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## Case Report

# Stirring the hornet's nest

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### ABSTRACT

Hornets are widely distributed in India, and their stings manifest from non-specific skin lesions to fatal complications as a result of a myriad of proteins in the venom. We report a case of a 52-year-old man who was attacked by a swarm of hornets and succumbed four hours later in rural Davangere district. Forty sting marks were noted on autopsy. Histopathology revealed histiocytic infiltration surrounding sting marks and laryngeal subepithelial oedema. The cause of death was opined to be laryngeal oedema following anaphylaxis. We conclude that a focus on preventive strategies, public awareness programmes, and providing protective gear to the vulnerable is vital.

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## 1. Introduction

Hornets are aggressive insects that belong to the Order Hymenoptera and Family Vespidae. All hornets are wasps, and the Asian Giant hornet (*Vespa mandarinia*), also called the murder hornet is the most venomous known hornet distributed in India.

Hornets tend to nest underground, on trees, or in shrubs. They are protective of their nests like other similar species and sting humans who attempt to handle them or while defending their nests. The stinging ability is present only in females, and a hornet can inflict multiple stings because their stingers are not barbed and do not get detached while stinging.<sup>1</sup> Clinically, manifestations may range from non specific skin lesions<sup>2</sup> to fatal complications<sup>1,3-7</sup> following the release of amines, peptides and enzymes. Here we report a case of anaphylaxis and death caused by a hornet sting.

## 2. Case Report

A 52-year-old male was attacked by a swarm of hornets in the rural taluk of Davangere district. He accidentally disturbed the low lying nest (Figure 1) while walking with a load of wooden sticks over his head. Following the attack, he was rushed to the medical college hospital, where he succumbed four hours later. An autopsy revealed forty sting marks with surrounding inflammation and oedema over the exposed parts of the body (Figure 2). The presence of laryngeal oedema was noted. Histiocytic infiltration around sting marks and laryngeal subepithelial oedema were confirmed by histopathology (Figures 3 and 4). The cause of death was determined to be laryngeal oedema as a result of anaphylaxis.

## 3. Discussion

The bites of *Vespa mandarinia* are aggressive when they are provoked. Several case reports from India<sup>3,5,8,9</sup> and other parts of the world<sup>1,2,4,6,7</sup> have been documented. The venom is composed of amines such as histamine,

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**Fig. 1:** Low lying hornet nest

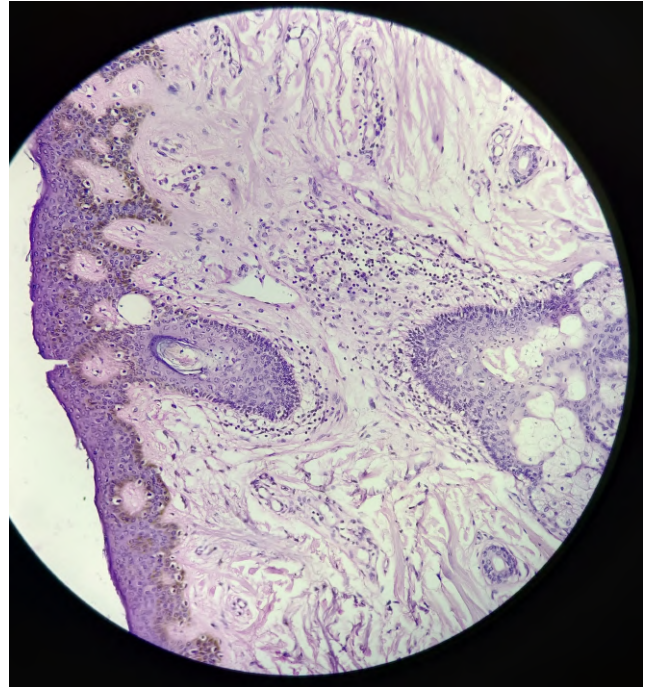


**Fig. 2:** Sting marks on face

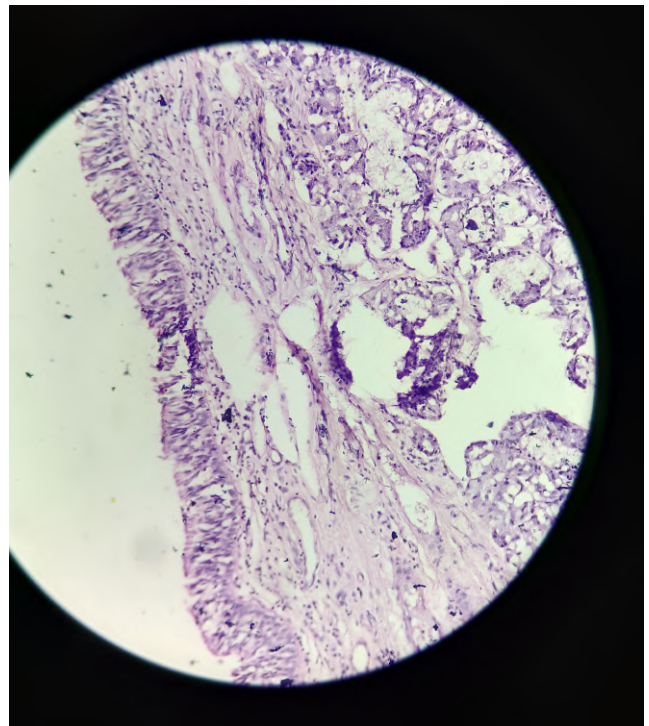
serotonin, acetylcholine; peptides such as mastoparan and kinin and enzymes namely phospholipase A, hyaluronidase, protease.<sup>1,2,9</sup>

The consequence of envenomation could result in either an IgE mediated anaphylaxis or a direct toxic effect of the venom.

An average adult can withstand a thousand stings, however, in a person who is allergic to such stings, a single sting can result in death due to anaphylaxis. The immune mechanisms causing the histamine releasing action of Hymenoptera stings are either Type 1 hypersensitive anaphylaxis or anaphylactoid reaction. Anaphylaxis is caused by IgE-mediated mast cell degranulation, whereas anaphylactoid reactions, which are caused by the activation of the complement and bradykinin cascades, do not involve immunoglobulins. Arthus reaction and serum sickness can occur as a result of delayed reactions caused by Type 3 hypersensitivity immune response.<sup>9</sup> In such hypersensitive



**Fig. 3:** Microscopy of skin surrounding sting marks showing histiocytic infiltration



**Fig. 4:** Microscopy of larynx showing subepithelial oedema

reactions, as in our case report, death occurred within hours despite the administration of life saving medications such as adrenaline, beta agonists, antihistamines and steroids. The organs, such as the lungs and kidneys were congested but failed to show any significant changes on microscopy owing to the short fatal period.

The direct toxic effect of the venom as a result of amines, peptides and enzymes results in intravascular hemolysis, rhabdomyolysis, acute renal failure, hepatic dysfunction, thrombocytopenia and coagulopathy.<sup>2</sup> These components of the venom have a direct and indirect cytotoxic, vasoactive, haemolytic and neurotoxic properties. Most common renal involvement is in the form of acute tubular necrosis as a result of direct nephrotoxicity due to the toxin, hypotension leading to ischemic tubular necrosis and nephropathy due to hemoglobinuria and myoglobinuria.<sup>3</sup> The actions of vasoactive amines and direct platelet toxicity can result in myocardial necrosis and infarction, toxic hepatitis and thrombocytopenia.<sup>4</sup> Histopathology shows evidence of vasculitis from the site of stings, acute renal tubular necrosis, microvesicular fatty infiltration and centrilobular necrosis of the liver in such scenarios. Jeyanthi J<sup>8</sup> reported two cases of short fatal periods in which the cause of death was attributed to the direct toxic effect of the venom resulting in acute encephalopathy in one and acute myocarditis in the other, both of which were confirmed on histopathology.

Ynagawa Y et al<sup>2</sup> studied the correlation between the number of stings and the outcome and inferred that the number of stings is never a reliable predictor of multiple organ injuries.

In the present case, the major organs, heart, lungs, kidneys and liver showed congestive changes. The skin on microscopy revealed focal areas of lymphohistiocytic infiltration in the epidermis, histiocytic aggregates in the dermis and congested blood vessels (Figure 3). Microscopy of larynx shows subepithelial oedema and mixed lymphohistiocytic infiltration (Figure 4). Testing for immunological mechanisms in hypersensitive reactions was beyond our scope. It is always better to visit the scene and indeed ascertain that the stings were the result of hornets and not native bees. The fact that bees usually die immediately after injecting the venom has to be kept in mind, and the same is not seen in hornet stings.

Considering all the above findings, the cause of death was opined to be laryngeal oedema following anaphylaxis.

#### 4. Conclusion

A focus on preventive strategies, public awareness programmes, and providing protective gear to the vulnerable is the need of the hour. The public should be educated on the importance of being alert and vigilant while venturing into

hornet or bee prone areas and to stay calm if accidentally close to a colony of hornets and move away slowly as hornets do not attack beyond their area. One should avoid disturbing a hornet nest or killing a hornet, as its secretion pheromone will attract other hornets to its vicinity, which can trigger the entire colony to attack. A single sting can be fatal in a sensitised individual, and hence immediate life saving measures should be available at all levels of health care.

#### 5. Source of Funding

None.

#### 6. Conflict of Interest

None.

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