Recommended measures on newborn infants born to mothers with suspected or confirmed the new coronavirus infection

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A new type of coronavirus infection was reported in Wuhan City, Hubei Province, China in December 2019 and has become a global pandemic. Since then, many scientific findings have been accumulated. In Japan, the new coronavirus infection is currently classified as a designated infectious disease and must be managed accordingly. Based on the current knowledge, this Society has revised the previous recommendation on newborn infants born to mothers with suspected or confirmed the new coronavirus infection during the early neonatal period. This recommendation is tentative based on the current scientific knowledge and under the current situation of the pandemic. Therefore, this could be revised appropriately in the future.

Several reviews and case series have been published on the vertical transmission to newborn infants from the new coronavirus-positive mothers [1,2]. The positive rate for the new coronavirus infection among those newborn infants during the early neonatal period was reported as 0.0-4.7% [3-18]. In some cases, serological positive tests of IgM suggesting prenatal infection were reported [4]. However, a trans-placental infection has been considered rare because of placental structure and immune responses [19,20]. Similarly, prenatal infections with the same coronavirus species as MERS or seasonal coronavirus have rarely been reported [21]. Therefore, the chance of prenatal infection of the virus can be extremely low, although it cannot be ruled out. However, a horizontal infection from positive mothers to their infants could not be preventable without strict measures of infection control. Most newborn infants infected have been reported as asymptomatic or mild except in rare cases [5].

<Care of newborn infants immediately after birth>

It is mandatory recommended to prevent the coronavirus transmission to newborn infants with all available precautions (mainly isolation and prevention of droplet and contact infections). The followings are necessary measures according to each situation.

1. When an infant was born from the mother who developed symptoms with the coronavirus infection during labor of who became asymptomatic just before delivery, or from the positive mother by a universal screening test just before delivery.

- To prevent droplet and contact transmissions from the mother to the newborn infant, they should be temporarily separated from each other. The mother should be isolated in a private room. The newborn infant should be isolated in an incubator or under cohort isolation.
- Close observation of the infant is mandatory by monitoring the infant's symptoms and vital signs. If the infant becomes symptomatic, an attending neonatologist should contact an infectious control team inside a hospital and also report a health center of the jurisdiction. At the same time, virologic tests and necessary treatment should be considered.
- Once the isolation period of the mother has expired, the direct contact between the mother and the newborn infants can be allowed. According to a report in Japan where all mothers and their infants were separated after birth, the number of infants infected from the mothers with PCR-positive for the coronavirus has been extremely limited (as of October 2020). At the moment, it is not conceivable to mitigate this separation policy with concrete evidence, although the disadvantage of separation is well recognized.
- If the mother wishes to share a room with the infant, caregivers can consider it under the condition that the mother and her family can follow and perform the strict preventive measures through guidance [22-24].

2. When an infant was born from the mother who became positive for the coronavirus between delivery and her hospital discharge (the dyad was already in close contact through kangaroo care, breastfeeding, etc.)

- Once the positive result confirmed, the mother should be isolated inside the hospital or considered the transfer to a hospital designated for infectious diseases.
- The infant should be isolated as a close contact person and examined for the coronavirus using a PCR test.
- If the test for the infant is positive, the isolation of the dyad in a seme room can be

acceptable. If the test is negative, the infant should be closely monitored as a close contact person.

3. Isolation of the newborn infant

・The newborn infant with the coronavirus infection or suspected should be isolated in a negative pressure room or private room. If not available, the infant could be placed in an incubator with at least 2m intervals between each incubator [24]. Alternatively, it could be also allowed to keep the infant in a cot with a cohort at 2m intervals.

・Healthcare workers in contact with the infant should wear gowns, surgical masks, face shields or goggles, in addition to hand hygiene before and after the procedure. If the infant is treated with a nasal oxygen cannula of 2 L/ min or more or NCPAP/NHFC, an N95 mask instead of a surgical mask should be used instead [24].

・The infants should be tested for the coronavirus twice within 24 hours after birth and after 48 hours [23,24]. To confirm the negative result, two separate tests are mandatory, because infants with negative results immediately after birth could become positive later in several reports [23]. However, in special circumstances, a single test during 24-48 hours after birth could be acceptable [23]. A nasopharyngeal swab examination using a nucleic acid amplification method with PCR or LAMP is recommended.

・ If the negative result is confirmed finally, the isolation of the infant is not mandatory furthermore even before discharge. On the other hand, if the test is positive, it is advisable to repeat the tests at intervals of 48-72 hours until two consecutive tests show negative [24].

4. Breastfeeding and handling of breast milk [18, 26, 27]

・ At this time (as of October 2020), the risk of viral transmission through breastfeeding from coronavirus positive mothers is considered to be extremely low. If we considered the beneficial effects of breastfeeding such as the specific immune substances in breast milk from infected mothers, which may act to prevent the coronavirus infection, there is no clear evidence to stop breastfeeding uniformly.

・There are two methods for continuing breastfeeding; (1) use of expressed breastmilk and (2) direct breastfeeding.

(1) When the expressed breastmilk is selected, it should be noted that most of the viral infection occurs through contaminated breastmilk pumping equipment or containers rather than breastmilk itself. Therefore, the complete sterilization of those materials is essential to prevent the infection.

(2) When direct breastfeeding is selected, there is a risk of infection from the mother to the infant through droplet or contact infection. Therefore, the mother must wash and sanitize their hands and wear a mask before breastfeeding.

・Regarding the method of isolation for coronavirus-positive mother and her newborn infant, it is still largely dependent on the rule at each hospital. Therefore, it may be inevitable to select bottle feeding according to the local condition at each hospital having a lack of spacing and stuffing, even if the mother wishes to breastfeed. In this case, continuous support such as milking of breastmilk would be rather important to start direct breastfeeding once their isolation is no more needed.

5. Coronavirus PCR screening for all pregnant mothers [18,28-30]

・The positive rate for the coronavirus test among pregnant women in outbreak areas of the infections was ranged between 3.8-15.4%, although 66-100% of them were asymptomatic.

・Because pregnant women usually require long-term care in person during labor and delivery inside hospitals, it is recommended to test for the coronavirus infection before admission routinely. In this way, risks of healthcare workers and newborn infants to be infected by pregnant women could be reduced through appropriate personal protective measures.

・On the other hand, there is no guideline so far to recommend a pre-hospital universal screening for the coronavirus infection positively. There may be a concern to increase the rate of cesarean delivery more than usual and the number of newborn infants necessary to be hospitalized in the NICU.

・Because the pre-hospital universal screening for the coronavirus infection among pregnant women in Japan is not a mandatory test at present, this concept may vary greatly depending on the region and facility. Furthermore, since the accuracy of those tests is so limited, each judicial region and hospital should decide their practical rules of the timing of the screening test and the patient flow after. Furthermore, this information should be shared among all staff responsible in each region and hospital.

Q & A

1. I understand that in principle, the mother cannot enter the NICU until she is diagnosed not to have a risk of coronavirus transmission, but what about the father? At that time, how to get information about an infant's condition and how to proceed with informed consent? Also, when all my family members need isolation at home,

our infant can stay at the hospital as long as needed?

A: Since the family members living together are identified as close contact persons, all families cannot be allowed to visit and to enter the NICU during the incubation period of the virus (14 days after the final contact). Appropriate explanations about the medical condition of the infant and informed consent can be provided to the parents by telephone or online devices. Alternatively, we think family members who do not live together and do not have contact history (for example, grandparents) can meet medical staff in person. In case, the infant will be discharged to the parent's home, the infant must stay to stay in the hospital until the risk of infection from parents is reduced enough. If that is difficult, the infant can discharge to the home of relatives (for example, grandparents) who have no contact history with the parents. Otherwise, we can consult with a healthcare center or a child guidance center.

2. Can infection control measures to the infant change depends on delivery mode?

A: At present, the newborn infant should be treated as a close contact person regardless of delivery mode, cesarean section or vaginal delivery [31].

3. Is there any effect on the newborn infant if the mother is infected with the coronavirus in the first or second trimester of pregnancy?

A: If mothers who tested positive at early or mid-pregnancy became negative in subsequent tests and finally gave birth at term, there was no report of birth defects in the infants and no report to detect the virus in the infants [4, 20, 32-36].

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