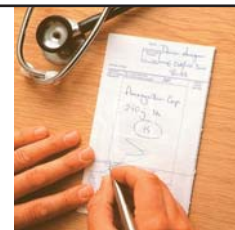




Spider bite – the redback spider and its relatives



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BACKGROUND

Redback spider bite is thought to be the commonest serious spider bite in Australia. The treatment for the envenomation syndrome it causes, termed 'latrodectism', is the most frequently used antivenom in Australia. Several cases of a 'latrodectism-like' illness after cupboard spider bites ('steatodism') have also appeared to respond to redback antivenom.

OBJECTIVE

This article describes the key presenting features of redback spider envenomation and discusses treatment for bites by this spider and that of its close relatives, the cupboard spider. It is intended that this information will assist general practitioners in the diagnosis and management of spider bite in Australia.

DISCUSSION

Redback spider antivenom is safe and appears to be broadly cross reactive with the venom of other spiders of the Theridiidae family. Guidelines for the use of this product are also provided.

Due to its wide distribution, the redback spider (*Latrodectus hasselti*) is arguably the most clinically significant spider in Australia. As such, the general practitioner should have a working knowledge of the diagnosis and management of this common spider bite. The antivenom for redback spider bites is safe and effective. Indications for its use have generally been for severe envenomation but, because of its safe nature, should also be considered in more moderate cases.

The redback spider

The redback spider is a native Australian species of Theridiidae ('comb footed') spiders. While it is ubiquitous throughout Australia, the redback spider does vary considerably in numbers from region to region and suburb to suburb, and is more common in temperate regions than the colder, southern areas. Alice Springs in the Northern Territory, Perth in Western Australia and Brisbane in Queensland are particularly infested, whereas the lowest incidence is in Tasmania.¹ These spiders lurk in household bric-a-brac in quiet locations where they build untidy webs and rapidly breed (*Figure 1*). Large numbers are found in the summer months as the spiderlings emerge – a single egg sac can hold 500 eggs. If you find one spider you can usually

find another close by. Redback spiders are also remarkably tough and adaptable – against the odds, they have successfully adapted to the harsh winters of Japan.²

Redback spider bite is the commonest envenomation requiring antivenom in Australia.³ Many more cases are mild or unrecognised and do not receive antivenom.⁴ Accordingly this spider's bite is a frequent cause of presentations to emergency departments and general practitioners throughout Australia, particularly from January to April; although bites do occur all year round.

The female redback spider is usually easily identified by the presence of a red, orange or brownish stripe on its characteristic black, globular abdomen (*Figure 1*). Juvenile spiders are smaller, more variably coloured and may lack any spots or stripes (*Figure 2*). As the male is considerably smaller than the female, it is only the female that has been considered dangerous. However, it should be noted that a recent study reported the male redback spider occasionally may also cause a mild form of latrodectism.⁵ Similarly two bites by the brown widow spider (*L. geometricus*) have now been reported in Australia as causing a mild form of latrodectism.⁶

Bites are typically sustained when the spider is disturbed in the garden or shed, in clothing (especially footwear), or even when

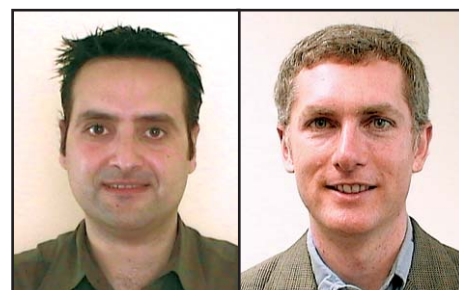




Figure 1. Female redback spider



Figure 2. Juvenile redback spider

it is sat upon. Bites to the limbs comprise approximately 75% of cases, distal approximately twice as common as proximal.⁷

Clinical presentation is usually characteristic, but occasionally the diagnosis may be obscure, typically when the bite is unrecognised or when the patient is a child. Redback spider bite has also been mistaken for sepsis, acute hepatitis, torsion of the testis and even acute abdomen. The diagnosis is clinical (unlike snakebite) as there is no specific laboratory test available.⁸

Symptoms and signs of envenomation

Even if the spider has not been seen or identified, the envenomation syndrome for redback spider bite is fairly distinctive.⁵⁻⁹

Signs and symptoms of envenomation are summarised in *Table 1*. Local pain radiating from the bite site increases over the first hour and typically persists for more than 24 hours; localised or regional sweating is pathognomonic. Piloerection and painful regional lymphadenopathy occur (*Figure 3*). Puncture marks are uncommon and local swelling does not appear to be a feature. Systemic features include hypertension and tachycardia, nausea, vomiting and headache,

Table 1. Symptoms and signs of redback spider envenomation

The time course and the actual symptoms are highly variable, but progression of the illness is generally slow, and symptoms may persist for weeks after an untreated bite. Acute symptoms include:

- Immediate **pain at the bite site** +/- erythema
- Pain progressing over hours to involve the entire limb, typically persisting for more than 24 hours
- Tender and swollen regional lymph nodes
- Local piloerection
- **Sweating** – sometimes affecting only the bitten limb or in bizarre distributions unrelated to the bite site
- **Nausea, vomiting, abdominal pain**
- **Headache**
- **Migratory arthralgia**
- Fever
- Restlessness and **insomnia**
- Hypertension and tachycardia
- Neurological symptoms associated with the neuromuscular blockade and possibly excessive catecholamine release caused by Θ -latrotoxin, eg. muscle weakness or twitching

Rare complications

- Myocarditis
- Rhabdomyolysis
- Paralysis
- Death

NB: Cardinal symptoms of redback spider envenomation are highlighted

lethargy and insomnia. Children generally present with irritability and local pain, erythema and non-specific maculopapular rashes. Myalgia and/or neck spasms in children older than 4 years of age seem to be a prominent feature.

The exact mechanism(s) by which the toxins produce the observed clinical effects are poorly understood, as is the precise cause of death in fatalities. The key toxin, Θ -latrotoxin, acts as a presynaptic neurotoxin that stimulates the release of catecholamines from sympathetic nerves and acetylcholine from motor nerve endings. This action has both receptor mediated and receptor independent phases. In a remarkable contrast to most envenomation syndromes, redback spider envenomation may progress or persist over several days to weeks or months. As a consequence latrosectism has been successfully treated with redback spider antivenom,



Figure 3. Local sweating

weeks or even months after the bite.¹⁰

Before the introduction of redback spider antivenom in Australia, at least 14 deaths had been reported.¹¹ Since 1955, no deaths had been reported until a recent fatality following presumed redback spider bite in northern New South Wales that was not treated with

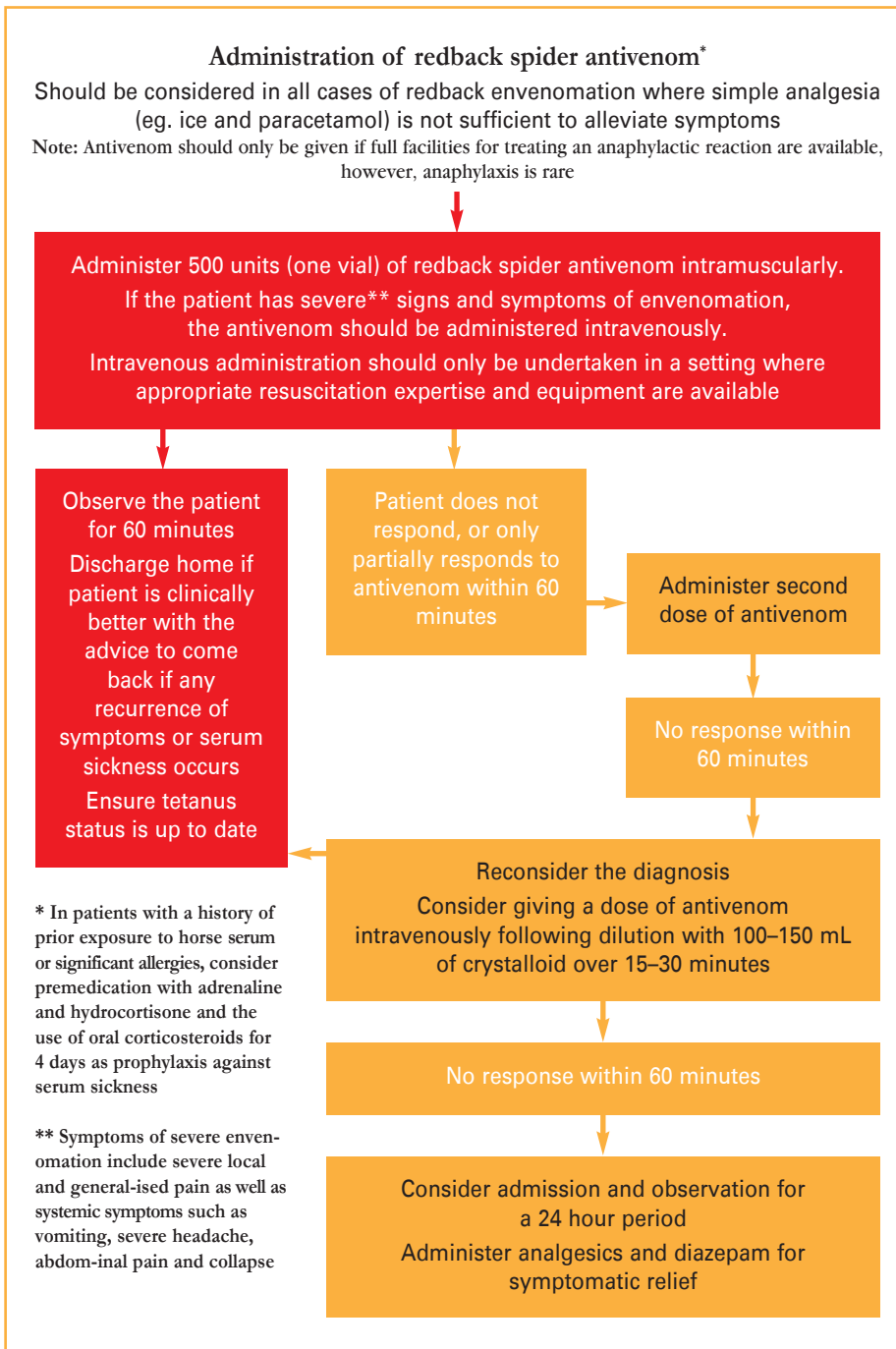


Figure 4. Management of redback spider bite

antivenom.¹ In this case, however, the cause of death occurred a week after the bite and was not clearly related to the envenomation syndrome. Internationally two cases of myocarditis have been reported as a result of apparent *Latrodectus* envenomation. However, in both cases the spider was not caught, neither patient had antivenom, and

one patient died as a result of cardiac failure.^{12,13} There have been two cases of rhabdomyolysis attributed to redback spider bite.^{1,7}

First aid and treatment for redback spider bites

- Ice packs and simple oral analgesia for local pain relief

- Pressure immobilisation is not recommended due to the slow and nonlife threatening progression of symptoms
- Collection of the spider may help confirm diagnosis
- Antivenom is the mainstay of treatment
- Opioid analgesics generally only make the patient drowsy without alleviating the pain.

Antivenom

The protocol for the use of redback antivenom is outlined *Figure 4*.

- Antivenom should be administered for pain unrelieved by simple analgesia (ie. ice or paracetamol) and/or when there are systemic symptoms or signs of envenomation such as vomiting, severe headache, abdominal pain, collapse, hypertension, arthralgia or myalgia
 - When clinical findings are atypical but the history is suggestive, a trial of antivenom may be helpful both diagnostically and therapeutically
 - Patients with a history of horse allergy or prior exposure to equine immunoglobulin may be at higher risk of acute or delayed allergic reaction
 - The antivenom dose should not be reduced for children who are likely to have more severe envenomation because of a higher dose of venom per body weight
 - The rate of reaction to antivenom is low, observed in one series as 0.5%, therefore premedication is usually unnecessary
 - The incidence of delayed reaction – serum sickness – is unclear but is very low (1.4% in one series³) and corticosteroids are not routinely recommended
 - There have been several reports of redback spider antivenom used at different stages of pregnancy without an increase in the frequency of malformation or other direct or indirect harmful effects to the fetus
 - Unlike most other envenomations, administration of redback spider antivenom may be effective even several weeks after the bite.
- The antivenom consists of a small volume (1–1.5 mL, 500 units) of equine antibody fragments and is usually given by intramuscular (IM) injection. However, there are increasing



Figure 5. Brown house or cupboard spider

concerns of the possible ineffectiveness of the IM route. In Mexico and South Africa, the intravenous (IV) route is recommended for *Latrodectus* antivenom (physiochemically similar to the Australian antivenom).^{14,15} As a consequence there are currently two prospective studies in progress in Australia to compare the effectiveness of these two routes.¹⁶ If envenomation is severe, or there is poor response to the IM dose, the IV route can be used. If given by the IV route, the antivenom should be diluted in 100–500 mL of crystalloid (normal saline, Hartmann's or dextrose) and run over 15–30 minutes.

The indications for antivenom have been broadened in recent times to include those who have moderate pain not relieved by simple analgesia.⁸ The usual dose is a single ampoule but occasionally several ampoules are required, especially in the setting of more than one bite and those presenting late. Typically the antivenom is effective within the first 2 hours after injection but occasionally symptoms can reappear necessitating a further dose of antivenom.

It has also been postulated that, in situations where the pain of the bite is not relieved by antivenom, regional IV administration of antivenom using the Bier's block technique, may be useful.¹⁷ While this technique was proposed by the authors as a 'therapeutic innovation', questions remain unanswered about the indications for this technique.

The redback spider antivenom may also be effective for other widow spiders that cause 'latrodectism-like' symptoms, however, more research needs to be undertaken before the full range of indications are established.

Brown house or cupboard spider

Occasionally confused with redback spiders, the brown house, cupboard or 'false widow' spiders (*Steatoda* species), belong to a separate genus within the same family (Theridiidae). Like the redback spider they are ubiquitous throughout Australia but bites by these species have been poorly documented. At least six species have been described in Australia, along with several unnamed native species.¹⁸ Physically they are slightly smaller in size with a similar body shape to the redback spider, but lack the distinctive red colouration on the ventral abdominal surface. Instead they may have a yellow or cream tip or spots (Figure 5). Both the *S. capensis* and *S. grossa* – the two main exotic species – are widely distributed especially in urban areas of Melbourne in Victoria and Sydney in New South Wales. The former has its origins from South Africa whereas the latter is endemic. With all *Steatoda* species, the female is the larger and more dangerous.

While preliminary research suggests there is significant variation in toxicity between the various species, as a group they are less toxic to humans than the redback spider.²² However, the venom of *S. capensis* and *S. grossa* have been reported to cause local and systemic symptoms and signs affecting both children and adults. The envenomation syndrome is similar to that caused by the redback spider only less severe – bite site pain and redness, swelling, sweating, piloerection, pain radiating to involve the limb, chest pain, nausea and vomiting, shivering, lethargy, tachycardia and hypertension have all been observed after these spider bites and may be prolonged or recurrent.^{1,20–23} It therefore seems prudent to treat these bites as for redback spider envenomation. Indeed, three cases of definite cupboard spider envenomation have appeared to respond to the redback antivenom.^{19,20} This apparent clinical effect has been confirmed by recent in-vitro neutralising studies,^{21,22} however, further research is required to confirm the broadness of the efficacy of this antivenom for cupboard spider envenomation.

Grey house spider

Spiders from this genus of the Theridiidae family have been recently reported to also cause a 'latrodectism-like' syndrome. Specifically, a recent Australian prospective study²³ documented five envenomations by the common house spider (*Achaearanea* spp.) in which persisting pain seemed to be an important feature, similar to that of redback spider bite and unlike most non-widow spider bites.

Conclusion

Due to their international distribution and toxicity, widow spiders, including the Australian redback spider, are the world's most clinically significant spiders. Redback spider antivenom is by far the most commonly used antivenom in Australia. Despite this, certain aspects of its use remain unresolved. This includes optimal route of administration and the range of indications for its use, the therapeutic window after the bite during which the antivenom can be used, and the range of spiders for which it is effective. It is likely that the next few years will see progress in addressing these issues.

Summary of important points

- Redback spider bite is the most clinically significant spider bite in Australia.
- Antivenom for redback spider bites is safe and effective and may be used days to weeks after the initial bite.
- Redback antivenom seems to be effective for the treatment of envenomation by other widow spiders.

Conflict of interest: none declared.

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