

Multiorgan Failure Following Mass Wasp Stings

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Abstract: Wasp bites usually bring temporary discomfort and pain, but on occasion, they can cause serious infections and fatal allergic reactions. We report on a patient who experienced massive wasp stings and developed multiple organ failure, including acute kidney, hepatic failure, and circulatory collapse 4 days later. He was treated with aggressive fluid resuscitation, inotropic agent, intravenous injection of steroids, broad-spectrum antibiotics, and hemodialysis. After intensive treatment, his liver function recovered one month later. Recovery of renal function was delayed, and the patient needed temporary regular hemodialysis. The pathology of kidney biopsy showed acute tubulointerstitial nephritis. This case shows that toxic reactions following massive wasp attacks may happen several days after the fact and result in severe, multiorgan system dysfunction.

Key Words: Acute kidney injury, acute hepatic failure, rhabdomyolysis, massive wasp stings, acute tubulointerstitial nephritis

Wasp stings are frightening, especially when masses of wasps attack, not only because of the severe pain but also because of the possibility of fatality.¹ Most people develop only minor local reactions; however, few patients with venom allergies are at risk for systemic allergic reactions, which can be particularly life threatening and are a leading cause of anaphylactic fatalities.² We report on a patient who developed severe multiorgan failure following multiple wasp stings.

A healthy 50-year-old man visited the emergency department (ED) after being attacked by wasps, which resulted in 50 to 60 stings. Initially, the patient did not feel any pain at the sting sites, so he went home after examination and treatment. Four days later, however, he began having black stools, dark-red colored urine, and yellowish discoloration of the eyes

and skin. The patient returned to the ED. He was conscious upon examination but irritable and jaundiced. He had facial puffiness, pitting edema, and erythematous sting marks over his entire body. His pulse rate was 118 beats per minute, respiratory rate was 38 breaths per minute, and blood pressure was 92/57 mm Hg. His labs were consistent with acute renal failure, acute hepatic failure and rhabdomyolysis, hemolysis, acute pancreatitis, and thrombocytopenia: blood urea nitrogen 181 mg/dL, creatinine 13 mg/dL, creatine phosphokinase 13,731 IU/L, glutamate-oxaloacetate transaminase 459 IU/L, glutamate pyruvate transaminase 478 IU/L, D/T bilirubin 29.7/40.2 mg/dL, lactate dehydrogenase 567 U/L, haptoglobin <10 mg/dL, amylase 577 U/L, lipase 1120 U/L, sodium 127 mEq/L, potassium 6.6 mEq/L, white blood cell count 12,900 cells per microliter with 91% neutrophils, hemoglobin 11.4 mg/dL, hematocrit 30.6%, and platelets 54,000/ μ L. Chest x-ray revealed right lower lung increased infiltration.

The patient was transferred to the intensive care unit and treated with fluid resuscitation, a low dose of dopamine (3 μ g/kg/min), hydrocortisone (100 mg three times per day), and a broad-spectrum antibiotic (piperacillin/tazobactam, 2.25 g three times per day). Emergency hemodialysis was performed for three consecutive days. Kidney ultrasound revealed acute renal parenchymal disease, and endoscopy revealed gastric and duodenal ulcers. A kidney biopsy was also performed and indicated acute tubulointerstitial nephritis (Fig. 1). After intensive treatment, the patient's condition stabilized and liver function recovered gradually after one month; however, his renal function did not improve (Fig. 2), and oliguria persisted despite treatment with continuous high doses (40 mg/hour) of furosemide. As a result, the patient underwent approximately three months of temporary hemodialysis. He fully recovered renal function seven months later.

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Key Points

- Wasp venom contains complex proteins, peptides, and amines that can cause reactions ranging from mild allergic reactions to fatal anaphylactic consequences.
- The toxic reactions following massive wasp stings may happen several days after the attack and result in severe, multiorgan system dysfunction.
- Acute interstitial injury may occur and could lead to delayed renal function improvement.

Wasp venom is composed of complex proteins, peptides, and amines that may result in mild allergic reactions to fatal anaphylactic consequences.³ Anaphylaxis is reported in 0.3 to 3% of stings, affecting up to 8% of some populations.⁴ Symptoms include fever, headache, nausea, vomiting, diarrhea, vertigo, convulsions, and syncope. In addition, hemolysis, rhabdomyolysis, acute renal failure, and cardiac complications have been reported.⁵ Toxic reactions usually occur in patients following massive stings due to a large amount of toxin injected into the body.⁶ In the present case, the patient received numerous wasp stings and developed severe acute onset of multiorgan failure, including kidney, liver, and circulative collapse.

The mechanisms of venom-induced renal damage are complex. In a review of 24 reported cases of hymenoptera sting, all of the renal biopsies revealed tubular necrosis. We report the first case, to our knowledge, of acute tubulointerstitial nephritis after wasp stings. For most patients with acute tubular necrosis, renal function will recover after two to three months of hemodialysis; however, our patient had delayed recovery of renal function and needed temporary regular hemodialysis. Rhabdomyolysis, hemolysis, shock, allergic reaction, and direct tubular necrosis were the possible factors for kidney insult.^{7,8} Except for acute tubular injury of the kidney, acute interstitial may explain in part the cause of delayed renal function improvement. In addition, the patient concurrently developed acute hepatic failure, and the pathogenesis of hepatocellular damage remained unclear. The toxic effect of venom could be implicated in hepatocyte necrosis. Most

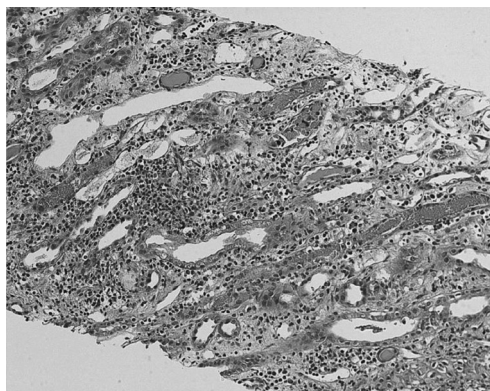


Fig. 1 Kidney biopsy showing acute tubulointerstitial nephritis (hematoxylin-eosin stain, original magnification $\times 100$).

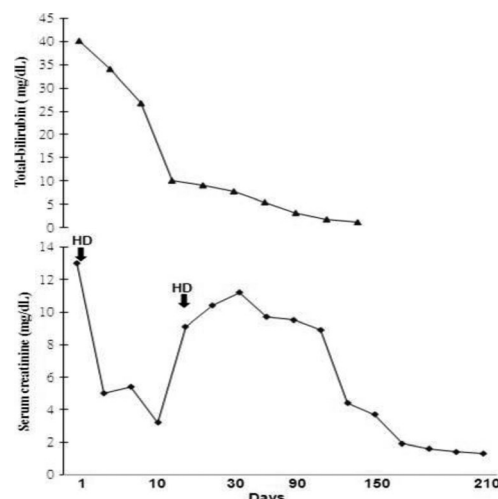


Fig. 2 A series of serum creatinine and total bilirubin level after multiple wasp stings.

patients experiencing multiple wasp stings had renal and hepatic recovery after intensive dialytic support.

This unusual case illustrates that the acute toxic reaction following wasp attacks may occur several days later and may result in severe multiple system dysfunction. As such, people having sustained multiple wasp or bee stings should be monitored closely in the hospital, even if they appear to be well.

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