CASE REPORT

Acute Kidney Injury Following Rhabdomyolysis due to Multiple Wasp Stings *(Vespa affinis)*

FAZLE RABBI CHOWDHURY*, MOHAMMAD SHAFIQUL BARI, ABDUL MUKTADIR SHAFI, ABDUL MUMITH RUHAN, MOHAMMAD ENAYET HOSSAIN, SONIA CHOWDHURY, MOHAMMAD ABDUL HAFIZ

Department of Medicine, Sylhet M.A.G. Osmani Medical College, Sylhet, Bangladesh

Abstract

Background: Wasp stings are quite commonly observed in Bangladesh though they are under reported. However, rhabdomyolysis following multiple wasp stings is a rare entity.
Case report: A middle aged physician was stung by a swarm of wasps at multiple sites of the body. He felt severe pain at the sites of the stings and was primarily treated with intravenous hydrocortisone and chlorpheniramine. Within few hours he developed oliguria with dark color. The dipstick urine test was positive for myoglobin and negative for red blood cell. His serum creatinine was 1.65 mg/dl, and creatine phosphokinase was 3963 IU/L, on admission. Subsequently, creatinine increased for the next three days. He was given forced diuresis with furosemide for three days and other supportive treatments. Clinical and biochemical picture started to improve including urine output and color and normalized on 6th day post-admission. The species *Vespa affinis* was confirmed by a zoologist as the offending insect.
Discussion: Wasp sting usually results in pain and allergic reactions, though severe anaphylaxis may occasionally occur. Mass envenomation can cause systemic reactions and organ dysfunction including rhabdomyolysis, hemolysis, coagulopathy, and hepatic, renal, cardiac and neurological complications. Rhabdomyolysis is a distinguished cause of acute kidney injury in patients with wasp sting. *Vespa affinis* is the species commonly found in this region which can bring catastrophe.
Conclusion: Multiple wasp stings may cause rhabdomyolysis followed by renal failure. Immediate supportive treatment (including copious hydration and sodium bicarbonate) is the mainstay to reduce morbidity and mortality in such cases.

Keywords: Acute Kidney Injury; Hymenoptera; Rhabdomyolysis; *Vespa affinis*; Wasp Stings

How to cite this article: Chowdhury FR, Bari MS, Shafi AM, Ruhan AM, Hossain ME, Chowdhury S, et al. Acute Kidney Injury Following Rhabdomyolysis due to Multiple Wasp Stings (Vespa affinis). Asia Pac J Med Toxicol 2014;3:41-3.

INTRODUCTION

Wasp stings may result in a wide range of clinical presentations which can be life-threatening if not diagnosed and treated in time. Localized pain, tissue necrosis and anaphylactic reactions followed by wasp sting are well recognized (1). Apart from these, they can produce systemic reactions and organ dysfunction including rhabdomyolysis, hemolysis, thrombolysis, disseminated intravascular coagulation (DIC), acute tubular necrosis (ATN), acute kidney injury (AKI), centrilobular necrosis of liver, subendocardial necrosis and neurologic complications (1-4). AKI due to wasp sting involves several pathomechanisms. Among them rhabdomyolysis has been identified as one the main mechanisms (1). Wasp stings are quite commonly observed in Bangladesh though they are under reported. Rhabdomyolysis following multiple wasp stings is a rare entity. Reports with such severe clinical pictures are scarce. Here we have reported a case of a patient who was stung by a swarm of wasps in different sites of his body, and later developed AKI due to rhabdomyolysis.

CASE REPORT

A 35-year-old physician was stung by a swarm of wasps at head, neck, face, upper part of the trunk and all of his four limbs while he was riding motorcycle through a rural area. Immediately, he felt severe pain at the sites of the stings and he was transported to a primary health care center where he was treated with intravenous (IV) hydrocortisone and chlorpheniramine maleate. Within few hours, he told to the staff that he noticed decrease in his urine volume and its color was dark. He did not report any previous history of wasp sting. He had no allergic history, past medical history of other disorders including hematemesis and melena, and family history of note.

On admission, he was conscious and oriented, but restless. There were multiple sting marks (approximately 60-70) all over the body, from where about 25 stings were removed. Stung areas were edematous, erythematous and severely tender. There was no pallor, jaundice, cyanosis, and his vital signs were normal. There was no rash, laryngeal edema or any other signs of severe anaphylaxis. Abdomen

*Correspondence to: Fazle Rabbi Chowdhury MBBS, FCPS (Medicine), MSc (Tropical and Infectious Diseases, UK). Registrar, Department of Medicine, Room No- 408 (3rd Floor), Sylhet M.A.G.Osmani Medical College, Sylhet, Bangladesh.
Tel: +8 191 657 8699, E-mail: mastershakil@hotmail.com
Received 2 September 2013; Accepted 15 March 2014

was soft, non-tender, without any organomegaly. Other systems revealed no abnormality. Urine collected was dark brown in color and the dipstick urine test was positive for myoglobin and negative for red blood cell (RBC). Initial investigation showed normal blood count with haemoglobin (Hb) level at 13.0 g/dL. Serum creatinine (SCr) was 1.65 mg/dL, creatine phosphokinase (CPK) was 3963 IU/L (normal range: 55-170). Routine urine examination showed no RBC, but it contained white blood cell (WBC) cast. Other investigations including serum electrolytes, liver function test, ultra sonogram of abdomen and ECG were normal. Following the day of admission, SCr increased to 2.44 mg/dL on the second day and 4.65 mg/dL on the third day (Figure 1).

On the basis of history, clinical manifestations and laboratory investigations, our diagnosis was AKI following rhabdomyolysis due to venomous wasp sting. IV saline infusion was initiated and continued to keep the urine output for over 100 mL/h.

Forced diuresis was done with injectable furosemide for first three days. The patient was also treated with IV sodium bicarbonate ($NaHCO_3$), hydrocortisone, antihistamine and antibiotics. Following the third day post-admission, clinical and biochemical picture started to improve. Urine output gradually increased, and its color became lighter. SCr and CPK began to decrease gradually and became normal on 6th day post-admission (Figure 1). The next day, the patient was discharged without any residual complication.

DISCUSSION

The medically important families of *Hymenoptera* order are the *Apidea* (bees), *Vespidea* (wasps, hornets and yellow jackets), and *Formicidae* (ants and fire ants) (5). A typical *Hymenopteran* stinging event occurs while the insects are disturbed searching for food. Any wasp will sting in defense if it is accidentally stepped on, swatted of, otherwise disturbed. In contrast, mass envenomation occurs when stinging insects attack a human deemed as a threat to their colony whereupon hundreds of insects may be involved, as happened in our case. In temperate climate, stings may occur during warmer seasons, but their numbers peak in august (5). Wasps and bees use their weapon, a modified ovipositor (egg lying organ), to protect themselves and their colony (5). Most species do so in a somewhat predictable manner, but others (notably yellow jackets) may attack without provocation. In case of wasps, stinger is left at the site of stinging and can be removed manually. The circumstances, number and pattern of stings are helpful clues in identifying the species (6). In this case, stinging occurred without any provocation, and stingers were found and removed from the body of the victim. Nevertheless, the victim could not bring any live or dead species of the offending wasp; hence, we showed him some pictures of wasps that are native to Bangladesh in presence of an expert zoologist who confirmed *Vespa affinis* as the offending species.

A spectrum of clinical manifestations ranging from

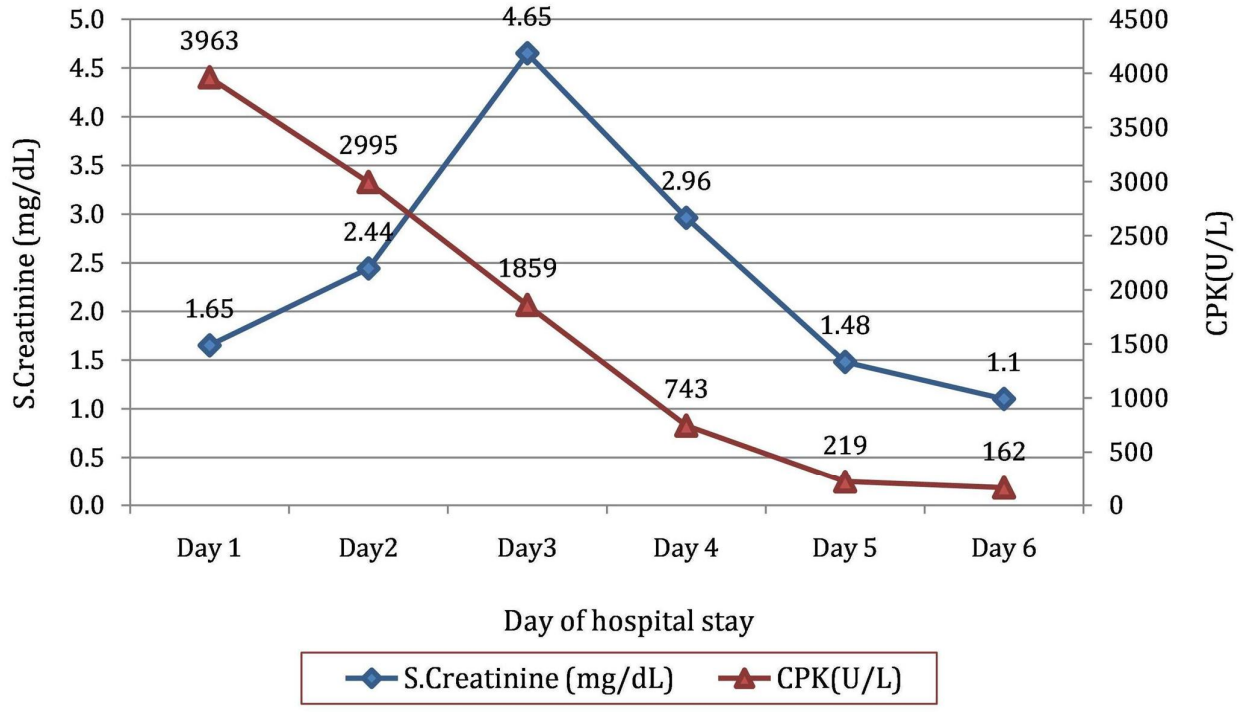

Figure 1. Biochemical parameters during hospital stay (S.Creatinine: Serum creatinine, CPK: Creatine phosphokinase)

nonspecific skin lesion to anaphylactic shock can occur in a previously sensitized person, following even a single sting. A toxin-naive person can have cellular damage due to systemic envenomation following multiple stings. Toxemia can lead to rhabdomyolysis, hemolysis, thrombolysis, DIC, ATN, AKI, centrilobular necrosis of liver, subendocardial necrosis (1-3). A number of about 500 stings have been considered necessary to cause death to an adult person through direct toxicity; while as few as 30-50 stings have been proved fatal in children (7). In our patient, around 60-70 sting marks were found all over the body and 25 stings were removed.

Wasp venom contains various biogenic substances including toxic surface active polypeptides (mellitin and apamin), enzymes (phospholipase A_2 and hyaluronidase) and low molecular weight agents (histamine and amino acids). Mellitin and phospholipase are the important components causing rhabdomyolysis following a toxic action on striated muscle which also act on RBC and provoke hemolysis (7). Rhabdomyolysis may cause AKI. It has been postulated that myoglobin released from muscles induces AKI by toxic effects on tubular epithelial cells through intralobular cast formation, or pigment nephropathy (8). In addition, myoglobin is a potent inhibitor of nitric oxide bioactivity and may trigger intra-renal vasoconstriction and ischemia in patients with borderline renal hypoperfusion. Another possible cause of renal insufficiency is acute interstitial nephritis which is thought to occur by direct venom effect (8,9).

In our case, presence of dark colored scanty urine (free of RBC with positive for myoglobin in dipstick test) along with raised creatinine and CPK proved rhabdomyolysis that can be the main cause of AKI. Different studies demonstrated that fatalities following multiple wasp stings are the result of renal failure due to myolysis and hemolysis. In a review of previously reported twelve cases of wasp stings, rhabdomyolysis were observed in seven out of seven evaluated cases (10). In India, five out of nine cases of rhabdomyolysis associated with wasp stings were also reported (11). But direct kidney injury via immune mediated acute interstitial nephritis due to toxin itself can be another mechanism which has been evident in case reports (12). Prognosis depends on time interval between sting and admission to the hospital. Immediate management is essential, which starts with removal of the stingers along with recognition of toxin-related complicating injury and treatment of anaphylaxis with injectable antihistamine, steroid and epinephrine (6,13). Possibly our patient might not have developed such clinical picture if the stingers had been removed earlier in the primary health care center. The primary therapeutic goal is to prevent the factors including volume depletion, tubular obstruction and aciduria that can cause AKI. Copious saline hydration for IV volume replacement and $NaHCO_3$ for urine alkalization should be administered for patients. Once overt renal failure has developed, the only treatment is dialysis (8). In such condition, steroid and antihistamine may have potential beneficial role (14). Furthermore, exchange transfusion or plasmapheresis has been found useful, as it acts through reduction of the circulating venom or removal of the circulating mediators of inflammation (6). Having determined rhabdomyolysis in our case and treating the patient accordingly, we were able to protect renal function evidenced by decreasing level of SCr and CPK towards normal.

CONCLUSION

Clinical toxicologists should consider not only anaphylaxis, but also the possibility of severe toxic systemic reactions in multiple wasp sting cases. Species-specific report is also important to understand the disease dynamics and geographical distribution of dangerous hymenopteran insects around the region.

ACKNOWLEDGEMENTS

We heartily acknowledge the effort of the duty physicians and nursing staffs who were directly involved with management of the cases.

Conflict of interest: None to be declared
Funding and support: None

REFERENCES

1. Thiruventhiran T, Goh BL, Leong CL, Cheah PL, Looi LM, Tan SY. Acute renal failure following multiple stings. Nephrol Dial Transplant 1999;14(1):214-7.
2. Kim YO, Yoom SA, Kim KJ, Lee BO, Kim BS, Chang YS, et al. Severe rhabdomyolysis and acute renal failure due to multiple wasp stings. Nephrol Dial Transplant 2003;18(6):1235.
3. Bhatta N, Singh R, Sharma S, Sinnha A, Raja S. Acute renal failure following multiple wasp stings. Pediatr Nephrol 2005; 20(12):1809-10.
4. Likittanasombut P, Witoonpanich R, Viranuvatti K. Encephalomyeloradiculopathy associated with wasp sting. J Neurol Neurosurg Psychiatry 2003;74(1):134-5.
5. Diaz JH. Hymenopterid bites, stings, allergic reactions, and the impact of hurricanes on hymenopterid-inflicted injuries. J La State Med Soc 2007;159(3):149-57.
6. Paudel B, Paudel K. A study of wasp bites in a tertiary hospital of western Nepal. Nepal Med Coll J 2009;11(1):52-56.
7. Bresolin NL, Carvalho LC, Goes EC, Fernandes R, Barotto AM. Acute renal failure following massive attack by Africanized bee stings. Pediatr Nephrol 2002;17(8):625-27.
8. Islam F, Taimur SDM, Kabir CMS. Bee envenomation induced acute renal failure in an 8 years old child. Ibrahim Med Coll J 2011;5(1):34-36.
9. Gunasekera WTP, Mudduwa L, Lekamwasam S. Acute pigmented tubulopathy and interstitial nephritis following wasp sting. Galle Med J 2008;13(1):55–56.
10. Atmaram VP, Mathew A, Kurian G, Unni VN. Acute renal failure following multiple wasp stings. Indian J Nephrol 2005;15(1):30-32.
11. Deshpande PR, Farooq AK, Bairy M, Prabhu RA. Acute Renal Failure and/or Rhabdomyolysis due to Multiple Bee Stings: A Retrospective Study. N Am J Med Sci 2013;5(3):235-9.
12. Nandi M, Sarkar S. Acute kidney injury following multiple wasp stings. Pediatr Nephrol 2012;27(12):2315-23.
13. Warrell DA. Venomous bites, stings and poisoning. Infect Dis Clin North Am 2012;26(2):207-23.
14. George P, Pawar B, Calton N, Mathew P. Wasp sting: an unusual fatal outcome. Saudi J Kidney Dis Transpl 2008;19(6):969-72.