

Case Report: West Nile Virus Encephalitis: The First Human Case Recorded in Brazil

Marcelo A. C. S. Vieira,* Alessandro P. M. Romano, Amaríles S. Borba, Eliana V. P. Silva, Jannifer O. Chiang, Kelsen D. Eulálio, Raimunda S. S. Azevedo, Sueli G. Rodrigues, Walfrido S. Almeida-Neto, and Pedro F. C. Vasconcelos
Natan Portella Institute of Tropical Medicine, Piauí, Brazil; Ministry of Health, Brasília, Brazil; Municipal Health Department, Teresina, Brazil; Evandro Chagas Institute, Ananindeua, Brazil

Abstract. A Brazilian ranch worker with encephalitis and flaccid paralysis was evaluated in the regional Acute Encephalitis Syndromic Surveillance Program. This was the first Brazilian patient who met the Centers for Disease Control and Prevention (CDC) confirmation criteria for West Nile virus disease. Owing to the overlapping of neurological manifestations attributable to several viral infections of the central nervous system, this report exemplifies the importance of human acute encephalitis surveillance. The syndromic approach to human encephalitis cases may enable early detection of the introduction of unusual virus or endemic occurrence of potentially alarming diseases within a region.

INTRODUCTION

The West Nile virus (WNV) disease is an arboviral disease with a large spatial distribution throughout the world. Following the route of its spread southward from the United States, evidence of WNV circulation among animals has been detected in the Cayman Islands (2001); El Salvador, Guatemala, and Belize (2003); Colombia and Venezuela (2004); Argentina (2005); and Brazil (2002–2013). However, viral isolation and human, equine, or avian morbidity were only sparsely recorded in Latin America and the Caribbean.^{1–3} The reasons for the discrepancy between the serologic evidence of widespread WNV circulation and the absence of significant human or animal morbidity in the Americas, except the United States and Canada, are still a subject of debate.^{1–4} Here we report the first documented case of West Nile encephalitis in Brazil.

CASE PRESENTATION

A 52-year-old ranch worker was admitted to a hospital in Brazil with acute encephalitis and flaccid paralysis in August 2014. He was coming from rural area of Aroeiras do Itaim municipality, Piauí State, Brazil (Figure 1). The patient reported severe muscle weakness arisen 2 weeks before hospitalization, during an acute febrile illness. The fever was accompanied by chills, prostration, headache, neck pain, vomiting, diarrhea, and abdominal pain. He suffered tonic-clonic generalized seizure followed by drowsiness, transient obtundation, and confusional state.

At admission examination, the patient was aware, with bilateral facial palsy, dysarthria, nuchal rigidity, and Lasegue's sign. He had flaccid and symmetrical tetraparesis, and abolished myotatic reflexes. There were no sensorial deficits.

Cerebrospinal fluid (CSF) was clear, with 14 leukocytes/mm³ (85% of mononuclear cells) with 274 mg/dL proteinorrachia, 59 mg/dL glycorrachia and nonreagent venereal disease research laboratory (VDRL). CSF tests for fungi and *Mycobacterium tuberculosis* were negative. Serum IgM antibody-capture enzyme-linked immunosorbent assay (MAC-ELISA),

hemagglutination-inhibition test, and plaque-reduction neutralization test (PRNT₉₀) showed high titers of antibodies against WNV and low titers against Saint Louis encephalitis virus (SLEV) and other flaviviruses commonly found in Brazil. CSF converted exclusively to WNV when a convalescent sample was tested by MAC-ELISA. Reverse transcriptase polymerase chain reaction (RT-PCR) and virus isolation results were negative.

Electroneuromyographic study showed acute motor axonopathy. Brain and spinal cord magnetic resonance images were normal. During hospitalization, the patient developed respiratory distress and was transferred to intensive care unit. Empirical administration of ceftriaxone and human hyperimmune immunoglobulin were performed. The patient showed partial and progressive improvement; at discharge, he was not able to walk without assistance.

DISCUSSION

In 2003, the Pan American Health Organization issued a warning for WNV epidemics in South American countries.¹ Serological evidences of viral circulation among horses and birds were found in the Pantanal and Amazon Brazilian regions between 2002 and 2013.^{2,4–7} Despite these results, to date no case of symptomatic WNV disease had been reported in any animal species or in humans in Brazil and very few SLEV encephalitis cases were recognized in Brazil.⁸

In December 2014, the WHO announced the confirmation of this first human case of West Nile virus (WNV) disease in Brazil, as described herein.⁹ This case had unclear characteristics. The disease did not occur within the context of notified equine or avian morbidity or an outbreak of human acute febrile illness or neuroinvasive syndrome. Also, the countryside of Piauí State is located far from the regions where equine seropositivity has been detected.^{2,4} However, a regional program of surveillance of human acute viral encephalitis had already begun when the patient was admitted. A protocol for investigation of encephalitis was applied, covering herpes virus, enteroviruses, and arboviruses.¹⁰

Despite the mandatory reporting of suspected cases of WNV disease in Brazil, it is possible that sporadic cases or small clusters of WNV disease had previously occurred in different regions of the country and remained undiagnosed because of 1) the lack of a syndromic sentinel surveillance system of viral encephalitis in humans in other regions, 2) the overlapping of the neurological symptoms attributable to

*Address correspondence to Marcelo A. C. S. Vieira, Rua Governador Artur de Vasconcelos, 151, Teresina, Piauí, Brazil 64001-450. E-mail: macsvieira@superig.com.br



FIGURE 1. South America: geographical location of Aroeiras do Itaim municipality, Piauí state, Brazil (prepared using the software TerraView—National Institute for Space Research, São José dos Campos, SP: 2010. Available at: www.dpi.inpe.br/terraview. Accessed August 4, 2015).

several other viral infections of the central nervous system, and 3) the limitations in the availability of diagnostic resources in most Brazilian hospitals.^{2,4,11–13}

Since the detection of this first human case of WNV encephalitis in Brazil, strategies for a prospective approach to new cases are being implemented. Preliminary serologic studies performed among chickens and equines on the patient's farm showed the presence of specific antibodies against WNV confirmed by PRNT₉₀.¹⁴ Consequently, serological surveys in humans and animals from the surrounding region, surveillance of epizootics in birds and horses, as well as entomological surveillance are being conducted.

WNV isolation and RT-PCR detection were negative in this patient because he did not access the tertiary health service until after 2 weeks of disease onset. Through early evaluation of patients with acute febrile illness or severe neurologic manifestations and by animal surveillance, WNV direct detection may allow us to characterize the lineage introduced into Brazil and provide important insights about the ecoepidemiology of this arbovirus.

This report exemplifies the importance of acute viral encephalitis surveillance. The syndromic approach to human encephalitis cases may enable early detection of the introduc-

tion of exotic viruses or the endemic occurrence of potentially alarming diseases within a receptive region.

Received February 27, 2015. Accepted for publication April 14, 2015.

Published online June 8, 2015.

Acknowledgments: We thank Alana Niede, Alexandre Linhares, Amelia Costa, Daniel Ramos, Elna Amaral, Fernando Tavares, Gabriela Araújo, José Cruz, Lydianny Lauritzen, Lucas Guimarães, Márcio Mascarenhas, Marlúcia Mesquita, Oriana Lima, Symonara Faustino, and Rui Cipriano for their participation in the Encephalitis Surveillance in Teresina or at in the laboratory in Ananindeua, Brazil.

Authors' addresses: Marcelo A. C. S. Vieira, Department of Neurology, Natan Portella Institute of Tropical Medicine, Teresina, Piauí, Brazil, E-mail: macsvieira@superig.com.br. Alessandro P. M. Romano, Health Surveillance Secretariat, Ministry of Health, Brasília, Brazil, E-mail: alessandro.romano@saude.gov.br. Amaríles S. Borba, Municipal Health Department, Surveillance Secretariat, Teresina, Piauí, Brazil, E-mail: amarilesborba@gmail.com. Eliana V. P. Silva, Jannifer O. Chiang, Raimunda S. S. Azevedo, Sueli G. Rodrigues, and Pedro F. C. Vasconcelos, Department of Arbovirology and Hemorrhagic Fevers, Evandro Chagas Institute, Ananindeua, Piauí, Brazil, E-mails: elianapinto@iec.pa.gov.br, janniferchiang@iec.pa.gov.br, raimundaazevedo@iec.pa.gov.br, sueli Rodrigues@iec.pa.gov.br, and pedrovasconcelos@iec.pa.gov.br. Kelsen D. Eulálio and Walfrido S. Almeida-Neto, Department of Infectious Diseases, Natan Portella Institute of Tropical Diseases, Teresina, Piauí, Brazil, E-mails: walfridomed@hotmail.com and kelsendeulalio@yahoo.com.br.

REFERENCES

- Gubler DJ, 2007. The continuing spread of West Nile virus in the western hemisphere. *Clin Infect Dis* 45: 1039–1046.
- Pauvolid-Corrêa A, Varella RB, 2008. Epidemiological aspects of West Nile fever [in Portuguese]. *Rev Bras Epidemiol* 11: 463–472.
- Petersen LR, Braut AC, Nasci RS, 2013. West Nile virus: review of the literature. *JAMA* 310: 308–315.
- de Figueiredo ML, Figueiredo LT, 2014. Review on infections of the central nervous system by St. Louis encephalitis, Rocio and West Nile flaviviruses in Brazil, 2004–2014. *Adv Microbiol* 4: 955–961.
- Melandri V, Guimarães AÉ, Komar N, Nogueira ML, Mondini A, Fernandez-Sesma A, Alencar J, Bosch I, 2012. Serological detection of West Nile virus in horses and chicken from Pantanal, Brazil. *Mem Inst Oswaldo Cruz* 107: 1073–1075.
- Ometto T, Durigon EL, de Araujo J, Aprelon R, de Aguiar DM, Cavalcante GT, Melo RM, Levi JE, de Azevedo Júnior SM, Petry MV, Neto IS, Serafini P, Villalobos E, Cunha EM, Lara Mdo C, Nava AF, Nardi MS, Hurtado R, Rodrigues R, Sherer AL, Sherer Jde F, Geraldi MP, de Seixas MM, Peterka C, Bandeira Dde S, Pradel J, Vachier N, Labruna MB, de Camargo LM, Lanciotti R, Lefrançois T, 2013. West Nile virus surveillance, Brazil, 2008–2010. *Trans R Soc Trop Med Hyg* 107: 723–730.
- Pauvolid-Corrêa A, Campos Z, Juliano R, Velez J, Nogueira RM, Komar N, 2014. Serological evidence of widespread circulation of West Nile virus and other flaviviruses in equines of the Pantanal, Brazil. *PLoS Negl Trop Dis* 8: e2706.
- Vasconcelos PF, Travassos da Rosa JFS, Travassos da Rosa APA, Dégallier N, Pinheiro FP, Sá Filho GC, 1991. Epidemiology of arboviral encephalitis in the Brazilian Amazon [in Portuguese]. *Rev Inst Med Trop Sao Paulo* 33: 465–467.
- World Health Organization, 2014. *Global Alert and Response: West Nile Virus—Brazil*. Available at: <http://www.who.int/csr/don/15-december-2014-wnv/en/#>. Accessed December 17, 2014.
- Fundação Municipal de Saúde de Teresina, 2014. Proposta de Vigilância das Encefalites Virais em Teresina. *Informe Epidemiológico* 12: 1–4.
- Venkatesan A, Tunkel AR, Bloch KC, Lauring AS, Sejvar J, Bitnun A, Stahl JP, Mailles A, Drebot M, Rupprecht CE, Yoder J, Cope JR, Wilson MR, Whitley RJ, Sullivan J, Granerod J, Jones C, Eastwood K, Ward KN, Durrheim DN, Solbrig MV, Guo-Dong L, Glaser CA, 2013. Case definitions, diagnostic algorithms, and priorities in encephalitis: consensus

- statement of the International Encephalitis Consortium. *Clin Infect Dis* 57: 1114–1128.
12. Sejvar JJ, Marfin AA, 2006. Manifestations of West Nile neuroinvasive disease. *Rev Med Virol* 6: 209–224.
 13. Soares CN, Castro MJC, Peralta JM, Freitas MRG, Puccion-Sohler M, 2010. Is West Nile virus a potential cause of central nervous system infection in Brazil? *Arq Neuropsiquiatr* 68: 761–763.
 14. ProMED-mail, 2014. *West Nile Virus—South America (03): Brazil (PI) Equine*. Archive no. 3052066. Available at: <http://www.promedmail.org/direct.php?id=3052066>. Accessed December 29, 2014.