

Cytotoxic spider bites – cases of mistaken identity

CE du Plessis,¹  H Reuter² 

¹Division of Clinical Pharmacology, Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa

²Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa

Corresponding author, email: acedp@sun.ac.za

Background: In South Africa, the medically important cytotoxic spiders include the *Cheiracanthium* (sac) and *Loxosceles* (violin) species. The diagnosis of necrotic arachnidism is difficult because bites are often unwitnessed and lesions nonspecific. Furthermore, many patients will claim that spider bites are the cause of their skin lesions.

Methods: Prospectively collected cases that were originally reported as spider bites were followed to describe the clinical progression of these lesions until a definitive diagnosis was established.

Results: Six cases of suspected cytotoxic spider bites were identified. One of these cases was confirmed as a sac spider bite resulting mainly in pain and redness, whereas an alternative diagnosis was established in the other five cases, including folliculitis, varicose eczema, adverse reaction to medications and an atypical ischaemic ulcer.

Conclusions: Many spider species are found around the house, but few will be responsible for bites and significant clinical effects. The progression of skin lesions should be monitored to differentiate between a wound caused by the bite of cytotoxic spiders and skin lesions due to other aetiology. Physicians should be educated in cytotoxic spider bites to improve the diagnostic yield and therapeutic management plan of suspected spider bites.

Keywords: cytotoxic spider bites, necrotic arachnidism, misattributions, skin lesions

Introduction

In South Africa, the medically most important cytotoxic spiders include the sac spiders (*Cheiracanthium* spp.) and violin spiders (*Loxosceles* spp).^{1,2} Spiders from these two genera produce cytotoxic venom, which damages the tissue surrounding the bite site causing necrotic lesions. The clinical syndrome associated with these bites is known as necrotic arachnidism.^{2,3} Sac and violin spiders are nocturnal and patients are usually unaware of being bitten at the time of the incident.^{1,2} Species like *C. furculatum* and *L. parrae* are found in and around houses where they come in contact with humans and are the most likely culprits.⁴

A Californian study showed that less than 4% of suspected cytotoxic spider bites could be confirmed and that almost 90% of skin lesions suspected to be due to spider bites were subsequently diagnosed as skin or soft tissue infections.⁵ The authors thought it likely that in two-thirds of the patients the cause of the infection was due to methicillin-resistant *Staphylococcus aureus* (MRSA).⁵ MRSA is a common cause of skin and soft tissue infections and due to the resistance to first-line antibiotics commonly present with atypical and more serious lesions.⁶ Several articles on this matter have described how 'spider bites' have initially been blamed for skin lesions associated with MRSA outbreaks and infections.⁶⁻⁸ A variety of other conditions can be misdiagnosed as necrotic arachnidism, including insect bites, bacterial and viral infections and vasculitic lesions.⁹

It is not a new phenomenon that spiders are being blamed for various illnesses and diseases. For example, during the Middle Ages, the Great Plague was originally believed to be caused by

spiders and spider bites.¹⁰ Arachnophobia is common and might be a reason why many patients claim spider bites as the cause of their skin lesions.^{5,8}

The aim of our study was to identify the aetiological causes of necrotic lesions considered by the affected person to be due to spider bites. Photos have been used to illustrate the progression of the disease states.

This study was approved by the Health Research Ethics Committee of Stellenbosch University (Ref: S17/09/171). Written informed consent was obtained from all participants.

Methods

Cases were prospectively collected over a one-year period between 1 June 2017 and 31 May 2018. Cases that were originally reported as spider bites were selected for careful follow up. The referrals were received from physicians and arachnologists in South Africa as well as self-referrals to the Tygerberg Poison Information Centre (TPIC). The TPIC is a specialised unit provided by Tygerberg Academic Hospital and the Division of Clinical Pharmacology, Stellenbosch University. Only the cases in which a definitive diagnosis was made by a physician were included in the study.

Results

Six cases of suspected spider bite were identified. Photos were obtained with permission of the patients and have been used to illustrate the progression of the disease states.

Case 1

A 23-year-old female was allegedly bitten by a spider on her left arm while getting dressed. The bite was described as initially causing a burning sensation before developing pain that was felt around the bite site accompanied by erythema and pruritus. On the following day the area was swollen, hard and still painful. A physician prescribed antibiotics and within four days after the bite the swelling and redness had subsided (Figure 1). The spider was positively identified as a sac spider.



Figure 1: 23-year-old female with confirmed sac spider bite

Case 2

Over the period of one year, a 22-year-old female experienced several skin lesions allegedly caused by spider bites. According to her history, she had been treated with ciprofloxacin (Ciprobay®) and methyl prednisolone (Medrol®) for these lesions.



Figure 2: 22-year-old female diagnosed with bacterial folliculitis

On the latest occasion, she presented with a lesion on her cheek characterised by redness and swelling around the suspected bite site (Figure 2). A spider was found in the patient's room, but due to poor photo quality, a definitive photo identification was not possible. However, an experienced arachnologist did suggest that it was most probably a wolf spider (*Lycosidae* spp) or a flat-bellied ground spider (*Gnaphosidae* spp). In the past, the patient had experienced similar skin lesions on her buttocks and under her arms. When she saw a different general practitioner on the last occasion, he diagnosed the lesions as bacterial folliculitis rather than recurrent spider bites and the patient was successfully treated with amoxicillin/clavulanic acid (Augmentin®) (Figure 2).

Case 3

Case 3 occurred in the same household as Case 2. The 70-year-old gentleman developed two painful lesions on the calf of his left leg (Figure 3). The affected area was painful, red and swollen. The family suspected a violin spider as the most likely culprit. During consultation, it became clear that the patient suffered from varicose eczema, which was complicated by cellulitis in the area of his calf and that a spider bite seemed extremely unlikely. The patient was successfully treated with elevation of his leg and treatment with clarithromycin (Klacid®).



Figure 3: 70-year-old male diagnosed with varicose eczema

Case 4

A 74-year-old gentleman was reportedly bitten by a spider five months prior to presentation. At the time, he experienced pruritus in the area of the suspected bite. Two months later, an erythematous and painful area developed at the same



Figure 4: 74-year-old male diagnosed with adverse drug reaction

site and the area was surrounded by blisters and small ulcers. Later it transpired that the patient had had an underlying haematological malignancy, polycythaemia vera (PCV) since 2004. His medication for the treatment of the PCV had been changed two weeks prior to the start of the lesions and the treating haematologist ascribed the lesions to an adverse drug reaction related to his new medication (interferon injections), rather than a spider bite or an infection (Figure 4).

Case 5

A 45-year-old gentleman presented to the emergency department of his local hospital with a history of a suspected spider bite on the ankle, which had allegedly occurred two days prior to presentation. However, no spider had been found and the alleged bite had not been witnessed. The leg was red and



Figure 5: 45-year-old gentleman diagnosed with cellulitis

significantly swollen from the ankle to the thigh. The area was itchy and severely painful. An alternative diagnosis of cellulitis was made and amoxicillin/clavulanic acid (Augmentin®) and analgesic medication was prescribed. The initial antibiotic therapy did not heal the cellulitis and 14 days post initial presentation the patient described ongoing severe swelling of his leg with 'water' leaking from the affected area. Deep venous thrombosis was excluded. He was instructed to elevate the leg for several hours per day and on follow-up at week six the patient reported that his condition had improved significantly and that his leg was healing (Figure 5).

Case 6

A 70-year-old gentleman woke up with a burning pain over his right ankle. Several blisters had formed over the following two days and the area was painful. His general practitioner requested numerous special investigations, including a blood culture. According to the patient, his doctor told him that these tests indisputably confirmed that the lesions were caused by a violin spider bite and prescribed a course of antibiotics. Due to lack of improvement, the patient completed a further four courses of antibiotics without any improvement, and in fact progressive deterioration of the affected area. The patient had a long history of cigarette smoking. The gentleman was referred to a dermatologist and subsequently to a vascular surgeon, who diagnosed severe peripheral vascular disease complicated by an ischaemic ulcer. Subsequently, the patient underwent a below knee amputation (Figure 6).



Figure 6: 70-year-old gentleman diagnosed with peripheral vascular disease and an ischaemic ulcer

Discussion

Spiders play a significant and unusual role in society, not only in the field of medicine, but also in other fields like psychology, mythology and journalism.^{10,11}

In our series, the only confirmed case of cytotoxic arachnidism was caused by the bite of a sac spider as described in case one. In contrast to previous descriptions by Newlands et al.,¹² a burning sensation was experienced by the patient. No necrosis was reported in our patient. This is in keeping with international literature.^{9,13-15}

These six cases of suspected spider bite, of which five (83%) were due to nonarachnid aetiology, demonstrate the many misattributions of spider bites as the cause of necrotic skin lesions. Cellulitis, folliculitis and reactions to new medications are just some of the medical conditions that can be misdiagnosed as cytotoxic spider bites.⁹

The assumed spider found in Case 2 was, in all likelihood, a wolf spider or a flat-bellied ground spider, which are not known to cause necrotic skin lesions. The bite was also not witnessed. In addition, the patient was affected more than once, and her father was also affected (Case 3). According to scientific literature, re-occurring bites and bites to more than one member of a household point strongly towards an alternative diagnosis other than spider bite.^{6,11,13} In Cases 2 and 3, alternative diagnoses of bacterial folliculitis and varicose eczema with cellulitis were made.

Patients commonly call undiagnosed skin lesions spider bites and continue to refer to these lesions as spider bites even after a specific alternative diagnosis has been established as illustrated in our case series and described in the literature.^{8,11} The poor understanding and fear of spiders is probably responsible for many patients blaming spider bites for their lesions. Also, the preying nature of spiders is often extended to humans.^{5,11,13} Vetter and colleagues put it as follows: 'patients find it oddly comforting to blame a familiar external aetiology of perceived danger and have difficulty accepting endogenous disease states for their afflictions'.^{9,13} It has furthermore been suggested that patients prefer a simple, understandable term for their diseases and 'spider bite' has become a simple and short way to describe their skin lesions.⁵

Healthcare professionals also contribute to the inappropriate diagnosis of spider bites and associated misconceptions.^{5,11} Case 6 is a good example of a patient putting his faith in the competence of his physician. This case reflects quite poorly on the physician, who failed to generate an adequate differential diagnosis. It is uncertain what tests were performed, as there is no laboratory test for the undisputable confirmation of spider bites.¹⁶ Vetter suggested that there might be a reluctance in ordering too many tests to rule out alternative causes as these can become costly to the patient.¹¹

Other possible explanations for physicians misdiagnosing spider bites may include a lack of training and physicians, just like many patients, believe that inflamed or necrotic skin lesions are

caused by spider bites.¹¹ Physicians often rely on scientifically poor articles that are based on circumstantial evidence with no real proof of an actual bite by a spider.¹⁷ These articles get cited repeatedly and the information is incorrectly deemed to be scientifically sound.¹⁴ This raises the concern that due to an inappropriate diagnosis of spider bite, other far more serious conditions could be missed and treatment delayed, which in certain circumstances could lead to significant morbidity or an amputation, as was seen in our study.^{9,10,14}

The suggested approach to the diagnosis of a suspected cytotoxic spider bite should include the following: (i) establish if a bite has been witnessed; (ii) perform a thorough clinical evaluation, considering the time and progression of the wound, excluding underlying diseases like diabetes, vascular diseases, thrombophilia and rheumatological diseases as well as various infections and malignant processes; (iii) conduct appropriate diagnostic investigations like skin biopsy, laboratory tests and bacterial cultures; (iv) provide treatment including wound management; and (v) follow-up and monitor.¹⁸ The approach should be specific to the presentation and financial viability. However, the clinical history and careful physical examination play the most important part in reaching the correct diagnosis.

The cases presented in this case series may not represent the typical patient population sustaining cytotoxic spider bites, and selection may be biased towards atypical cases with their atypical clinical course. The description of the clinical course is based on the history provided by the patients and may be clouded by the subjective nature of the reports.

Conclusion

Many species of spiders occur in and around houses, but few will cause severe effects. The progression of skin lesions should be monitored over a period of time to differentiate between a wound caused by the bite of cytotoxic spiders and skin lesions caused by other aetiology.

Physicians should be educated in cytotoxic spider bites to provide an adequate diagnosis and therapeutic management plan. Spiders endemic to a specific area should also be taken into consideration when making a diagnosis of spider bites. A poison centre plays an important role in educating and providing reliable information.

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Conflict of interest

The authors declare no conflict of interest.

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Ethical approval

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ORCID

CE du Plessis  <https://orcid.org/0000-0002-1410-6338>H Reuter  <https://orcid.org/0000-0003-4672-1412>

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