Acute Kidney Injury Secondary to Rhabdomyolysis Due to Wasp Bite

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ABSTRACT

Wasp and bee bites have been well known to cause effects in the human body ranging from minor local skin reactions to deadly anaphylactic reactions. They have also been known to disrupt kidney functions or cause liver injury. The kidney injury associated with wasp bite is a well-known phenomenon, but it is still very rare. We report a case of a 74-year-old man who developed rhabdomyolysis and acute kidney injury, three days after he was bitten by wasp. His symptoms improved after nine days of hospital admission, where he received fluid resuscitation and hemodialysis sessions. This report aims to educate clinicians about the diverse effects of wasp bite for timely diagnosis and management.

KEY WORDS

Acute kidney injury, Rhabdomyolysis, Wasp bite

INTRODUCTION

Insects of the order Hymenoptera comprises of Apoidae (bees), Vespoidae (wasps, hornets) and Formicidae (fire ants).[1] These insects are found all over the world and various reports of their stings have been reported.[2-4] Several cases have also been reported in Nepal.[5,6] Envenoming syndrome ensues after massive multiple bites (more than 50 stings), and the lethal dose is approximately 20 stings/ kg in most mammals. Broadly, there are four possible reactions seen after insect stings: local reactions, regional reactions, systemic anaphylactic responses, and less commonly, delayed-type hypersensitivity.[7]

Intravascular hemolysis, myocardial infarction, pulmonary hemorrhage, thrombocytopenia, rhabdomyolysis and acute kidney injury are atypical multisystem reactions to stings. We are reporting a case of 74-year-old man who developed acute kidney injury (AKI) and rhabdomyolysis after wasp sting.

CASE REPORT

A 74-year-old man presented to the emergency room of our hospital, with complaint of inability to pass urine for the last two days. On further questioning, he revealed that he had been stung by wasp multiple times, three days ago. He was working in his farm, when a swarm of wasps attacked him. Immediately after the sting, he only had itching and burning sensation in the bite area. However now, along with inability to pass stool, he also had developed abdominal pain, shortness of breath and swelling of limbs.

On examination, he was ill looking, afebrile and had multiple bite marks on his left arm and also his abdomen. He had a blood pressure of 140/90 mmHg and he required two liters of oxygen via the nasal canula to maintain 94% oxygen saturation. He also had bilateral pitting edema and crepitations were heard on chest auscultation. On skin examination, a total of around 50 bite injuries were seen in his left arm and abdomen. Most of them had central necrosis.

Figure 1. Necrosis of the skin surrounding the sites of stings in Right Forearm.

Blood investigations were immediately sent and he was admitted for monitoring and fluid management. On admission, his urea was 145.5 mg/dl and creatinine was 5 mg/dl. Similarly, he has a serum sodium of 129 mmol/l and potassium of 5.5 mmol/l. His Creatine Phosphokinase (CPK) was 1100 on admission. He was admitted to the ward with the diagnosis of Acute Kidney Injury (AKI) and rhabdomyolysis secondary to wasp bite.

Figure 2. Necrosis of the skin surrounding the sites of the stings in chest and abdomen.

The patient was initially managed with injectable Cefepime, injectable Torasemide, injectable Hydrocortisone, injectable antihistaminic and injectable Adrenaline. After he remained anuric despite adequate hydration, he was planned for hemodialysis. His ABG on the second day revealed metabolic acidosis and hyperkalemia. The next day, a dialysis catheter was placed in the right internal jugular vein for the purpose of hemodialysis. His fluid intake was restricted to a total of 1.5 to 2 liters per day. The target ultrafiltrate was set to 1.5 liters after hemodialysis was begun.

Table 1. Monitoring of Laboratory Parameters After Admission of Patient

Date	Urea	Creatinine	Sodium	Potassium	AST	ALT	CPK
8th Sept.	145.5	5.0	129	5.5	521	252	1100
9th Sept.	155.2	5.8	129	5.6	483	184.4	700
10th Sept.	162.2	6.52	131	5.8	457.5	198.7	500
11th Sept.	147.9	6.75	133	5.4	387.3	242.8	300
12th Sept.	181.2	8.74	132	6.0	413	389	90
13th Sept.	169.4	8.22	135	5.2	186.3	342.4	85
17th Sept.	147.1	8.14	141	4.3	182.2	250.3	88
18th Sept.	142.4	7.9	142	4.1	182.1	244.1	80
19th Sept.	136.1	7.64	138	4.2	174.2	232.1	78
20th Sept.	125.2	7.1	141	4.5	170.1	202.4	80

As depicted by the table above, he had deranged renal function test for over 10 days, for which supportive management and hemodialysis was done. He underwent a total of 9 hemodialysis sessions which finally led to improvement in his symptoms. He still had deranged kidney function tests at the time of his discharge, and he was advised to follow-up in 2-4 weeks with renal function tests.

DISCUSSION

All the deleterious effects of the bite are due to the venom that is injected during the bite of the wasp; which constitute of various biogenic amines such as melittin, apamine, phospholipase, hyaluronidase, acid phosphatase, histamine and kinin.[8] Phosphpholipase A2, melittin and apamine are responsible for hemolysis whereas the rhabdomyolysis is probably due to the effect of the venom on the muscle.[9] In addition, phospholipase A2 may play a role in the development of acute pancreatitis following wasp sting.[10] Usually, the clinical symptoms of rhabdomyolysis are evident when the total bite count exceeds 50 and the bite can be lethal if the total bite count exceeds 500.[9] Our patient had over 50 bite marks around his left arm and abdomen.

Among all the systemic effects of the wasp bite, acute kidney injury (AKI) is among the most common one. Various theories have been put forward to explain the AKI following wasp bite and they include acute tubular necrosis due to hypovolemia (from the shock), pigment nephropathy due to rhabdomyolysis or intravascular hemolysis, interstitial nephritis due to the venom, direct toxicity of the venom and acute cortical necrosis.[11] The most important cause of AKI among these is definitely the pigment nephropathy due to rhabdomyolysis; as evidenced by one study by Xie et al. which demonstrated that of the 79.5% of the patients who suffer from rhabdomyolysis after wasp bite ultimately develop acute kidney injury.[12] Other systemic manifestations of wasp bite include myocardial infarction, centrilobular necrosis of liver and thrombocytopenia (due to direct toxicity to platelets).[13] Liver injury is not very uncommon following wasp bite as evidenced by a study where liver damage was seen in all the 24 cases of bite victims; whereas hemolysis was seen in 14 out of 21 and rhabdomyolysis was seen in 11 out of 19 cases.[14]

In a study in Japan, 16 cases of wasp bites were reported out of which 15 cases had skin necrosis in their bite wounds.[15] Skin necrosis can be a poor prognostic sign after wasp sting.[16] Our patient also had skin necrosis at the bite site.

Management of these patients comprise of fluid resuscitation to maintain urine output 200-300 ml/hr and alkaline diuresis. Renal replacement therapy must be sought if the patient develops acute renal failure, oliguria, hyperkalemia, metabolic acidosis or acute pulmonary edema.[17] In our case as well, fluid resuscitation was tried initially to restore urine output. However, hemodialysis had to be soon started in view of worsening uremic symptoms. In a study, continuous renal replacement therapy (CRRT) was started 30 hours after admission and it led to normalization of liver function test and CK values within three days. However, AKI was persistent till the 13th day of admission and the values normalized after 8 months.10 In our case as well, initiation of hemodialysis led to improvement of uremic symptoms and normalization of CK value within five days, but the kidney function tests were deranged even on the 9th day of admission. The patient has been advised to follow-up with renal function tests. In a large case series of 75 patients from China, 7 died, 8 developed chronic kidney disease and most of the other patients showed complete recovery of their renal function.[17]

Contrary to conventional thinking, the major cause of death in bite victims was toxicity to organ systems rather than anaphylactic shock.[12] Hence, it is imperative that cases of wasp bites be dealt with caution and timely intervention, since it is usually the delay in diagnosis and management that can prove to be fatal for these patients. The clinicians should be well informed of the possible diverse effects of wasp bite in various organ systems so that they can identify these in early stages and intervene on time for best results.

We have concluded from our case report that AKI secondary to rhabdomyolysis is the main manifestation following wasp bite that warrants close monitoring and treatment with hemodialysis. We also found that hemodialysis leads to symptomatic improvement. However, the AKI takes months to resolve.

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