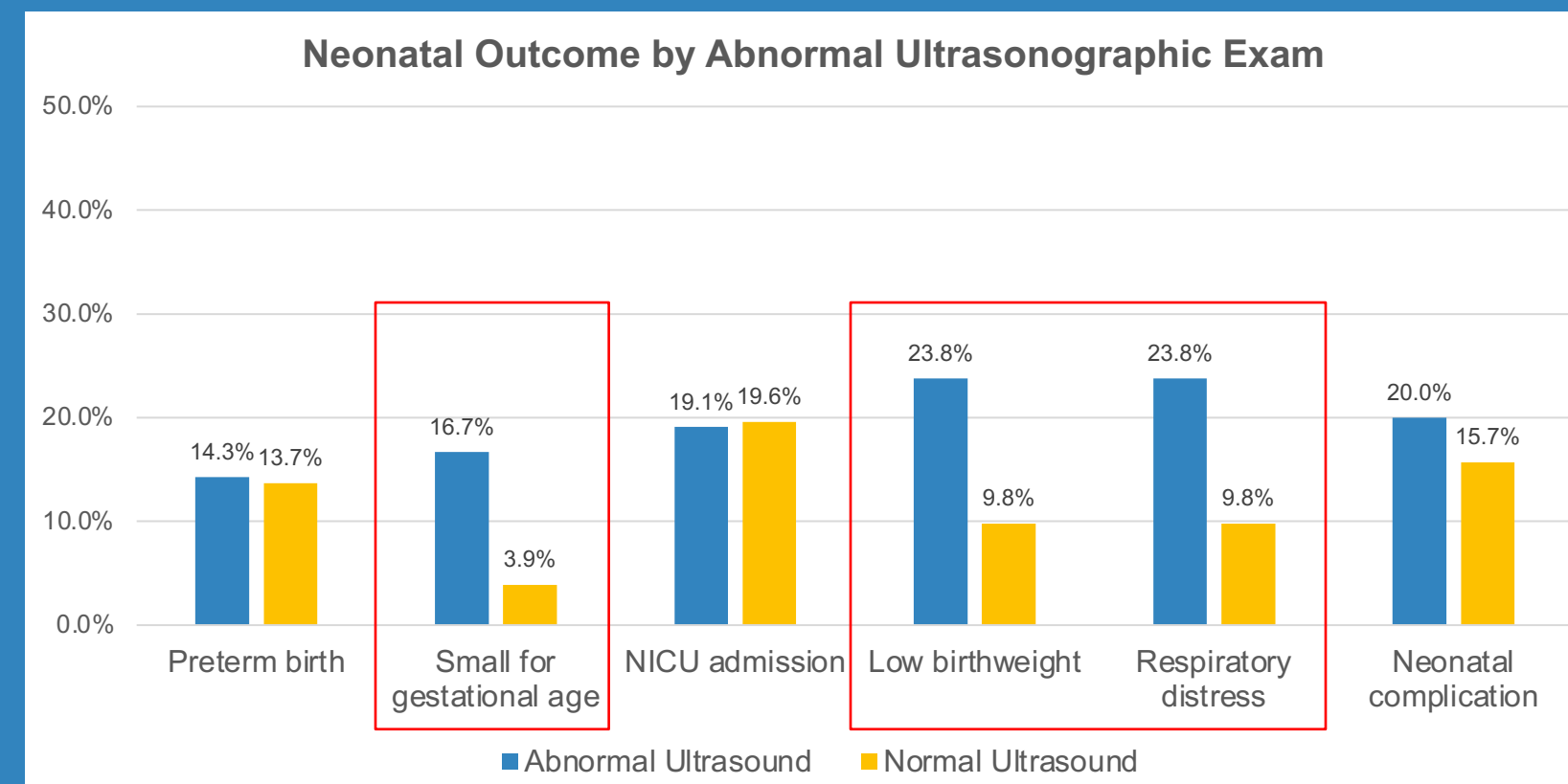


Figure 1. Rate of adverse neonatal outcome by abnormal prenatal ultrasonographic exam

## Questions?

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Table 1: Maternal characteristics and obstetric outcomes by prenatal ultrasonographic findings

	Abnormal Ultrasound (N=45)	Normal Ultrasound (N=58)	p-value
<b>Maternal Characteristics</b>			
Age (years), median (range)	32 (20-44)	33 (18-42)	0.51
Race/Ethnicity			0.89
Asian/Other	16 (35.6)	17 (29.3)	
Black	2 (4.4)	4 (6.9)	
Hispanic	19 (42.2)	27 (46.6)	
White	12 (26.7)	16 (27.6)	
Gravida, median (range)	2 (1-8)	2 (1-10)	0.49
Maternal comorbidity	19 (42.2)	31 (53.5)	0.32
Obesity	13 (28.9)	23 (39.7)	0.30
Diabetes Mellitus	0	3 (5.3)	0.25
Asthma	4 (8.9)	10 (17.2)	0.26
Trimester of Infection			0.23
First	5 (11.1)	12 (20.7)	
Second	23 (51.1)	21 (36.2)	
Third	7 (37.8)	25 (43.1)	
COVID Severity			0.72
Asymptomatic	3 (6.7)	12 (20.7)	
Mild/moderate	33 (73.3)	21 (36.2)	
Severe/critical	7 (37.8)	25 (43.1)	
<b>Obstetric and Neonatal Outcomes (N=93)</b>			
Mode of delivery			0.44
Vaginal delivery	30/42 (71.4)	30/51 (58.8)	
Cesarean delivery	10/42 (23.8)	18/51 (35.3)	
Operative vaginal delivery	2/42 (4.8)	3/51 (5.9)	
Gestational age at delivery (weeks), median (range)	39 (21-41)	39 (27-41)	0.66
Preterm birth	6/42 (14.3)	7/51 (13.7)	1.00
Birthweight, median (range)	3010 (439-4260)	3230 (309-4780)	0.14
Small for gestational age	7 (16.7)	2 (3.9)	0.02
NICU admission	8 (19.1)	10 (19.6)	1.00
Low birthweight	10 (23.8)	5 (9.8)	0.04
Respiratory distress	10 (23.8)	5 (9.8)	0.04
Neonatal complication <sup>a</sup>	9 (20)	8 (15.7)	0.59
Composite adverse neonatal outcome <sup>b</sup>	14 (33.3)	12 (23.5)	0.36

Data presented as n (%) unless otherwise indicated  
a. Maternal comorbidity included one or more of the following: obesity, diabetes, asthma, autoimmune disease, cardiac disease  
b. Neonatal complication included one or more of the following: condition requiring additional medical intervention (e.g., intraventricular hemorrhage, hypoglycemia, pneumothorax), congenital anomaly, or neonatal demise  
c. Composite adverse neonatal outcome defined as one or more of the following: preterm birth, NICU admission, small for gestational age, low birthweight, respiratory distress, or other neonatal complications

Table 2: Prenatal ultrasonographic findings by adverse neonatal outcome

Ultrasonographic Result	Composite Adverse Neonatal Outcome		p-value
	Yes (N=26)	No (N=72)	
Any abnormal ultrasound finding	14 (53.8)	31 (43.1)	0.37
Estimated fetal weight percentile, median	40.5	48	0.24
Fetal growth restriction	9 (34.6)	2 (2.82)	<0.001
Placentomegaly	1 (3.8)	26 (26.1)	0.002
Other abnormal ultrasound finding	2 (6.7)	3 (4.2)	0.61
Infection-associated abnormal finding			0.40
Intracranial calcifications	0	0	
Ventriculomegaly	1 (3.8)	0	
Microcephaly	0	0	
Cardiomegaly	0	0	
Intraabdominal calcifications	0	0	
Echogenic bowel	0	3 (4.2)	
Ascites	1 (3.8)	0	
Pleural effusion	0	0	
Pericardial effusion	0	0	
Hydrops	1 (3.8)	0	
Abnormal Doppler indices			
Umbilical artery	2 (7.7)	0	0.07
Middle cerebral artery	1 (3.8)	0	0.27
Fluid abnormalities			
Oligohydramnios	2 (7.7)	0	0.31
Polyhydramnios	0	2 (2.8)	1.00

Data presented as n (%) unless otherwise indicated