Umbilical cord clamping and skin-to-skin contact in deliveries from women positive for COVID-19

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Abstract

OBJECTIVE: To demonstrate that delayed cord clamping (DCC) is safe in mothers with confirmed SARS-CoV-2 infection. DESIGN, SETTING, AND PARTICIPANTS: Prospective, observational study involving epidemiological information from 403 pregnant women with SARS-CoV-2 between March 1st and May 31st, 2020. Data were collected from 70 centers that participate in the Spanish Registry of COVID-19. MAIN OUTCOMES AND MEASURES: The rate of perinatal transmission of SARS-CoV-2 and development of COVID-19 disease in neonates at day 14 of the delivery. RESULTS: The Early cord clamping (ECC) group consisted of 231 infants (57.3%), whereas the DCC group consisted of 172 infants (42.7%). A total of 5 positive cases (1.7% of total tests performed) were identified with the nasopharyngeal PCR tests, 2 from the ECC group (1.7%) and 3 from the DCC group (3.6%). No significant differences between groups were found regarding neonatal tests for COVID-19. No confirmed cases of vertical transmission were detected. The percentage of mothers who made skin-to-skin contact within the first 24 hours after delivery was significantly higher in the DCC group (84.3% versus 45.9%). Breastfeeding in the immediate postpartum period was also significantly higher in the DCC group (77.3% versus 50.2%). CONCLUSIONS: The results of our study have been similar to early cord clamping practices, no skin-to-skin contact, and suppression or delay of breastfeeding. FUNDING: This study was fully funded with public funds from the Institute of Health Carlos III and co-financed with FEDER funds. KEYWORDS: COVID-19, umbilical cord clamping, skin-to-skin, breastfeeding, vertical transmission, safety.

Introduction

On January 12th, 2020 Chinese Authorities shared the genetic sequence of a novel type of virus belonging to the Coronaviridae family, given the name severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1] By international consensus, its related disease has been called coronavirus disease 2019 (COVID-19). The World Health Organization (WHO) declared COVID-19 a pandemic on 11th March due to the prevalence, spread, and severity of the disease.[2] To date, a higher predisposition to infection of pregnant women compared to the general population has not been proven; however, evidence suggests they have a greater susceptibility to develop pneumonia.[3] Moreover, the clinical course seems more severe among them. Higher rates of preterm births and cesarean deliveries have also been detected; the latter being associated with an elevated risk of clinical impairment.[4] Protocols for isolation and social distancing in pregnant women are the same as those for the general population.[5] There is no strong evidence supporting the existence of vertical transmission.[6-8] Some case reports suggest the possible transplacental transmission of SARS-CoV-2.[9] Nevertheless, although vertical transmission has been described, it is very uncommon. Certain practices

during vaginal and cesarean deliveries have been modified during the pandemic. Some centers have suppressed or substantially minimized delayed cord clamping (DCC), mother/infant skin-to-skin contact, and breastfeeding.[8,10] However, WHO[11]and diverse Scientific Societies (Centers for Disease Control and Prevention, CDC;[12] The American College of Obstetricians and Gynecologists, ACOG,[13] National Institute for Health and Care Excellence, NICE;[14]Spanish Society of Obstetrics and Gynecology, SEGO;[5]or The Spanish Neonatology Society, SENEO;[5] among others) recommend these practices in COVID-19 positive mothers because the benefits outweigh the risks and the likelihood of neonatal infection is actually very low. The objective of the present study was to demonstrate that DCC is safe in mothers with confirmed SARS-CoV-2 infection.

Materials and Methods

Study design and population

This prospective, observational study involved epidemiological information from pregnant women with SARS-CoV-2 between March 1st and May 31st, 2020. Data were collected from the Spanish Registry of COVID-19.[15] A total of 100 Spanish centers participate in the Registry, representing 49.95% (n = 172,000) of total deliveries (N = 359,770) carried out in 2019 in Spain.[16] Finally a total of 70 centers included cases in the present study. The study was firstly approved by the Puerta de Hierro University Hospital Ethics Committee, and subsequently by the Ethics Committee of each participating hospital. Procedures were in concordance with the Declaration of Helsinki. Oral informed consent was obtained from each participant.

Analyzed variables

Women were differentiated according to the timing of cord clamping (early or delayed). Early cord clamping (ECC) and DCC were established when performed < 30 or > 30 seconds after the delivery, respectively. Primary variables included: the rate of perinatal transmission of SARS-CoV-2 and development of COVID-19 disease in neonates at day 14 of the delivery. Perinatal transmission was defined by a positive PCR in a nasopharyngeal sample from the neonate. Given the lack of a uniform criterion about neonatal infection, the diagnosis was made by PCR from a nasopharyngeal sample, following specific considerations. If the PCR was positive within 12 hours after delivery, it was repeated. If this second PCR was negative, the first PCR was then considered as contaminated or a false positive; however, if positive, the infection was corroborated. Each case was followed-up at 14 days after delivery, by phone. The state of health of each neonate was confirmed during the writing of this manuscript (June 2020). Secondary variables included: the need for neonatal resuscitation, admission at the intensive care unit (ICU), neonatal symptomatology suggestive of COVID-19, and rates of skin-to-skin contact and early breastfeeding. Neonatal symptoms were evaluated at day 14 after delivery, by completing a clinical questionnaire during a phone interview.

Statistical analysis

For the descriptive analysis, categorical variables were expressed as absolute and relative frequencies; and quantitative values as mean and range (minimum-maximum values). Comparisons between ECC and DCC groups were carried out with the chi-square or Fisher Exact tests for categorical variables, and t-test or U Mann-Whitney test for quantitative ones, when appropriate. Statistical significance was established with $P < .05$. All statistical analyses were performed with SAS 9.4.

Results

Data from 475 pregnant women with confirmed SARS-CoV-2 infection and their deliveries were initially included in the study; however, 72 were discarded out because of a lack of information about the timing of the cord clamping. Therefore, 403 cases were finally analyzed. ECC was performed on 231 neonates (57.3%), whereas 172 (42.7%) received DCC. No significant differences were found between ECC and DCC groups in maternal age and time between COVID-19 diagnosis and delivery (Table 1). Regarding maternal symptomatology at the time of delivery, 82 (35.5%) and 149 (64.5%) women showed COVID-19 symptoms or were asymptomatic in the ECC group, respectively. In the case of DCC, 30 women (17.4%) showed symptoms, whereas 142 (82.6%) were asymptomatic. The gestational age at delivery with ECC was significantly lower

than DCC (37+9 versus 38+8 weeks, $P = .001$). The number of instrumental and cesarean deliveries were higher with ECC than DCC (13.0% versus 8.1% for instrumental ones, and 45.9% versus 17.4% for cesarean); whereas the number of eutocic deliveries was higher for DCC (74.4% versus 41.1%). The weight at birth was significantly higher with DCC than ECC (3,210.4 versus 3,065.7 grams, $P = .037$). Although statistically significant, this difference was not clinically relevant.

A total of 5 positive cases (1.7% of total tests performed) were identified with the nasopharyngeal PCR tests, specifically 2 from the ECC (1.7%) and 3 from the DCC group (3.6%; Table 2). No significant differences between groups were found regarding neonatal tests for COVID-19 ($P = .390$). All positive cases reported within 12 hours after delivery resulted negative in the confirmation test performed between 12 and 48 hours post-delivery. Therefore, no confirmed cases of vertical transmission were detected. A new positive case was found within 12–48 hours of delivery, which was possibly related with horizontal transmission, through contact with a relative without the use of protection measures (and unknown infection). None of the neonates experienced COVID-19 at day 14 after delivery.

The percentage of mothers who made skin-to-skin contact within the first 24 hours after delivery was significantly higher with DCC (84.3% versus 45.9%, $P = .001$). Breastfeeding in the immediate postpartum period was also significantly higher with DCC than ECC (77.3% versus 50.2%, $P = .001$).

No significant differences between groups were found regarding arterial pH and Apgar score at 5 minutes in neonates. A higher percentage of admissions to the ICU were reported in the ECC (16.5% versus 8.1%,$P = .015$).

Considering the temporal distribution, ECC was more prevalent than DCC during the first few days of the pandemic (5.2% versus 2.3% between 1st and 15th March, 25.5% versus 15.1% between 16th and 31st March, and 31.6% versus 20.9% between 1st and 15th April. Time evolution is shown in Table 3.) The main reason for an ECC was due to maternal COVID-19 disease (37.2%)

Discussion

Our study supports the recommendations from WHO,[11]CDC,[12] and the Spanish Government[5]on the management of deliveries and neonate care during the COVID-19 pandemic. Current evidence does not conclusively support intrauterine transmission of SARS-CoV-2.[6-8] However it is known that DCC, and not ECC, can reduce the risk of death before hospital discharge in preterm neonates,[17] and provide benefits in those born at term. Thus, there is no evidence for not continuing to perform it. The routine separation of the neonate from the mother interferes in the mother/infant relationship.[18] A woman with a probable or confirmed suspicion of COVID-19 disease can give skin-to-skin contact in the delivery room, and exclusively breastfeed her baby. Breastfeeding improves the health of both mother and infant, results in benefits for the families, and has a positive social and economic impact.[18] On the whole, this current pandemic has led to combining the promotion of breastfeeding with adequate measures of infection control (wearing a mask, frequent hand washing, and social distancing). In Spain, the lack of solid evidence on the vertical transmission of the coronavirus during the initial days of the pandemic led to very conservative recommendations from the Spanish Ministry of Health for the management of deliveries in women with COVID-19.[5] ECC, little skin-to-skin contact, and negativity to breastfeeding practices, were the decisions made in many cases. According to our study, ECC was more prevalent over DCC during the early period. Both ECC and DCC were equally used between 16th and 30th April. Once Healthcare Authorities proclaimed the safety of these interventions,[19] the clinical practice took a new stance and progressively returned to DCC and early skin-to-skin contact. Moreover, hygienic measures (wearing a mask and frequent hand washing) were introduced to avoid mother/infant transmission during breastfeeding.

The characterization of our present study is the provision of perinatal outcomes of neonates born to COVID-19-positive mothers with DCC, practicing skin-to-skin contact and early breastfeeding under appropriate safety measures. Moreover, we included perinatal outcomes of neonates with ECC due to diverse reasons. No significant differences in COVID-19 infections were detected between the ECC and the DCC groups. Likewise, no COVID-19 symptomatology was found in neonates at day 14 of follow-up in both groups. This

fact corroborates the safety of DCC and skin-to-skin contact and breastfeeding practices in women with COVID-19, in agreement with main Scientific Societies.[5,11,12] It is interesting to highlight in our study the large percentage of preterm neonates with ECC. The fear of vertical transmission of COVID-19 (principle reason for choosing ECC) probably caused the decrease in the number of DCC in these neonates, who in turn are those who may benefit most from this intervention.

The possible intrapartum infection of neonates has been described.[19] The suspicion could originate from a positive nasopharyngeal PRC test within 12 hours after delivery and confirmed within 24-48 hours. Horizontal transmission is suspected in the case of a positive nasopharyngeal PRC test within 24-48 hours, but a prior negative one.[20] In our study, we reported 5 cases of positive nasopharyngeal PRC within 12 hours of delivery, and all were negative in the confirmation test within 24-48 hours post-delivery. This result points to the probable contamination during sample collection or a false positive. Another study from our research group also evidenced two positive PCR cases (cesarean deliveries at term), who experienced COVID-19 symptoms within 10 days of delivery.[4] In that study, the initial test was negative but positive when confirmed. In both cases, neonates were in contact with parents immediately after delivery. The COVID-19 symptoms resolved within 48 hours. No information about the timing of the cord clamping was available. In our present study, we reported one positive case within 12–48 hours after delivery, possibly related to contact with a relative unaware of being infected. This neonate showed COVID-19 symptoms for some days and did not require admission into the ICU. None of the neonates from our cohort showed COVID-19 symptoms when the phone evaluation took place at day 14 after delivery, and while writing this manuscript (June 2020). Moreover, none of the neonates required admission into the ICU due to severe symptomatology of SARS-CoV-2 infection.

Strengths and Limitations

The main strength of the study is the number of registered cases (403 deliveries from 70 centers across Spain), being one of the largest cohorts described. Furthermore, it represents a novel topic because, to our knowledge, there are no studies that have analyzed perinatal outcomes in neonates born to mothers with COVID-19 regarding the timing of cordon clamping, or that have evaluated the safety of DCC, skin-to-skin contact, and breastfeeding practices in these neonates.

On the other hand, our study has several limitations. Routine serology tests (for determining the immunological state after delivery) were not performed in neonates born to mothers with confirmed COVID-19 due to the lack of availability at the beginning of the pandemic in Spain, and later, once they were available, due to the diversity of tests and protocols in the distinct centers. Furthermore, the clinical questionnaire (for evaluating the neonatal symptoms) was not normalized and homogeneous in all the centers. The determination of parts of the virus in the neonate with ultrasensitive tests does not mean the existence of the complete virus with infective capacity. We did not know if the healthcare professionals who assisted the deliveries or the relatives who visited the neonates were SARS-CoV-2 positive or not. We were able to trace this association in one of the positive PCR cases; nevertheless, in a pandemic like this, we do believe that the present results are unique and relevant because of the difficult circumstances in which they were obtained. In the future, once serologic diagnostic methods improve and become more available, there will be a need to determine the presence and evolution of immunoglobulins against SARS-CoV-2 in order to clarify whether transplacental transmission does exist. Further long-term, prospective studies with neonates are thus required.

Conclusions

Our study supports the approaches of delayed cord clamping, skin-to-skin contact, and early breastfeeding in mothers with COVID-19. Perinatal results associated to these practices have been similar to those with early cord clamping, no skin-to-skin contact, and suppression or delay of breastfeeding.

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Disclosure Statement

The authors report no conflict of interest.

Contribution to Authorship

All the authors certify that have participated sufficiently and equally in the work.

Details of Ethics Approval

The study was firstly approved by the Puerta de Hierro University Hospital Ethics Committee, and subsequently by the Ethics Committee of each participating hospital. Procedures were in concordance with the Declaration of Helsinki. Oral informed consent was obtained from each participant.

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