



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.

National Maternity Hospital, University College Dublin, Dublin,  
Ireland

J. Briet  
Department of Obstetrics and Gynaecology, Medisch Spectrum  
Twente, Enschede, the Netherlands

F.M. McAuliffe  
National Maternity Hospital, University College Dublin, Dublin,  
Ireland

J.H. Baalman\*  
Department of Obstetrics and Gynaecology, Medisch Spectrum  
Twente, Enschede, the Netherlands

\* Corresponding author at: Medisch Spectrum Twente, Konings-  
plein 1, 7512 KZ Enschede, the Netherlands.  
E-mail address: [Jelle.Baalman@mst.nl](mailto:Jelle.Baalman@mst.nl) (J. Baalman).

Received 15 May 2020

## Is termination of early pregnancy indicated in women with COVID-19?



Dear editors,

By May 11, 2020, more than 84,430 confirmed cases and 4 suspected cases infected with 2019 novel coronavirus disease (COVID-19) have been reported in China. Besides the human-to-human transmission via respiratory droplet, vertical transmission has been concerned and not determined since one case of a mother and neonate was laboratory-confirmed with COVID-19. We studied 13 COVID-19 infected pregnant women from Renmin Hospital of Wuhan University, Wuhan, Hubei province, China and published online [1]. One woman in that study experienced the biochemical pregnancy. It is unclear whether the biochemical pregnancy was associated with maternal infection, and therefore additional research is warranted. However, several days ago, a news program of Hubei TV suggested that early pregnant women infected with COVID-19 should terminate their pregnancies. This viewpoint seems oversimplified but has triggered controversy widely. In February, there were 3 pregnant women with mild COVID-19 infection in a hospital of Wuhan who decided to terminate their pregnancy in the first trimester.

Early pregnancy is a challenging and vulnerable period, and viral infection at this stage could potentially affect embryogenesis and fetal organ development, but there is still no evidence for the vertical transmission of COVID-19 so far. In February 13rd, 2020, Chen et al. reviewed nine cases of COVID-19 infected pregnant women, and reported none of their neonates had been infected through vertical transmission [2]. Prior to COVID-19, there were a total of six coronavirus species that induced human infection including severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) which led to the outbreak of pneumonia, but no vertical transmission of the coronavirus had been confirmed [4,5]. With reference to the experience to SARS or MERS, they can cause preterm, miscarriage, stillbirth, and fetal growth restriction in pregnant women, associated with placental insufficiency, but not vertical transmission. There is no evidence that SARS-CoV or MERS-CoV itself can cause fetal malformations, because neither of them passes across the placental barrier [3,4]. Children born to pregnant women infected with SARS showed similar physical and mental development when followed up to 10 months in both full-term and preterm babies. Current research on long-term health of pregnant women of SARS or MERS is not available, but we anticipate that maternal SARS-CoV-2 infection would not result in significant, long-term health risks to the offspring.

Pregnant women with SARS-CoV infection have a three times higher mortality rate than non-pregnant populations. However, SARS-CoV-2 infection outcome seems to have a better prognosis than SARS-CoV infection [5]. Only 7.45 % of all confirmed cases are defined as “severe” according to an announcement by National Health Commission of China on Feb 15th, 2020. Based on the limited number of cases reported, there is no evidence indicating a worse outcome of maternal patients than that of general population. On the other hand, pregnancy terminations in early pregnancy may result in post-abortion infection, which might aggravate the maternal COVID-19 illness. Therefore, consideration of termination of pregnancy has to be individualized during this COVID-19 outbreak. For pregnant patients with mild symptoms, treatment should be modified to avoid using teratogenic drugs near the fetus. Patients are commonly at higher oxygen demand during early pregnancy, so hypoxemia should be monitored, and interventions should be provided without delay. For severe patients during early pregnancy, the first priority is to ensure maternal safety. Decisions of early pregnancy termination should be considered upon risk factors including viral load, transmission generations, range of lung lesions by CT (more than two lobes), maternal age, and coexisting disorders (diabetes, cardiovascular diseases etc.).

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Contribution to authorship

He-feng Huang put forward the initial ideas and opinions, which were drafted by Yan-ting Wu, Cheng Li, and Chen-jie Zhang.

### Ethics approval

Not applicable.

### Funding

Not applicable.

### Acknowledgements

Thanks to everyone involved in the fight against the epidemic.

## References

- [1] Wu Y, Liu C, Dong L, Zhang C, Chen Y, Liu J, et al. Coronavirus disease 2019 among pregnant Chinese women: case series data on the safety of vaginal birth and breastfeeding. *BJOG* 2020(May), doi:http://dx.doi.org/10.1111/1471-0528.16276 [Epub ahead of print].
- [2] Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet* 2020;395(10226):809–15.
- [3] Wong SF, Chow KM, Leung TN, Ng WF, Ng TK, Shek CC, et al. Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome. *Am J Obstet Gynecol* 2004;191(1):292–7.
- [4] Alserehi H, Wali G, Alshukairi A, Alraddadi B. Impact of Middle East respiratory syndrome coronavirus (MERS-CoV) on pregnancy and perinatal outcome. *BMC Infect Dis* 2016;16:105.
- [5] Munster VJ, Koopmans M, van Doremalen N, van Riel D, de Wit E. A novel coronavirus emerging in China – key questions for impact assessment. *N Engl J Med* 2020;382(8):692–4.

Yan-Ting Wu<sup>a,b</sup> FRCOG

<sup>a</sup>International Peace Maternity and Child Health Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China

<sup>b</sup>Chinese Maternal and Child Health Association, China

Cheng Li

Chen-Jie Zhang

International Peace Maternity and Child Health Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China

He-Feng Huang<sup>a,b,\*</sup>

<sup>a</sup>International Peace Maternity and Child Health Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China

<sup>b</sup>Chinese Maternal and Child Health Association, China

\* Corresponding author at: International Peace Maternity and Child Health Hospital, School of Medicine, Shanghai Jiao Tong University, 910, Hengshan Rd., Shanghai 200030, China. E-mail address: [huanghefg@sjtu.edu.cn](mailto:huanghefg@sjtu.edu.cn) (H. Huang).

Received 13 May 2020

## Re: Novel Coronavirus COVID-19 in late pregnancy: Outcomes of first nine cases in an inner city London hospital



We would like to share our experience of nine laboratory-proven COVID-19 mothers delivered at a London inner-city hospital between 7th of March and 22nd April 2020. In all cases, positive diagnosis was based on real time reverse transcriptase polymerase chain reaction (RT-PCR) of maternal nasopharyngeal swabs.

The median age and gestation at delivery were 31 years (range 18–39) and 39 weeks (range 27–39) respectively and two of the nine women were delivered by emergency caesarean section (CS) for COVID-19 pneumonia and deteriorating maternal respiratory function. Of the remaining seven, one mother had a normal vaginal delivery, six underwent elective CS for obstetric indications while an emergency CS was performed in one woman for suboptimal cardiotocography (Table 1). Seven of our nine women (78 %) had mild to moderate prodromal symptoms not requiring admission (such as fever, cough, myalgia, sore throat, anosmia): these women were only screened due to a high index of suspicion rather than severity of complaints. The infants were immediately isolated from the mothers at birth and had RT-PCR for SARS-Cov-2 nucleic acid nasal pharyngeal swabs performed. Only one of the nine babies was subsequently confirmed as COVID-19 positive (patient 1) based on nasopharyngeal RT-PCR.

We would like to focus on the first two mothers who were delivered by emergency CS due to inability to maintain oxygen saturation and to highlight the accompanying lymphopenia that were previously described in the cases reported by Sutton [1] and Zheng [2].

**Patient 1:** A 33 year old woman with diet controlled gestational diabetes mellitus was admitted at 39 weeks gestation with flu-like symptoms and productive cough. A provisional diagnosis of pneumonia was made but she developed chest pain and became tachypnoeic. Chest Xray revealed right basal consolidation and lymphopenia was noted ( $0.92 \times 10^9/l$ ; normal: 1.2–3.6). Maternal nasopharyngeal swabs were positive for SARS-CoV-2 RT-PCR and she underwent an emergency CS for sudden deterioration of respiratory function, requiring 15 L/min of oxygen to maintain saturation of >95 %. A live infant 4.165 kgs was delivered with Apgar scores of 5<sup>1</sup> minute and 9<sup>5</sup> minutes and was immediately

separated from the mother. Following delivery, the patient continued to desaturate (80–85 %) on 100 % of oxygen and was transferred to a tertiary centre for extracorporeal membrane oxygenation (ECMO). The baby, subsequently confirmed as COVID-19 positive, developed pyrexia and exhibited signs of pneumonia on the sixth day but settled with benzylpenicillin and gentamycin.

**Patient 2:** A 29 year old lady was admitted at 27 weeks gestation with myalgia, cough, pyrexia >38.4 °C and dyspnoea. SARS-CoV-2 was diagnosed on basis of nasopharyngeal RT-PCR and chest Xray showed basal consolidation (Fig. 1). She was commenced on intravenous clarithromycin and cefuroxime but became tachypnoeic and was unable to maintain oxygen saturation. Lymphopenia ( $1.05 \times 10^9 /l$ ; normal: 1.2–3.6) was noted and an emergency CS was performed for deteriorating maternal respiratory function. She required mechanical ventilation for four days post-delivery before being “stepped down”. The baby weighing 1.2 kgs with Apgars of 2<sup>1</sup> minute and 6<sup>5</sup> minutes and required intubation because of prematurity. The baby was negative for nasopharyngeal, amniotic fluid and placental swabs RT-PCR for SARS-CoV-2 and was weaned off ventilation after 10 days.

Table 1 shows that maternal symptoms can be variable and of interest is that cough (8/9) and anosmia (7/9) appear to be the commonest presentations in this small series. We had initially followed advice from Chinese literature which recommended isolation of the infected woman and her baby for 14 days [2]. However, given the limited data and considering the potential detrimental effects on feeding and bonding, the Royal Colleges of Midwifery and Obstetricians and Gynaecologists have now jointly issued a guideline [3] that COVID-19 women and their healthy babies should be kept together in the postpartum period. Similarly, breast milk of affected mothers [4] has tested negative for COVID-19 and current evidence suggest that breast feeding is not contraindicated [3].

The most recent systemic review of six studies involving 48 delivered women indicates low likelihood of vertical transmission [5], although transplacental maternal-fetal transmission have been reported [1,2] including in our first case (where mother and baby were immediately separated and membranes had remained intact until CS). We can postulate that there may be a relationship between vertical transmission with maternal viral load as this was our most respiratory-compromised patient.