

Acute Kidney Injury Following Wasp Stings - A Case Report and Literature Review

SAYEEDA ANWAR¹, NASIR HOSSAIN², FARZANA KABIR ROZANA³, SULTAN MAHAMUD SUMON⁴.

Abstract

The manifestations of wasp stings are usually benign and localized at the site of stings but susceptible individuals may present with multisystem and potentially fatal complications like hemolytic anaemia, acute renal failure and shock. We report here a child who developed acute kidney injury seven days after multiple wasp stings. The renal functions recovered with supportive management including two sessions of peritoneal dialysis. This case report highlights that management of some of the wasp stings should be done in consultation with centre which has facilities for dialysis. The management of wasp sting should be started as early as possible and when progressive renal failure ensues, intensive dialysis support results in good renal recovery in majority of survivors.

Key Words: Acute kidney injury, Wasp stings, Venom.

Introduction

Wasp stings are not uncommon in Bangladesh. The manifestations are usually benign and localized at the site of stings. However, susceptible individuals may present with multisystem and potentially fatal complications like hemolytic anaemia, acute renal failure and shock. Acute renal failure is due to hypovolemia, anaphylactic shock, myoglobinuria, hemolysis, acute tubular necrosis and from direct toxicity.

Hymenoptera are social creatures that typically sting following provocation. These include apids (honeybees and bumble bees), vespids (wasps, hornets and yellow jackets) and ants. Though the worker bees and bumblebees sting in defense; attacks are commonly carried out by swarm of bees or wasps¹. Wasp stings are a well known form of envenomation in the tropics². The manifestations range from pain, erythema and edema at the site of sting to anaphylaxis, generalized urticaria,

angioedema and dyspnoea which usually occur within 10 minutes of sting³ or it may prolong more than 24 hours.

Intravascular hemolysis, myocardial infarction, pulmonary haemorrhage, thrombocytopenia, rhabdomyolysis and acute kidney injury are atypical multisystem reactions to stings⁴.

Here in we report a two year three months old boy who presented with acute kidney injury due to intravascular hemolysis following multiple wasp stings. This case report highlights the diverse manifestations of wasp stings to increase awareness of pediatricians.

Case Report

A 2 year 3 months old boy, second issue of nonconsanguineous parents admitted in the department of Nephrology, Dhaka Medical College Hospital, Dhaka, with painful itching on different parts of the body for seven days following accidentally bitten by a swarm of wasps while playing in the playground. Immediately the child developed severe pain and intense itching on different parts of the body. After two days of wasp bite he developed gradual swelling of whole body starting from face. He developed oliguria followed by anuria and dyspnoea for one day without any history of offending drugs or familial nephropathy.

The boy was irritable, puffy, edematous, and moderately anemic. There were multiple bite marks

1. Professor and Head, Department of Paediatrics, Dhaka Medical College
2. Assistant Professor, Department of Paediatrics, Dhaka Medical College
3. Assistant Registrar, Department of Paediatrics, Dhaka Medical College Hospital.
4. Medical Officer, Department of Transfusion Medicine, Dhaka Medical College Hospital.

Correspondence: Prof. Dr. Sayeeda Anwar, Professor and Head, Department of Paediatrics, Dhaka Medical College and Hospital, Mobile: +88-01819229423, Email: sayeeda.anwar01@gmail.com

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(about 40 in number) was present over scalp, face, shoulder and forearm, variable in size and shape- largest one being measured 5x5 mm with each lesion having central necrosis surrounded by itchy red edematous zone and tender on palpation. His vital parameters showed that he was febrile, tachypnoic & hypertensive but other systemic examinations were normal.

Investigation reports revealed he was moderately anemic with neutrophilic leucocytosis, CRP positive, blood urea-156 mg/dl, S.creatinine-8.18 mg/dl and S. electrolyte showed hyperkalaemia. His circulating eosinophil count was raised, FDP dimer negative, Urine R/M/E, coagulation profile & liver function tests were normal. Arterial blood gas showed metabolic acidosis. Echocardiography and chest X-ray-normal, Ultrasonogram of KUB-Both kidneys are echogenic with moderately maintained corticomedullary differentiation.

The child was admitted with a diagnosis of acute kidney injury (stage III) following multiple wasp stings. After resuscitation emergency peritoneal dialysis was done for uremic encephalopathy and blood transfusion for anemia along with general supportive care. Intraperitoneal dialysis was continued for 96 hours (08/08/2014-11/08/2014) and post dialysis investigation revealed S. creatinine 3.8 mg/dl, blood urea-96 mg/dl and S.potassium-4.5 mmol/l. At 48 hours interval peritoneal dialysis was repeated and kept for another 96 hours from 14/08/2014 to 17/08/2014. Before and after second peritoneal dialysis S. creatinine, blood urea and S. potassium were 5.2 to 2.5 mg/dl, 70 to 40 mg/dl and 5.5 to 3.5 respectively. His urine and blood culture revealed no growth.

Patient's condition improved and urine output was gradually increasing to >1ml/kg/day by 7th day of admission and after 1st dialysis. His blood urea and S. creatinine levels also declined steadily over following days with blood urea and serum creatinine levels coming down to 3.6mg/dl and 1.2 mg/dl respectively at discharge on 16th day on 23/08/2014. Renal biopsy was not considered as his renal functions improved. The follow up renal function tests were normal and after 4 weeks his DTPA and DMSA showed normal cortical tissue and normal functioning both kidneys with normal GFR (left kidney-52.7 ml/min and right kidney-53.8 ml/min).

Discussion

A wasp when threatened or attacked, stings in self defiance while mass envenomation occurs when their colony is disturbed⁵. Wasp toxins include histamines, serotonin, phospholipids, hyaluronidase and antigen⁶ which cause different clinical manifestations following wasp stings^{7, 6}. Children of all age and sex are vulnerable to wasp sting^{8, 9, 10}.

Phospholipase A₂ initiates inflammation, hyaluronidase causes spread of venom, melitin has hemolytic, vasoactive, contractile and cellular antimembrane properties, histamine increases vascular permeability and apamine is a neurotoxin^{11, 12}. The local reactions following wasp bite include pain and swelling, while systemic allergic reactions may be mild, moderate (angioedema, asthma, abdominal pain) or severe (laryngeal edema, hypotension, loss of consciousness)^{14, 13, 15}.

Anaphylaxis is a dreaded complication occurring within first few hours after the stings. It may be followed by liver injury, coagulation derangements, rhabdomyolysis or haemolysis which peak in one to three days. This may further be followed by kidney injury that peaks in four to nine days in susceptible patients¹⁶.

The incidence of acute kidney injury following wasp sting in children is not precisely known although seven out of 45 (15.5%) patients had developed acute kidney injury in a retrospective study in Thailand⁶. Causes of acute kidney injury were rhabdomyolysis and intravascular haemolysis in this study¹⁷.

There were many case series of acute kidney injury without evidence of shock, haemolysis or rhabdomyolysis which were found to be due to acute interstitial nephritis on renal biopsy^{18, 19}.

Similarly a combination of acute tubulointerstitial nephritis and acute tubular nephropathy has also been described causing acute kidney injury²⁰. Recently delayed onset immune mediated interstitial nephritis following multiple wasp stings has also been described where there were minimal clinical manifestation at time of sting followed by gradual reduction in urine output after one week²¹.

In our patient Acute tubular necrosis following intravascular haemolysis was suspected due to anaemia, high CPK level and no prior history of exposure to any nephrotoxic drugs or preexisting renal disease. The exact cause of acute kidney injury

could not be established as renal biopsy was not performed. Interstitial nephritis, direct nephrons toxicity or combinations of these factors as cause of acute renal failure could be a possibility.

Our patient also presented with decreased urine output and uraemia. Acute kidney injury secondary to *Hymenoptera* stings might present as oligouria, anuria, microscopic or macroscopic haematuria and hypotension¹⁵. Our patient underwent two sessions of peritoneal dialysis, which is similar to previous studies where hospital stay ranged from one to 39 days and 86% of patients underwent dialysis. After 16 days of hospital stay the boy was discharged with advise to come after 4 weeks with DTPA & DMSA reports which were also came normal.

This highlights that these patients should be managed in consultation with centre with facilities for peritoneal dialysis or haemodialysis.

Renal biopsy is recommended when renal function is deteriorating or not improving to detect renal lesion as that determines specific drug treatment²⁰. Acute interstitial nephritis can be treated with steroid^{18,19,21}. Steroid reduces interstitial fibrosis in acute interstitial nephritis helping early renal recovery and ultimately preventing irreversible kidney damage²⁰.

Prompt recognition and treatment is very important to prevent renal damage as the long term renal morbidity of wasp stings are not known precisely.

Conclusion:

Wasp sting is a common phenomena mostly in rural areas. The management of wasp sting should be started as early as possible and when progressive renal failure ensues, intensive dialysis support results in good renal recovery with return of renal functions to normal in majority of survivors,

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