

Introduction

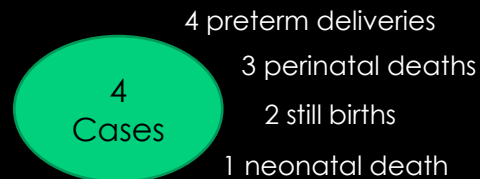
The current coronavirus disease COVID 19 pandemic caused by the novel Severe Acute Respiratory Syndrome Coronavirus 2 has inflicted a serious health crisis globally. From the start of the COVID 19 pandemic it has been evidenced that pregnant women are at risk of more severe SARS-CoV 2 infection. A UKOSS prospective cohort study reported an estimated incidence of hospital admission of 4.9 patients per 1000 maternities (95% C.I.4.5-5.5). The current evidence has shown that there has been a global increase in stillbirth by 28%. Studies have shown that infected mothers are at a risk of preterm delivery and low birth weight. Vertical transmission appears to be uncommon but recognised. Understanding placental pathology in COVID 19 infection is important in defining disease trajectory, potential risks for the mother, fetus and vertical transmission.

Reports have suggested placental SARS-CoV2 infection with diffuse viral localisation in syncytiotrophoblast.

Case Series

In Blackpool Victoria Hospital from 2002-2021 there were 4 cases of reported Covid Placentalitis. In all 4 cases the patient was covid positive with symptomatic illness, all deliveries were preterm deliveries. Two of the four were spontaneous deliveries and two emergency caesarean sections. Three out of the 4 babies demised and of the three perinatal deaths, two were still births. There was one neonatal death.

All babies tested positive for SARS CoV2 and the placental histopathology showed changes consistent with COVID placentalitis.



The main histological features of Covid placentalitis which are identified in all 4 cases include:

1. Ischaemic damage was reported in all 4 cases and reflected maternal vascular malperfusion
2. Intervillous inflammation
3. Intervillous fibrinoid trophoblast necrosis
4. Antibody for SARS CoV2 spike protein demonstrated.
5. Perivillous Fibrin
6. Intervillous inflammation.

References

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 Schwartz, David A., et al. "Placental tissue destruction and insufficiency from COVID-19 causes stillbirth and neonatal death from hypoxic-ischemic injury: a study of 68 cases with SARS-CoV-2 placentalitis from 12 countries." *Archives of pathology & laboratory medicine* 146.6 (2022): 660-676.

SARS CoV2 And pregnancy-Pathogenesis

SARS-CoV 2 is a single stranded RNA virus with a genome size of 30kilobase in length. There are 4 major structural proteins that form the backbone of the virus. The Spike protein (S), Membrane Protein (M), Envelope protein (E), Nucleocapsid protein (N).

The spike protein (S) plays a key role in its pathogenesis. SARS-CoV2 infects target host cells by binding to cell membrane angiotensin converting enzyme 2(ACE2), facilitated by S protein priming proteases TYPE II transmembrane serine protease (TMPRSS2). ACE2 expression is abundant in syncytiotrophoblast and cytotrophoblast in villi, decidual stromal cells, decidual perivascular cells and endothelial and vascular smooth muscle cells. The coexpression of the viral receptor ACE2 and TMPRSS2 in human placenta may increase vulnerability of the placenta and possibly fetus to SARS-CoV2 infection. Viraemia is a prerequisite for transplacental transmission to occur. Plasma viral load was positively correlated with disease severity and is an excellent biomarker for impending disease. Viraemia may trigger a cytokine storm subsequent to a maternal immune response to SARS CoV2 infection with a surge in proinflammatory cytokines including Interferon gamma,IL-2,Tumor necrosis factor. The uncontrolled release of inflammatory cytokines will further exaggerate the maternal immune system and link to the occurrence of placental damage, fetal growth restriction, and preterm labour.

Conclusion

There is still a need for copious research into the effect of the virus on the pregnancy and placental changes produced. Evidence clearly demonstrates intrauterine vertical transmission to fetus does occur. Whether the damage to placental tissue is an immune mediated event or direct cytopathic effect needs further exploration. Large studies with data comparing placental histology with Covid -19 and non Covid-19 infected placentas at different stages of infection is needed to conclude the significance of the SARS-Cov2 related histomorphological changes in the placenta.

