# Congenital Chikungunya Virus Infection after an Outbreak in Salvador, Bahia, Brazil

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## Abstract

There is little information about the congenital chikungunya virus (CHIKV) transmission. We describe two cases of well-documented congenital CHIKV infection in Salvador-Brazil, where CHIKV has been identified since 2014. The outbreak in the city led to the clinical CHIKV diagnoses of both pregnant women 2 days before delivery. Urine and blood samples from the mothers and newborns were collected and tested for reverse transcription-polymerase chain reaction (PCR) analysis for Zika, dengue, and CHIKV. Both neonates and mothers had positive urine and serum PCR results for CHIKV. The newborns had significant perinatal complications and were admitted to the neonatal intensive care unit. The purpose of our case report is to show how severe congenital CHIKV infection can be and the importance to include CHIKV infection in the differential diagnosis of neonatal sepsis when mothers have clinical signs of the disease and live in an affected area.

**Keywords**
- newborn
- chikungunya
- congenital
- infection

Chikungunya virus (CHIKV) belongs to the *Togaviridae* family and is transmitted by mosquitoes of the genus *Aedes*, the same vector responsible for dengue virus (DENV) and Zika virus (ZIKV) infections.[1] Currently, there is little information about the congenital transmission of CHIKV.

We describe two cases of congenital CHIKV infection of neonates who were born between August 19, 2015 and September 12, 2015. An ongoing arbovirus outbreak in Salvador, Brazil, led to the clinical CHIKV diagnosis of both pregnant women 2 days before delivery. Their newborns had significant perinatal complications, such as cutaneous rash, fever, and hemodynamic disorders, and both were admitted to the neonatal intensive care unit (NICU) with congenital CHIKV infection. Urine and blood samples from the mothers and newborns, as well as breastmilk from the mothers, were collected for reverse transcription-polymerase chain reaction (RT-PCR) analysis for ZIKV, DENV, and CHIKV as previously described.[2–4]

Sera and urine samples were collected during the first week after birth in the neonates and during the perinatal period in the mothers. Both sera and urine samples of neonates and their mothers had positive RT-PCR results for CHIKV and negative results for ZIKV and DENV.

## Case 1

A 24-year-old mother reported the appearance of maculopapular rash exanthema without fever in the third month of gestation and was presumed to be infected with ZIKV. In the ninth month, 2 days before delivery, she had arthralgia of the wrists, elbows, hips, and knees and also developed an abdominal

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maculopapular rash. The day before labor, she progressed with persistent fever (39°C) and chills. CHIKV infection was suspected because a CHIKV outbreak was ongoing in the city.

The newborn was a 38 weeks' gestational female. Her birth weight was 3,382 g, with a 35 cm cephalic perimeter and Apgar score of 9/9, and the amniotic fluid was meconium stained. On the first day of life, she had early respiratory distress, a palpable liver, and spleen 2 cm below the respective costal margins and generalized edema. Chest X-ray showed hypotransparency and diffuse pulmonary infiltrates. The patient was transferred to the NICU and placed on continuous positive airway pressure and later placed on mechanical ventilation. Surfactant was administered and a pneumothorax was identified. On the sixth day of life, she developed disseminated maculopapular rash and fever. The patient progressed with hemodynamic instability and required vasoactive drugs as well as antibiotics. The patient's cerebrospinal fluid study, ophthalmologic examination, and cranial ultrasound were normal. After 20 days, she was diagnosed with staphylococcal endocarditis that did not respond to clinical treatment and required cardiac surgery. Notably, valve vegetation tested negative for CHIKV by RT-PCR. The neonate progressed well and was discharged from hospital on the 37th day after delivery.

## Case 2

An 18-year-old female patient had a presumed diagnosis of CHIKV 2 days before delivery. She had a vaginal delivery of a male newborn at 41 weeks and 4 days of gestational age with an Apgar score of 8/9. His birth weight was 3,373 g, and he had a cephalic perimeter of 34 cm. Ampicillin and gentamicin were started to treat the presumable perinatal bacterial infection. On the fourth day of life, he progressed, with a 37.9°C fever, lethargy, and poor perfusion signs. The patient was transferred to the NICU with signs of early-onset sepsis and was treated with additional antibiotics, fluid expansion, and vasoactive drugs. The patient's cerebrospinal fluid study was normal, and cranial ultrasound showed a grade I intraventricular hemorrhage. The patient progressed favorably and was discharged at 17 days of life.

The most important clinical features of congenital CHIKV infection are pain, fever, lethargy, edema, cutaneous lesions (petechial, bullous rash, and desquamative lesions), and maculopapular rash.[5] Thrombocytopenia, lymphopenia, and hypoprothrombinemia have also been reported.[5,6] Infected neonates usually present symptoms and signs after an incubation period of 4 days (range: 3–7 days).[1,5] In our patients, fever appeared on the fourth day (case one) or on the sixth day of life (case two). Only in the first case, the neonate presented a cutaneous rash at day 6. Neither of the newborns had thrombocytopenia, lymphopenia, or hypoprothrombinemia. Acute encephalopathy, seizures, cerebral hemorrhage, and cerebral palsy may also occur. Our second reported newborn developed a grade I cerebral hemorrhage; however, neither newborn progressed with seizures, acute encephalopathy, or cerebral palsy. Half of the children may exhibit diminished neurocognitive performance at 2 years of age.[1,5] Hyperpigmentation areas in the face, chest, shoulder, and the palm of the hand may also occur.[7] In a previous study, 1,400 pregnant women were enrolled during a CHIKV outbreak in the Reunion Island (628 uninfected, 658 infected during pregnancy, 27 infected before pregnancy, and 87 infected on unknown dates). Outcomes (cesarean deliveries, obstetric hemorrhaging, preterm births, and stillbirths after 22 weeks, birth weight, congenital malformations, and newborn admissions) were similar between the groups.[8] In some reports, CHIKV infection during pregnancy did not appear to cause major clinical outcomes in the newborns.[9,10] Intrapartum infections are associated with congenital transmission and could be responsible for severe infection in the newborn.[5] The mother's viremic state during the week before delivery appears to be the major risk factor for vertical CHIKV transmission.[6,7]

In 2015, a series of eight cases of congenital CHIKV infection in Colombia were reported. The newborns developed severe symptoms of respiratory distress, sepsis, necrotizing enterocolitis, meningoencephalitis, myocarditis, edema, bullous rash, and pericarditis. There were three deaths (37.5%).[11] In both of our cases, the newborns developed sepsis and hemodynamic instability and required intensive care, confirming the more severe progression of the disease when the mother's CHIKV infection occurs just before delivery. Therefore, neonatologists should include CHIKV infection in the differential diagnosis of neonatal sepsis when mothers have clinical signs of the disease and live in an affected area.

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