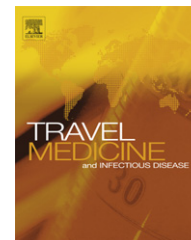


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CASE REPORT

Envenomation by *Bothrops atrox* in a traveler to Manaus, Brazil

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Summary Snakebites are an infrequent but real risk for travelers. We report a case of envenomation by *Bothrops atrox* in a traveler to Manaus, Brazil. Rapid administration of specific antivenom prevented the expected systemic disorders. This case gives opportunity to review prevention and first aid measures of snakebites in travelers.

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Envenomations and specially snakebites cause considerable morbidity and mortality in tropical regions. The annual global burden of snake envenomations and deaths is estimated to be, respectively, 421,000–1,841,000 and 20,000–94,000.¹ The World Health Organization incorporated snakebite envenomations in its list of neglected diseases in 2009.² Rural inhabitants are most at risk and few

travelers are victims.³ However, the risk is real as it is presented in this case of envenomation by *Bothrops atrox* in a traveler near Manaus, Brazil. Given the high number of wrong ideas about snakebite management, this case gives opportunity to review prevention and first aid measures of snakebites for physicians working in pre travel clinics.

Case report

A 68-year-old man was bitten above his right ankle by a snake while walking with a group in the morning in the

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Amazon rainforest near Manaus, Brazil. He wore pants and tennis shoes. He immediately experienced lightheadedness, intense pain at the site of the bite, nausea, and limb paraesthesiae. He did not apply a tourniquet or attempt to cut or suck the wound. The patient was transferred to the Tropical Medicine Foundation of Manaus, where the snake, killed by the guide, was identified as *B. atrox*.

On admission, there was minimal bleeding from the wound, but the entire right leg was severely edematous and the dorsum of the foot was ecchymosed. There was neither evidence of cardiac, renal or neurological dysfunction nor signs of systemic bleeding or coagulopathy. Eight vials of specific antivenom were administered within 80 min of the bite. He was treated for cellulitis with penicillin G, gentamicin, ceftriaxone and clindamycin. Local hemorrhagic blisters and necrosis were developed around the fang marks during the next days. Debridement was proposed but refused by the patient, who was repatriated two weeks after the envenomation, without prophylactic anticoagulation. On admission to our hospital, the patient was afebrile and no sign of an abscess but his leg remained swollen. His laboratory evaluation was entirely normal, but on Doppler exam, he was found to have thrombophlebitis of the right soleal vein, requiring anticoagulation for 3 months. The edema slowly dissipated in 6 months and he continued to have dyesthesiae of the toes during several years.

Discussion

Envenomations are an uncommon cause of death or morbidity among travelers. Some accidents can happen with venomous submarine animals as jellyfish⁴ or stonefish⁵ but snakebites in travelers seem to be exceptional. In a study that identified all cases of diseases and injuries associated with travel among 460 interviewed people of the Central University of Venezuela during the national summer vacations, one case of snakebite was reported on 248 medical events.⁶ In our knowledge, no other case was published.

On other hand snake envenomations are a significant health problem for rural populations in many parts of the world. In Brazil, amongst 192 million inhabitants, 30,000 snakebites with 100–300 deaths occur each year.¹ In Latin America, *Bothrops* (family *Viperidae*) is responsible for most snake envenomations.⁷ According to the classification scheme proposed by Otero-Patiño, this case represents a severe envenomation, but without systemic signs.⁸

Bothrops envenomations induce local, regional and systemic signs. Local regional signs are caused by venom proteolytic enzymes associated to the nervous–vascular bundle compression due to the swelling.⁹ Infections such as abscess or cellulitis are common while development of the compartment syndrome is unusual. The hemorrhagic manifestations due to incoagulable blood are mainly gingival bleeding, hematuria, ecchymosis, purpura and recent wounds bleeding. *Bothrops* venoms may also lead to hypovolemic shock or acute renal failure.^{7,8} In Colombia, the fatality rate of snakebite is 3–5%, and 6–10% of patients suffer some sequelae, e.g. limb deformity or amputation, chronic ulceration or osteomyelitis.⁸

First aid measures are limited. Outdated practices such as tourniquets, topical applications or ingestion of

traditional medications, incisions, suction, cauterization, cryotherapy, electrical shock, black stone are not only ineffective, but are also dangerous: tissue necrosis and wound infection are likely worsened by their use.^{10,11} Pressure immobilization bandage (PIB) (application of a crepe bandage to compress lymphatic vessels, thereby impeding systemic spread of venom) is recommended only for *Elapidae* envenomations, except African spitting cobras and some Asian cobras.¹² This measure is contraindicated in case of *Viperidae* bites because of early swelling changing PIB into garrote. Moreover catching or killing a snake in the aim of identification is not recommended.

Transport to adequate medical care as quickly as possible is the key, but first aid interventions such as calming the patient, immobilizing the bitten limb, cleaning the bite site with soap and water, pain control and adequate hydration are also important. Constrictive items (watch, ring, clothing near the bite) must be removed to prevent a tourniquet like effect.^{10–12}

Antivenom is indicated as soon as systemic signs occur. Otherwise, antivenom is indicated only when the biting species is known to cause local necrosis or there is swelling involving more than one-half of the bitten limb and/or is rapidly progressive.¹¹ Swelling and necrosis may involve inflammatory mechanisms that are independent of antivenom-mediated neutralization.¹³ However, delayed antivenom administration is associated with an increased risk of compartment syndrome, local necrosis, or other sequelae, and is also a risk-factor for acute renal failure or central nervous system hemorrhage.⁸ Early application may have prevented systemic manifestations in this case.

Although antivenom is very expensive and in very short supply in tropical regions,¹² travelers should not be advised to carry antivenom because administration requires medical skills and appropriate equipment.

Secondary infection may require antibiotics, but prophylaxis is not justified. Surgery is rarely indicated and should only be performed after administration of antivenom.^{10–12}

This patient's phlebitis may be related to both airline travel and to the hypercoagulable state that can be observed after the envenomation by *Viperidae*. Thus if heparin is contraindicated during the acute hemorrhagic phase, it could be considered after, especially when risk factors for thrombosis exist such as prolonged immobility.¹⁴

Prevention of snakebites is limited. Boots and heavy trousers can prevent most of bites. Carrying a torch at night and stepping hard on the ground when walking are useful. If a snake is encountered, it is best to remain still and wait for the reptile to go away. Handling snakes, including dead ones, should be avoided. Sleeping in a camp bed or a bed net is recommended.¹¹

Conclusion

Snakebites are an uncommon but real risk for travelers. However in pre travel clinics, physicians should be able to give specific advises on snakebite management, especially measures which should be avoided. As a rule, carrying antivenom should not be recommended.

Conflict of interest

The authors state they have no conflicts of interest to declare.

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