Centipede Envenomation: Bringing the Pain to Hawai'i and Pacific Islands

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Abstract

Scolopendra subspinipes *is the only clinically significant centipede found in Hawai'i. Envenomation typically leads to extreme localized pain, erythema, induration, and tissue necrosis and possible lymphedema or lymphangitis. Mortality is uncommon and results from secondary infection or anaphylaxis. Management is supportive and includes wound care, pain control, and treatment with topical or oral antihistamines and anti-inflammatory medications.*

Introduction

Centipede envenomations are frequent occurrences among hikers, campers and other visitors to Hawai'i. It is not uncommon to find recipients of these bites in clinics or emergency rooms throughout the state.[1] Bites from centipedes can cause extreme pain, edema, erythema and other localized symptoms as well as anxiety and panic.[2-4] Rarely, anaphylaxis and death have occurred after a centipede bite. In a remote setting where resources are limited, importance should be placed on identification of the source of the bite and recognition of common symptoms of centipede bites to distinguish them from more serious and potentially fatal arthropod bites.[4]

Relevance To Hawai'i And Asian Pacific

Hawai'i is home to three species of centipede *Lithobius sp*, *Mecistocephalus maxillaries*, and *Scolopendra subspinipes*. *S. subspinipes* is the only Hawaiian centipede with clinical significance and has a number of aliases, including Giant Centipede, Jungle Centipede, Vietnamese Centipede, and Chinese Red Head. As is implied by these aliases, these centipedes are large and have a broad habitat that includes all of the Pacific islands.

Many residents and tourists engage in camping, hiking, and other outdoor activities that bring human and centipede into close proximity, setting the stage for bite occurrences.[3] The actual incidence is difficult to determine since not all bite victims seek care, but a significant number of cases do get evaluated in emergency rooms. The Hawai'i Department of Health's most recent injury prevention plan reports that, of the unintentional injuries presenting to emergency departments with a "natural or environmental" cause from 2007-2011, 11% were due to bites by centipedes.[1] For perspective, 36% were due to canine bites and 11% were due to stings from bees and wasps.

Example Cases

Many human encounters with *S. subspinipes* and other centipedes end in a startle at the expense of either or both parties. Some may be unfortunate enough to experience the grasp of a centipede's forcipules and the nagging pain and inflammation induced by envenomation. Very few, though, experience symptoms of such severity that their lives are at risk.

A 22-year-old gardener, with no risk factors for coronary artery disease, developed ST elevation myocardial infarction after being bitten on his finger while working. His initial presentation was typical. He had severe pain and edema which subsided over the next hour with application of cold and pressure to the area. Approximately two hours after the bite, he began to have intense, retrosternal chest pain with nausea, diaphoresis, and radiation down his left arm. He presented to the emergency department at fourteen hours after the bite with persistent chest pain, but vital signs and examination were unremarkable. His electrocardiograph showed ST segment elevations in the anterior leads and his cardiac enzymes were significantly elevated. Echocardiography showed a hypokinetic anterior wall and a left ventricular ejection fraction of 35%; coronary angiography was unremarkable. Three days after the bite, his chest pain had resolved and his repeat electrocardiograph and echocardiography were without abnormality.[5]

A 44 year-old woman developed rhabdomyolysis and acute kidney injury after a centipede bite to her right foot in her eastern Arizona home. Her immediate symptoms of localized pain, swelling, numbness and discoloration spread to involve her entire right leg over the following three days which drove her to seek medical attention. She was referred to the University of Arizona Health Sciences Center at five days after the bite due to worsening of her condition despite therapy.

She was found to be afebrile, but hypertensive and tachycardic with a marked non-erythematous swelling, warmth, and tenderness of her entire right lower extremity. She also had impaired motor function and abnormal sensation of her ankle and toes. She had 2+ blood on urine dipstick with two erythrocytes per high power field on urine microscopy. Her serum creatinine was elevated to 11.4 mg/dl and hemodialysis was initiated within 24 hours of admission. She underwent three sessions of hemodialysis with her renal function returning to near her baseline; however, she was found to have neurovascular compromise in her right lower extremity due to compartment syndrome. Her motor function and sensation improved with fasciotomy, but her neurologic function was not fully recovered at the time the report was written.[6]

The number of fatalities documented after centipede envenomation are few, and there is just one report that is well authenticated. A publication from 1932 reports the case of a seven year old female in the Phillipines who became severely ill and died shortly after she was bitten on the head by a S. subspinipes centipede.[7] Other fatalities have been reported but not substantiated.

Discussion

S. subspinipes is among the largest species of centipede measuring up to 20 cm in length. These arthropods have a brown or redish head and dark green body with 21 total segments. From each segment extends one pair of yellow or yellow-orange legs. The legs attached to the head are modified into sharp claws, called forcipules, which are hollow and connected to venom glands; and the legs attached to the final segment are long and prominent, extending behind the body. These centipedes are easily distinguished from other centipedes in Hawai'i by their significant size since both *Lithobius sp.* and *M. maxillaries* reach just 5 cm in length.

S. subspinipes are fast and aggressive centipedes which strike instinctively with little provocation. *S. subspinipes* is nocturnally active, generally preying on other insects and arthropods; however, these centipedes will feed on anything they can overpower to include mice and small reptiles. During the day, they hide in moist and darkened areas, under logs, leaves, and rocks. Shoes, clothing, bedding and sleeping bags are adequate substitutions and common meeting places for human stings.[2] *S. subspinipes* grasp victims with their forcipules and inject a venom comprised of a complex mix of chemicals, including phospholipase A2, serotonin, and acidic proteins, from their venom glands via hollow openings in the forcipules.[4,8]

In humans, this leads to immediate and often excruciating burning pain followed by local edema and erythema. Lymphadenopathy and lymphangitis are also common. Tissue necrosis may be seen at the forcipule puncture sites.[3,4] The degree of symptoms varies from person to person and bite to bite. Pain and edema generally resolve spontaneously over a few days to one week, but can persist for up to three weeks.[4] Cellulitis and secondary infection occur, but are uncommon complications of *S. subspinipes* bites. Systemic reactions and death from centipede envenomation rarely occur, however, acute myocardial ischemia in an adult male as well as death in a 7-year-old girl after a bite to the head have been reported.[3,8] Urticaria, anaphylaxis and rhabdomyolysis are also very rare complications which have been attributed to envenomation by *S. subspinipes*.[3,4]

Treatment In Resource Constrained Environment

Data on treatment is limited and there is no standard or protocol that exists for management of these wounds. Treatment for centipede bites is primarily supportive.[3,4] In a resource constrained environment, it is helpful if the centipede is positively identified because it can be difficult to distinguish a centipede bite from bites of other poisonous arthropods which require more resource intensive management. Anesthetic, anti-inflammatory and antihistamine medications are suggested for control of pain and inflammation.[4] Hot water or other mode of heat application soon after the bite occurs is thought to denature proteins in venom, reducing degree and duration of symptoms.[3,4,8] After the initial heat application, icing the bite area assists with reduction in swelling and inflammation.[2] For subjects with more severe symptoms, a short course of corticosteroids may decrease pain intensity and edema. The wound should be kept clean and should be covered to prevent contamination or secondary infection, and a tetanus immunization should be administered.[4]

Treatment In Non-Austere Environments

Many victims of centipede envenomation do not seek medical attention and most symptoms will resolve spontaneously. Treatment of uncomplicated wounds does not greatly differ when limited resources are not a concern. Management should be supportive with wound care and control of pain and inflammation being the mainstay of treatment. Initial heating and later ice application is again suggested.[3,4,8] Prophylactic antibiotics are generally unnecessary; however, if evidence of secondary infection is present, the wound should be cultured and a course of antibiotics which cover gram positive organisms should be initiated. Benzodiazepines may be helpful in the centipede victim with symptoms of anxiety.[3] Cardiac ischemia and anaphylaxis are very rare complications and managing these conditions with standard protocols takes priority over treating localized symptoms. All patients presenting with centipede bites should be monitored in the emergency room for at least 4 hours for evidence of toxic shock.[9] In addition, bite victims should receive an immunization for tetanus.[3,4,9]

Conclusion

Scolopendra subspinipes is the vector of all medically significant centipede envenomations in Hawai'i. Though their bites can be very painful, serious morbidity is very uncommon. Treatment is primarily supportive in both the resource constrained and hospital settings, and therapy is directed at reducing pain, swelling, and anxiety. There is anecdotal evidence supporting the use of heat soon after the bite has occurred with the goal of denaturing the venomous proteins. Anaphalaxis, cardiac ischemia, or other serious complications are rare and should be managed according to existing treatment protocols. Victims of centipede bites should be monitored for four hours for development of symptoms of these complications, and all should receive a tetanus vaccination.

Disclosure

The author reported no conflicts of interest.

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Ua mau ke ea o ka ʻaina i ka pono.
The life of the land is preserved in righteousness.