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Case Report

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SARS-CoV-2 Pneumonia in A Preterm Newborn Treated Successfully by Dexamethasone

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Abstract

Data on illness in preterm infants due to severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) is limited. Duration of viral shedding and treatment options including use of dexamethasone to treat SARS-CoV-2 pneumonia in preterm newborns are scarce and not-well reported. We are reporting SARS-COV-2 positive sick preterm twins vertically infected from SARS-COV-2 positive unvaccinated mother. Twin B initially tested negative at 24 & 48 hours of life (HOL) but subsequently tested positive at 72 HOL and developed SARS-COV-2 pneumonia and required a longer duration of respiratory support. We treated her with 10 days of dexamethasone and noted a good clinical response. To our knowledge, we are first to report the use dexamethasone in a premature newborn with SARS-COV-2 pneumonia. Additionally, the duration of viral shedding in both Twin A and Twin B was between 4-5 weeks.

Keywords: COVID-19, Preterm, Vertical transmission, SARS-CoV-2, Dexamethasone, Viral shedding

List of Abbreviations:

NICU: Neonatal Intensive Care Unit
SARS-CoV-2: Severe Acute Respiratory Syndrome-Coronavirus-2
HOL: Hours of Life
NIV: Non-Invasive Ventilator
DOL: Day of Life
AAP: American Academy of Pediatrics

Introduction

Data on early clinical manifestations in preterm infants due to severe acute respiratory syndrome-coronavirus-2 (SARS-CoV-2) is limited. In general, infection rates among newborn infants born to women who test positive at delivery range from 0-12%. Furthermore, maternal infection is associated with increased risks of preterm birth and perinatal morbidity [1].

Preterm delivery occurs in a higher proportion of women with SARS-CoV-2 infection compared to uninfected women [2]. Angelidou et al., studied the perinatal SARS-CoV-2 infections in 11 academic and community hospitals, and found a higher rate of preterm deliveries as well as a higher need of respiratory support in newborns born to mothers who are SARS-CoV-2 positive [3]. Duration of viral shedding and treatment options including use of dexamethasone to treat SARS-CoV-2 pneumonia in preterm newborns are scarce and not-well reported.

Cases Presentation

Dichorionic diamniotic twins at 33 weeks + 2 days were born to a 14-year-old primigravida mother, via cesarean section. Mother presented to the hospital for uterine contractions, reported no vaginal bleeding or leaking of fluid and positive fetal movement. Her pregnancy was complicated by symptomatic SARS-COV-2 diagnosed 4 days prior to delivery. Ultrasound done at 24 weeks revealed no congenital anomalies. Mother did not receive the SARS-CoV-2 vaccine. Membranes were artificially ruptured at the time of C-section delivery. All hospital staff involved in the mother's care put on a gown and gloves as well as a N95 respirator and eye protection (goggles or face shield). No skin-to-skin contact was practiced with either of the twins. Apgar scores were 8 and 8 at 1 and 5 minutes respectively for both babies. They were immediately isolated from the mother and admitted to the NICU isolation room because of prematurity.

Twin B

Female. Birth weight 1280 grams. After arrival to the NICU, the infant was in room air, however, she required oxygen via nasal cannula within few hours of life due to desaturations into the 80s. On DOL2, she was intubated and placed on mechanical ventilation due to severe respiratory distress. She received surfactant and was weaned to NIMV on DOL 14, then CPAP on DOL 20. She then was changed high flow nasal cannula which she remained on DOL 20 to 30. Supplemental oxygen was discontinued on DOL 30 and she was placed in room air. Of note, she tested negative for SARS-COV-2 negative at 24 and 48 HOL. However, she then tested positive at 72 HOL, and also on DOL 13 and 26. On DOL 23, dexamethasone (0.1 mg/kg/day) was initiated for 10 days per pediatric pulmonology and infectious diseases recommendations due to concern for SARS-CoV-2 pneumonia (afebrile but had increased work of breathing and consolidation in the chest x-ray), that time dexamethasone started while the patient was receiving oxygen via high flow nasal canula 2 liter and FiO2 40%. Additionally, vancomycin and cefepime was used to cover for superimposed bacterial infection. They were discontinued after 72 hours. She improved on the 10-day course of dexamethasone and was then converted to hydrocortisone (2 mg/kg/day) because of concern of adrenal suppression which was gradually weaned. Twin B also remained on contact precautions per AAP guidelines until she tested negative on DOL 34, and 36. She began feedings on DOL 5 of expressed breast milk, donor milk or 24 kcal/ounce High Protein formula. She was discharged on DOL 57 after achievement of full oral feeds and good weight gain, on room air, and with no home medications other than vitamins and iron.

Twin A

Male. Birth weight 1655 grams. After arrival to the NICU, the infant was placed on CPAP due to increased work of breathing. He continued to have respiratory distress and required invasive ventilator support at 2 hours of life. He received one dose of Curosurf and was extubated the following day to non-invasive ventilator support (NIV). On day of life (DOL) 8, he was weaned to CPAP, then to room air on DOL 13. He was evaluated for sepsis post-birth, received ampicillin and gentamicin for 36 hours following negative

blood culture. He tested positive for SARS-COV-2 at 24 and 48 hours of life (HOL) Given the uncertainty on the duration of viral shedding in preterm infants, SARS-COV-2 test was performed and he was positive on DOL 13 and again on DOL 26. Throughout the stay in the NICU, he was placed on contact precautions per American Academy of Pediatrics (AAP) guidelines. The contact precautions were discontinued with two negative tests on DOL 34 and 36. He began feedings on DOL 6 using either expressed breast milk or donor breast milk, fortified with human milk fortifier on day of life 12, and later transitioned to full feedings of Special Care High Protein 24kcal/ounce High Protein formula. He was discharged home on DOL 48 after achievement of full oral feeds and good weight gain, in room air, and with no home medications other than vitamins and iron.

Twin B

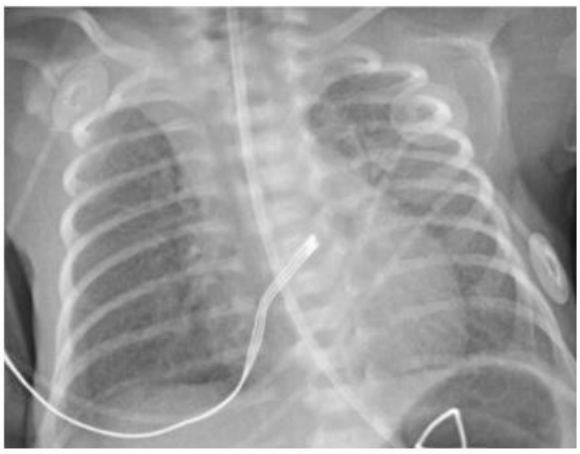
Age	Hours			Days				
	24	48	72	13*	19*	26	34	36
SARS-CoV-2	Negative	Negative	**Positive**	**Positive**	**Positive**	**Positive**	Negative	Negative

*Clinical Illness

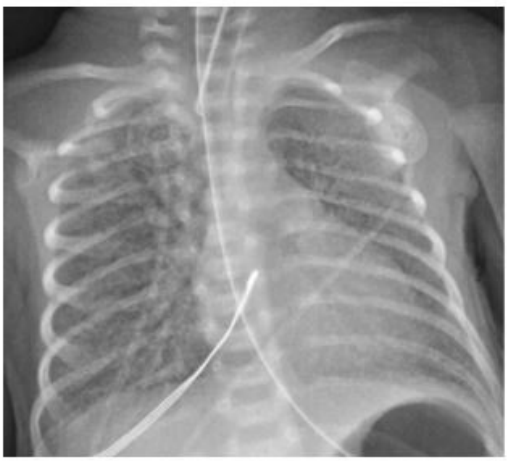
Twin A

Age	Hours			Days				
	24	48	72	13	19	26	34	36
SARS-CoV-2	**Positive**	**Positive**	Not tested	**Positive**	Negative	**Positive**	Negative	Negative

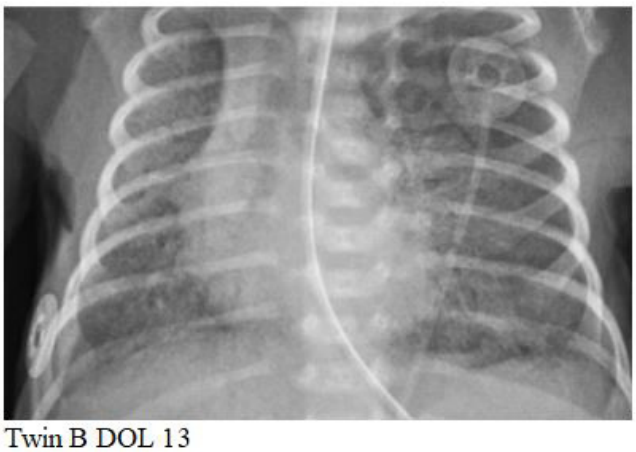
Table 1: Timing and result of SARS-CoV-2 testing



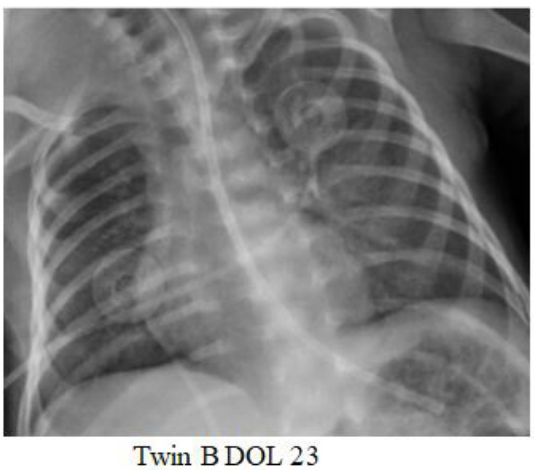
Twin B DOL 1



Twin B DOL 3



Twin B DOL 13



Twin B DOL 23

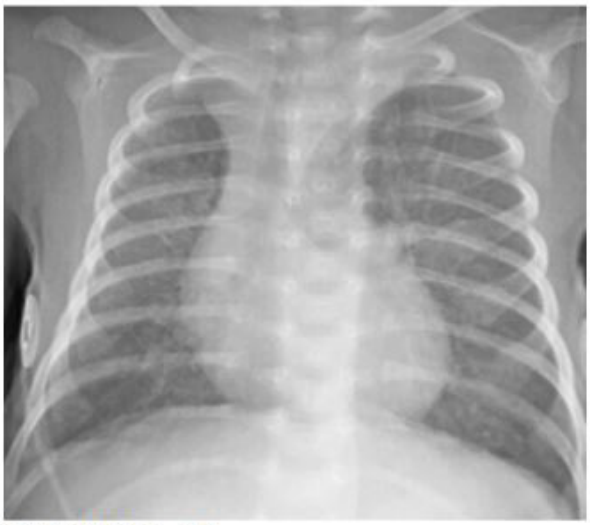


Figure 1: Chest X-ray for Twin B

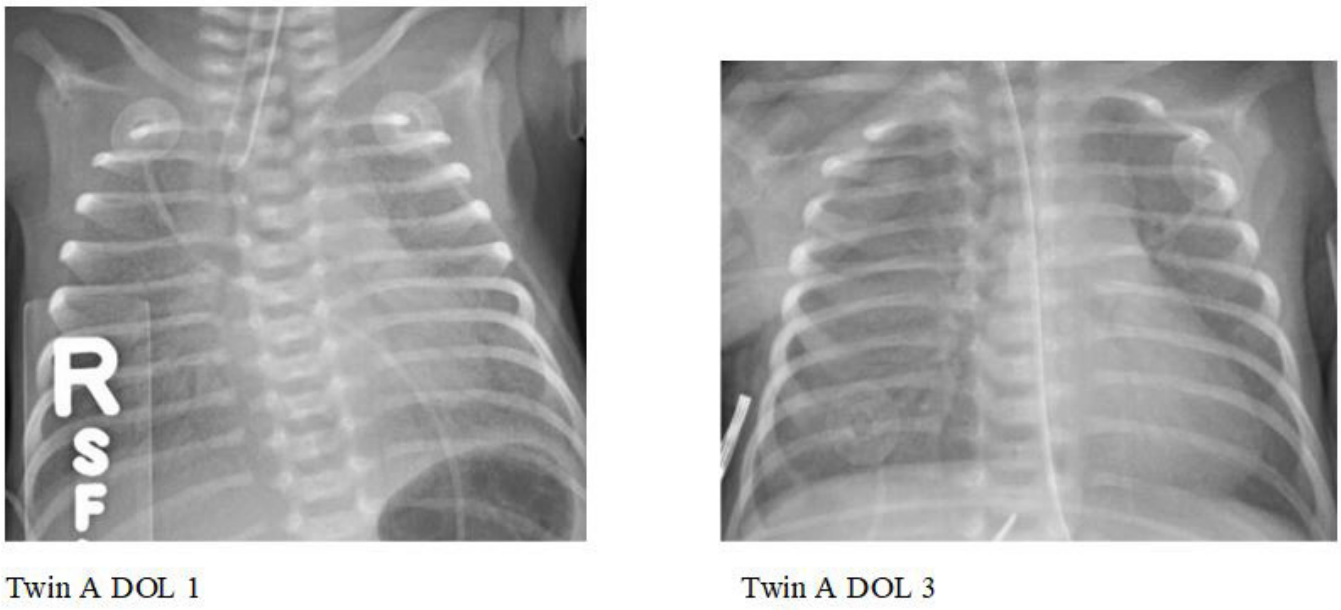


Figure 2: Chest X-ray for Twin A

Discussion

We are reporting SARS-COV-2 positive sick preterm twins born to SARS-COV-2 positive mother. Both babies had several subsequent RT-PCR testings for SARS-COV-2. Both babies were immediately separated from their mother and admitted to the NICU isolation room. Both twins tested positive for SARS-COV-2 indicating vertical transmission of the virus. This in contrast to a study by Dumitriu et al., who stated that no evidence of vertical transmission was identified in 101 newborns of positive mothers [5].

Twin A (male) who initially tested positive at 24 and 48 HOL was less sick than Twin B (female) who initially tested negative at 24 & 48 HOL but subsequently tested positive at 72 hours of life. Twin B had SARS-COV-2 pneumonia and required a longer duration of respiratory support. We treated her with 10 days of dexamethasone and noted a good response in terms of clinical well-being and radiological evidence. To our knowledge, we are the first to use dexamethasone in a premature newborn with SARS-COV-2 pneumonia. Many published studies in adults have illustrated the use of dexamethasone in patients with Covid-19, but we could not find one study in newborns. In adults, dexamethasone resulted in lower mortality among those who were receiving respiratory support [6,7].

Our infectious diseases specialist recommended antibiotics based on a report of higher incidence of serious bacterial infections in children with SARS-COV-2 infections, however, we stopped the antibiotics at 72 hours after blood and urine cultures reported no growth. Our rational to discontinue the antibiotics was supported by Payson et al., who found that febrile infants younger than 90 days who tested SARS-CoV-2 positive had lower rates of serious bacterial infections than febrile infants who tested negative [8]. Dexamethasone inhibits neutrophils' migration and lymphocytes' proliferation. It decreases the expression and production of pro-inflammatory cytokines and increases the expression and production of anti-inflammatory cytokines. Thus, it reduces pulmonary inflammation resulting in improved respiratory functions [9].

We followed the AAP recommendations regarding isolation precautious and timing of testing1. Both infants were immediately transferred to the NICU following delivery and placed in the isolation room. Per hospital policy, mother was not allowed to visit infants in the NICU until 10 days after she tested positive (on infants DOL 10). Babies remained in the isolation room until DOL 18, when they were transferred to one of our nurseries within our open-bay NICU per pediatric infectious disease recommendations. However, once transferred out of the isolation room, infants remained under our COVID-19 isolation protocol, where they remained in isolette and staff was required to gown and glove. Masks are worn standardly at our institution.

Both babies received expressed breast milk and premature formula. Feedings of maternal breast milk were not initiated until after infants tested positive. The mother has never received COVID-19 vaccine. However, we opt to feed the patients breast milk in consistence with AAP guidelines1. Also, that with in agreement with Young et al., who concluded that the production of IgA and IgG antibodies in breast milk differed after COVID-19 infection and COVID-19 vaccine. While infection was associated with a highly variable IgA-dominant response and vaccination was associated with an IgG-dominant response, both were associated with having milk that exhibited neutralization activity against live SARS-CoV-2 virus [10].

Duration of viral shedding has not been established in premature infants1. In our two cases, the duration of viral shedding was almost 4 weeks postnatal for both babies. This duration is consistent with Dolan et al., who concluded that most immunocompromised children with a SARS-CoV-2 infection had prolonged viral shedding of >6 weeks (median time to two negative tests was 42 days) [11].

Unfortunately, we did not test the strain of the virus. Due to the higher reports of Delta strain; we suspected that the strain might be Delta. However, at that time we thought that further testing would not change our management plan.

Conclusion

In conclusion, we are reporting twin preterm infants who had SARS-CoV-2 infection transmitted vertically from their unvaccinated SARS-CoV-2 positive mother. Twin B had SARS-CoV-2 pneumonia treated successfully with 10-days course of dexamethasone. Furthermore, their duration of viral shedding was 4 weeks postnatal.

Acknowledgments

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