

Acute kidney injury following multiple wasp stings

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Abstract

Background Common manifestations of hypersensitivity reactions to toxins of stinging insects range from local swelling to angioedema and anaphylaxis. Sometimes it may result in unusual manifestations like intravascular hemolysis, disseminated intravascular coagulation, rhabdomyolysis, etc. Acute kidney injury (AKI) due to immune-mediated acute interstitial nephritis is an extremely uncommon manifestation of insect stings.

Case-Diagnosis/Treatment A 9-year-old boy who developed renal failure from acute interstitial nephritis 7 days after getting stung by a swarm of wasps at multiple sites is described. He regained normal renal function after eight sessions of hemodialysis.

Conclusions Acute interstitial nephritis resulting in AKI may be either due to immune-mediated tubulointerstitial injury or acute cellular injury caused by obstruction by pigments like hemoglobin and myoglobin. Timely and appropriate supportive management usually cures the patient without any residual damage. The objective of reporting this case is to draw the attention of fellow clinicians towards the possibility of this unusual but life-threatening delayed complication in multiple wasp stings, even if there are no significant immediate reactions.

Keywords Wasp sting · Acute kidney injury · Interstitial nephritis

Introduction

Allergic manifestations of various stinging insects may vary from local reaction to angioedema and anaphylaxis.

Intravascular hemolysis, disseminated intravascular coagulation, rhabdomyolysis, etc., are some of the unusual complications. Hemoglobinuria and myoglobin-induced pigmentary tubulopathy may occur [1–3]. However, renal injury due to immune-mediated acute interstitial nephritis is extremely uncommon.

Case report

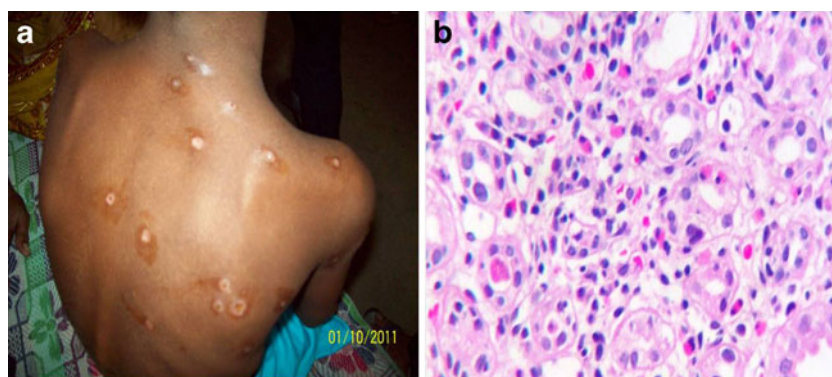
A 9-year-old male child was referred from a peripheral hospital for renal replacement therapy after he developed anuria for 2 days. He had been stung by a swarm of wasps while playing with his friends on the terrace of his home 9 days before. He did not have any significant problems immediately after being stung, except for swelling and itching at the local sting sites. He was treated with oral promethazine by a local physician resulting in the subsidence of local symptoms. Seven days after this, he developed reduction in urine volume, which progressed to anuria.

On examination, the child was conscious but irritable. He had 40–45 sting marks distributed all over his body (Fig. 1a). There was mild facial puffiness and pedal edema. Blood pressure was 150/100 mmHg (>95th percentile of age, gender, and height). There was moderate pallor but no icterus. There was no significant abnormality in cardiovascular, respiratory, nervous, or gastrointestinal systems. His anthropometric parameters were within normal limits.

On admission, investigations showed a serum creatinine level of 13.2 mg/dl (Jaffe method), a urea level of 320 mg/dl (urease kinetic method), serum sodium of 151 mEq/l, serum potassium of 5.2 mEq/l, and serum chloride was 103 mEq/l. His hemoglobin level was 8.2 gm/dl, total leucocyte count was 7,400/mm³ (N-65, L-28, E-6, M-1, B-0), platelet count was 4.51 ac/mm³ and absolute reticulocyte count was 1 %. Urine examination could be done only after 4 days of admission because of complete anuria before that, and it

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Fig. 1 **a** Photograph of the child showing multiple wasp sting marks. **b** Light microscopic image of kidney tissue showing interstitial inflammation (hematoxylin and eosin (H&E), 40×)



revealed proteinuria ++, RBC 4-5/HPF and pus cells 18-20/HPF. Urine hemoglobin and myoglobin were absent. Urine culture did not show any growth. This was the same for the blood culture. Serum creatine phosphokinase was 60 IU/L (N-5-130 IU/L) and lactate dehydrogenase was 150 IU/L (N-150-300 IU/L). Liver enzymes were within normal limits (alanine transaminase 45 IU/L and aspartate transaminase was 35 IU/L). Prothrombin time was 15 s (INR-1.1). Chest skiagram was normal. Both of the kidneys were normal in size and echotexture on ultrasonography. Complement C₃ level was 146.3 mg/dl (N-90–180 mg/dl by immunoturbidimetric method).

He required eight sessions of hemodialysis over 10 days. Raised blood pressure was managed by calcium channel blockers. After the 8th cycle, his serum creatinine level gradually declined to 3.3 mg/dl. His urine output and blood pressure gradually returned to normal after 2 weeks of admission. He was taken up for renal biopsy on the 10th day of admission to identify the cause of renal shutdown. Biopsy specimen showed evidence of interstitial nephritis with peritubular eosinophilic and mononuclear cell infiltration, with some interstitial edema. The glomeruli were unremarkable (Fig. 1b). He was discharged with a creatinine level of 1.5 mg/dl and has maintained his creatinine level, urine output, and blood pressure in the normal range on regular follow-up for the last year. His urinalysis also does not have any abnormality at present.

Discussion

Stinging insects of the class Hymenoptera include vespids and apids. Wasps fall into the vespid category. Wasp venom contains a mixture of complicated active components such as apamin, phospholipase, hyaluronidase, acid phosphatase, histamine, and kinin. These have hemolytic, neurotoxic, and vasoactive properties that can cause intravascular hemolysis and rhabdomyolysis [3, 4].

Acute kidney injury (AKI) is rare with wasp stings, which is reported to be mostly due to acute tubular necrosis in the setting of hemolysis or rhabdomyolysis [4–8].

However, hypersensitivity-related acute interstitial nephritis progressing to renal shutdown has been reported in a few children [9, 10]. Our patient had features of acute interstitial nephritis without any evidence of hemolysis or rhabdomyolysis and pigmenturia. Absence of exposure to any other nephrotoxic agent and the temporal relation of AKI with wasp stings points towards wasp venom as the culprit giving rise to acute renal shutdown. Hemolysis and rhabdomyolysis were reasonably ruled out. Clinical and laboratory features were pointers towards delayed hypersensitivity-induced interstitial nephritis and renal shutdown. Histopathology proved the diagnosis of immune-mediated interstitial nephritis. The patient did not have immediate symptoms of anaphylaxis, such as nausea, abdominal cramping, generalized urticaria, flushing, and angioedema, bronchospasm, hypotension, or shock. This excluded the IgE-mediated, type 1 immediate hypersensitivity reactions.

The histological picture of acute interstitial nephritis may be either that of acute tubulointerstitial inflammation or of renal tubular injury caused by obstruction with pigments like hemoglobin and myoglobin [3, 4]. Eosinophiluria and eosinophilia may suggest the diagnosis of immune-mediated acute interstitial nephritis, but renal biopsy remains the gold standard of diagnosis. Timely and appropriate supportive management usually cures the patient without any residual damage [4, 5]. Corticosteroids may provide some benefit in terms of clinical improvement and return of renal function, but there are no controlled trials to confirm this. Most of the previous cases reported in literature have used corticosteroids for rapid symptomatic improvement [1, 9, 11, 12], but quite remarkably, our patient improved and regained normal renal function without steroids.

The objective of reporting this case is to draw the attention of fellow clinicians towards the possibility of this unusual but life-threatening delayed complication in multiple wasp stings, even if there are no significant immediate reactions. It may result in significant morbidity and mortality in the absence of timely management. Early referral to centers with optimal facilities may reduce morbidity and mortality in patients of AKI following wasp stings.

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