

Arachnid Envenomation in Taiwan

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Abstract

Taiwan is located at the juncture of tropical and subtropical regions. About 300 species of spiders in Taiwan are named. Among the variety of spiders, only two kinds of spiders are reported to do serious harm to people. They are *Latrodectus hasselti* (red back spider) and *Macrothele* species (include *M. gigas*, *M. holsti* and *M. taiwanensis*). Tarantula which is mainly imported for petting would also do harm to people. Until now, no mortality case after spider bite was reported in Taiwan. The treatments of spider bite in Taiwan are supportive treatments. It is important to educate people not to capture the spiders with hands and be aware of the spiders especially in the dark and wet environment. If bitten by a spider, it is important to search medical support as soon as possible. (*Ann Disaster Med.* 2004;3 Suppl 1:S12-S17)

Key words: Arachnid Envenomation; Taiwan; Disaster Medicine

Introduction

More than 35,000 species of spiders are named throughout the world and hundreds more than that have not yet been identified. Spiders are notorious for the venomous bite especially the well-known "black widow spider". Many people over the world have the symptom of "arachnophobia", which means the fear of the spiders. It is true that almost all spiders are venomous to their prey. However, most spiders are not harmful to people. Actually, there are only 20 to 30 spiders over the world have the possibility to cause serious damage to us. Most spider bite would only cause itching and erythematous change and will recover spontaneously in 1 to 3 days.^{1,2,3,4}

Taiwan is located at the juncture of tropical

and subtropical regions. It has a warm and humid climate with abundant precipitation and food, which coupled with the island's diverse vegetation and landscape, make it a suitable environment for many spider species. About 300 species of spiders in Taiwan are named and almost 3 to 4 times are not yet named. Among the variety of spiders, only two kinds of spiders are reported to do serious harm to people. They are *Latrodectus hasselti* (redback spider) and *Macrothele* species (include *M. gigas*, *M. holsti* and *M. taiwanensis*). Beside this two species of venomous spiders, there are also some imported venomous spiders which are feed as pets. The Tarantula is the most famous one. Until now, no mortality case after spider bite was reported in Taiwan.^{1,4} We will introduce these

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three species of spiders in this article.

Venomous Spiders in Taiwan

***Latrodectus hasselti* (Redback spider)**

The redback spider belong to the genus *Latrodectus* (the widow spiders) and is a close native to the notorious black widow spider.^{5,6} Like the black widow spider, only the female spider is large enough to bite people effectively. The mature female will reach the length of 1 cm with a small cephalothorax, large round abdomen which usually bears a bright red or orange dorsal stripe and a ventral hourglass mark that is characteristic of widow spiders throughout the world.^{7,8} They like to live near the house and under the cool space in the park. There are few Redback spiders in Taiwan but they are reported since the period Taiwan was colonized by Japan. It had ever been found in Chengkungling in Taichung and in Peng-Hu. There were some outbreaks in Peng-Hu with many people bitten and no mortality was noted. The last record of redback spider was in Yilan in 1998.¹

Macrothele species (include M. gigas, M. holsti and M. taiwanensis)

Macrothele species were widely spread over the mountain area in Taiwan. They are also called the “funnel web”, because their funnel-like entrance to their silk-lined burrow retreats.⁹ The *Macrothele golsti* is a common venomous spider in southern Taiwan.¹ Adult female will be about 3.5 cm and the adult male will be 1.4 cm. They like to stay in the rocky area and make funnel-like web. When other insect fall in to the web, they will kill it with their venomous teeth and take it to their net. Reversal to other highly poisonous spiders, only the bite from the

male appears to be dangerous. Although females secrete several times more toxin, venom toxicity is consistently several times higher in the male. Furthermore, the male will permanently leaving the burrow to seek a mate and leads it to enter houses and find its way into clothing and bedding.^{9,10} The aboriginal people in Taiwan were afraid of these spiders and called it “Darumas”. They believed that people would die if they passed the track the spider ever passed and would be blind if they saw the spider’s nest.^{1,11}

Tarantula

Tarantulas are among the largest spiders in the world and perhaps the most feared. These species can have 6-9 cm in body length and a leg span up to 25 cm.¹² The population feeding this kind of spider as pet is increasing. There is no *Tarantula* in Taiwan, all of them are imported. However, in Orchid Island, there is a kind of *Tarantula* which called *Yamia watase*, but it has not been found for tens of years. Although these are big, hairy spiders are scary at first sight. They are generally nonaggressive and rarely bite. If they are forced to defend themselves, the arachnid may flick very fine, fiberglass like, sharp hairs from its abdomen at its enemy. If still no way to run, they will finally bite the enemy.^{12,13,}

¹⁴

Pathophysiology

***Latrodectus hasselti* (Redback spider)**

The active component of redback spider venom that affects vertebrates appears have similar actions to that of the black widow.⁵ It is a protein of molecular weight 130,000 called alpha-latrotoxin. The protein mainly acts on nerve endings and causes the release of neurotrans-

mitter substance. It increases in frequency of miniature endplate potentials at the neuromuscular junctions and causes the depletion of acetylcholine and patchy paralysis of voluntary muscle. It also causes release of other transmitters, like catecholamines, and induces structural changes to sensory nerve terminals, similar to those occurring at motor endplates. Some study in mice showed that the toxin would rapidly disrupt Schwann cells. However, after 48 hours, reinnervation would occur and become complete normality in 8 days.^{5,15,16}

Macrothele sp.

The venoms of *Macrothele* are not well characterized. But the toxins of their relatives, Sydney funnel web and *Hadronyche versuta*, were confirmed. The toxins of these two kinds of spiders are robustotoxin and versutoxin. Both toxins consist of 42 amino acid residues and the clinical effects are similar.⁹ The toxins are proteins that will bind to autonomic and motor neurons. Not only cause neurotransmitters release, they will inhibit neurologically mediated neurotransmitter release. If the peripheral nervous systems are involved, they will cause skeletal muscle spasm, fasciculations and patchy weakness. Autonomic stimulation causes excessive secretions, piloerection, tachycardia, hypertension and cardiac arrhythmias. Hypotension may occur after hypertension due to catecholamine depletion and/or impaired catecholamine release. After subcutaneous injection, the venom will reach the circulation rapidly (approximately 2 minutes).^{9,17}

Tarantula

The venom of tarantula is rarely toxic to humans. It usually cause painful sensation and is not

dangerous. The typical effects are no more serious than those of hymenopteran stings. The most common reaction is a low-grade histamine response. Tarantula can also attack people by their hairs. The hairs discharged from the Tarantula can penetrate several layers of skin or ocular tissue and cause mechanical irritation. Inhalation of urticating hairs may cause significant allergic rhinitis. Small mammals may suffocate within 2 hours if they exposure to some Tarantula hairs.^{9,17}

Symptomatology

Redback spider

Serious complications are seldom occurred within 3 hours after biting. The most bites are occurred to the distal parts of the limbs.⁵ The bites may initially be unnoticed but the most common effect of envenomation is still the intense local pain. The site may become hot, warm, red and swelling. If systemic envenomation occurred, patient could have the symptoms of nausea, vomiting, generalized sweating, paraesthesias, mild pyrexia, insomnia, dizziness, headache and hypertension. Some uncommon symptoms and signs have been reported, including titanic spasms, trismus, tingling teeth, swollen tongue, bite site infection, convulsions, thirst, diarrhea, anaphylaxis, blotchy rashes, patchy sweating, hemoptysis, dyspnea, dysuria, persistent anorexia, priapism, albuminuria, leukocytosis, periorbital edema and conjunctivitis.^{5,15,16}

Macrothele sp.

Because the fangs of the spider are large and enter with considerable force, the bite is very painful and the pain will persist for hours to days. Perioral tingling usually occurs within 15 min-

utes followed by tongue spasms, lacrimation, salivation, abdominal pain, nausea, vomiting, diaphoresis or severe dyspnea. Muscle fasciculations and spasms are also common. Cardiac arrhythmias and cardiac arrest may occur. Severe pulmonary edema may occur early and be fatal.^{9,17}

Taruntula

Mild pain similar to a pinprick is the most complaint of *Taruntula* bite. However, some bites may cause severe pain, local swelling and numbness. If the bite is near the joint, arthritic stiffness may last for several weeks.¹² Ocular exposure to tarantula hairs may lead to ocular injury and the patient may have a red eye and associated keratoconjunctivitis. Significant allergic rhinitis may be present in patients who have inhaled hairs. Anaphylaxis is a rare complication of *Taruntula* hair exposure.^{12,18}

Treatment

Redback spider

During prehospital period, pressure-immobilization bandaging is not recommended because the progression of envenomation is usually slow. Ice packing is an effective analgesic. Supportive treatment with ACLS protocols is required. Tetanus prophylaxis should be done. The goal of therapy is to neutralize the toxin of the spider bite with the antivenom. However, there is no antivenom available in Taiwan. Fortunately, the outcome of *Latrodectus* species bite, even the most venomous black widow spider, is good. Most patients do not need hospitalization and need only supportive treatments. The supportive treatments focus on alleviating pain and muscle cramping. The three main treatments are pain relievers such as narcotics, muscle

relaxants, and intravenous calcium gluconate. The effect of calcium gluconate is not clear but it seems to reduce the mortality and morbidity. The dose of calcium gluconate is 1-2ml/Kg with 10% solution as slowly intravenous route, not exceed 10 ml/dose. Antihistamine may be prescribed for skin itching and antibiotics are not helpful. Most patients will recover fully.^{5,15,16,19}

Macrothele sp.

The prehospital care is mainly supportive treatments with ACLS protocols. Most bites do not result in envenomation and pain is the most common complaint. When envenomation occurs, standard life support measures and antivenin therapy are necessary. However, there is no antivenum available in Taiwan and supportive treatment is the main way. Tetanus immunization must be prescribed. Victims may be discharged safely in one day or so if they response well to antivenin. If antivenum is unavailable, the patient may need to stay more days in intensive care unit. Hypertension may be treated with alpha-blocker. Ventilator is indicated if respiratory failure is noted.^{9,17,19,20}

Tarantula

Supportive care is needed in prehospital stage. Eye protective shield may be needed following ocular exposure to prevent the patient from rubbing the eyes and driving the hairs deeper. In hospital, it is most important to relieve the symptoms. Antihistamine and analgesics may be used to relieve itching sensation and pain. Tetanus immunization is indicated. The ophthalmologist should be consulted for orbital involvements and topical broad-spectrum antibiotic may be helpful. Following up in ophthalmologist department is recommended. If anaphylaxis occurs,

admission is indicated. Chronic local dermatitis caused by urticating hair could be controlled by oral steroid and antihistamine.^{12,18,22,23}

Case report in Taiwan⁴

There is only one case report about spider envenomation in Taiwan. In May 2000, a four-year-old boy was bitten over left middle toe by a hidden spider in his shoes when he was wearing them. About 10 minutes later, severe pain over left foot and muscle cramping over left lower leg with mild claudication were noted. There was an obvious red line extended from the wound to inguinal area and abdominal pain was also noted. Two hours later, general weakness, poor appetite, drowsiness, drooling, vomiting and chills happened. He was sent to emergency department ten hours later. Physical examination showed tachycardia, a target lesion over left middle toe and rigidity over left lower leg. Bilateral inguinal lymph nodes enlargement and mild abdominal tenderness were noted. Lab data showed leukocytosis and mild hypoglycemia. 10% Calcium gluconate, glucose-containing fluid, antihistamine and prophylactic antibiotics were prescribed. Patient was discharged under stable condition 48 hours later. The spider was finally confirmed as *Macrothele* sp.

Conclusion

Of 300 species in Taiwan, only two kinds of spiders are reported to do serious harm to people. They are *Latrodectus hasselti* (red back spider) and *Macrothele* species (include *M. gigas*, *M. holsti* and *M. taiwanensis*). *Tarantula* which is mainly imported for petting would have the same effects. There is still no mortality case after spider bite in Taiwan.

Education, prevention and supportive care are the main management strategies for such kind of animal injury.

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