Wasp Stings with Multisystem Dysfunction

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The insect order of Hymenoptera includes bees, hornets, wasps and fire-ants. Their stings are not usually life threatening, causing mainly local reactions and rarely anaphylaxis. This is a report of an 18 month old child who survived after an unusually severe envenomation, resulting in encephalopathy, hypertension, coagulopathy, intravascular hemolysis, hepatic and renal failure, following multiple wasp stings.

Keywords: *Envenomation, Hypmenoptera, Wasp*

Bee and wasp stings are common in rural areas, and usually of minor significance. Severe consequences may result from anaphylaxis and only rarely from toxin mediated direct organ injury(1). Twenty to 50 deaths are reported annually from the United States(2). We report a child who had multi-organ dysfunction after massive wasp envenomation.

Case Report

An 18 month old boy was attacked by a swarm of wasps while playing with a box in the attic of their house, in which there was a hive. His mother, trying to save him was also stung. Both were immediately admitted to a local hospital. The mother recovered with symptomatic treatment but the child developed jaundice and oliguria at the end of the day, and was referred for treatment in an intensive care setup. He had already received antihistamines and steroids before transfer.

On admission, he was confused, drowsy, extremely restless and crying on touch. He had 83 stings all over the body including face and scalp– each of which had developed a weeping, central necrotic area with surrounding erythema. There was generalized tense and tender skin edema. He was deeply icteric and pale. He had low grade fever (100ºF), sinus tachycardia (heart rate 170/min) and systolic hypertension (BP-130/70 mmHg). Liver was palpable 3 cm below the costal margin. The child was passing scanty dark urine. There were bleeding and scabs around his mouth.

Initial laboratory workup revealed: hemoglobin 9.1 g/dL total leukocyte count 37,000/cu mm with a left shift, creatinine 1.7 mg/dL, bilurubin 15.3 mg/dL, AST 9960 U/L and AL T 4070 U/L. There was evidence of coagulopathy with increased PT (INR 2.29) and APTT (88 seconds with a control of 26 seconds). There was subsequent evidence of intravascular hemolysis with dropping hemoglobin levels, hemoglobinuria, fragmented RBCs, and high LDH and reticulocyte counts. There was mild metabolic acidosis. CPK was normal and urine for myoglobinuria was negative. Ultrasonography revealed bilateral small pleural effusions and mildly enlarged liver and kidneys.

He was clinically assessed to have intravascular fluid depletion, and treated initially with normal saline fluid boluses with improvement in urine output to over 1 mL/kg/hour. A high fluid intake and frusemide infusion were continued to maintain diuresis. IV morphine infusion, dexamethasone and anti-histaminic were administered along with lactulose through nasogastric tube. Antibiotics were also given . Persistent hypertension (BP 174/90 mm Hg) necessitated use of antihypertensive drugs (amlodepine 5 mg OD, atenolol 12.5 mg OD and sublingual nifedeping 5 mg SOS). The child received injectable vitamin K; daily FFP infusions were given for 3 days, and the child also received one blood transfusion.

On the third day, he was alert and oriented with continued improvement in urine output and liver function. However despite diuresis, renal biochemistry worsened with rapidly, increasing levels of serum urea, creatinine, potassium and phosphate. Peritoneal dialysis was started on day 4 post admission. Despite dialysis his serum creatinine

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peaked to a level of 5.63 mg/dL on day 6; this improved gradually and dialysis was stopped on the 10th day of admission.

Follow up after 1 month revealed that the skin lesions were healing but deep punched out areas at the site of stings remained. The blood pressure, urine analysis and serum biochemistry were normal.

Discussion

The insect order *Hymenoptera* consists of *Vespidae* (hornets, wasps and yellow jackets), *Apidae* (honey bees and bumble bees) and *Formicidae* (ants). Their venom contains protein toxins, biogenic amines, and enzymes that allow the toxins to spread(1,2). Bees leave stings behind in the wound whereas wasps do not. The offending large black wasps involved in this case were identified as "Vespa polistes" and no stings were identified in the wounds of our patient.

The commonest manifestations of wasp stings are related to allergy and anaphylaxis. Local reactions such as edema, urticaria and erythema with localized pain, are commonly seen. Generalized reactions are rare, and usually due to IgE mediated Type 1 anaphylaxis, and can occur even after a single bite.

Rarely, direct toxin mediated cellular damage in massive envenomation can cause rhabdomyolysis, intravascular hemolysis, disseminated intravascular coagulopathy, cardiovascular abnormalities, hepatic damage, acute renal failure and neurodeficits of different degrees(3-6). The mechanisms postulated for renal damage due to wasp stings are: (*i*) direct nephrotoxicity due to toxin; (*ii*) hypotension leading to ischemic tubular necrosis and (*iii*) nephropathy due to hemoglobinuria and myoglobinuria.

The management of massive wasp envenomation remains supportive with no specific antivenom being available. Early treatment with steroids and antihistaminics which is advised in anaphylaxis were not able to prevent ensuing toxin related multisystem injury in our patient or in those reported previously(7,8). The evolution of systemic involvement appears to be characteristic with early onset hemolysis, hemoglobinuria and hepatic failure, which improve over a few days and progression of renal failure over the first week(6-8). In our patient, despite maintaining hemodynamic stability and a good diuresis, worsening renal function necessitated institution of dialysis on day 4.

In children, previous reports have described survivors of single or two system involvement, whereas with severe multisystem involvement, the risk of fatality is high(9,10). Our patient, other than having severe local reaction to the stings, showed evidence of intravascular hemolysis, coagulopathy, encephalopathy, hypertension, non-oliguric renal failure and hepatic failure and maybe the youngest reported to have survived this degree of multi-system injury. Severity of involvement in this child is presumed to be related to large volume of toxin compared to small body mass, the mother having had only minor symptoms with similar number of stings.

In conclusion, multiple *Hymenoptera* envenomation is a serious condition and children particularly are at high risk of developing multi-system involvement and death. Such cases need to be admitted where facilities for monitoring, intensive care, and dialysis support are available, and followed up for at least 2 weeks as renal failure may be progressive and delayed.

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