

WITHDRAWN: Analysis of Management Approach to Newborn Care of Infants Delivered to COVID-19 Positive Mothers at Five Tertiary Care Centers in the UAE over a 7 Month Period

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EDITORIAL NOTE:

The full text of this preprint has been withdrawn by the authors while they make corrections to the work. Therefore, the authors do not wish this work to be cited as a reference. Questions should be directed to the corresponding author.

Abstract

Objectives

To assess newborn care practices, clinical characters and risks of mother to child transmission during rooming in and breastfeeding in infants born to mothers with COVID-19.

Design

Retrospective observational study.

Participants

5 Tertiary care centers located in the UAE.

Infants born to mothers diagnosed with COVID-19 at the time of delivery, born between April 1st and October 30th 2020.

Methods

In this retrospective observational study, we analyzed the newborn care practices in various tertiary care hospitals and the rate of transmission of SARS-CoV-2 from mother to infant (vertical or horizontal) while rooming in, breastfeeding and post discharge.

Results

40 infants were born to mothers with COVID-19 at the time of delivery. One infant tested positive for SARS-CoV-2 after birth and had respiratory symptoms and fever. 23 of the well infants were roomed in during their hospital stay and were breastfed. In 8 cases, the mother and baby were separated and isolated from the time of birth till discharge.

95% of the discharged infants were rooming in with mothers, 45% of the infants were exclusively breastfed and 55% were on mixed feeding (breast milk and formula milk) at the follow-up. None of the infants developed significant health issues or symptoms attributable to SARS-CoV-2.

Conclusion

The risk of mother to infant transmission of COVID-19 in the perinatal period is very low. Our study reaffirms the AAP guidelines that rooming in and breastfeeding of newborns born to COVID-19 positive mothers is safe without an increased risk of transmission by following mandated safety precautions.

Introduction

In late November of 2019, a novel coronavirus (SARS-CoV-2) emerged in the Chinese city of Wuhan. It was identified among a cluster of pneumonia cases¹. The outbreak of the coronavirus disease (COVID-

19) rapidly spread to become a global pandemic as declared by the World Health Organization in March 2020¹⁻³. Knowledge about the epidemiology and clinical presentation of COVID-19 is rapidly evolving and so, the guidelines to follow are also rapidly changing with new evidence and additional experience.

This SARS-CoV-2 is a member of the Coronavirus family. Other pathogens from this family have inflicted a range of viral infections, including Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS)⁴. The main route of transmission is through respiratory droplets and direct contact. While the severity of ranges from mild to critical, most are mild. Most of the fatal cases occur in patients with advanced age or with underlying comorbidities⁵. Remarkable widespread SARS-CoV-2 reflects a new public health crisis⁶ unlike the other previous viruses belonging to the SARS-CoV-2 family. This makes the management of SARS-CoV-2 both unique and challenging. In the initial stages, countries all over the world started responding to the pandemic based on past experiences with other SARS-CoV-2 viruses. However, it was quickly realized that new policies and guidelines were required to tackle the spread of the novel COVID-19.

It is well known that the body's immune system and response to viral infections might change due to pregnancy, which explains the cause of more severe symptoms in pregnant women in previous corona epidemics [SARS CoV and MERS CoV]⁷. In the literature published on COVID-19 so far, pregnant women do not seem to be more severely affected compared to non-pregnant individuals⁷⁻⁹.

To date, information about different routes (transplacental, perinatal, intrapartum, and postnatal) and risks of transmission of COVID-19 to newborn infants from mothers is based on a case series methodology¹⁰. Since SARS-CoV-2 is a respiratory virus, the risk of vertical transmission is believed to be minimal to non-existent. This is supported by evidence that no vertical transmission was detected in other members of the coronavirus family (SARS and MERS)¹¹.

The first documented case of COVID-19 in the UAE was in January 2020. Since the disease's evolution to a pandemic, various measures have been taken by the UAE's governing health bodies to contain the spread of infection. These include mass screening, contact tracing and strict isolation at home or in designated quarantine facilities.

Since the risk of transmission from mother to child in the postnatal period remains unclear, it is debatable whether the newborn should be separated from mother after birth and isolated¹². Studies so far provide contradictory evidence for separating or rooming in the neonates^{13,14}. Guidance from the AAP and WHO suggests rooming in and breastfeeding from the time of delivery^{1,2,15}.

In our study, we analyzed how the practices of rooming in and breastfeeding as opposed to separating and isolating the newborn from the COVID-19 positive mother affected the neonatal positivity rate of SARS-CoV-2.

Method

Study Design

All infants born to mothers who tested positive for SARS-CoV-2 during the period of April 1st to October 30th were included in the study. As per the protocol of the hospitals, all the pregnant women who were admitted for delivery were screened for COVID-19 using the RT PCR test. The test was performed using a nasopharyngeal swab. Positive mothers were isolated, and deliveries were conducted according to guidelines laid out by the DHA and MOH, the respective health authorities in the Emirates of Dubai and Abu Dhabi.

The mothers were admitted to isolation wards post-delivery and were retested again after 72 hours. If the repeat result was positive, the same frequency of testing was continued till the result was negative. Once the result was negative, a repeat test was performed after 24 hours to confirm the true negative status and if the repeat test was also negative, the mother was deemed negative and discharged.

Infants who were born to COVID-19 positive mothers as described above were included in the study. Babies were received in the labor room and the operating theatre under barrier precautions enforced by the health care professionals i.e., doctors and midwives.

A healthy newborn was given routine post-delivery care. Infants who required NICU care (prematurity, respiratory distress, etc.) were transferred to the NICU in a designated transport incubator. Babies were cared for in an isolation room in the NICU with negative pressure. All droplet and barrier precautions were taken by treating doctors and nursing staff till the baby was negative of COVID-19. The first nasopharyngeal COVID-19 RT PCR swab for babies was done at 24 hours of life. If negative, the swab was repeated after 72 hours. Once 2 swabs were negative, the baby was deemed to be uninfected and was shifted to the mother's room if the baby was fit to be discharged from NICU. Once with the mother, the baby received routine postnatal care. Once discharged from the hospital to either home or a quarantine facility depending on the mother's condition, a follow up was done by routine telephonic interviews.

Infants who were well enough to be cared for in the postnatal ward were roomed in with their mothers unless the mother expressed a desire not to do so or the mother was critically unwell to care for the infant. All the Covid-19 positive mothers were admitted to a separate wing of isolation rooms with negative pressure. Infants who roomed in could breastfeed with adequate droplet and contact precautions in accordance with recommendations from established guidelines at the time of this study¹⁶. This involved caring for the infant in a separate baby cot which is placed at least 6 feet from the mother's bed, the mother wearing a mask when in close proximity to the infant and while breastfeeding and performing hand hygiene with either soap and water or alcohol based gel prior to handling the baby. All the isolation rooms were equipped with additional hand sanitizers. No visitors apart from health personnel with appropriate protective equipment were permitted into the rooms while in hospital. The parents were advised to continue the same precautions at home after discharge till the mother was

considered negative for COVID-19 and had been in isolation for 14 days from the second confirmed negative test.

The above protocol was followed by all the hospitals included in the study except one which practiced strict isolation of mother and baby from the time of delivery till discharge to quarantine facility. In this unit, the babies were directly admitted to the isolation room in the NICU and were cared for by the nursing staff using all precautions as described above. The babies were given formula feeding during this time. Once the babies were tested negative as per the above protocol, they were discharged along with the mother to home or a quarantine facility.

Data collection and analysis

Maternal and neonatal data was extracted from the electronic medical records or medical charts using a standardized data collection sheet. For maternal data, we recorded the information on gestational age at diagnosis of SARS-CoV-2, parity (nulliparous or multiparous), COVID-19 RT PCR results and symptoms (fever, sore throat, anosmia, ARDS).

For neonatal data, we collected gestational age at delivery, mode of delivery, birth weight, 1- and 5-min Apgar score, the first and repeat results of nasopharyngeal swabs, whether or not they were admitted to NICU, clinical symptoms, type of feeding, whether or not they were rooming in and given skin to skin contact.

The parents or the designated caregivers were contacted by telephone 2 weeks post-delivery to enquire about the health of the infants, any COVID-19 testing done post discharge on the infants and any healthcare facility visits. For infants still in NICU at 2 weeks of age post-delivery, data was extracted from the electronic patient record. Informed consent was obtained from the parents for inclusion in the study and for telephonic contact post discharge. Data was inputted into an electronic database upon which analysis was performed.

Statistical analysis

Continuous variables were reported as median (interquartile range i.e IQR) and categorical variables as number and percentage.

Results

During the study period, a total of 39 mothers tested positive during pregnancy and delivered in the 5 hospitals included in the study.

One out of the 39 was a twin pregnancy. Additionally, one mother was tested positive 2 weeks after delivery. She had an extreme premature delivery, and the baby was cared for in the NICU. Hence, she is included in the study. The maternal characteristics are summarized in table 1.

<p style="text-align: center;">Table 1 Maternal characteristics (N = 39)</p>	
Age (years)	31 (19–48)*
Gravida	2 (1–7)*
Parity	1 (0–6)*
Gestation at delivery (weeks)	38 (26–41)*
Covid symptoms at the time of delivery	15, 38%
Mode of delivery	
Vaginal	20, 50%
Caesarean section	20, 50%
* Median (range)	

The infant characteristics are summarized in table 2. Out of the 40 infants:

- 11 were admitted to an intensive care unit. Out of the 11, 55% (6) were admitted for prematurity and 18% (2) were admitted for respiratory distress/transient tachypnea. One baby was tested positive for COVID-19 at 24 hours of life. The baby also exhibited symptoms of respiratory distress and fever. After treatment, the baby was successfully discharged from NICU after 2 negative swabs for COVID 19.
- 8 infants were separated from the mother after delivery and were cared for in an isolation room in the NICU. This was practiced in one out of five hospitals included in study. Once two COVID-19 PCR results were negative, the babies were discharged to home or a quarantine facility as per the discharge of the mother.
- 21 infants were cared for in the postnatal ward and all were roomed in with their mothers and breastfed.

Table 2
Infant characteristics (N = 40)

Birth weight (gms)	3110 (700–3780)*
Gestation (weeks + days)	
Term (> 37 weeks)	25, 63%
Pre-term (< 37 weeks)	15, 38%
Late pre-term (32–36 + 6 weeks)	8, 20%
Very pre-term (28–31 + 6 weeks)	1, 3%
Extreme pre-term (< 28 weeks)	1, 3%
Apgar scores	
1 min	9 (6–9)*
5 min	9 (7–10)*
Isolated infants	20%
Admitted to NICU	11, 28%
Indication for admission	
Prematurity, RDS	6, 55%
Respiratory distress	2, 18%
Jaundice	2, 18%
Poor feeding	1, 9%
Neonatal SARS-CoV2 test	
Positive	1, 3%
Negative	35, 88%
Not done	4, 10%
Neonatal Repeat SARS-CoV2 test	
Positive	0, 0%
Negative	19, 48%
Not done	21, 53%

Table 2	
Infant characteristics (N = 40)	
Type of feeding	
Breast fed	23, 58%
Formula	17, 42%
Skin to skin	
Yes	22, 55%
No	18, 45%
Clinical presentation	
Yes	1, 3%
No	39, 97%
Rooming in	
Yes	21, 53%
No	19, 48%
* Median (range)	

Finally, 23 out of the 40 infants (58%) received breast milk either directly, if rooming in with mother, or via expressed breast milk if admitted to NICU. Delayed cord clamping was not followed in either of the centers

All the neonates including the COVID-19 baby were successfully discharged from their hospitals and were regularly followed up with by telephonic interviews [Table 3]. All the mothers expressed satisfaction about the health of babies and none of them were tested positive for COVID-19 or developed any related symptoms.

<p style="text-align: center;">Table 3 Follow-up data on infants at two weeks' time (N = 40)</p>	
Still in NICU	2, 5%
At home	38, 95%
Breast feeding on follow-up	18, 45%
Health concerns post discharge	Nil
Any other family members tested positive for COVID-19 post discharge	Nil
Any infant COVID-19 negative at birth and tested positive post discharge	Nil

Discussion

In the current pandemic, perinatal management and postnatal care of infants born to mothers with a suspected or confirmed SARS-CoV-2 infection and the clinical characteristics of COVID-19 in newborns, infants and children are highly relevant topics with rapidly evolving knowledge. The need for new studies to contribute to the existing evidence base is very important to provide guidance in clinical decisions. Our study aims to publish our experience in the UAE from a cluster of hospitals and their existing practices. Since the directives and guidelines to approach and treat COVID-19 are ever evolving, we hope to share our knowledge about the rooming in practices.

Since the outbreak of SARS-CoV-2 began, it has been consistently found in several studies that children are less likely to be infected and do not develop severe manifestations of the disease. The hypotheses include mal-adaptive immune response in the elderly compared to children, developmental changes in immunity, with a predominant innate response to infectious stimulus in young infants, the negative effects of ageing on lungs, differences in the physiology and anatomy of the respiratory tract and the crucial role of comorbidities on outcomes¹⁸. Additionally, according to some studies, children's healthier endothelium may protect them from the disease progressing in severity or fatality¹⁹. This is contrary to what may happen in adults, in whom problems with the endothelium seem to be related with a worse prognosis.²⁰

The risk of maternal to neonatal transmission has also been shown to be low. The hypothesis is that the paucity of ACE2 receptors in the placenta which may be necessary for transplacental transfer to the fetus leads to a lower transmission risk¹⁷.

Despite initial concern that pregnant women and their newborns may be high-risk groups compared to the general population based on outbreaks of other coronavirus diseases in the past, it has become increasingly clear that this is not the case with the SARS-CoV-2 pandemic.^{7-10,21}. The risk of vertical

transmission of the virus from mother to infant before or during delivery has been shown to be low in our study similar to what has been observed in other studies⁸⁻¹⁰. The estimated risk found in our study was 2.5% (1/40) which is similar to previously published data which reported outcomes approximately 1-1.5%.^{7,17,22} .

Based on literature so far, the breast milk of a COVID-19 positive mother is not considered to be a transmission vehicle, similar to other known respiratory viral infections^{23,24}. In our study, we also found that exclusive breastfeeding or mixed feeding did not increase the chances of the baby contacting the infection from the mother.

It has also been suggested from previous studies,²⁵ that specific maternal SARS-CoV-2 antibodies pass via the breast milk from the COVID-19 positive mother to her child within a few days after the onset of the disease, thus possibly acting as a protecting factor for the infant. However, it must be emphasized that mothers who chose to exclusively breastfeed their infants were taking all droplet precautions and practicing hand hygiene before the initiation of each breastfeeding session.

Due to the initial uncertainty surrounding the outcomes of mothers affected by COVID-19 and their infants, recommendations on the postnatal management of the mother–infant dyad from professional bodies have been inconsistent.^{16, 25-28} Some guidelines advocate caring for the affected mothers and their infants in separate rooms when feasible to reduce the risk of mother–infant transmission postnatally and also recommend avoiding direct breastfeeding while mother is still infected, unless mother expresses her wish to directly breastfeed.^{27,28}

In our study which consisted of a study group from five different hospitals, one hospital adopted the practice of completely separating the mother-baby dyad and rest of the hospitals adopted a different approach of rooming in the well babies with mothers and caring for them using all precautions.

From our study, the risk of horizontal transmission from mother to baby is negligible and on par with the general population exposure. Additionally, given the evidence that the chances of neonates getting infected or developing severe manifestations of the COVID-19 disease is very low, we strongly recommend rooming in and direct breastfeeding the newborns with mothers after delivery. We have found that this approach far outweighs the clinical risks of contacting the disease as the mother infant bonding and direct breastfeeding rates were comparatively lower in separated mother-infant dyad which is not the correct approach for the well-being of the baby and the mother. Our study has validated this approach with no clinically or laboratory-proven mother to infant transmission of the virus during the hospital stay and the 2 weeks follow-ups, even with a very high rate of breastfeeding in the discharged infants.

Our study is unique in that it encompasses the data from 5 different hospitals across the UAE. Hence, a diverse population is included in the study group. Our study also has limitations. Our study is observational and retrospective, and the sample size is small. However, our results are encouraging and would act as a guide for further studies involving large sample sizes. Also, since the follow-up of infants

was conducted by telephonic interviews, there is a chance that asymptomatic infants infected with the virus may have been missed in the absence of testing; however, this risk seems to be low.

The risk of mother-to-infant transmission of SARS-CoV2, vertically or horizontally, in the perinatal period is very low. Breastfeeding and rooming in can be practiced safely with adequate infection control precautions. Further studies are needed with larger sample sizes to evaluate neonatal outcomes in the short and long term.

Conclusion

There is minimal risk of vertical transmission of Covid-19 from mother to neonate. There is no risk of transmission of Covid-19 from breast milk to neonate or through rooming in if adequate precautions are enforced. However, the impact of delaying cord clamping in Covid-19 positive mothers is unknown.

Declarations

Conflict of Interest-

None

Ethics approval and consent to participate-

Ethics approval is obtained from ethics committee/institutional review board (IRB) of NMC Royal women's hospital and Emirates specialty hospital.

All methods were performed in accordance with the relevant guidelines and regulations.

Consent for Publication-

Consent for inclusion in the study and publication was taken during the time of admission to the hospital by the concerned staff on prepared format.

Availability of data and materials-

Data was collected from the patient records, both physical and electronic records. datasets used and /or analyzed during the study are not publically available due to the local laws but are available from the corresponding author on reasonable request

Competing interests-

None

Funding-

None

Authors' contributions-

1. Dr Monika Kaushal: Managed the cases born to COVID-19 mothers and had built up the concept had tied up with other hospitals to collect the data, written the protocol and edited
2. Dr. Venkata Subba Yamuna Tulasi, collected data from the Emirates specialty hospital, made the tables and did the analysis and review of literature.
3. Dr Ayush Kaushal, helped to make excel sheet, analysis and table and also the written part along with Dr Yamuna also helped in review of literature
4. Dr Aditya Rakhecha, collected data from the NMC Royal Women's Hospital, Abu Dhabi and along with Dr Monika [1] helped to prepare the protocol of the study.
5. Dr. Rafiq Memon , collected data from NMC Specialty hospital Dubai
6. Dr Karvendhan Ramasamy helped in collecting the data from NMC Speciality Hospital, Dubai.
7. Dr Shoaib Shahzad Khan, collection data from the Canadian Specialty Hospital, Dubai.

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