The evidence of natural infection by Trypanosoma cruzi in animals in which Chagas’ disease (ChD) had not been previously described can contribute to a better understanding of many aspects of American trypanosomiasis. On this basis, we report here a case of acute Chagas’ heart disease in a polar bear (Ursus maritimus) which occurred at the Guadajalara zoo in the State of Jalisco, Mexico.

Case description. A 24 year old Ursus maritimus female entered the Guadalajara zoo on June 28th 1994. The animal had been brought from the United States where she lived in a zoo in the Great Lakes area. During 10 months of captivity in the Guadalajara zoo, the bear presented five episodes of ascaridiasis and was treated with mebendazole. On March 12th 1995 she had no appetite, did not move and was somnolent. A few days later, she had a high temperature and developed tachycardia. Fifteen days after the beginning of these symptoms she was found dead in her artificial habitat.

After death, a 1.5 x 1.0cm heart fragment was taken from the left ventricle, fixed in 10% formalin, and routinely processed for histology by paraffin embedding. The sections were mounted on histopathologic slides and stained with hematoxylin-eosin, Masson's trichrome and Giemsa. The peroxidase-antiperoxidase (PAP) immunocytochemical method was applied as described by Barbosa with the use of anti-T. cruzi antibodies. The material was then submitted to amplification by the polymerase chain reaction (PCR) by the method of Sturm et al.

Histopathologic examination (Figures 1, 3 and 4) showed myocarditis which was diffuse in most fields due to the confluence of multiple focal points of inflammation. In addition to congestion and edema there was an intensive infiltrate of macrophages, lymphocytes and their derivatives (blast cells and plasmocytes), and variable amount of granulocytes, neutrophils and eosinophils. These elements of exudation were localized in the endomysium, dissociating and separating the fiber cells from the capillaries, at time extending to the epicardium, and from it to the vascular adventitia. Extensive necrotic-degenerative damage to myocells was associated with the exude phenomenon. There was an intensive focal and diffuse acute epicarditis with marked parasitism. A mild focal acute parietal endocarditis was also detected. Parasitism was intensive with the presence of many forms of T. cruzi amastigote nests (Figure 2) inside the myocells and macrophages or free in the interstitium. PCR amplification was positive to T. cruzi. The DNA extracted from the histopathologic slides was amplified using primers homologous to the variable region of T. cruzi R DNA.
After establishing a diagnosis of ChD, the presence of T. cruzi-infected triatomines identified as Triatoma longipennis Usinger was detected 5 meters from the place where the bear lived in the Guadalajara zoo (Figure 5). This species is the most widely distributed in the state of Jalisco and is also the species most frequently parasitized by T. cruzi.

Comments. The histophatologic study of the heart was conclusive for the diagnosis of ChD which, to our knowledge, is reported in a polar bear for the first time. Our findings not only confirm the fact that the etiologic agent of American Trypanosomiasis is extremely eclectic in terms of vertebrate hosts but add to the number of mammals in which the infection has been proved.

The present results lead us to conclude that the bear acquired the infection from infected triatomines which were collected near its habitat. The fact that bears are covered with a dense and thick coat makes it difficult to believe that T. cruzi transmission was caused by the feces of infected triatomines through the skin or mucous of the animal. It seems more likely that transmission occurred in the digestive tract through the ingestion of infected triatomines. This mechanism has been confirmed experimentally, in other animals. The ingestion of triatomines seems to be common among animals, and bears, although classified as carnivorous, are omnivorous.

An important fact in the present study was the possibility of clarifying some of the
characteristics of the infection, which permit us to speculate about cases such as that reported by Malamos in Hamburg in 1953. On that occasion trypanosomes morphologically identical to T. cruzi were detected in the blood of four monkeys from the island of Java. With the feces of triatomines infected from these monkeys it was possible to reproduce the infection in rats, which resulted in the finding of T. cruzi in the heart and muscles. Based on these findings, the hypothesis was raised that Chagas’ infection may occur in Indonesia, although this fact has not yet been confirmed. The present data and the fact that infected triatomines are occasionally found in houses, closets, suitcases, etc. led us to suspect, as Hoare in 1963, that in cases like those reported by Malamos the infection may have occurred in areas other than the site of origin of the monkeys.

The acute Chagas’ carditis reported here presented histopathologic characteristics quite similar to those described in man and other animals. Particularly striking were the intensive exsudative and necrotic degenerative phenomena in the myocardium as well as the massive parasitism observed.

The T. cruzi-infected triatomines found in a zoo located in the metropolitan north zone of Guadalajara, Jalisco, where human ChD was notified for the first time in 1967, and where high rates of T. cruzi infection (82.3%) were found in some municipalities in a state sample of about 13,274 individuals with a general index of 17.7% in Jalisco state, and where other human cases had been described, should have alerted the authorities. The Guadalajara zoo is surrounded to the north by a wild ecotope known as "La Barranca de Huentitán" and by residential projects to the west and south (Figure 5). The zoo keeps its vegetation and conditions practically natural.

Figure 5 - Air view of the Guadalajara zoologic (zoo). Note the place where the bear lived (arrow). Five meters from this place was detected T. cruzi infected triatomines (Triatoma longipennis Usinger).
Finally it is important to emphasize that an animal who can live as long as 30 years was infected at 24 years of age. In 1993 Lozano-Kasten et al. described an acute ChD case involving an 80-year-old Guadalajara woman, an age at which an initial infection by T. cruzi is not frequent.

RESUMO

Relatamos o caso de uma ursa polar (Ursus maritimus) de 24 anos de idade, que contraiu a infecção chagásica no Zoológico de Guadalajara, em Jalisco, no México, e morreu de cardite chagásica aguda 15 dias após o início da sintomatologia. Os achados histopatológicos são descritos, bem como a presença de triatomíneos (Triatoma longipennis Usinger) infectados por Trypanosoma cruzi coletados a 5 metros do local onde o animal vivia, na cidade de Guadalajara.


ACKNOWLEDGEMENTS

We are grateful to Professors Geraldo Brasileiro Filho and Sérgio Pena for their help in the PCR amplification study and to Professor Aluizio Prata for valuable suggestions.

REFERENCES