

Case Report

Acute tubulointerstitial nephritis following multiple hornet stings: A case report

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Key words:  acute interstitial nephritis, hornet sting, acute tubular necrosis

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Received: 03 Jun 2024, accepted revised version: 06 Jun 2024, Published 30 Jun 2024

Competing Interests: Authors have declared that no competing interests exist

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Introduction

Hymenoptera sting and its sequelae is an underestimated clinical entity in Sri Lanka that carries significant morbidity [1,2]. There are three clinically relevant families in *Hymenoptera*, *Apidae* (honeybees, bumble bees), *vespids* (yellow jackets, hornets, and wasps), and *Formicidae* (stinging ants). *Vespa affinis* or 'Debara' in Sinhala which belongs to the subfamily Vespinae [3] is a widely distributed hornet in Sri Lanka (Figure 1).



Figure 1: An image of "Debara" *Vespa affinis*

Source: Toxicliniq July 2015 Volume – 03. The official newsletter of Toxicology & National Poisons Information Centre, National Hospital of Sri Lanka. Accessed from www.toxbaselanka.info

Hornet stings usually cause mild allergic reactions and occasionally anaphylaxis. However, severe systemic reactions such as haemolysis, rhabdomyolysis, cardiac complications, hepatic complications, serum sickness, encephalitis, and renal failure have been reported following numerous stings [4].

Acute tubulointerstitial nephritis (ATIN) is characterized by an inflammatory infiltrate in the renal interstitium associated with a decline in kidney function [5]. It is commonly induced by drug therapy followed by other aetiologies such as infection-related, associated with a systemic illness like sarcoidosis and idiopathic forms. ATIN following wasp/hornet stings is increasingly recognized as a cause of acute renal injury [6].

We describe a case of a 20-year-old male patient who developed ATIN following multiple hornet stings and required repeated haemodialysis and treatment with steroids.

Case Summary

A 20-year-old, previously healthy male was referred to our hospital with a history of multiple hornet stings. Ten days before his admission he was stung by approximately 30 hornets while he was working in the field. Immediately following stings, he developed pain and swelling in the affected areas but without any features of angioedema or anaphylaxis. Initially, he had applied herbal preparation over the affected areas which improved the skin lesions.

On day 04 following stings he developed oliguria, low-grade fever, and nausea and by the seventh day he was oliguric and had difficulty in breathing, bilateral leg oedema and vomiting. He was admitted to the local hospital and found to have progressively worsening renal function.

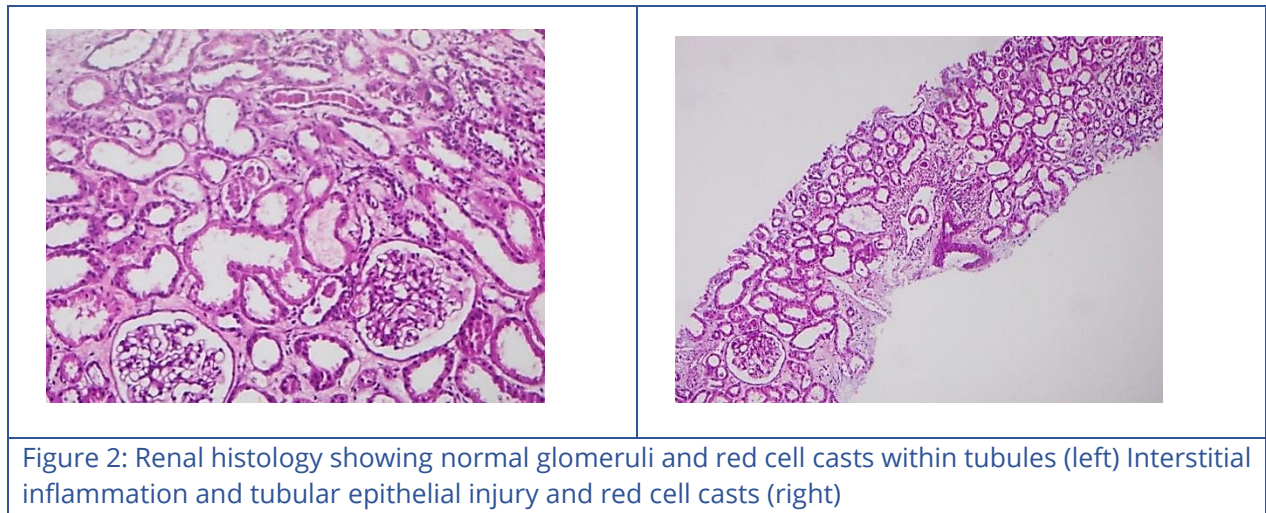
On the tenth day of illness, he was referred to our unit. On admission, he was anuric for the last 24 hours and had fluid overload and uraemic symptoms. He denied a history of urinary infections or a history of frothy urine, haematuria, tea-colored urine or urolithiasis. He did not have chest pain, hemoptysis or any features to suggest rheumatological or connective tissue disease. The family history was unremarkable.

On examination, he was confused but not pale nor icteric. Multiple healed hornet sting marks were present over the face, trunk and limbs. There were flapping tremors in outstretched hands and bilateral pitting ankle oedema. His pulse rate was 108bpm, regular, with a blood pressure of 160/90mmHg. He was dyspnoeic and had pulmonary oedema, SpO₂ on room air was 95%. Abdominal and neurological examination was normal. The following table shows the results of the investigations.

Table 1: Results of investigations

Investigation	Results
Haemoglobin	12.8 mg/dL(13-16.9mg/dL)
White cell count	10.63×10^9 /L ($4-11 \times 10^9$ /L)
Neutrophils	8.3×10^9 /L ($2-7.5 \times 10^9$ /L)
Eosinophils	0.22×10^9 /L $90.04-0.4 \times 10^9$ /L)
Platelets	202×10^9 /L. $9150-400 \times 10^9$ /L)
Urine analysis	Pus cells = 15-20/HPF Red cells = 20-30/HPF No casts or dysmorphic red cells
Urine protein creatinine ratio	1.73
Serum creatinine	19.3mg/dl (0.57-1.11)
Sodium	108mmol/L (136-145)
Potassium	6.7 mmol/L. (3.5-5.1)
Creatinine phosphokinase/ liver biochemistry	Normal
Inflammatory markers	Normal
Arterial blood gas analysis	High anion gap metabolic acidosis
Ultrasound scan kidneys	Features of bilateral acute renal parenchymal changes

Haemodialysis (HD) was initiated as the patient was anuric with fluid overload and uremic features. However, despite repeated hemodialysis, his creatinine continued to rise during HD-free days and he was persistently oliguric. Therefore, a renal biopsy was performed on the 14th day of illness. It revealed 17 normal glomeruli. Interstitium showed mild patchy mixed inflammation with scattered eosinophils and moderate tubular epithelial injury with features of regeneration and a few red cell casts. The findings were suggestive of tubulointerstitial nephritis. (Figure 2)



He was started on oral prednisolone 50mg/day along with supportive medical management and haemodialysis. Gradually his urine output improved, and serum creatinine decreased. By the 28th day following the hornet sting his serum creatinine had come down to 1.17mg/dL. Steroids were gradually tapered over the next few weeks with close monitoring.

Discussion

The venom of hornet contains a mixture of histamine-releasing factors, haemolysins, neurotoxins, vasodilators, phospholipase-A, and enzymes [7]. A single or few stings cause mild local hypersensitivity reactions and occasionally anaphylaxis whereas numerous stings cause severe systemic reactions and can be rarely fatal [8].

Acute kidney injury (AKI) following hornet stings is commonly due to acute tubular necrosis (ATN) as a result of hemolysis and rhabdomyolysis causing pigment nephropathy or shock, direct toxicity, and hypoxia causing ischemic injury. Rarely acute interstitial nephritis, acute cortical necrosis, and thrombotic microangiopathy (8) can occur. Sigdel et al. who studied a case series reported the main clinical features of AKI as oliguria (55%), microhaematuria (36%), and hypertension (18%) [9].

ATIN due to a wasp sting was first reported by Zhang et al in 2001 [6], postulating that polypeptides in the venom can mediate immune complex-mediated glomerulonephritis, interstitial nephritis, renal microangitis or vasculitis. However, ATIN following hornet stings seems to lack the classic clinical features such as fever, maculopapular rash, and peripheral eosinophilia [8] which makes a high degree of suspicion essential. Urine analysis generally shows bland sediment with leukocyturia, microscopic haematuria, sub-nephrotic range proteinuria, and occasionally eosinophiluria. Early renal biopsy is indicated in a rapid decline of renal function which requires dialysis within 24-72 hours. If AIN is not severe patient can be observed for 3-7 days before considering renal biopsy [10]. The majority of reported cases had shown a good response to steroid therapy, as steroids reduce interstitial fibrosis and

facilitate early renal recovery [11]. Studies have shown that the mean time to improve oliguria after AKI was 2-35 days and 10.2% of cases progress to chronic kidney disease [9].

Our patient lacked classical features of AIN and severe hyponatremia pointed more toward an underlying ATN. A renal biopsy was performed due to the high degree of suspicion as the patient had rapidly deteriorating renal functions which needed repeated haemodialysis. Early diagnosis of acute interstitial nephritis allowed us to start the patient on timely glucocorticoids and achieve a remarkable recovery.

Conclusion

Hornet sting is a rare cause of ATIN and should be considered in a patient with persistent oliguria and elevated serum creatinine. Renal biopsy should be considered if renal functions do not improve after a period of observation and glucocorticoid therapy along with supportive care can aid in reducing interstitial fibrosis and early renal recovery.

Consent: Informed written consent was obtained from the patient

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