MULTIPLE CEREBRAL INFARCTIONS FOLLOWING A SNAKEBITE BY BOTHROPS CARIBBAEUS

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Abstract. Bothrops caribbaeus, a species of the Bothrops complex, is found only in the island of Saint Lucia, West Indies. Snakebite from this pitviper is very rare. We report the case of a healthy 32-year-old Saint Lucian man who developed multiple cerebral infarctions following envenoming by this snake. This patient developed signs and symptoms very similar to those observed in patients envenomed by Bothrops lanceolatus, a snake found only in Martinique, the neighbor island of Saint Lucia. This clinical presentation differs dramatically from coagulopathies and systemic bleeding observed with the Central and South American bothropic envenomings. The exact mechanism of this thrombogenic phenomenon, leading to a unique envenoming syndrome, remains unknown.

INTRODUCTION

Envenoming from Bothrops caribbaeus, a crotalid found only in Saint Lucia, West Indies, is a very rare event in this island. It has been recently shown that Bothrops lanceolatus, a crotalid found only in Martinique (the neighbor island north of Saint Lucia), and B. caribbaeus form a monophyletic group divergent at the molecular level from all other South American species of Bothrops. In Martinique, the severity of envenoming by B. lanceolatus is due to the development of severe thrombotic complications, mainly cerebral infarctions, that may appear within 7 hours to 1 week after the bite in 30 to 40% of envenomed patients. We believe that a description of the clinical and biologic aspects of human envenoming by these two Caribbean species will be of interest to the practitioners of clinical tropical and travel medicine as well as more fundamentally oriented scientists.

CASE REPORT

A healthy 32-year-old Saint Lucian man, with no significant past medical history, was bitten on the right lower leg by a two-feet long grey snake while walking on a path named chemin Millet in Saint Lucia, on the December, 24, 1998. He was hospitalized in Victoria Hospital, Castries, the capital city of Saint Lucia. He presented with typical fang marks, bleeding at the site of the bite, local pain, and swelling limited to the leg. He was given 30 mL of Wyeth polyvalent crotalid antivenin intravenously (IV) within 6 h after the bite. During the following days, he developed gross swelling of the bitten limb and fever despite the use of IV cefazidime and IV metronidazole. On December 30, he complained about weakness of his left upper and lower limb, which was not present at admission time. Laboratory investigations showed normal renal profile, normal liver enzymes, and an elevation of creatine kinase (1212 U/L, normal range 26–174) and C reactive protein levels (147.7 mg/L, normal range 0–10). Partial thromboplastin time was 29 sec (control: 32), fibrinogen was 6.33 g/L (normal range 2–4), and D dimer was positive. Hematocrit was 30.4%, hemoglobin was 10.1 g/L, WBC was 30400/mL, and platelet count was 201000/mL. He was transferred to the emergency department, University Hospital, Fort de France, Martinique on January 1. On arrival he was alert and oriented, blood pressure was 130/70 mm Hg, heart rate was 120 bpm, and body temperature was 39.6°C. Heart sounds were normal. Chest was clear on auscultation and transcapillary O₂ saturation was 97%. Neurologic examination showed a left hemiplegia with a left facial paralysis and a partial Wernicke’s aphasia (including difficulties to repeat spoken words and to understand simple straightforward orders). Magnetic resonance imaging (MRI) revealed multiple areas of cerebral ischemia, especially in the right anterior cerebral artery territory (Figure 1). Blood cultures remained sterile. Local signs of envenoming were severe with sterile bloody leakage at the site of the bite, extensive swelling of the right lower limb, and edema of the abdominal wall and upper chest. Interstitial tissue pressure was measured in the fascial compartments of the right leg utilizing a 21-gauge needle connected to an electronic pressure monitoring device and was found to be 20 mm Hg, indicating an absence of compartmental syndrome. Transcutaneous ultrasonography showed no arterial or venous thrombosis in the lower limbs. MRI of the bitten limb revealed the presence of a superficial edema in the aponeurosis. No abscess or hematoma was observed within the muscle. A 10-cm diameter area of local necrosis developed around the site of the bite, despite the use of hyperbaric oxygen chamber treatment, leading to a skin graft that was performed on February 1, 1999. He subsequently recovered with minimal neurologic sequelae and went back to Saint Lucia after a 2-month hospital stay.

DISCUSSION

To our knowledge, this is the first case of B. caribbaeus envenoming reported in the literature. This patient developed signs and symptoms very similar to those observed in patients envenomed by B. lanceolatus in Martinique. Apart from local signs, such as pain, swelling, bleeding at the site of the bite, and necrosis, which are common to most crotalid envenomings, the severity of this envenomation was associated with the development of multiple cerebral infarctions. This clinical presentation differs dramatically from coagulopathies and systemic bleeding observed with the Central and South American bothropic envenomings. These findings and the phylogenetic studies of the Bothrops species by Wuster et al. suggest that the venoms of the two Caribbean species of Bothrops are very close and may have the same thrombogenic potential. In this respect, the potential efficacy of the monospecific B. lanceolatus antivenom (now known to be fully effective in preventing the occurrence of thrombotic complica-
also demonstrated that the monospecific B. lanceolatus snake venoms in mice. This unique feature that characterizes and defibrinating activities of heterologous venin is devoid of neutralizing capacity against the procoagulant activities of Bothrops species seem to be the ones mostly involved.8–13

The occurrence of major vessel occlusion in human snakebite envenomation, affecting mainly the cerebral arteries, has been more and more described during the past decade. Vipers and crotalids species seem to be the ones mostly involved.8–13 To our knowledge, however, B. lanceolatus is the only snake in the world whose venom produces significant systemic thrombotic complications. The exact mechanism of this phenomenon remains unknown. When added to human-citrated plasma, the venom of B. lanceolatus has no coagulant effect, even at concentrations as high as 100 μg/mL.14 Studies have also demonstrated that the monospecific B. lanceolatus antivenin is devoid of neutralizing capacity against the procoagulant and defibrinating activities of heterologous Bothrops snake venoms in mice.14 This unique feature that characterizes this venom vis a vis other Bothrops venoms would explain the development of local thrombosis phenomena, as a result of endothelium injury induced by direct action of toxins (hemorrhagins?) on the vessels. In fact, the systemic bleeding observed in other bothropic envenomings has been attributed to the combined effect of vascular injury and defibrination.15 This bleeding would not occur in the case of Caribbean species of Bothrops, owing to the integrity of the fibrinogenetic pathway. In this respect, the attention of toxicologists and other scientists working on the cascades of coagulation and inflammation should be drawn on the study of this particular venom.


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FIGURE 1. Magnetic resonance imaging (FLAIR imaging): infarction of the right anterior cerebral artery territory and multiple small foci of ischemia involving the cerebellar cortex, the territories of the right posterior cerebral artery, and of both middle cerebral arteries.