

## CASE REPORT

### FIRST REPORT OF ACUTE CHAGAS DISEASE BY VECTOR TRANSMISSION IN RIO DE JANEIRO STATE, BRAZIL

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#### SUMMARY

Chagas disease (CD) is an endemic anthroponosis from Latin America of which the main means of transmission is the contact of skin lesions or mucosa with the feces of triatomine bugs infected by *Trypanosoma cruzi*. In this article, we describe the first acute CD case acquired by vector transmission in the Rio de Janeiro State and confirmed by parasitological, serological and PCR tests. The patient presented acute cardiomyopathy and pericardial effusion without cardiac tamponade. Together with fever and malaise, a 3 cm wide erythematous, non-pruritic, papule compatible with a “chagoma” was found on his left wrist. This case report draws attention to the possible transmission of CD by non-domiciled native vectors in non-endemic areas. Therefore, acute CD should be included in the diagnostic workout of febrile diseases and acute myopericarditis in Rio de Janeiro.

**KEYWORDS:** Chagas disease; Transmission; *Triatoma vitticeps*; Rio de Janeiro.

#### INTRODUCTION

Chagas disease (CD) is an endemic anthroponosis from Latin America of which the main mechanism of transmission is the contact of skin lesions or mucosa with the feces of triatomine bugs infected by *Trypanosoma cruzi*<sup>3</sup>. Significant changes in CD epidemiology in endemic countries occurred after widespread efforts to control the main domiciled vectors (*Triatoma infestans* and *Rhodnius prolixus*) and improvement in blood banking quality programs<sup>4,16,19</sup>. In 2006, Brazil was certified by WHO as an area free of CD vectorial transmission by *T. infestans*<sup>19,24</sup>. Although the prevalence of CD has decreased in the last decades, a recent meta-analysis estimated CD prevalence in Brazil to be near 2.4% or about 4.6 million Brazilians infected by *T. cruzi*<sup>15</sup>. However, other transmission mechanisms may keep CD as a public health problem such as the ingestion of food contaminated with *T. cruzi*, causing outbreaks of acute CD and transmission by native vectors in different areas of Brazil<sup>1,3,5,12,14,21,22,23,27,28</sup>.

Rio de Janeiro State (RJ) was always considered free of CD vectorial transmission with few old reports of domiciled *T. infestans*<sup>2,11,25</sup>. Most of the eight vector species found in RJ are sylvatic, living in the Atlantic Forest and rarely found inside human habitations or in the peridomicile<sup>9</sup>.

However, *T. vitticeps* may be attracted to lights and invade human habitations in RJ rural areas<sup>7,8,11,13,14,21</sup>.

In this study, we report the first acute CD case acquired by vector transmission in RJ and confirmed by parasitological, serological and PCR tests. The patient presented acute cardiomyopathy and pericardial effusion without cardiac tamponade. Together with fever and malaise, an indurated, erythematous, and swollen skin lesion compatible with a “chagoma” was found on his left wrist<sup>20</sup>. This case report draws attention to the possible transmission of CD by non-domiciled native vectors in non-endemic areas where enzootic cycles in the peridomicile may contribute to CD human cases<sup>21</sup>. Therefore, acute CD should be included in the diagnostic workout of febrile diseases and acute myopericarditis in RJ.

#### CASE REPORT

A forty-seven-year-old white man born in the city of Rio de Janeiro and resident in the Engenho de Dentro neighborhood, in the city of Rio de Janeiro, was referred to the outpatient service of the *Instituto Nacional de Infectologia Evandro Chagas* (INI) with a one-month history of headache and daily remittent high fever (40 °C). The symptoms started

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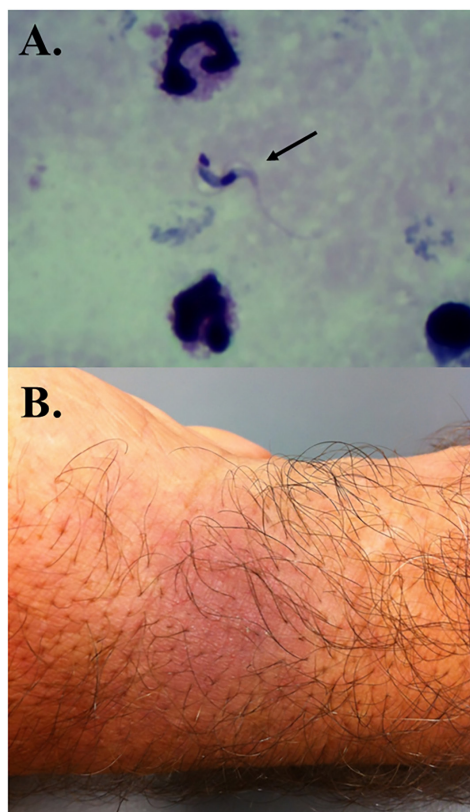
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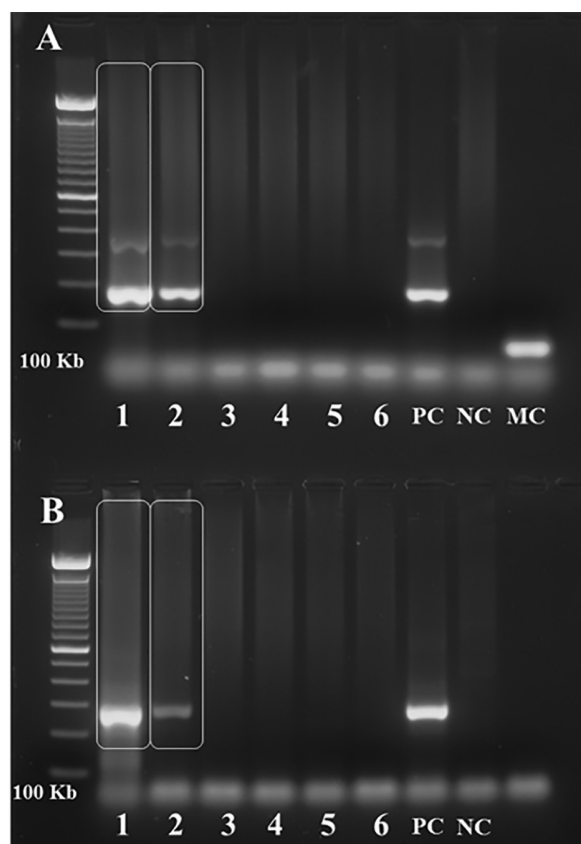
some days after returning from his country house located 100 km south of RJ, in the municipality of Mangaratiba. Over the last month, he went to other outpatient services where dengue, urinary infection, acute toxoplasmosis, tuberculosis, and HIV infection were ruled out. He was referred to our institution for malaria testing. Thick blood smear examination was negative for *Plasmodium* spp., but positive for *T. cruzi* trypomastigotes (Fig. 1A). On his epidemiological history, the patient denied knowing triatomine bugs, having received any blood transfusion or organ transplant, or having traveled outside RJ. However, there were fruit trees surrounding his country house, and he used to sleep in hammocks on the porch every weekend.



**Fig. 1 - A.** Walker-stained thick blood smear positive for *T. cruzi* trypomastigotes (1000x). **B.** A 3 cm wide erythematous papule on the left wrist compatible with "chagoma".

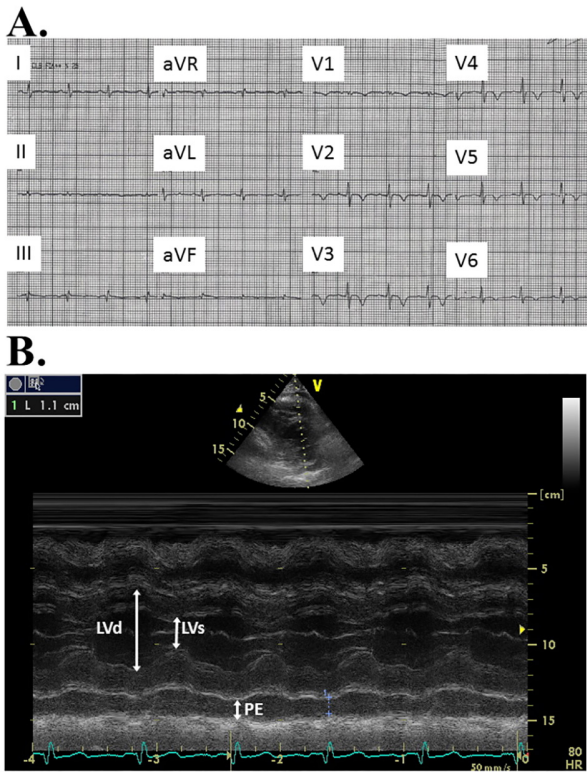
Examination was remarkable for high temperature (38 °C), one cm rubbery, non-tender, freely movable bilateral occipital and right submandibular lymph nodes, and a three cm wide erythematous non-pruritic papule on his left wrist (Fig. 1B). Vital signs: heart rate 86 beats per minute, blood pressure 130/80 mmHg, weight 90 kg. The patient was alert, without respiratory distress, and with unremarkable respiratory, cardiovascular, and abdominal physical examination. Blood work revealed mild anemia, leukocytosis, and neutrophilia; high erythrocyte sedimentation rate (50 mm/h); a positive IgG indirect immunofluorescence (IIF) test for CD (1:1,280) and a negative enzyme-linked immunosorbent assay (ELISA) for CD. ELISA became positive (index of reactivity 1.3) on the fifth test obtained fifteen days after the first blood work, while IIF was strongly reactive (1:5,120) in the same blood sample. Hemoculture and PCR (Satellite DNA and kDNA) were positive for *T. cruzi* (Fig. 2). PCR was performed as previously

described<sup>17</sup>. Electrocardiogram (ECG) showed sinus rhythm, incomplete right bundle branch block, low voltage complexes on the frontal plane and primary repolarization changes in anterior and inferior leads (Fig. 3A). Echocardiogram (ECO) revealed normal chamber diameters and left ventricular systolic function, left ventricular delayed relaxation and moderate pericardial effusion with no signs of restriction to diastolic filling of the heart (Fig. 3B). Those findings were considered compatible with acute myocarditis<sup>18</sup>. The patient started treatment with benznidazole (BZN) 300 mg/d, and seven days later the fever resolved. However, after 12 days of BZN treatment, the thick blood smear examination remained positive for *T. cruzi* and BZN dose was increased to 500 mg/d. Three days later the thick blood smear examination became negative for *T. cruzi*. The patient presented a mild transitory exanthema during BZN treatment. BZN treatment was discontinued after 60 days of treatment. The ECG and ECO findings normalized within 60 days of BZN treatment. A 5-fold decrease in serologic titers was observed four months after the end of BZN treatment.



**Fig. 2 - Polymerase Chain Reaction (PCR) for *T. cruzi*.** Positive result for *T. cruzi* satellite DNA (A.) and kDNA (B.) in the first two slots of both agarose gels depicted in the figure. The first slot corresponds to the collection made on the 13<sup>th</sup> day of BZN treatment, second slot on the 20<sup>th</sup> day, third slot on the 27<sup>th</sup> day, fourth slot on the 34<sup>th</sup> day, and fifth slot on the 41<sup>st</sup> day of BZN treatment. The sixth slot represents the sample collected four days after BZN was discontinued. PC = positive control; NC = negative control; MC = mix control (negative control: master mix devoid of DNA). PCR was performed as previously described<sup>17</sup>.

According to the epidemiological investigation carried out at Mangaratiba after the case was notified to the RJ vigilance authorities, *T. cruzi* was found in the feces of an adult specimen of *Triatoma*



**Fig. 3 - A. Electrocardiogram.** The electrocardiogram depicts sinus rhythm, incomplete right bundle branch block, low voltage complexes in the frontal plane and primary repolarization changes in anterior and inferior leads. **B. Echocardiogram.** Two-dimensional-guided M-mode echocardiogram at the papillary muscle level. Note the normal LV chamber diameters and systolic function, and moderate pericardial effusion. LV = left ventricle; LVd = LV end-diastolic diameter; LVs = LV end-systolic diameter; PE = pericardial effusion.

*tibiamaculata* collected inside of one of the houses and *T. cruzi* infection was identified in sylvatic rodents and dogs (GIORDANO-DIAS 2012, unpublished results).

## DISCUSSION

The late diagnosis of acute CD in this case is at least in part due to the fact that CD was never considered endemic in RJ. There are few reports of domiciled triatomines in RJ but the domestic invasion of human habitations by sylvatic triatomines is frequent<sup>2,7,8,11,13,14,21</sup>. Although domestic invasion by *T. tibiamaculata* in RJ is very rare, this triatomine has been found frequently inside homes in the Bahia State<sup>6,10</sup>. Moreover, *T. tibiamaculata* was associated with the acute CD outbreak that occurred in the southern Brazilian Santa Catarina State in 2005, due to the consumption of contaminated sugarcane juice<sup>9,27</sup>. The contact of the vector with the patient most likely occurred on the porch of the house where the patient used to sleep in a hammock every night. On the other hand, *T. vitticeps* infected by *T. cruzi* is often found inside human habitations not only in RJ but in the Espírito Santo and Minas Gerais States<sup>8,21,22,26</sup>. Although *T. vitticeps* has never been reported in Mangaratiba, this triatomine was already found in many other municipalities of RJ<sup>21</sup>. *T. cruzi* transmission cycles found in the peridomicile in RJ may contribute to the occurrence of CD autochthonous cases in RJ<sup>21</sup>.

Acute CD is usually asymptomatic, but even when symptoms occurs the disease has a good prognosis<sup>19</sup>. In this case, the “chagoma” in the left wrist appeared some days before the beginning of fever, as expected according to the described evolution of acute CD cases<sup>19</sup>. Myocarditis and pericarditis presented a benign evolution, and were resolved after BZN treatment. Meningoencephalitis, which is more prevalent among children under 2 years old, was not observed in this case<sup>20</sup>. This is the first study to report that a thick blood smear became negative for *T. cruzi* within 15 days of BZN treatment. This case also illustrated that BZN doses above 300 mg/d may be necessary in adults weighing more than 60 kg. In this case, while IIF was already strongly positive in the presentation, ELISA was much less effective to confirm the diagnosis. The different diagnostic effectiveness between these two tests may be due to the use of recombinant antigens in the ELISA with higher affinity for the IgG produced in the chronic phase than in the acute phase of CD<sup>29</sup>.

From 2007 to 2011, 34 vector-transmitted acute CD cases were reported in Brazil outside the Amazon region<sup>1,28</sup>. However, the actual incidence of vector-transmitted acute CD cases must be higher due to several reasons: acute *T. cruzi* infection is usually asymptomatic, laboratory tests failure to diagnose acute CD cases, and underreporting<sup>1,19</sup>. It is estimated that only 15% of vector-borne acute CD cases are reported<sup>1</sup>. The case reported in this article draws attention to the challenging control of CD transmission by non-domiciled sylvatic vectors that occasionally invade houses attracted by artificial light sources<sup>1</sup>.

Acute CD is unlikely to become common in RJ as there are no domiciled vectors in RJ and *T. vitticeps*, which may invade human habitations in several RJ municipalities, has low vector potential due to the long interval between feeding and defecation<sup>7,22</sup>. However, the presence of *T. cruzi* sylvatic cycles in RJ allows sporadic autochthonous human cases in the State. Thus, CD must be included in the diagnostic workout of febrile diseases and myocarditis in RJ.

## RESUMO

### Primeiro relato de doença de Chagas aguda por transmissão vetorial no Estado do Rio de Janeiro, Brasil

A doença de Chagas é antropozoonose endêmica na América Latina que tem como principal mecanismo de transmissão humana o contato da pele lesada ou da mucosa com as fezes de triatomíneos infectados por *Trypanosoma cruzi*. Neste artigo descrevemos o primeiro caso de doença de Chagas aguda adquirida no Estado do Rio de Janeiro por transmissão vetorial com confirmação parasitológica, sorológica e pela PCR. O paciente apresentou miocardite aguda e derrame pericárdico de evolução benigna. Juntamente com as manifestações sistêmicas da fase aguda, foi notada pápula eritematosa de três cm de diâmetro compatível com chagoma em punho esquerdo. Este relato de caso chama a atenção para a possibilidade de transmissão da doença de Chagas por vetores nativos não domiciliados e em áreas consideradas indenes. Portanto, a doença de Chagas aguda deve ser incluída entre os diagnósticos diferenciais de doenças febris e miopericardites agudas no Rio de Janeiro.

## ACKNOWLEDGEMENTS

The authors are grateful for the information regarding the epidemiological investigation carried out in Mangaratiba provided by

the coordination of Health Surveillance of the Health Secretariat of the Rio de Janeiro State.

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Received: 4 July 2014

Accepted: 2 December 2014