

# SARS-CoV-2: do corticosteroids for fetal lung maturation worsen maternal or fetal outcomes?

## Abstract

Immune system changes during pregnancy could make pregnant women more susceptible to SARS-Cov-2 infection. The use of corticosteroids within obstetrics has been shown to reduce the risks of respiratory distress syndrome, intraventricular haemorrhage, necrotizing enterocolitis and neonatal death in the baby associated with premature delivery. During the COVID-19 pandemic, corticosteroids have been trialled as a treatment to dampen the 'cytokine storm' and associated inflammatory processes. Corticosteroids have long been known to have immunosuppressive effects that could hinder the body's ability to mount a defence against COVID-19 and thereby delaying viral clearance. In this clinical case studies, antenatal steroids for fetal lung maturation appear to be of benefit and did not result in a deterioration of maternal disease. Our clinical case studies support the current recommendations from the Royal College of Obstetricians and Gynaecologists ie corticosteroids for fetal lung maturation is appropriate in patients who are suspected or have confirmed SARS-CoV-2 infection.

## Keywords

SARS-Cov-2 | COVID-19 | Pregnancy | Antenatal care | Corticosteroid | Fetal lung maturation

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The SARS-Cov-2 virus is a virulent pathogen which first emerged in December 2019 in Hubei province of China. This virus is thought to cause severe acute respiratory syndrome and the associated illness was termed by the World Health Organization (WHO) as the coronavirus disease 2019 (COVID-19) (Pascarella et al, 2020). Due to the virulence of this disease and global movement of infected people, COVID-19 has quickly become a global pandemic and crisis (Pascarella et al, 2020).

There are well-established changes within the immune system during pregnancy. These immune changes occur both locally at the uterine decidua (in order to tolerate the semi-allogeneic fetus) and also peripherally, as maternal blood comes into contact with fetal cells once placental circulation is established. An unfortunate consequence of this is that pregnant women are more vulnerable to external pathogens.

Thus, pregnant women are considered a high-risk group during this COVID-19 pandemic. However, there remains a paucity of data pertaining to the care of pregnant women with SARS-Cov-2 infection.

The use of corticosteroids within obstetrics is well-established and has been shown to reduce respiratory distress syndrome in the baby associated with premature delivery by increasing surfactant production in the immature fetal lungs. This also significantly reduces the risk of intraventricular haemorrhage, necrotizing enterocolitis and neonatal death (Kemp et al, 2016). Betamethasone and dexamethasone are fluorinated corticosteroids that crosses the placenta and are therefore the agents of choice commonly used interchangeably to promote fetal lung maturation (Kemp et al, 2016).

During the COVID-19 pandemic, corticosteroids have been trialled as a treatment to dampen the 'cytokine storm' and associated inflammatory processes. Corticosteroids have long been known to have immunosuppressive effects that could hinder the body's ability to mount a defence against COVID-19 and thereby delaying viral clearance. A recent publication

did not find this to be true, indicating no association between low-dose corticosteroid therapy and delayed viral clearance (Fang et al, 2020).

The Royal College of Obstetricians and Gynaecologists (RCOG) still recommend that corticosteroids be used for lung maturation of the premature fetus even in cases of COVID-19; however, the RCOG also acknowledged that the evidence supporting this advice is lacking (BMJ, 2020).

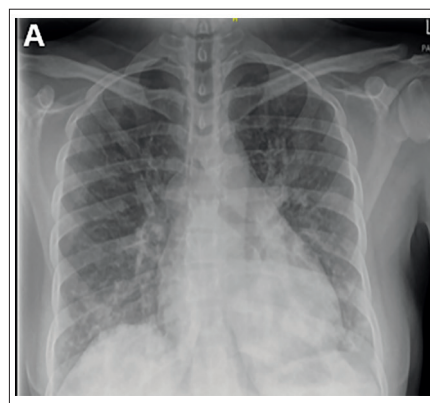
### Clinical case studies

We collected data consecutively from the 23 March 2020 to 16 April 2020 from pregnant women with confirmed SARS-CoV-2 infection who had been treated with antenatal corticosteroids in the University Hospitals Birmingham NHS Foundation Trust (Birmingham Heartlands Hospital and Good Hope Hospital maternity: 10 000 to 11 000 births per year). Patients included in this review presented with symptoms and signs consistent with SARS-CoV-2 virus which were confirmed using throat and nasal swabs in line with the WHO (2020) diagnostic criteria.

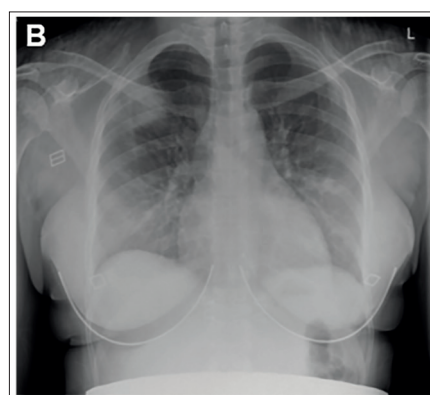
Other viral infections of the respiratory tract were also tested and excluded in each case. Three women provided written consent. All three women, where preterm labour or imminent delivery was anticipated, received two doses of 9.9 mg of dexamethasone intramuscular injections, 12–24 hours apart prior to delivery. Two women were multiparous and one woman was nulliparous. All three women were of an ethnic minority background, with one Somali, one Middle Eastern and one East African. The mean age of the three women was 35 years old (ranging from 33–38 years of age). The mean fetal gestational age was ranging from 31 weeks and three days to 33 weeks gestation). The details of the three cases are as follows:

#### Case 1

A 33-year-old multiparous Somali woman, body mass index (BMI) of 26, with a history of asthma with a dichorionic diamniotic twin pregnancy presented at 33 weeks' gestation with pyrexia, tachycardia, tachypnoea and oxygen saturation of 94% at room air. SARS-CoV-2 infection was confirmed by polymerase chain reaction (PCR) testing and a chest X-ray (CXR) demonstrated bilateral patchy consolidation (Figure 1A). She received oxygen and corticosteroids to promote fetal lung maturity. Her condition stabilised after 24 hours and she was discharged from hospital. An ultrasound scan two weeks later showed normal growth. The patient had an elective caesarean section at 37 weeks of gestation under spinal anaesthesia. Both mother and baby were well and discharged home.



**Figure 1A: case 1 – chest X-ray (CXR) showing patchy consolidation throughout both lungs predominantly in the lower zones**



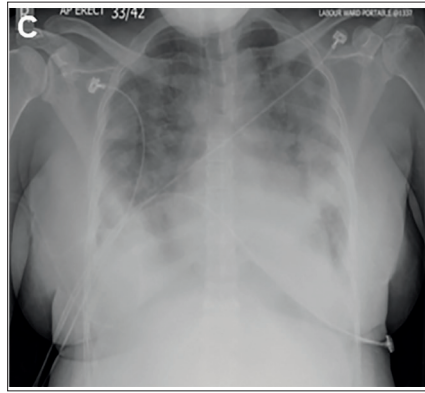
**Figure 1B: case 3 – CXR showing bilateral peripheral opacification in the lungs**

#### Case 2

A 38-year-old nulliparous Middle Eastern woman, BMI of 27 with no comorbidities, presented at 33 weeks' gestation with preterm rupture of membranes and one-week history of shortness of breath and cough. Severe maternal tachycardia was noted. The patient was admitted and corticosteroids were given for fetal lung maturation. SARS-CoV-2 infection was confirmed by PCR testing. She did not require respiratory support and was discharged the following day. An elective caesarean section was performed at 35 weeks of gestation because of a breech presentation. The baby did not require any resuscitation. Both mother and baby were well and discharged home.

#### Case 3

A 34-year-old multiparous East African woman, BMI of 29, with history of caesarean section, suspected viral hepatitis and was recently diagnosed with latent tuberculosis. She presented at 31 weeks and three days gestation with reduced fetal movements, shortness of breath, cough, fever and loose stools. She was noted



**Figure 1C: case 3 – CXR showing bilateral opacities, dense consolidation in the left middle and right lower lung zones; findings have deteriorated (three days later) compared to the previous CXR (Figure 1B)**

to have pyrexia, tachycardia and tachypnoea. SARS-CoV-2 infection was confirmed by PCR testing and CXR (Figure 1B) showed old parenchymal scarring due to previous tuberculosis and bilateral peripheral patchy consolidation.

The patient was given steroids for fetal lung maturation and was discharged two days later. The patient was then readmitted to hospital three days later with rapidly deteriorating respiratory symptoms. A repeat chest radiograph (Figure 1C) demonstrated a worsening bilateral patchy consolidation. She received oxygen, an initial bolus dose of magnesium sulphate for fetal neuroprotection was given and caesarean section performed under general anaesthesia due to deteriorating maternal condition. She was extubated 24 hours later. Her baby required resuscitation and was intubated for 24 hours due to prematurity; SARS-CoV-2 testing was negative. Both mother and baby recovered well and were discharged home.

### Conclusions

In conclusion, antenatal steroids for fetal lung maturation appear to be of benefit and did not result in a deterioration of maternal disease. One patient ie case 3, did deteriorate in the post-corticosteroid period but this could be attributed to underlying long-standing damage to the lung parenchyma secondary to tuberculosis infection rather than SARS-CoV-2 infection per se. Our clinical case studies support the current recommendations from the RCOG ie corticosteroids for fetal lung maturation is appropriate in patients who are suspected or have confirmed SARS-CoV-2 infection.

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