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CASE REPORT

Wasp Sting Envenomation: Clinical Spectrum

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ABSTRACT

Wasp stings can present from benign local reactions to fatal multisystem involvement resulting in multiorgan dysfunction. Local allergic reactions present at time of wasp sting, however systemic manifestations present later. We report here two cases of multiple wasp stings to boys while playing in the lawn and presenting with varied manifestations.

Key Words: *Wasp sting, Anaphylaxis, Acute kidney injury*.

INTRODUCTION

Wasps also known as yellow jackets belong to vespid subgroup of hymenoptera. They usually attack in swarms if disturbed. Clinical manifestations depend mainly on number of stings, venom strength injected and immunity of the victim however some studies have reported multi-organ involvement even after single wasp sting.[1] Venom contains multiple compounds like lysophospholipase, apamin, acid phosphatase, histamine, vasoactive peptide and mastoparan resulting in local tissue reaction to systemic involvement.[2] Here we present case reports of two boys, one presented with anaphylactic shock and died within two days of multiple wasp stings, and other boy presented with acute kidney injury (AKI) and multiorgan involvement surviving after one month of critical illness.

Consent: Written consent was taken from parents of both patients for publishing the cases for human interest at large.

CASE REPORT 1

15 months old boy was bit by 40 - 50 black wasps while playing in ground. He remained admitted in local hospital and then shifted to tertiary care hospital after developing generalized body edema and altered state of consciousness. He landed in emergency department in critically sick condition with two episodes of blood in vomitus, generalized tonic clonic fits, facial swelling, swollen lips, jaundice, cold peripheries, weak pulses with GCS of 10/15. Patient was shifted to pediatric critical care unit. His all baseline investigations were sent. His CBC revealed Hb = 6.1g/dl, TLC = 18.9 x 10^3/microliters and platelets = 158 x 10^3/microliters. Serum biochemistry revealed Na^+ = 160mmol/L, K^+ = 4.5 mmol/L, Ca^{+2} = 9.0mg/dl, urea = 115mg/dl and creatinine = 2.0mg/dl, ALT = 6072 IU/L, bilirubin = 7.9mg/dl, CRP = 89, and ammonia = 79. His ABGs showed pH = 7.423, PaO_2 = 309 mmHg, $PaCO_2$ = 21.2mmHg and HCO^-_3 = 13.6 mmol/L. His coagulation profile showed PT = 48.6 sec, APTT = 53.8 sec and INR = 3.87. IV fluids and inotropic support were started along with antibiotics. Patient was treated on the lines of anaphylactic shock. Pediatric nephrology and gastroenterology departments were taken on board due to multiple organ involvement. Packed cells and FFPs were transfused. Tablet Rifixamin, sodium benzoate, syrup lactulose and IV vitamin K were added with strict intake and output monitoring and laboratory investigations were regularly followed. After being managed for 2 days his condition did not improve, GCS further deteriorated and he developed catecholamine resistant shock. Stress doses of IV hydrocortisone

were given. Patient was electively intubated and supportive treatment was stepped up. Patient's peritoneal dialysis was done due to deranged renal functions and low urine output. He started bleeding from ETT. FFPs, packed cells were transfused and IV tranexamic acid was given. Patient developed bradycardia along with unrecordable blood pressures followed by cardiopulmonary arrest. Cardiopulmonary resuscitation was started and IV epinephrine given according to standard protocols. Patient declared dead after confirmation on ECG.

CASE REPORT 2

Multiple wasps while playing in fields bit a 2 years old boy. He was taken to nearby hospital for local swelling and sent back home on oral syrups. After 8 days he first started having hematemesis, multiple episodes followed by one episode of melena. He developed severe respiratory distress and landed in emergency in critically sick condition. He had cold peripheries, with heart rate = 155 b/min, B.P = 70/40mmHg, and bleeding from mouth. His GCS was 13/15 with unremarkable CNS examination. His baseline workup was sent which favoured multiorgan involvement. Complete blood picture showed TLC = 15.1 x 10^3 /microliters, Hb = 14.7 g/dl and platelets = 90 x 10^3 /microliters. Blood chemistry revealed ALT = 168 IU/L, urea = 302 mg/dl, creatinine = 6.3 mg/dl, sodium = 138 mmol/L, potassium = 6.0 mmol/L and chloride = 94 mmol/L. CRP was raised with deranged coagulation profile ultrasound abdomen was normal. ABGS showed severe metabolic acidosis. His septic profile was sent. Patient was shifted to nephrology unit and multidisciplinary teams were involved. Peritoneal dialysis (PD) was done for acute renal injury. His respiratory distress worsened and patient was shifted to intensive care unit where elective intubation and mechanical ventilation was started with X-ray findings favoring fluid overload due to deranged renal functions. FFPs were transfused with I/V vitamin K. Inotropic support was started for hemodynamic instability. Regular monitoring was done. Daily laboratory investigations were sent and electrolytes replaced accordingly. After 5 cycles of PD his renal parameter improved. Patient acquired nosocomial infection and antibiotics were adjusted according to culture and sensitively reports. He did not tolerate spontaneous breathing trials so tracheostomy was done in consultation with ENT department due to prolong ventilation. After one month of mechanical ventilation, he was successfully weaned off and sent home with regular follow up for tracheostomy tube care.

DISCUSSION

Insect bites, by hymenoptera family members, like bee, wasps, ants and flies are encountered routinely in pediatric population.[3] Wasps or commonly known as yellow jackets usually attack in swarms in developing countries leading to hemolysis and rhabdomyolysis induced acute kidney injury mainly. However in developed countries, usually a single wasp sting leading to anaphylactic reactions have been reported mainly.[4]

Wasps during sting inject proteinaceous liquid known as wasp venom. It is composed of multiple enzymes, peptides and amines.[5]

Wasp toxins once injected can involve multiple systems. Phospholipase A2 and its product lysolecithin are main culprits in damaging the cell membrane, mitochondria and lysosomes of any organ, thus exerting hepatotoxic, cardiotoxic, neurotoxic, hemolytic, nephrotoxic, myotoxic and vasodilator effects. Venom components also initiate inflammatory cascade by augmenting the release of cytokines like TNF, IL-6, IL-1 and IL-8.[6,7]

Toxin induced injury of wasp sting venom includes AKI, hemolysis, liver injury with or without hepatic failure, disseminated intravascular coagulation, cardiac injury, rhabdomyolysis, pulmonary hemorrhage and ARDS. Literature also supports delayed effects of wasp stings induced activation of immune system and ultimately leading to interstitial nephritis, vaculitis and encephalopathy. Of all the clinical manifestations AKI and rhabdomyolysis have been commonly reported with mortality reaching 25-50%.[8] IgE – medicated hypersensitivity reaction results in generalized vasodilation and organ hypoperfusion leading to anaphylactic shock is the commonest recognized manifestation of wasp stings. Patients previously exposed to the venom, known insect allergy and positive atopic history have potential to develop

anaphylaxis, however its not the rule and toxin mediated circulatory collapse can also occur. A study conducted in China tested patients for venom specific IgE and reported that venom specific IgE alone in body might not be the sole factor in developing anaphylaxis.[9]

Clinical picture after wasp sting ranges from mild local tissue reaction to multiorgan involvement and ultimately to death of a patient. Severity of clinical manifestation depend on number of factors like age of the patient, gender, immunity levels, number of wasp stings, site of the sting and the time elapsed between bite and onset of symptoms.[10]

Treatment is largely supportive after wasp sting as there is no specific antidote and no specific guidelines have been published in past to treat wasp stings. Usually antihistamines and corticosteroids are given to treat the local tissue reactions. Supportive treatment includes hydration to prevent hypovolemic renal injury, $NaHCO_3$ for alkalization of urine in case of rhabdomyolysis and if there is significant renal involvement then renal replacement therapy, peritoneal dialysis, hemodialysis or continuous venovenous hemodiafilteration (CVVHD) can be done to remove the toxins from body.[11] Studies suggest that therapeutic plasma exchange is beneficial in patients with hemolysis and rhabdomyolysis as this removes the toxins and toxin induced cytokines effectively. Some studies favour combining multiple modalities of treatments like CVVHD and therapeutic plasma exchange together for better results than either alone.[12,13]

Literature emphasized that patients who have encountered more than 20 wasp stings should be admitted in intensive care unit and observed for AKI and other systemic manifestations so that timely initiation of treatment and better monitoring can help to reduce the mortality associated with wasp stings.[14]

Conflict of interest: None

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