

Spider bites

an update on management

Two Australian spiders cause serious generalised illness with the possibility of death – the redback spider and several species of funnel-web spiders. Recognition of illness syndromes caused by these is important; specific antivenom therapy is available that curtails the illness and may be life-saving.

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Of all the many spiders that may be encountered in Australia, only two are known to cause serious generalised illness with the possibility of death. These are the redback spider (*Lactrodectus hasselti*) and several species of funnel-web spider (genera *Atrax* and *Hadronyche*). Recognition of the illness syndromes caused by these species is important, and specific antivenom therapy is available that curtails the illness and may be life-saving. Recently, antivenom therapy has been extended to the envenomations caused by bites from certain other spiders. Almost without exception, any spider can give a painful bite and may cause severe local and regional inflammation. Very occasionally, acute and recurrent ulceration of the skin may occur around the bite site.¹

Redback spider bites

Bites by the redback spider are the most numerous of all envenomations in Australia requiring antivenom treatment: several hundred doses are

administered each year. Although potentially fatal, the syndrome of envenomation develops slowly over many hours to several days. No deaths have been recorded due to redback spider bite since an antivenom became available in 1956.

Redback spiders are found throughout Australia, living among man-made objects such as playground equipment and refuse, or in outside dwellings. The female has a dark coloured body about 1 cm in diameter and a distinctive red or orange stripe over the abdomen (Figure 1). The redback spider is a placid spider but if disturbed or handled will bite. The male of the species is much smaller and less dangerous, and the stripe is less distinctive.

The diagnosis of redback spider bite is usually obvious because attention is drawn to the sharp, pinprick-like bite.

Clinical features

Pain at the bite site is universal and increases in

IN SUMMARY

- Characteristic syndromes are associated with redback and funnel-web spider bites, and effective antivenom therapy is available for both.
- The envenomation syndrome of redback spider bite is slow in development; the main features are local and regional pain, although respiratory failure is possible.
- A bite by a funnel-web spider can be rapidly lethal and must be treated urgently with appropriate first aid, acute resuscitation and antivenom.
- Redback spider antivenom may be used to treat envenomation by a cupboard spider, and funnel-web spider antivenom may be used to treat envenomation by a mouse spider.
- Very occasionally, ulcerative lesions may occur after a bite by a white-tailed spider or a window spider, for which debridement and grafting may be needed.

severity over several hours. It may involve the whole limb or be referred to a distant site and is made worse by movement. The bite site becomes inflamed and may be surrounded by perspiration. The effects of the bite may become systemic and may include a rash, perspiration, abdominal pain, fever, hypertension, pruritus, paraesthesia, headache, vomiting and myalgia (Table 1). In serious untreated cases, progressive muscle paresis may cause respiratory failure and necessitate mechanical ventilation. However, this last feature is of slow onset and has not been observed since the availability of antivenom, an equine immunoglobulin. Unless the bite

is treated, muscle weakness and spasm may persist for months after the phase of acute illness has subsided.

Treatment

First aid treatment for redback spider bite is the application of a cold pack to relieve pain (Table 2). Movement of the limb should be avoided. The patient should be referred to a hospital for possible antivenom therapy, which is required if pain is severe or if there are systemic effects. The latter occurs in about one-third of cases. Symptoms subside quickly after antivenom therapy.

Occasionally, a bite from a redback spider may not require antivenom therapy. In several studies, about one-quarter of patients who had presented to hospital had required antivenom therapy on the basis of severe local symptoms, usually pain, or generalised effects.^{2,3} However, a recent study highlighted that the pain of many patients was under-treated.⁴ If there is no immediate need for antivenom, the patient should be observed for several hours or reviewed. In most cases, only one ampoule of antivenom (Red Back Spider Antivenom) is required to alleviate symptoms. In all but the most severe cases, the

antivenom can be administered by intramuscular injection, although efficacy by that route has been questioned.⁴

Adverse reactions to intramuscular antivenom are infrequent (0.3%),⁵ and premedication with subcutaneous adrenaline, 0.005 to 0.01 mg/kg (Adrenaline 1:1000 and 1:10,000, Adrenaline Hydrochloride 1:1,000 and 1:10,000) is not mandatory unless the victim has a known allergy to equine serum. Nonetheless, precautions should always be taken to treat anaphylaxis. Unfortunately, other medications (such as antihistamines and corticosteroids) are of secondary value in the prevention and treatment of anaphylaxis.⁶ Antivenom may be given intravenously but there is then a higher rate of adverse reactions (11%).⁵

Funnel-web spider bites

Many species of funnel-web spiders have been identified along the eastern coasts of Queensland, New South Wales, Victoria and Tasmania, and in the south of South Australia.⁷ Several of these are known to be dangerous. The main species are the Sydney funnel-web (*Atrax robustus*), the Toowoomba funnel-web (*Hadronyche infensa*), the Blue Mountain funnel-web (*H. versuta*), the southern tree funnel-web (*H. cerbera*), the northern tree funnel-web (*H. formidabilis*) and the Port Macquarie funnel-web (*Hadronyche sp. 14*).

Identification of the spiders by inexperienced observers may be difficult because of the similarities with mouse and trapdoor spiders, which are also large, dark and heavy bodied. However, a distinguishing feature of a male Sydney funnel-web spider, which can be observed with the naked eye, is the spur on the second leg (Figure 2).⁸

After a bite, it is helpful, but not essential, to capture the spider – dead or alive – for identification. If live capture is attempted, this should be done with great care since funnel-web spiders are aggressive, nimble and may bite repeatedly. An intact, dead specimen will suffice but a



Figure 1. Female redback spider.

Table 1. Effects of redback spider bite

Local effects

Pain
Inflammation
Perspiration

Systemic effects

Distal pain
Perspiration
Hypertension
Nausea/vomiting
Pyrexia
Myalgia
Headache
Paresis (advanced in untreated envenomation)
Paraesthesias

Table 2. Treatment of bites by Australian spiders

Redback spider (and cupboard spider)

Cold pack
Antivenom

Funnel-web spiders (and mouse spiders)

Pressure-immobilisation first aid bandage
Antivenom
Intensive support

Other species

Symptomatic treatment – analgesics, antipyretics, antihistamines

mashed spider is too much of a challenge for hospital staff to identify. Such a specimen may, however, still be identifiable by a museum arachnologist and so should be preserved in alcohol and sent for identification. In any case, the syndrome of envenomation by a funnel-web spider is quite characteristic.

Cases of reported envenomation have been due mostly to the Sydney funnel-web spider. It is a large, aggressive spider with a sinister reputation and inhabits an area within an approximate radius of 160 km from Sydney. The male of the species is more dangerous than the female, which is unusual among spiders. The males are inclined to roam, particularly after rainfall, and may enter homes and shelter among clothing and bedding. The large fangs produce a painful bite and the spider is sometimes difficult to remove. The venom is highly toxic to humans and other primates but curiously not to other mammals. However, venom is not always injected. The venom contains a small protein that stimulates the release of acetylcholine at neuromuscular junctions and within the autonomous nervous system. The venom also causes the release of catecholamines into the circulation.

Clinical features

Early clinical features after envenomation include nausea and vomiting, profuse perspiration, piloerection, salivation, lachrymation and abdominal pain (Table 3). A characteristic sign of serious envenomation is the appearance of muscle fasciculation near the bite site, which may spread to involve the whole musculature. Hypertension, tachyarrhythmias and intense vasoconstriction may occur and the victim may lapse into coma. Respiratory muscle weakness, obstruction of the airway with saliva, pulmonary oedema and coma combine to cause profound hypoxaemia.⁹

A bite by a funnel-web spider is potentially fatal, particularly in a child,

unless treated quickly. The syndrome usually develops over several hours but may manifest more rapidly. Over a dozen deaths have been recorded, several of these within 90 minutes of a bite and one within 15 minutes. However, no deaths have been recorded since the introduction of the antivenom in 1980, and the severity of the illness has been dramatically curtailed.

Treatment

First aid treatment of funnel-web spider bite is vital, and involves the application of a pressure-immobilisation bandage – as for snake bite (Table 2). This prevents venom gaining access to the circulation and, unlike in the case of snake bite, also enables some inactivation of the venom.

Treatment is the intravenous administration of antivenom (Funnel Web Spider Antivenom), two ampoules initially or four if severe envenomation and thereafter guided by clinical response. The antivenom, a rabbit immunoglobulin, is readily available at hospitals in areas where dangerous funnel-web spiders are known to exist. Antivenom should be administered if any symptoms or signs of envenomation develop after a bite. Premedication is not considered necessary because of the endogenous release of catecholamines. Other supportive treatment, including mechanical ventilation with oxygen, atropine (Atropine Injection BP, Atropine Sulfate Injection BP) and sympathetic blockade, may be necessary.

White-tailed spider bites

Controversy surrounds the effects of a bite by the white-tailed spider (*Lampona cylindrata*). A bite from such a spider has long been suspected of causing severe pain and subsequent skin necrosis. Several case reports initially drew attention to the possibility of a disease syndrome that was called 'necrotising arachnidism'.^{9,10,11} However, in a recent systematic study of 130 patients bitten



Figure 2. Male Sydney funnel-web spider. Note the spur on the tibia of the second leg.

Table 3. Effects of Sydney funnel-web spider bite

Local effects

Pain
Fasciculation
Piloerection
Perspiration

Systemic effects

Nausea/vomiting
Perspiration
Lacrimation
Salivation
Fasciculation
Paresis (respiratory failure)
Hypertension
Tachyarrhythmias
Vasoconstriction
Pulmonary oedema
Coma

by either *L. cylindrata* or *L. murina*, necrotic ulcers did not occur.¹² Thus, although necrotic or blistering lesions (Figure 3) have been attributed to this and other species,^{1,9} the incidence of such extreme lesions must be very low. Other medical conditions may cause a similar lesion and should be sought (Table 4).^{9,13}

The white-tailed spider can be easily



Figure 3. Lesion caused by spider whose description matched a white-tailed spider.



Figure 4. Female white-tailed spider.



Figure 5. Window or black house spider.

identified (Figure 4). The adult has a body length of approximately 1.5 cm and a distinctive whitish spot on the tip of an elongated abdomen. It is found throughout Australia and is often discovered indoors.

Table 4. Differential diagnoses of 'necrotising arachnidism'*

Vascular ulcer due to arterial or venous insufficiency
Diabetic ulcer
Bacterial infection (e.g. with <i>Mycobacterium ulcerans</i> , <i>Streptococcus</i> spp, <i>Staphylococcus</i> spp, <i>Bacillus anthracis</i> , <i>Photorhabdus luminescens</i>)
Fungal infection
Viral infection
Foreign body
Focal vasculitis
Fat herniation with infarction
α_1 -Antitrypsin deficiency
Injection of toxin (accidental or deliberate)
Drug reaction
Physical/mechanical trauma
Burns (especially chemical burns)
Pyoderma gangrenosum
Neoplasia
Connective tissue disease (e.g. SLE, scleroderma)
Immunosuppression
Whiplash rove beetle (<i>Paederus australis</i>) lesion

* In order of perceived frequency.

Clinical features

A recent study has shown that most white-tailed spider bites occur indoors, typically among bedclothes, towels or clothing.¹² About 25% of bites are sustained on distal limb parts. Pain and discomfort are usual and may be severe. Nausea, vomiting, headache and malaise occur in approximately 10% of cases. The most frequent effects shown in the study were a persistently painful or irritating lesion (44%), pain and a red mark lasting less than 24 hours (35%) or pain only (21%).¹²

Treatment

The victim should be treated symptomatically with analgesics and intravenous fluids as required (Table 2). Cultures of the wound should be performed.

Bites by other spider species

Bites by other common spiders, such as the window or black house spider (*Badumna insignis*) and the cupboard or brown house spider (genus *Steatoda*), have been reported to cause severe local and regional

inflammatory changes or ulcers in a few patients (Figures 5 and 6).^{1,9,14,15} The cupboard spider closely resembles the redback spider in size and shape but does not have a stripe.¹⁵ A painful bite by this species has been successfully treated with redback antivenom.¹⁶ The cupboard and window spiders, as their common names suggest, are found in domestic dwellings.

A syndrome similar to that caused by a funnel-web spider may occur after a bite by an eastern mouse spider (*Missulena bradleyi*) – a large, heavy-bodied and dark-coloured spider (Figure 7). Its venom is similar to funnel-web spider venom and is neutralised by funnel-web antivenom.¹⁷ Although bites by this species are not usually serious, one case necessitating funnel-web antivenom has been reported.⁹

The general symptomatic treatment of spider bites should consist of analgesics and antipyretics as required and perhaps an antihistamine. Very occasionally skin grafting is required for an ulcerative lesion. Although hyperbaric oxygen therapy has been used for ulcerative lesions attributed to spider bites, its efficacy is unproven.



Figure 6. Cupboard or brown house spider.



Figure 7. Male eastern mouse spider.

Consultant's comment

All spiders possess venom, a necessary weapon by which they capture their prey. Putative spider bites are a very significant subject of calls to Australian poisons information centres, in some surveys comprising as many as 8% of all calls. Virtually all these bites are by spiders belonging to genera other than *Lactrodectus*, *Atrax* and *Hadronyche*, the three genera known to cause serious generalised illness in Australia.

The bites of many types of spiders, however, cause local irritation and swelling. The standard first aid, prehospital care of most of these injuries is simply to apply wrapped ice to the wound and pursue a policy of watchful expectancy (usually a spider will not have been seen). In the case of redback spider bites, persistent systemic symptoms of muscle ache and pain, sweating and, sometimes, piloerection, form the characteristic envenomation syndrome. If anything, such bites are undertreated with respect to the administration of antivenom. Antivenom will reverse this envenomation syndrome even if it has been present for several weeks.

There is a continuing need for matching identified species of Australian spiders with the envenomation syndromes that they produce. For this reason, researchers of today and clinical practitioners of the future would benefit from better collection of offending spiders and their submission for formal identification.

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Conclusion

Characteristic syndromes are associated with redback spider bite and bites by species of funnel-web spiders. Effective antivenom therapy is available for both. The envenomation syndrome of redback spider bite is slow in development and although respiratory failure is possible, the main feature of a bite by this spider is local and regional pain, which is often undertreated. In contrast, a bite by a funnel-web spider can be rapidly lethal and must be treated urgently with appropriate first aid, acute resuscitation and antivenom. Redback spider antivenom may be used to treat envenomation by a cupboard spider, and funnel-web spider antivenom may be used to treat envenomation by a mouse spider. Many other spiders may cause painful and inflammatory lesions for which symptomatic treatment may be necessary. Very occasionally, ulcerative lesions may occur after a bite by a white-tailed spider or by a window spider, for which debridement and grafting may be needed. **MT**

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