CASE REPORT

Centipede envenomation

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Five episodes of envenomation by centipedes in 2 patients are reported. These arthropods are fast-moving, frightening in appearance to some, and may display aggressive behavior. However, stings from these centipedes, like most found worldwide, caused no serious morbidity or mortality. Common effects included intense local pain, erythema, induration, and necrosis, as well as mild constitutional symptoms. All resolved without sequelae. Treatment included pain control, wound care, and tetanus immunization.

Key words: centipede, *Chilopoda*, *Scolopendra*, envenomation, venom, poison, animal stings

Introduction

Centipede stings occur in the warmer climates throughout the world. The literature contains few reports concerning these envenomations, the majority describing a painful but benign syndrome. We report 5 recent occurrences of centipede stings in 2 patients, and update treatment recommendations based on the most recent literature.

Case 1

A 30-year-old patient presented to the emergency department with excruciating pain to his right hip. He had been putting on his jeans when he felt the sudden onset of burning pain. On examination, he saw an arthropod under the waistband, where it was still “biting” at the skin with repetitive jabbing motions of its head. On arrival to the emergency department 20 minutes later, the patient produced a captured 7-cm centipede (*Scolopendra* species), which was still thrashing vigorously. The patient’s burning pain was getting more intense and was radiating throughout the buttocks and down the right leg. Other local symptoms included numbness and tingling in the right hip and weakness in the right leg. The patient also complained of dizziness, near syncope, and nausea.

Vital signs included blood pressure of 149/83 mm Hg, pulse of 76 beats per minute, breathing rate of 22 breaths per minute, and oral temperature of 37.6°C. He was anxious, writhing, and rigidly holding his right leg in an extended, contorted position. There was a 12-cm round area of swelling over the right hip. Within that area was a 3 × 2-cm wheal-like area of raised edema, where 2 tiny puncture marks, 3 mm apart, were visible. This area was extraordinarily tender, with the patient jumping at the slightest touch. Examination was otherwise normal.

The wound was cleaned, and tetanus vaccination given. The patient received 60 mg intramuscular ketorolac, 1 mg intravenous lorazepam, and 50 mg intravenous diphenhydramine. Morphine sulfate was titrated to relief of pain, with 20 mg being given intravenously over an hour. The patient was discharged with wound care instructions and a prescription for acetaminophen with hydrocodone after 6 hours of observation in the emergency department. He did not return for recommended follow-up in 2 days, but was contacted by telephone at 1 week and 1 month. His pain had resolved after 2 days; however, he developed a necrotic area approximately 3 cm in diameter, which sloughed and healed spontaneously over a month’s time.

Case 2

On February 5, 1998, one of the authors (S.S.), then 36 years old and in excellent health (on no medications), was stung by an approximately 13-cm specimen of *Scol-*

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Figure 1. Photograph of *Scolopendra subspinipes* (a species native to much of Asia and the Pacific islands). Photograph by Scott Stockwell, PhD.

opendra heros, the giant desert centipede. The sting occurred to the ulnar aspect of the left little finger at the distal interphalangeal joint. There was immediate onset of pain, experienced as a burning discomfort at a level of “6” on a verbal pain scale of 1 to 10. Additional pain was noted sporadically in other parts of the hand within a few minutes. Within 10 minutes, there was also acute pain in the left elbow, both axillae, the clavicular area, and the neck. There was moderate soft tissue swelling of the affected finger within approximately 30 minutes, to a degree to limit range of motion by about 50%. At approximately 45 minutes following the sting, there was a red streak running from the involved digit, proximally along the dorsum of the hand to the elbow. This line was not painful. There was a general sensation of being “unwell.” The victim did not take any medications for pain, but did lie down to rest. The red streak faded after another hour, and the pain and swelling rapidly began to subside. Within 3 hours the victim felt fine (almost “euphoric”). There was no necrosis and no permanent sequelae.

Case 3

While handling an approximately 20-cm *Scolopendra subspinipes* (a species native to much of Asia and the

Pacific islands; Figure 1) for a television interview, the same victim as in case 2 (S.S.) was stung once on his left index finger at approximately 10 AM (October 18, 1999). The patient had been stung by this species once previously with minimal reported effects (little pain and no swelling). On this occasion, however, there was nearly immediate onset of burning pain that spread over the next several minutes into the back of his hand. Blood oozed from 2 puncture wounds for several minutes, and swelling and erythema began at the site. Two puncture wounds were present, approximately 1.5 cm apart (Figure 2). Pain engulfed the entire hand. A burning sensation was present at the leading edge of the soft tissue swelling with severe throbbing at the sting site. By 10:30 AM, the swelling in the finger had become pronounced (with approximately 50% loss of flexibility) and had spread into the dorsum of the hand. Pain was now present in the left elbow and axilla. By 11 AM, pain was present to some degree in all the digits of the hand, and pain in the wrist, elbow, and axilla was pronounced. Swelling continued over the next several hours, peaking at approximately 3:30 PM (with swelling of all 5 digits and the dorsum of the hand and proximal wrist) (Figure 3). By this point, pain was a “10” on a verbal scale of 1 to 10. There was a severe “sprained” sensation from the elbow to the hand. The patient self-medicated with

Figure 2. Case 3. *Scolopendra subspinipes* sting to the left hand at 45 minutes. Note the puncture wounds and the mild erythema. Photograph by Scott Stockwell, PhD.

Figure 3. Case 3. Photograph taken at 7 hours and 15 minutes following envenomation. Note the progression of soft tissue swelling and erythema. Photograph by Scott Stockwell, PhD.

acetaminophen (2000 mg per os), but noted no relief of the pain. He got some pain relief by applying local heat (by wrapping a heating pad around his hand with an elastic bandage, covering this with a large bath towel, and wedging his arm between 2 pillows to increase the insulation). (Recreation of this technique later demonstrated an attained temperature of 41°C at the skin surface.) He maintained this heat application for approximately 6 hours and noted his pain level was reduced to approximately a "5." The patient was unable to find a position of comfort and had a restless night secondary to the pain. On arising at 4 AM the next morning (October 19, 1999), the patient noted significant improvement in the pain, and he experienced nearly complete resolution by 7 AM. Swelling persisted, however, and as the patient used the hand throughout the day, mild ecchymosis developed over the proximal phalanges and metacarpals. The swelling began to recede by early that afternoon and was resolved by the morning of October 20, 1999. Pain did not recur and there was no necrosis.

Case 4

At approximately 4 PM on October 20, 1999, the same patient as described in cases 2 and 3 (S.S.) was stung again (when an emergency occurred in his animal facility) by the same *S subspinipes* that had stung him 2 days previously. On this occasion, there were 2 stings in the same location on the dorsum of the right hand between the first and second metacarpophalangeal joints. There were 4 puncture wounds. Again, there was rapid onset of pain and swelling in the hand, with radiation into the upper arm. The patient went home and began heat application (at approximately 6 PM) in similar fashion to his prior sting. He applied the heat for approximately 12 hours and again noted a definite decrease in his pain level. The patient had a light dinner at 5 PM so that he could try ibuprofen for the pain. He took 800 mg of ibuprofen at 5:45 PM. This was followed by some slight nausea, but no vomiting. Once again, a pain similar to a severe "sprain" was most bothersome. This was not significantly relieved by the ibuprofen. As with the previous sting, there was significant swelling of the digits and hand. By 8 AM the next morning (October 21, 1999), the pain was significantly improved, and it had completely resolved by noon. The swelling took longer to dissipate, resolving by 4 PM on October 22, 1999. Again, there was no tissue loss.

On November 10, 1999, the patient noted recurrence of swelling at the sites of his envenomations on October 18 and 20. The left index finger swelled most noticeably (until flexibility was reduced by approximately 50%). Swelling in the right hand was less noticeable. The

swelling was associated with intense local itching. The swelling and pruritus lasted approximately 1 week. There also appeared an approximately 1.5-cm hardened "lump" below the skin at the site of the stings on the right hand.

The victim visited a dermatologist in late November 1999 for the lump on his right hand. The dermatologist prescribed 0.05% clobetasol propionate ointment to be applied over the site of the lump. This treatment was used sporadically without obvious effects. The lump ultimately regressed by early February 2000.

Case 5

On February 9, 2000, at approximately 9:05 AM, S.S. was stung again while preparing for a class. The centipede was a smaller (approximately 10-cm) *S heros*, and the sting occurred to the tip of the victim's left thumb. There was an immediate, burning pain (rated "6" out of 10) at the site of the sting. Within 1 minute the victim was experiencing a very sharp, piercing pain on the ventral side of the left mandible. The thumb itself seemed quite hot and red, but there was little or no appreciable swelling. At 9:15 AM, the victim experienced another area of sharp, piercing pain near the proximal tip of the left clavicle. He generally felt unwell and slightly "flushed." By 9:20 AM, there was a vague, altered "sensation" in the tip of the left forefinger that was not truly painful. This sensation spread to all the fingertips of the involved hand by 9:25 AM. There was now a sharp pain present in the first interdigital web space. By 9:40 AM, pain had spread to his palm and wrist, and there was some discomfort in the chest and along his chin. There was also a strange, "dull" pain at the proximal phalanx of the left thumb. At 10 AM, the remote pains began to subside. Within the next hour, as the victim was teaching his class, all symptoms subsided except for a lingering dull pain at the sting site, which persisted for approximately 12 hours. At no time did the finger or hand look abnormal (no redness or swelling), and there was no necrosis or any other complications.

Other than the visit to a dermatologist mentioned in case 4, the victim (S.S.) did not seek medical care for any of his stings.

Discussion

Centipedes (class Chilopoda, phylum Arthropoda) are slender, multisegmented arthropods with 1 pair of legs per segment and 1 pair of antennae.¹ Their size may range from 1 to 30 cm, and coloration from bright yellow to brown-black. The first pair of legs has been modified into 2 sharp stinging structures connected to mus-

Figure 4. Centipede venom apparatus. Photograph by Sean P. Bush, MD.

cular venom glands (Figure 4).² Their range is worldwide in warm temperate and tropical climates, and in the United States they are found throughout the southern states, most commonly California, Arizona, Texas, Louisiana, Alabama, Kansas, and Georgia, as well as Hawaii.^{1,3} They prefer dark damp environments, such as undersurfaces of rocks and logs, but on rainy days often retreat indoors. Centipedes are nocturnal carnivores with a wide range of prey. These fast-moving arthropods use their venom to paralyze prey prior to eating. They primarily eat insects, although they are known to prey occasionally on slugs, worms, and small snakes.² There are even reports of some of the larger species killing and eating small birds, toads, and rodents.⁴ There are 4 orders: Geophilomorpha (soil centipedes—small, innocuous soil dwellers), Scolopendramorpha (tropical or giant centipedes—known stingers), Scutigeraomorpha (house centipedes—fast, but delicate), and Lithobiomorpha (rock or garden centipedes—resemble small scolopendramorphs in appearance with many anecdotal reports of stings). All orders are venomous. The *Scolopendra* are the largest centipedes, and therefore probably the most dangerous. On an encounter basis, lithobiomorphs and

scutigeraomorphs (both are widely distributed even in temperate areas) are probably more common. *Scolopendra* range from 8 to 15 cm, and *S. heros* can achieve lengths of up to 20 cm or more. *Scolopendra* usually have a yellow-brown body with orange and blue cephalic/caudal parts.

Venom from *Scolopendra* species has been analyzed by a number of authors; however, the exact compounds are still unknown. The presence of 5-hydroxytryptamine (serotonin) in the venom of *Scolopendra* has been demonstrated by many investigators.^{5–7} Gomes et al^{6,7} used animal models to demonstrate significant cardiovascular effects of *Scolopendra* venom, mediated by histamine and a cardiodepressant factor designated as Toxin-S. They also reported the presence of a smooth muscle contractile agent, which was recently confirmed to have muscarinic activity.^{7–9} Proteinases and lipoproteins have also been reported to be active agents in the venom, and it is thought that the venom is a lipid-toxin complex, similar to that of scorpion venom, which facilitates local cellular penetration and absorption.¹⁰ A cytotoxin also has been isolated from venom of the giant desert centipede, *S. heros*, potentiating both its local and systemic

effects.^{1,3} Most authorities recognize the cardiodepressant Toxin-S to be the lethal factor (predatory), and the histamine/serotonin components to be pain mediators (defensive).^{7,10} The lethal dose for all subjects (LD₁₀₀) in juvenile mice was found to be 0.01 venom glands per gram body weight, which might account for the lack of human lethality (extrapolating to humans, the contents of almost 1000 venom glands would be required for a fatal sting in an average adult).²

Centipede stings often occur as the victim is putting on clothes or while in bed. They usually release from the skin immediately, although there are reports of tenacious attachments requiring removal with a noxious agent such as alcohol and even surgery.¹¹ There have been a number of centipede envenomation cases reported worldwide describing a benign, albeit painful, syndrome.^{12,13} The most common scenario includes moderate to severe local symptoms associated with mild systemic symptoms. Local symptoms include pain, erythema, edema, lymphangitis/lymphadenitis, weakness, and paresthesias. Skin necrosis may occur at the site of envenomation during the weeks following the sting, but rarely becomes extensive and heals spontaneously. Systemic symptoms may include anxiety, fever, dizziness, palpitations, and nausea. Excluding local skin necrosis, findings usually resolve within 2 days without sequelae; however, exceptions should be mentioned. Extensive myonecrosis with subsequent compartment syndrome, rhabdomyolysis, and acute renal failure followed a sting from an Arizona *S heros*.³ Japanese *Scolopendra* species have been reported to cause psychological disturbances and Korsakoff syndrome.¹³ The recurrence of swelling associated with pruritus at the sting sites 3 weeks following multiple stings in victim S.S. (our cases 3 and 4) may have been related to an immune complex deposition syndrome (type III hypersensitivity reaction), although the reaction was mild and required no specific therapy.

No fatality due to a centipede sting has ever been reported in the United States, although 1 fatality was reported following a sting by a large specimen of *S subspinipes* (the same species responsible for cases 3 and 4 in our series) to the head of a small Filipino child.¹⁴

For pain, many authors suggest infiltration with local anesthetics such as lidocaine, and there are reports of using intradermal biscoclaurin alkaloid (thought to protect mitochondria), although there are no studies establishing its effectiveness.^{1,13} The apparent analgesic benefit of local heat application in 2 of our stings is of interest. It may be that some components of centipede venoms that are responsible for pain are heat labile. Boiling centipede venom was found to inactivate its lethality in moths.² Similar to many marine envenomation syndromes, application of local nonscalding heat (up to

45°C as tolerated) may be considered for the management of acute centipede stings. However, the lability or stability of centipede venom at this temperature has not been investigated to our knowledge. Further research is needed to explore this possibility. Otherwise, systemic analgesics are standard, and significant doses of narcotics are often necessary to achieve relief. Antihistamines may also be used to alleviate symptoms (such as pruritus). Cleansing of the wound, tetanus prophylaxis, and routine care for any necrosis are indicated. Prophylactic antibiotics would not appear to be necessary.

Based on our experience and that described previously in the literature, the clinical course following most centipede stings, particularly of species found in the United States, appears benign, self-limited, and rarely associated with any serious sequelae. Factors such as patient age, comorbid conditions, anatomic site of envenomation, and size/species of centipede should be considered when evaluating a patient with a centipede envenomation. Despite the striking appearance of the offender and the significant pain associated with a sting, treatment for centipede envenomation is essentially pain control and routine wound care.

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