inflammation surrounding the vertebra, in the epidural space and affecting the soft tissue of the pharynx and neck.

The infant eventually completed 8 weeks of intravenous cloxacillin therapy and is doing well at 6 months of age. There is no evidence of neurodevelopmental delay. A repeat spinal MRI at 6 months of age demonstrated mild flattening of the C5 vertebra with complete resolution of the inflammation. No neurologic sequelae were found on examination.

**DISCUSSION**

The spine is an uncommon site for osteomyelitis in children, and it is rarely seen in neonates. In a review of 163 cases, Dich et al. reported that the inflammation was located in the vertebrae in only 1.2% of children treated for osteomyelitis. Cervical osteomyelitis in neonates is particularly rare, and only 11 cases have been reported in the literature to date.\(^8\)\(^{-}\)\(^{17}\) \(S.\) aureus is the most common organism responsible for hematogenous vertebral osteomyelitis.\(^3\)\(^{-}\)\(^{5}\)\(^,\)\(^8\) As in our case, \(S.\) aureus was the causative agent in most cases (7/11) of cervical osteomyelitis in neonates. The neonates in those reported cases presented with nonspecific symptoms, such as hypotonia, fever, irritability, poor feeding, weight loss, episodes of apnea and bradycardia. Eight of the 11 neonates presented with neurologic symptoms, such as tremor, upper limb paresis or quadriparesis.

Our patient presented with upper limb paresis, which can be explained by compression of the cervical nerve roots because of the extensive inflammation and edema involving the epidural and paravertebral spaces and the soft tissue of the pharynx (Fig. 1). There was no compression or inflammation of the spinal cord that could have led to lower extremity paresis, as in previously reported cases.\(^7\)\(^,\)\(^13\)\(^,\)\(^16\)

Advanced imaging studies, such as MRI, computerized tomogram or technetium bone scan, are commonly used to confirm the presence and site of infection, to evaluate the extent of the spondylodiscitis and to identify present or impending complications, such as extradural and paraspinal collections.\(^9\)\(^,\)\(^8\) The MRI scan has been shown to be the most sensitive and specific study, delineating the extent of bone and soft tissue involvement.\(^18\),\(^19\) In our patient, although the diagnosis of cervical osteomyelitis was made early, bone destruction, as seen on MRI, had already become extensive during the week after disease onset (Fig. 1). Despite the delay in treatment, however, its results were satisfactory. The inflammation subsided, and the neurologic deficit recovered. Current guidelines do not favor second-look MRIs to assess for resolution. Nevertheless, because of the extensive inflammation, the vertebral destruction and the fear of cervical instability, we carried out follow-up MRIs to assess for resolution of the infection and cervical stability before removing the cervical collar.

The mainstay of treatment of vertebral osteomyelitis is antibiotic treatment, and current guidelines advocate its administration for 4–6 weeks. Our patient was treated for 8 weeks because of residual inflammation involving the affected vertebra and surrounding soft tissue, which was demonstrated on a second MRI that was done 4 weeks after treatment initiation. Depending upon the degree, extent and site of spinal instability, some patients may require spinal immobilization for several weeks.\(^11\) Surgical decompression and stabilization are usually not required. Recovery from any associated neurologic deficit depends on the degree and duration of spinal cord or nerve roots compression.

**REFERENCES**


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**FIRST DETECTION OF CHIKUNGUNYA VIRUS IN BREAST MILK**

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**Abstract:** Chikungunya virus (CHIKV) has never been detected in human breast milk. This is a brief report of CHIKV infection in a breastfeeding woman of a 3-month-old baby. The mother's CHIKV-RT PCR was positive in serum, urine and milk. The baby's CHIKV serology and reverse transcription polymerase chain reaction (RT-PCR) were negative. The detection of CHIKV in milk raises clinical and epidemiologic questions.  

**Key Words:** chikungunya, breast milk, chikungunya infection  

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The authors have no conflicts of interest to disclose.
Chikungunya virus (CHIKV) is an alphavirus transmitted by the *Aedes* spp mosquitoes that was first reported in 1952 in Tanzania. CHIKV outbreaks were reported in Asia and Africa, but in Brazil the first case was reported in September 2013 in Oiapoque, Amapa State. The East-Central-South-African CHIKV genotypes were detected in Feira de Santana, Bahia and disseminated to other regions in Brazil.

Symptoms during the acute phase of the CHIKV infection are characterized by arthralgia, erythematous rash and fever, which can progress to more severe, chronic and debilitating arthritis. Atypical CHIKV with neurologic and cardiac manifestations have also been described.

There have been reported cases of chikungunya involving transmission by other means than mosquito bite, such as vertical transmission. Studies of the presence of CHIKV in samples other than serum are scarce, though detection of viral particles in body fluids, such as saliva, urine and semen has been reported. We present a case report of chikungunya infection in a breastfeeding woman in whom the virus was detected in breast milk without transmission to the baby.

**CASE REPORT**

A 28-year-old Brazilian woman from Salvador, Bahia, who was breastfeeding her 3-month-old baby, presented with mild headache, asthenia and asthenia followed by a nonpruritic macular rash on the face, neck, upper chest and arms without fever or arthralgia. The symptoms have been present for 4 days. The patient denied dysuria, diarrhea, recent use of drugs or dysphagia. Physical examination did not disclose any oral lesions or ocular erythema, but bilateral inguinal lymph node enlargement without signs of inflammation was detected. Symptoms onset initiated after a recent trip to an endemic region for dengue virus (DENV), CHIKV and zika virus (ZIKV).

Samples of serum, urine and milk from the mother were collected at 3 time points: third, 23rd and 27th days after the inception of symptoms and tested for ZIKV, CHIKV and DENV by reverse transcription polymerase chain reaction (RT-PCR). The milk was collected using a milk pump, after washing the breasts with soap and water and before breastfeeding the infant. It was analyzed before and after centrifugation, and then the supernatant and the pellet of the milk were tested separately. The first CHIKV-RT PCR test, performed at the third day of symptoms, was positive in all samples: serum, urine and milk. In addition, whole milk, the supernatant and the pellet of the milk were also positive for CHIKV. In the second test, only the milk, both before and after centrifugation, was positive for chikungunya by RT-PCR. In the third test, all samples were negative for CHIKV, including the milk. The inoculation of CHIKV onto Vero cells was tried twice but probably because of the difficulty of removing excess fat from the milk, cellular lysis must have occurred. All samples were negative for DENV and ZIKV by RT-PCR (Table 1).

The patient chose not to discontinue breastfeeding after onset of the symptoms and the infant remained healthy throughout the period. The baby’s CHIKV RT-PCR was negative in urine, serum and saliva in the fifth and 15th day after initial symptoms of his mother. The serology for immunoglobulin G and immunoglobulin M (IgM) CHIKV antibodies by ELISA were negative 60 days after the onset of his mother’s disease. We received the mother’s written informed consent to use the samples for research and publication.

**DISCUSSION**

There are few publications about detection of arboviruses in breast milk. Grivard et al (2007) have reported molecular and serologic methods for the diagnosis of chikungunya from different samples, but CHIKV RNA was not detected in 28 maternal milk samples, including 8 that were collected during viremia (RT-PCR positive plasma). However, our case report presents a woman with a positive CHIKV RT-PCR in serum, breast milk and urine. The milk was tested in 2 forms, before and after centrifugation to rule out the possibility of different results in the supernatant or pellet of the milk. The infant’s CHIKV seroconversion and RT-PCR make the possibility of contamination of the milk by the child’s saliva unlikely because the baby did not present clinical and laboratory signs of infection.

In 2002, the CDC reported the first possible transmission of West-Nile virus (WNV) via breastfeeding in a mother that might have been infected postdelivery by transfusion with blood products containing WNV. In this case, a sample of milk from day 16 postdelivery tested positive for the presence of WNV nucleic acid, WNV-specific IgM and immunoglobulin G antibodies. The infant remained healthy but tested positive for WNV-specific IgM at 25 days of age. Additional information is needed to understand the potential for WNV transmission through breast milk.

The World Health Organization has recently published a guideline, Infant Feeding in Areas of ZIKV Transmission, suggesting that the benefits of breastfeeding to the infant outweigh any potential risk of transmission since there are currently no documented reports of ZIKV being transmitted in this manner and no descriptions of severe infant disease. In July 2015, in New Caledonia, infective viral particles were detected in breast milk samples, confirmed by the presence of a cytotoxic effect and by RT-qPCR, without signs of the disease in the neonate. The absence of cytopathic study in Vero cells is a limitation of our case report because it could evaluate if the CHIKV strains detected in milk had replicative capacity. The long-term persistence of CHIKV in breast milk after maternal clearance viremia raise the possibility of the milk act as a sanctuary for sheltering CHIKV, needing further investigation because of diagnostic and transmission concern.

In 2009, a case report in Brazil pointed to a possible yellow fever (YF) transmission through breast milk after vaccination for yellow fever (YF) transmission through breast milk after vaccination for yellow fever (YF) vaccination.

**TABLE 1. Molecular Markers During the CHIKV Infection**

<table>
<thead>
<tr>
<th>Days From Symptoms Onset</th>
<th>DENV (Serum)</th>
<th>ZIKV (Serum)</th>
<th>ZIKV (Urine)</th>
<th>CHIKV (Serum)</th>
<th>CHIKV (Urine)</th>
<th>CHIKV (Pellet of Milk)</th>
<th>CHIKV (Supernatant of Milk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>NEG</td>
<td>NEG</td>
<td>NEG</td>
<td>POS+</td>
<td>POS+</td>
<td>POS+</td>
<td>POS+</td>
</tr>
<tr>
<td>23</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>NEG+</td>
<td>POS+</td>
<td>POS+</td>
<td>POS+</td>
</tr>
<tr>
<td>27</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td>NEG-</td>
<td>NEG-</td>
<td>NEG-</td>
<td>NEG-</td>
</tr>
</tbody>
</table>

ND indicates not done; NEG, a negative result; POS+, a positive result.
YF, but analysis of milk was not carried out. In this report, the infant had encephalitis, with several seizures, but recovered without sequelae. However, due to the severity of the condition and the possibility of transmission by milk, the Ministry of Health recommended careful assessment of epidemiologic risk regarding the use of the YF vaccine in breastfeeding women.

This is the first report of CHIKV RNA particles in breast milk and for an extended period of more than 3 weeks without transmission to the baby. There are few other reports on the detection of arboviruses in maternal milk as described above. Even though CHIKV can be found in the milk, in the absence of cytopathic and replication in Vero cell of the isolate, we must be very cautious before affirming CHIKV infection could be transmitted by breast milk and cross infant natural barriers to cause a significant disease. The detection of CHIKV in breast milk raises clinical and epidemiologic questions and more studies are needed to assess its potential of infectivity.

RAISED FREQUENCY OF MICROCEPHALY RELATED TO ZIKA VIRUS INFECTION IN TWO BIRTH DEFECTS SURVEILLANCE SYSTEMS IN BOGOTÁ AND CALI, COLOMBIA

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Zika virus infection during pregnancy is now known to cause congenital microcephaly and severe brain defects. In Brazil, epidemicologic studies in Brazil have documented a remarkable increase in population rates of microcephaly concurrent with the epidemic. Colombia has been experiencing an epidemic wave of Zika infection, starting approximately in October 2015. However, epidemicologic data on central nervous system (CNS) anomalies in the country have been limited. Here, we document the trends of microcephaly and severe CNS malformations in 2 major cities in Colombia from 2012 through 2016, tracking the epidemiologic curve from before through the major Zika epidemic so far.

MATERIALS AND METHODS

Congenital Anomalies

Microcephaly was defined as an occipitofrontal circumference <3rd centile at birth, for gestational age and sex. This definition has not changed since inception of the surveillance programs (2001 and 2010). The study also included neural tube defects (anecephaly, spina bifida and encephalocele), holoprosencephaly and hydrocephaly. Malformations were reported by clinicians at the source hospitals and coded using World Health Organization International Classification of Diseases codes, 10th revision.

Surveillance Programs

The data were derived from 2 hospital-based surveillance programs in 2 large cities in Colombia, Bogotá and Cali. The Bogotá program, started in 2001, includes 51 hospitals. The Cali program, started in 2010, includes 2 hospitals that cover 25.9% of all city births. Together, the 2 programs monitor approximately 110,000 births per year.

These surveillance program monitors selected major congenital anomalies (reference) among all pregnancy outcomes, including live births and stillbirths (fetal deaths, ≥500 g in weight).

Data

Prevalence was calculated as cases of anomalies ascertained among live births, stillbirths and pregnancy terminations, divided by the number of live births and stillbirths for the same period. The study period was from January 2012 through December 2016.