ORIGINAL ARTICLE

Centipede bite victims: a review of patients presenting to two emergency departments in Hong Kong

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Objective To review the clinical characteristics of patients presenting after centipede bites in Hong Kong.

Design Descriptive case series.

Setting Emergency departments of two public hospitals in Hong Kong.

Patients Patients presenting after centipede bites between 2006 and 2010.

Main outcome measures Demographics, time and locations of bites, symptoms and signs, treatments and outcomes.

Results A total of 46 relevant patient records were retrieved. The bites were frequently at night, indoors, on lower limbs, and consistently resulted in pain. The majority of the victims were treated with analgesia, anti-histamines, and antibiotics. One patient developed necrosis and five re-attended for delayed pruritus and relapsed/recurrent swelling.

Conclusions Centipede bites are usually uncomplicated, but may lead to necrosis or delayed hypersensitive reactions.

New knowledge added by this study

- Local centipede bite could cause delayed local hypersensitivity reactions.
- Local centipede bite could cause skin necrosis.

Implications for clinical practice or policy

- Topical steroids may alleviate the delayed local hypersensitivity reactions.
- Follow-up should be arranged for patients suspected at risk of developing necrosis.

Introduction

Centipedes are arthropods, there being 3300 species in five orders.[1] In Hong Kong, four orders are encountered, namely *Geophilomorpha* (soil centipedes), *Scolopendromorpha* (tropical centipedes), *Lithobiomorpha* (rock centipedes) and *Scutigeromorpha* (house centipedes).[2,3] All except *Geophilomorpha* attack humans.[2] The *Scolopendromorpha* include the *Scolopendra* (Fig 1), which are the largest and therefore probably the most dangerous centipedes.[3] Centipedes have a pair of modified legs connected to venom glands at the first segment behind the head enabling them to capture and envenom their preys. According to overseas experience, centipede bites in humans result in benign local reactions, but wound necrosis and systemic complications like acute myocardial infarction have been reported.[4-7] In Hong Kong, publications on the envenoming and related characteristics of centipede bites are lacking. We therefore report the clinical settings and features of centipede bites presenting to the two emergency departments, serving more than one million inhabitants, in one of the seven public hospital clusters in the territory. Our aim was to enhance knowledge about and management of centipede bites.

Methods

Records of subjects diagnosed with centipede bites from 2006 to 2010 were retrieved from the Clinical Data Analysis and Reporting System of the Hospital Authority of Hong Kong. The following information in the clinical records was specifically analysed: gender; age; month, time, and location of bites; parts of the body bitten; symptoms and signs; investigations performed; treatments, disposal, length of hospital stay and outcomes.

Key words
Arthropods; Emergency treatment; Insect bites and stings; Necrosis

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遭蜈蚣咬傷而到香港兩所急症室求診的病例回顧研究

目的 回顧香港被蜈蚣咬傷的病人的臨床症狀。

設計 描述性病例回顧。

安排 香港兩所公立醫院的急症室。

患者 2006至2010年期間被蜈蚣咬傷而求診的病人。

主要結果測量 被蜈蚣咬傷者的人口學資料、被咬的時間及地點、傷者的病徵和症狀、醫治方法和結果。

結果 共檢閱46個有關紀錄。大多數的病例發生於晚上及在室內，傷者通常下肢被咬，並持續感到痛楚。大部分情況會為病人施以止痛劑、抗組胺藥及抗生素。其中一名病人出現壞死性組織，五名病人因延遲搔癢症和復發性腫脹而須再度入院。

結論 被蜈蚣咬傷的病例一般來說並不複雜，但亦有可能引致組織壞死或延遲性過敏性反應。

FIG 1. A specimen of *Scolopendra* native to Hong Kong
This genus is characterised by 21 pairs of legs (ie 42 and not 100).[2] The pair of hind legs as shown on the right of the photo is not used for locomotion but is a sensorial organ.[1] The antennae on the head were damaged during the killing by the victim

Results

A total of 46 cases were identified (Table 1). Their mean age was 51 years. Diagnosis of a bite by centipede was based on the description by the patients, taken together with their compatible clinical manifestations. The bites were confined to the months from May to November (mostly September and October). Seventy percent of the bites occurred in the evening and at night. According to 28 records detailing the location of the patients when bitten, 79% occurred indoors (mainly in village houses).

The lower limbs, especially the toes and feet, were the parts most frequently bitten (74%) owing to accidental encounters. Two patients each had bites on two parts of the body (finger and thigh, and abdomen and thumb). One patient was bitten thrice during sleep (on both sides of the lower chest and the left side of abdomen). A bite mark was evident in 27 (59%) of the patients, nine of whom had two bite marks. Pain was universal, and numbness around the wound or radiating proximally was present in 22% of the patients. One patient presented with late itchiness of the wound (after 49 hours). Swelling and erythema around the wound were common, and bruises were occasionally observed. In all, 11% of patients complained of systemic symptoms, including: chest pain, palpitations, vomiting, dizziness, and

TABLE 1. Demographics, presentations, and treatments on initial attendance

Characteristic	Data (n=46)*
Male	19 (41%)
Mean (range) age (years)	51 (15-88)
Monthly case number	
May	6
June / July / August	5
September / October	11
November	3
Time of bite	
07:00-18:59	14 (30%)
19:00-06:59	32 (70%)
Location of bite	
Indoor	22
Outdoor	6
Unknown	18
Median (interquartile range) time lag of presentation (mins)	43 (25-81)
Clinical features	
Bite site	
Lower limb	34 (74%)
Upper limb	12 (26%)
Trunk	2 (4%)
Pain	46 (100%)
Erythema	37 (80%)
Swelling	30 (65%)
Bite mark	26 (57%)
Numbness	10 (22%)
Systemic symptoms	5 (11%)
Bruise	3 (7%)
Itchiness	1 (2%)
Therapeutic modality	
Analgesic drugs	42 (91%)
Heat	2 (4%)
Cold	4 (9%)
H_1 anti-histamines	26 (57%)
Steroids	3 (7%)
Antibiotics	27 (59%)

* Data are shown in No. (%) of patients, unless otherwise stated

headache. The latter symptoms were all short-lived. Blood pressure, heart rate, and other vital signs were normal. The electrocardiogram (ECG) disclosed no ischaemic changes in the patient with chest pain, sinus tachycardia (111 beats/min) in another with palpitations, and nil abnormal in three others without cardiac symptoms. Of the 17 (40%) patients who had blood tests, a neutrophilic leukocytosis ranging from 11 to 19.6 x 10^9 /L (reference, 3.9-10.7 x 10^9 /L) was noted in nine patients. Other blood test results were unremarkable (including the creatine kinase level in eight patients and the troponin level in two; all of whom had had no chest pain). Foreign bodies were not detected in the three patients who underwent X-ray examinations. In all, 19 (41%) of the patients were admitted for in-patient management. Their mean length of stay was 22 hours (range, 6-52 hours).

Regarding the pain relief offered, 42 (91%) received analgesic medications, and only two (4%) and four (9%) patients received hot water immersion and ice pack treatment, respectively. In 26 patients, H_1 anti-histamines were given. Steroids were injected intravenously to one patient and applied topically to two. Prophylactic antibiotics (mainly amoxicillin/clavulanate, ampicillin, and cloxacillin) were utilised in 27 (59%) patients.

On discharge, all the patients were stable or their clinical condition had improved. In all, eight (17%) developed delayed complications (Table 2). A 66-year-old woman with diabetes mellitus and hypertension sustained centipede bite on her left thumb at home, about 1.5 hours before arrival at the hospital. At presentation, bruises were evident around the wound and swelling had extended up the hand. Her random blood glucose level was 7.6 mmol/L. Amoxicillin/clavulanate and paracetamol were administered. Pain and swelling were decreased 2 days after admission but the bruises persisted. On follow-up 6 days post-bite, there was skin necrosis (2 cm in diameter) with obvious surrounding swelling. She underwent surgical debridement, which revealed necrosis down to subcutaneous layer. Tissue culture did not grow any bacteria and necrosis was confirmed histologically. A second debridement was carried out 2 weeks post-bite in view of persistent friable necrotic tissue at the wound base. Seven weeks after the second debridement, the wound eventually healed by secondary intention (Fig 2). Altogether seven patients re-attended for wound swelling (Table 2). One was a 25-year-old woman who returned because of increasing pain and swelling 7 days after a centipede bite on right fourth toe, for which she had presented to the emergency department and was discharged with 5 days of treatment with amoxicillin/clavulanate. The swelling spread up to the dorsum of the foot and was accompanied by multiple tender right inguinal lymph nodes. The symptoms improved after admission for 1 day during which she was treated with intravenous amoxicillin/clavulanate, and then discharged herself against medical advice. Five patients treated with antibiotics and/or anti-histamines sustained relapsed/recurrent swelling and later development of itchiness. These symptoms ensued at a mean of 12 days post-bite (range, 9-16 days). A complete blood count checked for two of them (a 20-year-old woman and a 66-year-old man) revealed eosinophilia. The eosinophil count in the woman was 0.9 x 10^9 /L and 6.5% (reference, <0.45 x

TABLE 2. Complications of the centipede bites

Complications	No. (%)
Necrosis	1 (2)
Relapsed/recurrent swelling	7 (15)
With itchiness	5 (11)
With pain	1 (2)
Itchiness or pain not documented	1 (2)

FIG 2. Progress to necrosis after a centipede bite of a 66-year-old woman
(a) Bruises on day 2. (b) Necrotic slough 2 weeks post-bite before the second debridement. (c) Near-complete recovery after 9 weeks leaving only scabs on the skin surface

10^9 /L and <6%) on day 16 after bite; in the man it was 0.5 x 10^9 /L and 6.4% on day 13 and 0.6 x 10^9 /L and 8.5% on day 20. Both patients were treated with topical fluocinolone and both responded. The woman was followed up only once, 4 days later. The man noted relapsing itchiness after temporarily discontinuing the topical steroid, and so eventually ceased treatment 5 weeks after the bite when his symptoms had fully subsided.

Discussion

Centipedes are nocturnal generalist carnivores, favouring dark warm places. An environment of temperature from 24°C to 29°C and relative humidity from 75 to 80% is optimal for their normal activities.[8] In Hong Kong, comparable conditions can be found in September (mean temperature of 28°C and humidity of 78%) and October (mean temperature of 26°C and humidity of 74%) during our study period.[9] Centipedes may hide in cracks and crevices inside buildings and come into contact with humans at night. Blankets and shoes are among the objects and spaces they tend to reside in. These zoological properties explain the predilection for bites in the months after the summer peak, at night-time, and in indoor premises. The mean age of our patients was 51 years, which possibly reflects a higher proportion of older inhabitants living in the village houses.

Bites predominantly occur on exposed parts, particular the lower limbs.[5,6] However they can ensue anywhere depending on activities being undertaken at the time of the bite.

Pain is a consistent symptom of centipede bites and is often severe, particularly for the genus *Scolopendra*. Swelling occurs in 43 to 71% of cases.[4,6] Numbness around the wound has to be distinguished from that caused by *Naja atra*, a local cobra which is able to inflict serious tissue damage.[10] As with other studies, in our series systemic symptoms were uncommon. Constitutional symptoms (headache, dizziness, and vomiting) were observed in 8% of cases in one series, whereas they were absent in another.[4,6] In addition to the aforementioned symptoms, our victims complained of chest pain and palpitation, but none had serious toxicities. Whether the symptoms indicate systemic envenoming due to toxins such as the cardiotoxin or simply a non-specific stress reaction is not clear.

Besides a neutrophil-predominant leukocytosis (consistent with an acute stress response), baseline blood test results were unremarkable. In the patients who were checked for creatine kinase and troponin, the results were negative. To increase the diagnostic yield, we recommend that blood testing should be guided by the clinical setting, for examples, likelihood of muscle injury, any chest pain or ECG evidence of ischaemia.

Concerning the treatment of pain, analgesics, heat and ice are regarded as equally efficacious. Heat possibly works through denaturing heat-labile toxins (polypeptides, enzymes, histamines, and cardiotoxins). Ice packs elevate the pain threshold as explained by the pain gate theory and the impedance of nerve conduction, and its vasoconstrictive action can also reduce tissue oedema.[11] In our cohort, most of the patients received analgesic drugs, whereas a few received heat and cold therapies. The latter are worthy of study to assess whether they have any additive or synergistic effect with analgesics.

Centipede venom not only contains but also releases histamine. Histamine contributes to pain and the haemodynamic toxicity in rodents exposed to histamine, and these effects can be blocked by anti-histamines.[12] Although centipede venom consists of multiple chemical mediators other than histamine, treatment with anti-histamines appears to be a logical therapeutic option, and has been employed as therapy of centipede bites.[5] Steroids have also been used clinically. Together with anti-histamines, their efficacy warrants further research.

The crude venom of the centipede *Scolopendra subspinipes mutilans* shows a broad spectrum of anti-microbial activity against Gram-positive and Gram-negative bacteria as well as fungi. A homologous peptide scolopendrin I possesses anti-bacterial property.[13] Infection is considered infrequent following centipede bites and in one series in which prophylactic antibiotics were not prescribed, infections ensued in 9% of the patients.[6] Data on organisms responsible for infection are scanty; in two cases with cellulitis and necrosis, *Staphylococcus aureus* was isolated.[14] To date the choice of antimicrobial for established infections after centipede bites has not been studied in detail, nor has their prophylactic value been defined.

The toxins in centipede venom are imperfectly understood but cytolysin, proteinases and lipoproteins have been isolated. The venom is a lipid-toxin complex with properties facilitating local cellular absorption and penetration, which leads to more serious tissue injury.[3] Necrosis secondary to centipede bites is fortunately rare. Among several studies, its occurrence was limited to one case (giving a rate of 2%),[6] and developed 2 to 3 days after envenoming down to the depth of subcutaneous tissues and involved a surface area up to 8 cm^2. Debridement, which may have to be repeated, is often indicated but small lesion heals spontaneously.[3,14] In our case, the necrosis was clinically evident 6 days post-bite. These observations suggest that macroscopic skin necrosis may be delayed; for suspect lesions follow-up should therefore be arranged.

Apart from the patient with an infection, after initial resolution five returned to health care facilities complaining of swelling, four of whom also had localised itchiness. A literature search revealed that similar delayed complications had been reported. According to one report,[3] a man was stung by a *Scolopendra subspinipes* on his right hand. This man's pain and swelling completely resolved 2 days after the bite, but after 20 days there was recurrence of local swelling associated with intense itching that regressed after 3 months of treatment with 0.05% clobetasol. The authors proposed an immune complex deposition syndrome (type III hypersensitivity reaction) as the underlying mechanism. In another case,[15] 2 weeks after a centipede bite on her left hand, the victim complained of pruritus and extensive new lesions. Physical examination revealed plaques on her left hand, four limbs, and trunk, whilst the white blood cell count had increased from a baseline of 10.3 x 10^9 /L with 31% eosinophils (on her first visit several days after the bite) to 16.5 x 10^9 /L with 81% eosinophils. Her skin biopsy showed abundant interstitial eosinophils and flame figures (characterised by collagen bundles coated with eosinophilic granules), and she was diagnosed as having eosinophilic cellulitis or Wells' syndrome. One week after the commencement of a course of oral steroids, the lesions were considerably less indurated and her white blood cell count and eosinophil decreased to 9.9 x 10^9 /L and 51%, respectively. We suspect our five cases that manifested with recurrence had similar hypersensitive mechanisms as they all displayed delayed itchiness and swelling as well as peripheral eosinophilia.

The completeness of clinical data documentation and the consistency of our management strategy were limited by our recourse to retrospective reporting. Nor were there recorded details about morphological appearances or photos for zoological sub-classification of the centipedes. The venue where the bite was acquired was not detailed in 39 of the instances. Symptoms and signs were not described in detail in some cases, and therefore their veracity was difficult to judge. The low rate of heat and ice therapies for these patients might represent lack of awareness or disbelief in the efficacy of such interventions.

Conclusion

Centipede bites are most frequent in the months following peak summer, in dark indoor settings, and on the lower limbs. The outcomes are largely benign but complications can occur. Swelling deterioration after initial improvement can be due to infection or hypersensitive reactions, each warranting different treatments. Patients with a suspicion of impending necrosis should be followed closely, since they may need surgical debridement.

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