Suspected spider bite

Definition, clinical features and epidemiology

Each year thousands of calls about spider bites are made to poisons information centres around Australia. There has been significant misinformation about spiders and the effects of suspected spider bites in Australia, particularly in relation to necrotic arachnidism (necrotic ulcers or skin lesions that occur after a spider bite).

Information on the clinical effects of spider bite is based mainly on case reports and small cases series, and in many reports the spider has not been caught or identified by an expert.

A recent study of 750 definite spider bites, in which the spider was collected at the time of the bite and identified by an expert, has improved our knowledge, and much of the following review is based on that study and subgroup analyses of it.

A discussion of spider bite requires an understanding of what constitutes good evidence in clinical toxicology and the conditions that must be met to establish definite spider bite cases. For a spider bite to be regarded as a definite bite by a particular species, all of the following must be satisfied:

- Evidence of a bite, including clinical effects such as discomfort or pain at the time or soon after the bite.
- Collection of the spider at the time or immediately after the bite.
- Identification of the spider by an expert arachnologist. Both the general public and clinicians often incorrectly identify spiders. Management of patients can be based on clinical findings and an algorithm that does not require spider identification (see later). When identification is required, spiders can be identified by a local museum or they can be sent to the author (see page 31 for contact details).

Pain or discomfort is a universal cont'd next page

With this issue a guide to spider bite

The author

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from previous page

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- Fang marks or bleeding, which
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- Enzyma or red mark, which is
variable in size but is found in 60-
80% of spider bites.
- Redness (immediate or delayed).
Swellling and oedema are uncom-
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In the study of 750 spider bites
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When there is a history of a
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In Australia, definite spider bites can be divided into bites by three clinically
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black spiders include funnel-
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trapdoor spiders).

All bites by these spiders should be treated initially as
suspected funnel-web bites in
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evidence of envenoming is
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Although red-back spider
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to be life threatening, recent evidence suggests that it
often causes significant pain and other unpleasant
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The remaining spiders responsible for bites in Aus-
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Probable bites by impor-
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A diagnostic algorithm that
can distinguish between bites
of big black spiders (includ-
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from information collected in
879 definite spider bites.

It can be used in any case in
which there is a definite his-
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the person collected the
spider or not, but they need
to have seen a spider biting.

The algorithm involves
obtaining information from six
questions (table 3) to determine
the spider type and path through the deci-
sion-tree algorithm (figure 1).

This algorithm correctly
classified 77 out of 81 big
black spider bites (96%),
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In patients with definite or
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Unfortunately, the speci-
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An approach to the diagnosis of suspected and definite spider bites

IT is not uncommon for patients to present with signs and symptoms, including itchiness (immediate or delayed).

Erythema or red mark, which is medically significant bites (44% [6%]), most (37%) by red-back spiders (Latrodectus hasselti).

Table 1 lists the medically impor-
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How to treat - suspected spider bite

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that several harmless spiders are classified as big black spiders. This may be improved with further research and refinement of the algorithm.

Necrotic arachnidism and white-tail spider bites

Necrotic arachnidism refers to necrotic ulcers or skin lesions that occur after a spider bite. The condition is recognised in many parts of the world but there is only good evidence for necrotic arachnidism occurring after bites by Loxosceles spiders (‘recluse spiders’). There is little evidence for the involvement of other spiders although many groups of spiders continue to be blamed for necrotic arachnidism.

In Australia, the term necrotic arachnidism arose in the early 1960s, with several cases of ulcers being reported after a suspected bite, often following a spider bite. It was suggested that these ulcers were the result of a spider bite, and several spiders were implicated, including white-tail spiders (Lampona spp.), wolf spiders (family Lycosidae) and, later, the black house spider (B. humenta sp.).

After this there were reports of several suspected cases of white-tail spider bite but in none of these was the spider caught or identified, and often was not even seen biting the patient.

Necrotic arachnidism is now commonly referred to in Australia as white-tail spider bite and the terminology is accepted by a large number of medical practitioners. The considerable publicity and general acceptance of the condition has led to an increased diagnosis of the condition by medical practitioners, despite the absence of evidence of a spider bite.

There are several published cases demonstrating misdiagnosis of necrotic arachnidism, failure to diagnose the correct underlying condition and delay in appropriate treatment. In the most recent study,11 cases of suspected white-tail spider bite were found to have alternative diagnoses, including dermatomyositis, staphylococcal infections, pyoderma gangrenosum, cutaneous polyarteritis nodosa, Nocardia brasilienis infection and an infected diabetic ulcer.

In a prospective study of 130 white-tail spider bites, there were no cases of necrotic ulcers. Of definite bites by white-tail spiders caused pain in only one-fifth of patients, pain and a red mark lasting less than 24 hours in about one-third and, in the most severe cases, a persistent red mark and associated itchyness, pain or lump that lasted for seven days on average, in 44%.

Analysis of bites by black house spiders and wolf spiders also confirmed that these spiders did not cause necrotic ulcers. Australian wolf spider bites cause minor effects (table 4). Bites by the common garden wolf spider caused significantly more itchyness and redness, and larger wolf spiders more often caused severe pain and left fang marks.

Current evidence suggests that spider bites are very unlikely to cause necrotic lesions and any cases of necrotic ulcers presenting as suspected spider bites should be thoroughly investigated for other causes. Hopefully the myth of the white-tail spider will slowly be forgotten.

### Table 2: An approach to the investigation and diagnosis of necrotic skin ulcers presenting as suspected spider bites

<table>
<thead>
<tr>
<th>Establish whether or not there is a history of spider bite</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Clear history of spider bite (better if spider is caught):</td>
</tr>
<tr>
<td>▪ Refer to information on definite spider bites</td>
</tr>
<tr>
<td>■ No history of spider bite:</td>
</tr>
<tr>
<td>▪ Investigation should focus on the clinical findings: ulcer or skin lesion</td>
</tr>
<tr>
<td>■ Provisional diagnosis of a suspected spider bite is inappropriate</td>
</tr>
</tbody>
</table>

### Clinical history and examination

- **Important considerations:**
  - Features suggestive of infection, malignant processes or vasculitis
  - Underlying disease processes: diabetes, vascular disease
  - Environmental exposure: soil, chemical, infective
  - Prescription medications
  - History of minor trauma

- **Specific historical information about the ulcer can assist in differentiating some conditions:**
  - Painful of painless
  - Duration and time of progression
  - Preceding lesion

### Investigations

- **Skin biopsy:**
  - Microbiology: contact microbiology laboratory before collecting specimens so that appropriate material and transport conditions are used for fungi, Mycobacterium spp., and unusual bacteria
  - Histopathology
  - Laboratory investigations: may be important for underlying conditions (autoimmune conditions, vasculitis), but can be limited, to:
    - Biochemistry (including liver and renal function tests)
    - FBC and coagulation studies
    - Autoimmune screening tests, cryoglobulins
  - Imaging:
    - Chest radiography
    - Computed tomography
  - Vascular function studies of lower limbs

### Treatment

- **Local wound management**
- **Treatment based on definite diagnosis or established pathology**

### Follow-up and monitoring

- The diagnosis may take weeks or months to be established, so patients must have ongoing follow-up.
- Continuing management: co-ordinated with multiple specialities involved


<table>
<thead>
<tr>
<th>Clinical effects (%)</th>
<th>Latrodectus (red-back spiders)</th>
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<td>Severe pain</td>
<td>62%</td>
<td>26%</td>
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<td>24%</td>
<td>27%</td>
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<tr>
<td>Duration of pain</td>
<td>36 hours</td>
<td>6 hours</td>
<td>5 min</td>
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<td>120 min</td>
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<td>Radiating pain</td>
<td>38%</td>
<td>13%</td>
<td>4%</td>
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<td>Redness/mark</td>
<td>44%</td>
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<td>Systemic effects</td>
<td>35%</td>
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<td>7%</td>
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### Circumstances:

<table>
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<tr>
<th>Indoors</th>
<th>56%</th>
<th>78%</th>
<th>56%</th>
<th>52%</th>
<th>48%</th>
<th>95%</th>
<th>37%</th>
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<tr>
<td>Night (6pm-6am)</td>
<td>45%</td>
<td>30%</td>
<td>26%</td>
<td>23%</td>
<td>37%</td>
<td>64%</td>
<td>25%</td>
<td>15%</td>
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<td>Winter (May-Aug)</td>
<td>12%</td>
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### Table 3: Questions for the spider bite diagnostic algorithm, and the recommended treatment advice

- **Questions**
  - Are puncture marks, fang marks or bleeding present at the bite site?
  - In which state/territory did the bite occur?
  - Are there localised diaphoresis?
  - In which month did the bite occur?
  - At what time of day did the bite occur?
  - Where is the bite region (distant site or not)?

- **Treatment advice**
  - **Big black spiders**
    - The patient should be observed in hospital for four hours and can be discharged if they remain asymptomatic or have only local effects. Patients at home should be advised to remain immobile, apply a pressure bandage and call an ambulance.
  - **Red-back spiders**
    - Patients with a red-back spider bite should be observed and antivenom considered if there are severe local or systemic effects. Discharged patients should be advised about the effects of red-back spider bite and to return if they have systemic effects or worsening pain. It is advisable to follow up patients at 6-12 hours (particularly children). Patients at home should be given information on red-back spider bite, including the chance of systemic effects and severe persistent pain. They should be advised to attend hospital or an ED if they have worsening pain or systemic effects. They do not require urgent transport to hospital.
  - **Others**
    - Reassure the patient and discharge home. If patient is at home, they do not require medical attention.

### Table 4: Clinical effects of bites by important spider groups (genus or family) in Australia (Adapted from: Isbister and White, 2003)

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Red-back spider bites

Red-back spider bites cause a clinical syndrome often referred to as latrodectism, which is responsible for significant morbidity in Australia. It has been estimated that there are at least 5000 red-back spider bites annually in Australia, but there is significant graphical variation, with far more bites in the temperate regions of Australia, and far fewer in the colder south or tropical north. A retrospective study appeared to have underestimated the severity of cases and, importantly, the frequency and duration of severe pain. A recent prospective study of 68 red-back spider bites in which patients were observed showed severe and persistent pain in two-thirds of cases, severe enough to prevent the patient sleeping in almost one-third of cases (table 4). This study also suggested that more patients should receive antivenom (on the basis of pain alone) and not just systemic effects.

Red-back spiders tend to occur in dry and dark places, and the circumstances of the bite may be useful for making the diagnosis. A common way to be bitten is by putting on a shoe with the spider in it. These spiders are also found under outdoor furniture in bike helmets and pot plants, and occasionally in clothes or shoes left lying around.

The appearance of the spider means that most people are able to identify it, but in a proportion of cases the spider is not seen at the time of the bite. Bites are far more common from the larger female spiders, although bites by juvenile spiders also occur. In the prospective study there was no difference between the effects of female and juvenile spiders. The male red-back spider is much smaller and rarely responsible for bites, although two cases have been reported.

Red-back spider bites can occur throughout the year but are most common between January and April. They are characterised by pain (localised, radiating and regional) associated with non-specific systemic features, local and regional diarrhoea and, less commonly, other autonomic and neurological effects (tables 4 and 5).

The pattern of the pain is characteristic, increasing over the first hour in more than half of cases. It may radiate proximally (from a distal limb bite) and less commonly to the trunk. The bite may only cause an initial irritation or discomfort, which may be the reason the spider is not seen in some cases.

Red-back spiders are small and rarely leave puncture marks or cause bleeding at the bite site. Envenomation is the most common finding at the bite site and local diarrhoea occurs in about one-third of cases. Swelling is usually not marked.

Systemic effects (listed in table 5) include nausea, vomiting, lethargy, malaise and headache. Hypertension, generalised myalgia and muscle spasms are often reported in the literature but are less common in large series of cases.

The effects of envenomation usually last about 4-7 days and in the prospective study almost all cases completely resolved within 1 week. No deaths have been reported since the mid-1950s.

The diagnosis, particularly if a spider is not seen, is clinical, and a combination of the circumstances of the bite, the character of the pain, and local or regional diarrhoea is often enough to make this diagnosis. However, in children and especially in infants, the diagnosis may be more difficult. Infants may simply present with irritability and distress.

The treatment of red-back spider bite varies considerably based on the perceived severity of most bites and concisely treats the effectiveness and safety of antivenom. The recent prospective study in Australia suggests antivenom should be considered in up to two-thirds of cases.

When a patient has systemic effects and severe or persistent local pain, it is reasonable to explain that the pain may persist for 24-96 hours and allow the patient to choose whether to have antivenom. Local analgesia may be effective in the most minor effects occur or they are unable to tolerate persistent pain.

Because the systemic effects of envenomation (often 4-12 hours) it is unnecessary to observe these patients. If children are discharged home without treatment it is prudent to contact the parents or carers after 6-12 hours, as well as them instructions to return if the child’s condition becomes worse.

There is increasing evidence that intramuscular antivenom is less effective than previously believed, and controlled trials have been undertaken to determine whether IV antivenom is more effective. However, the recommendation of the manufacturer is administered over 20-30 minutes and premedication is not recommended. However, the antivenom should not be administered undiluted or rapidly because this may cause complement-mediated reactions.

Serum sickness after 4-15 days characterised by fever, rash, arthralgia, myalgia and non-specific systemic features is uncommon, but patients should be warned of this adverse event. A short course of IV steroids will generally result in moderate-to-severe cases of serum sickness.

Antivenom therapy should not be used in pregnancy and during breastfeeding. Patients who require no treatment can be discharged but should be warned of this complication, the condition is often referred to as a dry bite. Severe envenoming develops in 2-3% of cases and is characterised by:

- Muscular paralysis (central nervous system) with or without hypotension, hypothermia, tachycardia or tachypnoea, and may require intubation
- Myocardial depression
- Serum sickness after 4-15 days
- Neurocardiogenic events (orthostatic hypotension, hypotension, labile blood pressure) and generalised vasodilation
- Local swelling
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There are case reports of the successful administration of red-back spider antivenom days to weeks after the bite.

The use of antivenom in the period 24-96 hours after the bite appears justified based on the natural course of the envenoming and the frequent response in these cases.

Red-back spider bites

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Red-back spider antivenom is only available in NSW and southern Queensland, including the Sydney area (Atrax robustus), the southern tree funnel-web (Hadronyche diversicolor) and the funnel-web (Hadronyche radicata). Local effects and less severe envenoming have been reported for most other species.

The most important part of the management of funnel-web bites is initial first aid and transport of the patient to an emergency department or local hospital. The mainstay of treatment in hospital is supportive. Antivenom is not administered to a critical care area and monitoring for 12-24 hours post-bite is important until envenoming has resolved. Atriplene may be used for con-
Funnel-web spider envenoming is a rabbit-derived (St Afent). In the Sydney funnel-web spider envenoming, the patient should have a pressure immobilisation bandage applied, be transported rapidly to hospital and observed in an emergency department for 2-4 hours. The pressure immobilisation bandage can be removed when the antivenom is available. If there is no evidence of severe envenoming after two hours, it is unlikely to occur, but it is prudent to observe the patient for four hours in total.

Mouse spider bites

Mouse spider bites (Miura spp.) are similar in appearance to funnel-web spiders and occur throughout mainland Australia. Suspected mouse spider bites should be treated as funnel-web spider bites in eastern Australia because these spiders are easily mistaken for funnel-web spider envenoming. A systematic review of mouse spider bites found that severe envenoming from these spiders was rare, with only one case out of 40 definite mouse spider bites. Mouse spider bites cause mainly local effects (pain and fang marks), but local neurotoxic effects (paraesthesia) and non-specific systemic effects occur in some cases.

Other common spiders that cause minor effects

Huntsman spiders

Huntsman spiders (family Heteropodidae) are among the most common spider bites, with recent research in children showing that more huntsman bites were far more severe in children than in adults. The analysis did not include enough cases of red-back or funnel-web spider bites to confirm or deny this conclusion in these groups of spiders. Similarly, red-back and funnel-web spider envenoming will be more severe in children because they are exposed to the same injected dose of venom as adults, so the dose per body weight is higher in children. It is therefore appropriate to assume that red-back spider bites may cause significant effects in children.

A conclusion is consistent with recent research in children that showed that systemic and severe effects occurred in 85% of children, 65% having three or more signs of diaphoresis, hypertension and tachycardia in contrast with only 22% in adults.

Theoretically, red-back and funnel-web spider envenoming will be more severe in children because they are exposed to the same injected dose of venom as adults, so the dose per body weight is higher in children. It is therefore appropriate to assume that red-back spider bites may cause significant effects in children.

This conclusion is consistent with recent research in children that showed that systemic and severe effects occurred in 85% of children, 65% having three or more signs of diaphoresis, hypertension and tachycardia in contrast with only 22% in adults.

References

Online resources

Clinical toxicology network web site: www.toxicology.net
A 46-YEAR-old man presents with pain in his right leg and abdomen. He says the pain started about 15-30 minutes after he put his shoes on this morning (seven hours ago).

Initially he had increasing pain in his right toe, which radiated up his right leg. He has no other signs. He is now in considerable distress from the pain. On examination there is no obvious mark on his foot. He has bilateral below-knee diaphoresis.

Questions
1. What is the most likely diagnosis?
2. What is the appropriate treatment for this man?
3. In the emergency department he is administered two ampoules of antivenom IM two hours apart, but has ongoing pain and has developed malaise. What further management should be considered?

Answers
1. Red-back spider bite.
2. Referral to the local hospital or emergency department for antivenom.
3. Following advice from the author.

GP’s contribution

1. Which symptom/sign is always present with a spider bite? (choose ONE)
   a) Tongue fasciculation
   b) Serum sickness may occur
   c) Anxiety and drowsiness may occur
   d) Antivenom is unsafe in pregnancy and breastfeeding
   e) Oral diaphoresis, drowsiness and hypothermia

2. Referral to the local hospital or emergency department for antivenom.

3. In the emergency department he is administered two ampoules of antivenom IM two hours apart, but has ongoing pain and has developed malaise. What further management should be considered?

Answers
1. Red-back spider bite.
2. Referral to the local hospital or emergency department for antivenom.
3. Following advice from the author.

How to Treat - suspected spider bite

**Author’s case studies**

Increasing and persistent pain after putting on shoes. A 46-YEAR-old man presents with pain in his right leg and abdomen. He says the pain started about 15-30 minutes after he put his shoes on this morning (seven hours ago).

Initially he had increasing pain in his right toe, which radiated up his right leg. He has no other signs. He is now in considerable distress from the pain. On examination there is no obvious mark on his foot. He has bilateral below-knee diaphoresis.

Questions
1. What is the most likely diagnosis?
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Answers
1. Red-back spider bite.
2. Referral to the local hospital or emergency department for antivenom.
3. Following advice from the author.

Initially our staff seemed to doubt it was a significant funnel-web bite because the patient looked well. We asked him to sit up on the bed in the emergency room, which he did, but almost immediately he became severely unwell. He vomited the huge meal he had recently consumed, started sweating profusely and began coughing up white foam. He had a huge tachycardia and a systolic blood pressure of more than 200mmHg. Within a few minutes of arriving he appeared to be drowning in his own secretions. His bandage was left undisturbed. In those days, Ryde had only one registrar present in the hospital at night. It was a rotation of medical, surgical, orthopaedic and anaesthetics registrars. The patient who had been bitten by the funnel-web was fortunate that night because the anaesthetics registrar was on duty. It was a difficult intubation but it was achieved and the patient given alcuronium, vecuronium, lasix and some nar- cotics.

I was given the task of hand-venting him in the ambulance taking him to Sydney’s Royal North Shore Hospital, where he was able to receive the first ever dose of funnel-web antivenom. I think he needed either one or two further doses, but was fortunate to be able to walk out of Royal North Shore with 48 hours in.

Questions for the author
1. Can you cite the statistics on the use of funnel-web antivenom around Sydney in recent years?
   a) Torsion fasciculation may occur
   b) The pain usually lasts for 24 hours
   c) Anxiety and drowsiness may occur
   d) Generalised diaphoresis often occurs

2. Concerning the consequences of funnel-web spider bites, which ONE symptom is incorrect?
   a) Funnel-web spider antivenom is correct
   b) Funnel-web antivenom is correct
   c) Antivenom is unsafe in pregnancy and breastfeeding
   d) Oral diaphoresis, drowsiness and hypothermia

3. Confusion and disorientation may occur

4. Concerning the consequences of funnel-web spider bites, which ONE symptom is incorrect?
   a) Funnel-web spider antivenom is correct
   b) Funnel-web spider antivenom is correct
   c) Antivenom is unsafe in pregnancy and breastfeeding
   d) Oral diaphoresis, drowsiness and hypothermia

5. Carol presents with a necrotic ulcer on her lower leg. Which is the least likely cause of the ulcer?
   a) Cutaneous neoplasia
   b) White-tail spider bite
   c) Peripheral arterial disease"
Figure 1: Decision tree for predicting types of spider bites (also available online at australiandoctor.com.au in the How to Treat section of our web site).

BBS = big black spider
RED = red-back spider
OTH = other spider

- Bleeding/fang marks
- Local diaphoresis
- State/territory
- Bite region
- Month
- Time

Vic, Qld, ACT, WA
NSW, SA, Tas, NT

Sep-May  Jun-Aug  Dec-Feb  Mar-Nov  12pm-4am  4am-12pm