
Medical Guidance for stings associated with Asian Giant Hornet (*Vespa mandarinia*)

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What is the concern?

Identification in the past few weeks, of two worker hornets confirmed as Asian Giant Hornets. This is a non-indigenous species to Canada and no previous reports from North America have been located. The two specimens were found in the Nanaimo area. The hornet foraging range is may be up to 8 km from the nest location. At this time it is suspected that there may be a nest and colony in the area. As the native range of the Asian Giant Hornet has similar climate (temperate Eastern Asia including Japan, Korea and portions of China) to Vancouver Island, it is speculated that the insect could become an established invasive species.

The Asian Giant Hornet is the world's largest hornet (workers are about 3.5 cm, queens can be 5 cm in length). The hornet also has a powerful venomous sting associated with a unique toxin in addition to other known stinging insect toxins. This species of hornet can repeatedly sting individuals and the risk for medical complications increases with the number of stings. The queen hornets usually leave the nest around late September/early October and are the only hornets to overwinter. Stinging events are unlikely until spring when nests are being established.

What are the medical concerns?

Hornets are a subfamily of the wasp family. Venomous stings can cause local reactions similar to other stinging insects and solitary stings would be similar and managed as other stings.

Allergic and anaphylactic reactions do occur and appear to be one of the risks with *V. mandarinia*. There may be allergic cross reactions with other members of the wasp, bee and stinging ant family (*Hymenoptera*) although the likelihood is reduced by genera distance.

V. mandarinia also produces several toxins. The venom of *V. mandarinia* is composed of amines, peptides, and enzymes. Mastoparan, phospholipase A, and hyaluronidase can each damage cell membranes directly, and result in rhabdomyolysis and hemolysis. Unique to the species is mandaratoxin. One or more toxins may contribute to affecting single or multiple organ systems. The uncommon but potential outcomes include:

- Acute Interstitial nephritis
- Acute toxic hepatitis
- Acute toxic myocarditis
- Seizures
- Cutaneous hemorrhages and/or necrosis.
- Other complications may include:
 - Rhabdomyolysis
 - Hemolysis
 - Coagulopathy

Asia reports dozens of sting-associated deaths annually and literature is mixed on the relative importance of anaphylaxis/allergy associated fatalities and toxin related fatalities.

Case series provide some information on severity and management of cases. The review to date has not identified the likelihood of developing any of the severe outcomes following stings. There is good evidence that there is a correlation between number of stings and developing medical complications, with studies often using a sting count of ten or more as a risk predictor that requires greater medical scrutiny. One guidance document suggested hospital admission for any person with fifty plus stings, though severe and fatal cases often had fewer than fifty stings. Fatal toxic outcomes have been reported with as few as three stings. Cutaneous manifestations of hemorrhage and/or necrosis appear to correlate with multiple organ involvement.

How can cases be managed?

Despite, the severity of the outcomes, no clear management guidelines have been located at this time.

Local inflammatory reactions following stings would be managed as per current insect sting approaches.

Anaphylactic and Allergy management would be consistent with existing anaphylaxis and allergy approaches (epinephrine, steroids, and/or antihistamines as per current practices)

Toxic related complications appear to be managed using symptom treatment and may include fluid support, antimicrobials, oxygen, dialysis, blood transfusions, plasma exchange...

If I have seen a case which is likely a *V mandrinia* sting, who should I contact?

You are invited to report to the Medical Health Office if you have treated a case suspected to be from an Asian Giant Hornet. The individual may discuss and report the sighting of the insect to the Invasive Species Council of BC via <https://bcinvasives.ca/report>

References:

1. Liu, Z., et al. 2016. Acute interstitial nephritis, toxic hepatitis and toxic myocarditis following multiple Asian giant hornet stings in Shaanxi Province, China. *Environ Health Prev Med*, 21, pgs 231-236.
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3. Yanagawa, Y., et al. 2009. Cutaneous hemorrhage or necrosis findings after *Vespa mandarinia* (wasp) stings may predict the occurrence of multiple organ injury: A case report and review of literature. *Clinical Toxicology*, 45 (7), 803-807.
4. Singh, P., et al. 2015. Fatal Asian Giant Hornet's Sting: First Case Series from Kumaon Hills of Uttarkhand, India. *J Indian Acad Forensic Med*, 37 (1).