Microvascular placental alterations in maternal COVID-19

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A 26-year-old primiparous woman with an acute SARS-CoV-2 infection was admitted to the hospital at 40 weeks of gestation for vaginal delivery. Laboratory studies of the maternal blood showed mild leukocytosis ($13.86 \times 10^3/\mu L$) and anemia (12.2 g/dL). The male newborn weighing 3100 g was delivered with 1- and 5-minute Apgar scores of 9 and 10, respectively. Furthermore, the newborn tested positive for SARS-CoV-2 by reverse transcription-polymerase chain reaction. The mother and newborn were discharged on the seventh postpartum day to domestic quarantine. Pathologic evaluation of the hypotrophic placenta (weight, 325 g; median gestational placental weight, 500 g) revealed syncytial knots of the terminal chorionic villi (Figure, A; marked by *arrows*) and focal perivillous fibrin depositions (Figure, A). The placental microvascular architecture (Figure, B) showed a distorted vascularity with multifocal intussusceptive angiogenesis (Figure, B; marked by *red arrowheads*). In contrast to the altered microvascular architecture in COVID-19, the gestational age-matched control tissue showed a mature tree of the terminal villi (Figure, C) with a physiological branched vascularity (Figure, D). ■

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The authors report no conflict of interest.

Supported by grants (HL94567 and HL134229, to Dr. Ackermann) from the National Institutes of Health, a European Research Council Consolidator Grant (XHale) (771883, to Dr. Jonigk), and a grant (KFO311, to Dr. Jonigk) from Deutsche Forschungsgemeinschaft (Project Z2). This work was supported by the German Registry of COVID-19 Autopsies (DeRegCOVID) supported by the Federal Ministry of Health - ZMVI1 2520COR201), and the Federal Ministry of Education and Research as part of the Network of University Medicine (DEFEAT PANDEMIcs, 01KX2021).

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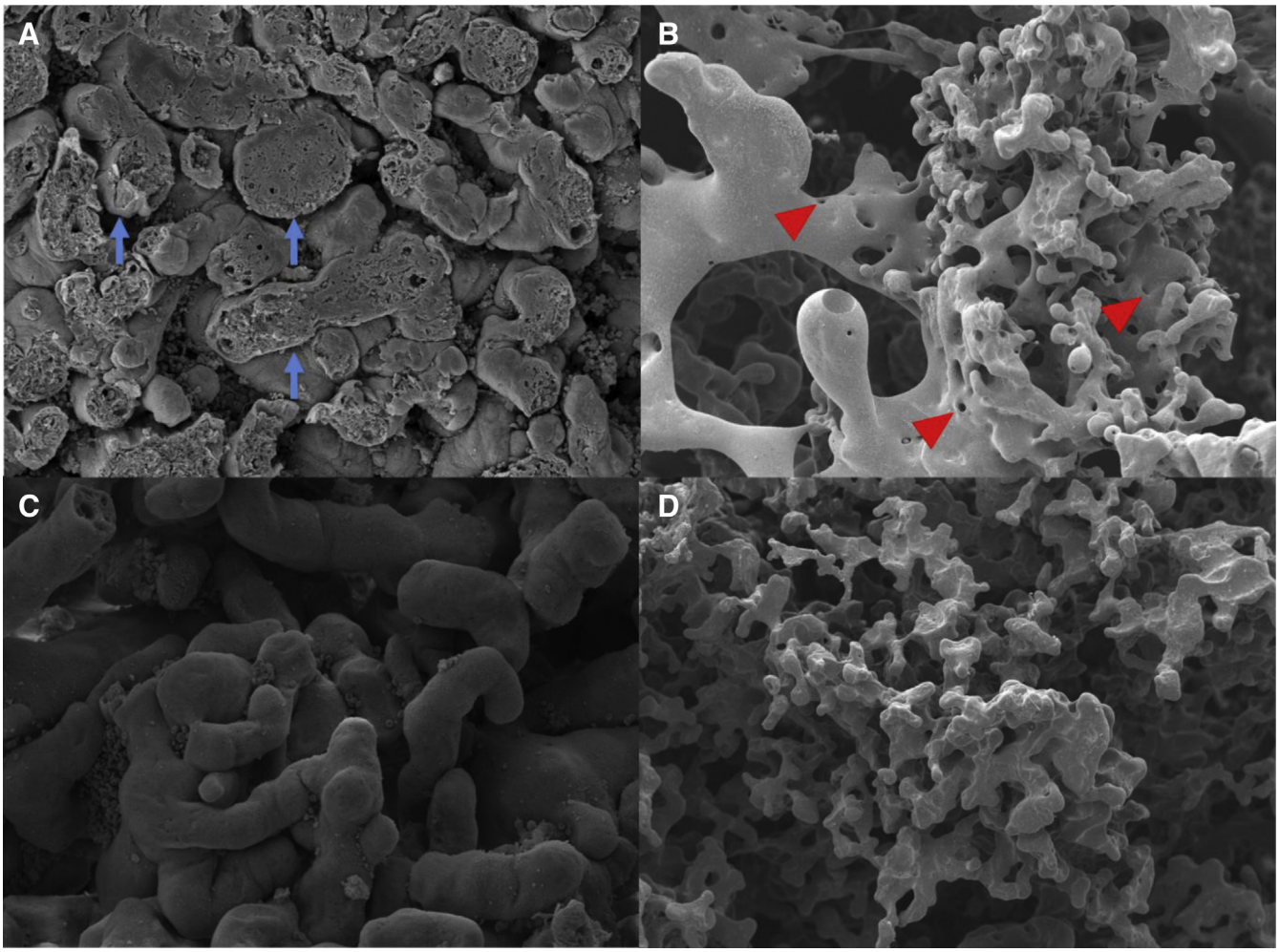
0002-9378/$36.00

https://doi.org/10.1016/j.ajog.2021.06.098

FIGURE
Placental morphology and microvascular architectural alterations in COVID-19



(**A**) Scanning electron micrograph demonstrates the formation of densely packed syncytial knots and enlarged chorionic villi *(blue arrows)* in COVID-19. (**B**) Microvascular corrosion casting illustrates an altered, aberrant villous microvascularity with a loss of vessel hierarchy, blind ending vessel segments and irregular diameters in COVID-19. Numerous tiny holes *(red arrowheads)* representing a transluminal, intussusceptive pillar have been observed in COVID-19. Intussusceptive angiogenesis is characterized as rapid morphogenetic process of intravascular septation that produces two lumens from a single vessel within minutes by recruiting circulating angiogenic progenitor cells. (**C**) Scanning electron micrograph of a non-infected placenta (same stage of pregnancy) shows the regular villous tree and intervillous space. (**D**) Microvascular corrosion casting of a non-infected control placenta with the same gestational age depicts the the branching hierarchy of thin blood vessels in the terminal villi.

Ackermann. Microvascular placental alterations in maternal COVID-19. Am J Obstet Gynecol 2022.