



Wasp Sting Envenomation – Case Series

Dr. Dhanya, Dr. Nithyaraj

Department Of Emergency Medicine, Sri Manakular Vinayagar Medical College, Pondicherry

*Corresponding Author:

Dr. Dhanya

Department Of Emergency Medicine, Sri Manakular Vinayagar Medical College, Pondicherry

Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Keywords: NIL

Introduction

Patients with a history of numerous wasp stings may have an increased incidence of mortality. Wasp venom-induced organ injury is mainly explained by two mechanisms which include toxin-induced allergic response mainly IgE mediated type 1 hypersensitive reaction and direct effect of toxin causing organ injury, especially in a mass wasp sting. Rhabdomyolysis, haemolysis, DIC, hepatitis, acute kidney injury, myocardial infarction, and pancreatitis are mainly caused by direct toxin-induced injury to the organs [1]. Wasp venom contains mellitin, histamine, hyaluronidase, apamin, phospholipase A2, and acid phosphatase. In addition to acute renal failure, hepatocyte damage, intravascular haemolysis, rhabdomyolysis, thrombocytopenia, coagulopathy, and cardiovascular and neurological abnormalities are severe complications that are also caused by wasp venom. It has also been reported that high concentrations of wasp venom can be detected 50 hours after wasp stings, indicating that it would still result in continuous damage to the body

Background

Wasp bites usually bring temporary discomfort and pain, but on occasion, they can cause serious infections and fatal allergic reactions. We report on a patients who experienced massive wasp stings and developed multiple organ failure, including acute kidney, myocarditis, encephalitis and circulatory collapse. They were treated with inotropic agent, and intravenous injection of steroids, broad-spectrum

antibiotics, and haemodialysis. After intensive treatment, patients were recovered after one month later. Recovery of renal function was delayed, and the patient needed temporary regular haemodialysis. The pathology of kidney biopsy showed acute tubulointerstitial nephritis. This cases shows that toxic reactions following massive wasp attacks may happen several days after the fact and result in severe, multiorgan system dysfunction.

Case 1 Wasp Sting With Acute Renal Failure

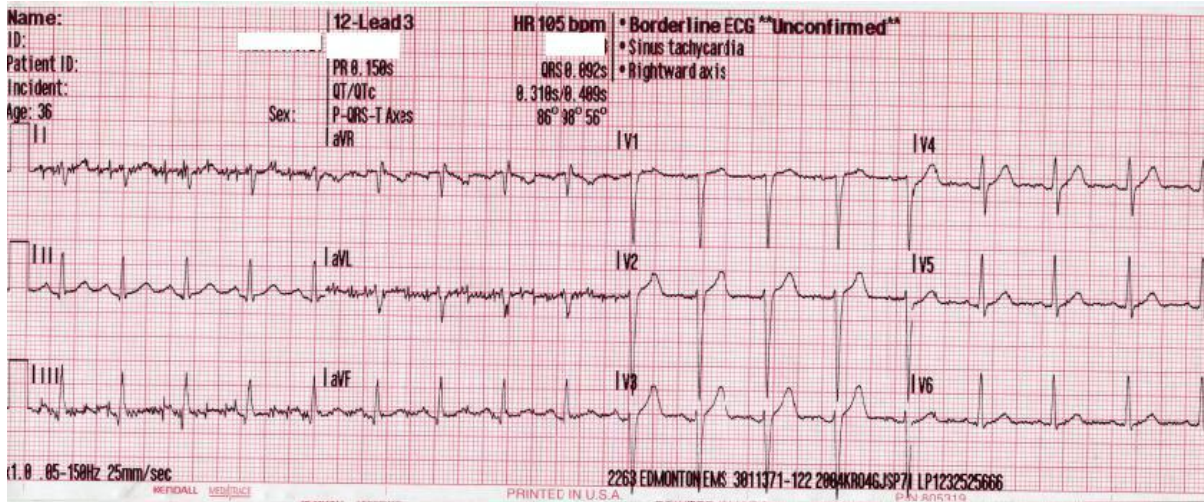
A 55yr old male came to the hospital with complaints of stung by a swarm of wasps(more than 50) in his farm field, within minutes he developed severe local erythema and edema followed by dizziness, diaphoresis and sudden loss of consciousness. Directly he was brought to the ER department Patient was conscious, oriented, and afebrile. Vitals are stable BP; 90/60mmhg PR; 90bpm SPO2 96%@room air. Patient was treated conservatively with INJ HYDROCORTISONE, INJ AVIL, INJ TETANUS TOXOID and EPINEPHRINE subcutaneously and EPINEPHRINE infusion given as anaphylactic treatment. IV crystalloids given as bolus. IN the ER his level of consciousness fluctuated between responsive to sudden LOC and interruption of speech. GCS during those episodes with LOC was E4M1V1. There were no signs of motor abnormalities. Patient was given INJ CLONAZEP 1mg IV during the episodes of LOC thinking of status epilepticus. Patient suddenly developed tachypnea with desaturation Spo2 83in room air, a

chest radiograph showed bilateral diffuse lung infiltration. He was subsequently diagnosed with acute respiratory distress syndrome. In view of ARDS patient was intubated. After 24 hours Lab investigations done which shows LDH-5000IU/L, PT-INR 1.4, URINE MYOGLOBIN- NEGATIVE, TOTAL WBC COUNT 22000CELLS/MM³, SODIUM-135meq/l, POTASSIUM-5.9meq/l. 2D ECHO EF 60%,SERUM CREATININE 4MG/DL AND LIVER FUNCTION TEST (total bilirubin 22.9mg/dl,serum glutamic pyruvic transaminase 7200U/L serum glutamic oxaloacetic transaminase 2700U/L) CREATININE PHOSPHOKINASE 15000IU/L . URINE ROUTINE -GRANULAR CASTS (features suggestive of acute tubular necrosis). CT brain and MRI brain shows normal study. He received N-Acetylcysteine infusion for rearranged liver functions. In view of sepsis patient was started on IV INJ MEROPENEM 1GM. Patient renal parameters, liver enzymes, CK total and LDH are grossly elevated. Post admission nil urine output and icterus was present. In view of acute renal failure due to rhabdomyolysis, patient was taken for emergency dialysis and patient admitted in intensive care unit.

Case 2 Wasp Sting With Myocarditis

A 46-year old, previously healthy male adult, was admitted to the Emergency Department of our hospital with a history of multiple wasp bites on head and face 6hrs prior to admission. In addition to local swelling and pain, he developed progressive difficulty in breathing within an hour of the event. He had received intravenous fluids, adrenaline, steroids and anti-histamines at local hospital before referral to

our hospital. He was drowsy, and had shortness of breath, and swelling over face. His pulse rate was 92 beats/min, blood pressure was 60/40mmHg and arterial oxygen saturation (SpO₂) was 55% at admission. Diffuse wheeze was present in chest on auscultation. He was immediately intubated, and put on artificial ventilation. He was started on bronchodilators, anti-histamines, steroids and inotropic support (Noradrenaline infusion). His haemoglobin, total leukocyte count, serum urea and serum creatinine were 11.7g/dL, 26,000cells/cu mm, 27mg/dL, 1.2mg/dL, respectively. Arterial blood gas analysis at admission showed metabolic acidosis with severe hypoxaemia. Electrocardiogram showed sinus tachycardia. His serum electrolytes, renal function and liver function tests remained within normal limits. His facial swelling decreased and chest wheeze progressively improved over next 48hrs. However, difficulty in weaning from ventilator and persistent requirement of inotropic support. Bedside echocardiography revealed global hypokinesia of the left ventricle with mildly decreased contractility and LVEF of 45-50%. His qualitative serum troponin T was negative. Repeat ECG showed sinus tachycardia with non-specific ST/T wave changes. A diagnosis of myocarditis was made. He improved over next 48hrs with symptomatic support and was off inotropic support after 3 days. He was weaned off ventilator by 7th day and later managed with oral beta blockers, ACE inhibitors and diuretics. Repeat echocardiography at 2 weeks after admission revealed normally functioning myocardium with 60-65% LVEF. He was discharged at 2 weeks after admission in a normal condition without any prescription drugs.



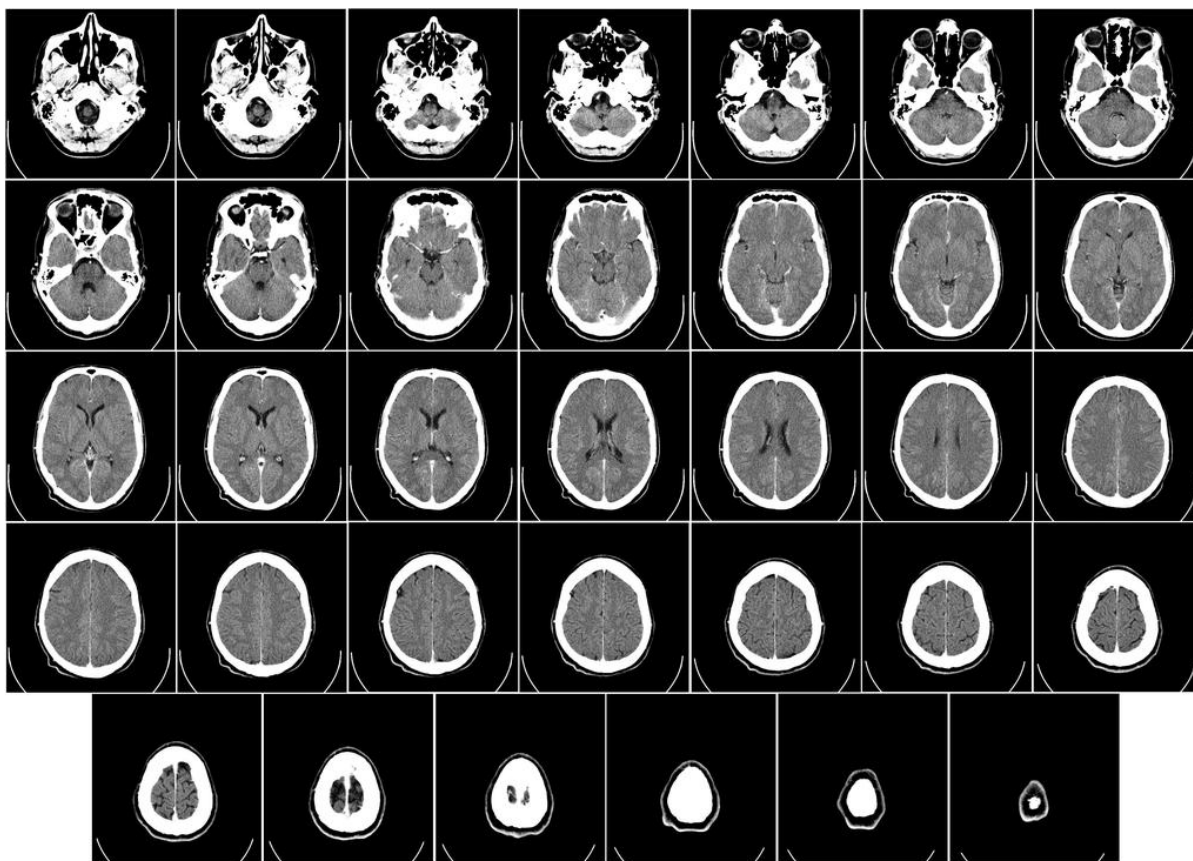
Case 3 Wasp Sting With Encephalitis

A 38 year male presented to the emergency department in altered sensorium. The history revealed that he got multiple bee stings while he was working in the field. Following the bee sting he received antihistaminic, and analgesics in the local hospital. The patient remained asymptomatic for the next three days and on the fourth day the attendants noticed irrelevant speech and gradually decreasing level of sensorium. They also noticed continuous rhythmic involuntary movements of the right upper limb.

However there was no history of fall, head injury, fever, and prior headache. Systemic review revealed no other positive history. Examination of the patient showed a pulse of 70/ min, blood pressure of 140/70 mm Hg, and patient was afebrile. Nervous system examination showed a Glasgow Coma Scale of 12/15 (E4 V3 M5) bilateral pupils were of normal size and reacting to light. Neck rigidity and kerning's sign were negative. Continuous focal seizures were noted in the right upper limb. Deep tendon reflexes were normal so as the muscle tone. Patient was started

with loading dose of inj.levipril 1gm iv and maintaince dose of 500mg bd iv. Owing to the mental status rest of the neurological examination was not performed. Investigations revealed hemoglobin, 14gm% Total Leukocyte Count 9000 / mm³ Differential count of N 65, L 25, and platelet count of 1, 80,000 / mm³. Serum chemistry showed sugar 120mg/dl, urea 14mg/dl, creatinine 0.9 mg/dl, bilirubin of 1.0 mg/dl, SGOT/SGPT 23/16 IU/L, Alkp 110 IU/L, calcium 7.2 mg/dl, Phosphate 3.8 mg/dl, Sodium 135 meq/dl, potassium 3.5 meq/dl.

Arterial blood gas analysis was within normal range. His CSF routine microscopy showed 40 cells, sugar of 60 mg/dl with corresponding blood sugar of 100 mg/dl, and protein of 65 mg/dl. CT brain was done which is found to be normal . EEG done after three days was normal. The patient was given methyl prednisalone1 mg/day and phenytoin 100 mg tds. He regained complete consciousness in 12 hours following treatment with complete resolution of all symptoms and signs next 36 hours and was discharged home.



Discussion

Stinging Apidae (bees) and Vespidae (wasps and hornets) insects belong to the order Hymenoptera and class Insecta. Their venom is a mixture of amines such as mellitin, apamine, phospholipases, hyaluronidases, acid phosphatase, histamine and kinin. Phospholipase A and surface agent such as mellitin and apamine act on the red cell membrane leading to haemolysis. Coagulopathy has been related to increased level of antithrombin and decreased level of fibrinogen, high molecular weight kininogen, factor V and VII. Rhabdomyolysis is a direct effect of the venom on the muscular tissues. Other

manifestation can be renal failure due to acute tubular necrosis because of hypotension or pigment nephropathy resulting from rhabdomyolysis or intravascular haemolysis, or acute interstitial nephritis. Liver dysfunction in form of centrilobular necrosis can also occur.

Giant Asian honeybee stings can cause myocardial involvement in previously healthy patients.⁶ The characteristic pain of acute cardiac event can be masked by generalized aches and pain due to multiple stings. Kounis Syndrome also known as allergic angina or allergic myocardial infarction characterized by allergic reaction, coronary artery

spasm and chest pain can occur in this setting. Direct toxic effects of the venom on myocardium could also be culprits. Also, acute pulmonary oedema can occur secondary to anaphylactoid reaction and heart failure

Finally, very rare medical disorders such as encephalitis, polyneuritis and renal failure have followed insect stings. The life threatening complications of the disease according to Rubenstein *et al* included atherosclerosis, sepsis, cerebral edema, defibrination syndrome, hemorrhages, emboli and neuro-encephalomyelitis variants . The review regarding various neurological manifestations revealed that several syndromes, presumed to be immune-mediated, are associated with late complications of Hymenoptera envenomation, including Guillain-Barre syndrome, multiple sclerosis, optic neuritis, Parkinsonism, and transverse myelitis. The possible mechanisms of the CNS involvement include, immunologically mediated damage resulting to GB syndrome and various other forms of encephalomyelitis, or the direct affection of the apamin receptors by the venom (n.b. the venom contains apamin, acetyl choline and various other neurotransmitters substances.) In the present case symptoms of hippocampus area involvement are prominent as the concentration of the apamin receptors is more in this region. However the unilateral involvement of the brain parenchyma (right sided encephalitis) could not be explained. Regarding the treatment of the acute episode, antihistaminic along with the analgesics besides the supportive care is enough. But systemic involvement warrants the use of steroids. so we used methyl prednisolone in the present case and the patient responded to therapy very promptly.

Furthermore, inflammatory reactions activated by wasp venom are also difficult to deal with. In the past, conventional therapy including anti-

inflammatory agents, fluid therapy, nutritional support, and other essential organ-supporting therapies was applied to cure patients who had been stung by wasps. When necessary, haemodialysis or peritoneal dialysis was carried out to manage hyperkalaemia, electrolyte disturbances, and excessive water load. However, all these measures are not able to antagonize all the toxic effects of wasp venom and remove the circulating mediators of inflammation caused by the venom itself. It is essential as soon as possible to restore homeostasis and protect vital organ function in patients who are suffering from wasp stings. In recent years, it has been reported that CVVH, which is one modality of continuous blood purification, might be useful in dealing with critically ill patients. Many observations indicate that CVVH exerts beneficial effects on the clinical course of critically ill patients that are independent of its impact on electrolyte and fluids.

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