5.2 Placental Pathology in COVID-19 Disease

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The emergence of COVID-19 infection has led to rare but serious maternal and neonatal consequences, including premature delivery and neonatal demise. A unique constellation of placental findings has been identified as “COVID placentitis”: massive perivillous fibrin deposition, chronic histiocytic intervillitis, and trophoblastic necrosis. Detection of SARS-CoV2 in placental tissue may be undertaken using immunohistochemistry, RNA in situ hybridization, electron microscopy, and RT-PCR.

The incidence and severity of COVID placentitis has not been well correlated to maternal clinical presentation and the underlying pathophysiology for this discrepancy is not well understood. ACE2 and TMPRSS2 protein receptors required for viral infection of tissue by SARS-CoV2. ACE2 expression varies in different human tissues, with placenta demonstrating borderline expression on transcriptomic profiling. Further, evidence suggests ACE2 expression varies based on gestational age and the presence of other placental pathologies, such as chorioamnionitis. Some studies have suggested that ACE2 may be depleted in placenta in the presence of SARS-CoV2, an innate protective measure that may play a role in the overall rarity of COVID placentitis in COVID-19 infected pregnant persons.

Educational Objectives

By the end of the presentation, participants will be able to:

1. Describe the gross and histologic features of COVID-19 placentitis.
2. Describe ancillary testing used for the detection of COVID-19 in the placenta.
3. Discuss the role of ACE2 and TMPRSS2 proteins in COVID-19 infection, their localization within the placenta, and application of ACE2 immunohistochemistry.