

LETTER TO THE EDITOR

Maternal SARS-CoV-2 infection and aplasia cutis congenita in a newborn

Editor,

Characteristics of Coronavirus Disease-2019 (COVID-19) in pregnant women and newborns have been described.¹⁻⁴ It remains unclear whether the maternal infection with SARS-CoV-2 causes harm to fetus *in utero* before birth. We examined all the 24 neonates born to infected pregnant women at Renmin Hospital of Wuhan University for congenital abnormalities and identified ulcerous lesions on the scalp vertex in one neonate at birth. Blood samples were collected from the mother at admission. Neonatal serum, cord blood and nasopharyngeal swab were collected immediately after birth. RT-PCR was conducted on placenta sample and neonatal nasopharyngeal swabs. Serum IgM and IgG were measured. Skin lesions were visually checked at days 1,

2, 9 months and 1 year and 8 months. This study was approved by the institutional review board of Wuhan University.

The neonate was male gender, 3350 g, 53 cm. Four well-demarcated ulcerous lesions on the scalp vertex were observed (Fig. 1a,b). There was no hair in the lesions. No other cutaneous lesions, no respiratory symptoms or COVID-19 associated multisystem inflammatory syndromes were detected. Limbs were normal. The neonate was isolated immediately after birth. RT-PCR test was negative for nasopharyngeal swabs. Venous and cord blood tested negative for IgM but positive for IgG. Laboratory profiles of the neonate at day 1 of life was compatible with the characteristics of COVID-19: serum level of D-dimer, aspartate aminotransferase, lactate dehydrogenase and neutrophil and platelet counts increased; lymphocyte count and serum level of creatine and AT-III decreased (Table 1). The newborn tested negative for IgM and IgG at the follow-up of 7 months. Cicatricial scars were detected at the follow-up of 9 months and 1 year and 8 months; no hair grew

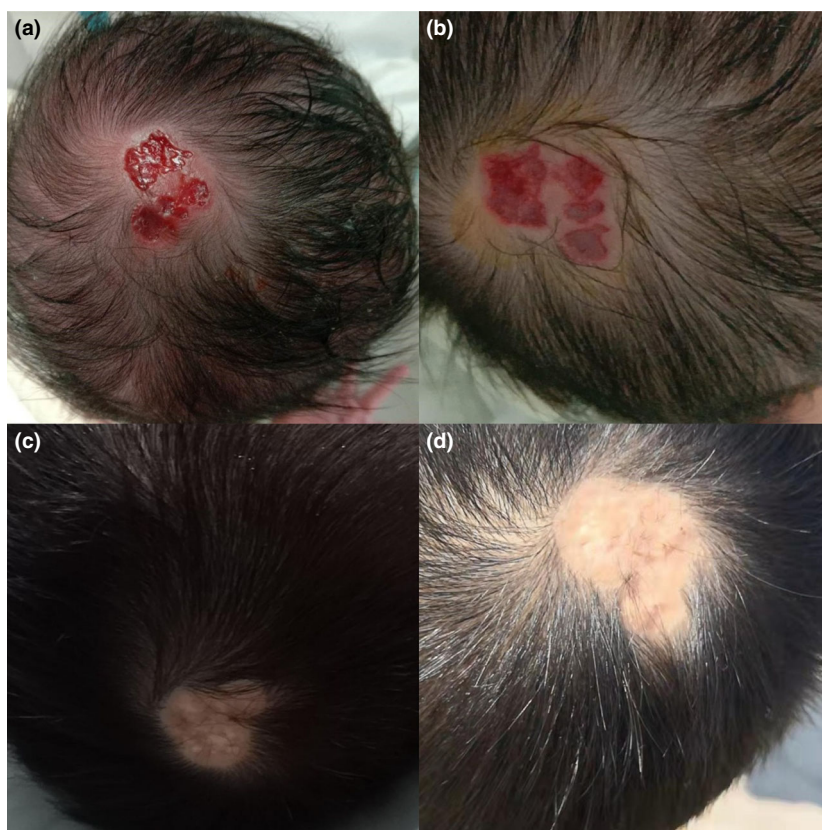


Figure 1 (a) four well-demarcated ulcerous lesions on the scalp vertex, examined at day 1 of life before cleaning; (b) ulcerous lesions on the scalp vertex, examined at day 2 of life after thorough cleaning; (c) Cicatricial scars, examined at follow-up of 9 months 1 day after birth; (d) Cicatricial scars, examined at follow-up of 1 year and 8 months after birth.

Table 1 Laboratory characteristics for the mother and newborn who showed skin lesions at birth.

	Normal range for adults	Mother	Normal range for newborns	Newborn
SARS-CoV-2 tests during hospitalization				
RT-PCR		Positive		Negative
IgM, AU/mL	<10	7.88	<10	Negative
IgG, AU/mL	<10	98.64	<10	Positive
SARS-CoV-2 tests 7 months later				
IgM, AU/mL	<10	14.56	<10	Negative
IgG, AU/mL	<10	46.69	<10	Negative
Laboratory characteristics				
Leucocytes, $\times 10^9/L$	3.5–9.5	3.45	10–20	17.29
Neutrophils, %	40–75	64.6	31–40	75.5
Lymphocytes, %	20–50	27	40–60	13.7
Lymphocytes, $\times 10^9/L$	1.1–3.2	0.93	3–7	2.37
Haemoglobin, g/L	115–150	92	140–220	201
Platelet, $\times 10^9/L$	125–350	202	100–300	349
C-reactive protein, mg/L	0–10	<5	0–10	<5
BNP, pg/ml	0–450	152.1		
Alanine aminotransferase, U/L	7–40	9	0–67	8
Aspartate aminotransferase, U/L	13–35	15	6–25	35
Total bilirubin, $\mu\text{mol/L}$	0–23	10.5	38–103	45.1
Albumin, g/L	44–55	38.1	32–48	34.7
Urea, mmol/L	2.6–7.5	3.41	1.5–10.5	3.32
Creatine, $\mu\text{mol/L}$	41–73	41	71–124	52
Glomerular filtration rate, mL/min	>90	129.44		
CK, U/L	9–13	33	130–1200	612
CK-MB, ng/mL	0–5	0.42		
Myoglobin, $\mu\text{g/L}$	0–110	14.06		
hs-cTN, ng/mL	0–0.04	<0.006		
Lactate dehydrogenase, U/L	120–250	186	185–407	433
Prothrombin time, s	9–13	10.3	13–20	13.8
Activated partial thromboplastin time, s	25–31.3	23.2	45–65	61.5
D-dimer, mg/L	0–0.55	2.1	0–0.55	1.32
AT-III, %	80–120	99.4	80–120	33.8

The bold values represent that the measurements were out of normal range.

in the lesions (Fig. 1c,d), consistent with a diagnosis of aplasia cutis congenita (ACC).

The 34-year-old pregnant woman was asymptomatic but tested positive for SARS-CoV-2 nucleic acid. Chest CT scanning showed evidence of mild bronchitis but no signs of pneumonia (data not shown). Serum IgM was 7.88 and IgG 78.64 AU/mL. Serum D-dimer increased; other laboratory measures were in normal range (Table 1). Caesarean section was performed in a negative-pressure isolation room the day of admission, gestational age of 39w + 2d. During the operation, the woman wore mask; all medical staff wore protective suits and double masks. Histopathological examination of placenta showed acute intervillitis (data not shown). RT-PCR tests turned negative 3 days after delivery and she was discharged with 5 days of hospitalization. She reported to have no history of trauma during pregnancy and childbirth, no genetic disease in the family, no consanguinity among the parents, no antithyroid drug was used during pregnancy, no family history of

ACC, no exposure to known causes of ACC including teratogens, cocaine, heroin, alcohol or anti-thyroid drugs.

ACC is a rare congenital malformation with an estimated incidence of 1 in 10,000 live births. The woman reported to have no exposure to known aetiological factors.^{5–7} Given causal relationship has been established between viral infection and ACC, for example, human immunodeficiency virus, varicella zoster virus and herpes simplex virus;^{5–7} the maternal SARS-CoV-2 infection may cause the ACC in the neonate.

It has been reported that SARS-CoV-2 infection causes excessive production of pro-inflammatory cytokines, and results in uncontrollable inflammation; the elevated immunological level in the mother has an impact on the fetal internal environment,⁸ which may in turn affect fetal development *in utero*. Indeed, the newborn in the present study showed COVID-19-compatible laboratory profiles at day 1 of life, for example, elevated serum D-dimer, decreased lymphocytes and serum AT-III. Furthermore,

no hair grew in the scalp lesions at the follow-up; hair loss is a common symptom in COVID-19 patients.

Skin may be one of the targeted organs attacked by the elevated immunological response. Accumulating reports described cutaneous lesions among COVID-19 patients, particularly among paediatric cases.⁹ Moreover, vaccine studies reported that cutaneous lesion occurred after COVID-19 vaccine inoculation, especially among children.¹⁰ It is biologically plausible that the identified ACC in this newborn resulted from his immunological responses to the maternal SARS-CoV-2 infection, which impacts the fetus *in utero* and cause damage to the fetal skin development.

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Conflict of interest

None reported.

Data availability statement

Data are available upon reasonable request at zhang22968@163.com

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