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Case Report

Paediatrics Section

Acute Liver Injury, Rhabdomyolysis and Acute Renal Failure in a Toddler due to Multiple Stings by *Vespa affinis*

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ABSTRACT

Vespa affinis stings are known to produce local as well as systemic toxic manifestations including haemolysis, rhabdomyolysis, renal injury, hepatic toxicity and encephalopathy. However, very few pediatric cases of *Vespa affinis* stings have been reported. An unusual case of a toddler with hornet stings (10 in number) is reported who presented to our hospital 72 hours after the sting and met with a fatal outcome. At the time of presentation, child was in altered sensorium and shock with multiple necrotic sting marks. Blood investigations were suggestive of acute renal failure with dyselectrolytemia, rhabdomyolysis and toxic liver injury. Child was managed conservatively with intravenous fluids, renal sparing antibiotics, inotropes, fresh frozen plasma and intravenous high dose steroid (Methyl Prednisolone 30 mg/kg/dose). However, the child deteriorated and had a cardiac arrest the same day. She was resuscitated, intubated and connected to a ventilator. The condition worsened and the child succumbed to death. Since there is no specific treatment, a rare case of hornet bite with acute toxic liver injury and rhabdomyolysis could be a challenge to treat.

Keywords: Hornet sting, Multi-organ dysfunction, Necrotic sting marks

CASE REPORT

A two-year six-months old girl reported with history of multiple hornet stings at her neck, trunk and limbs. There was pain with swelling in the sting sites. She was first taken to a nearby hospital, admitted and given intravenous antihistamines, antibiotics and single dose of hydrocortisone (5 mg/kg). During the course of stay, she developed generalised swelling, decreased activity, decreased urine output and breathlessness. Investigations revealed acute renal failure. Following this, the child was referred to our tertiary care hospital 72 hours after the sting. Child deteriorated further during transport and developed altered sensorium.

When the child was received in our hospital, she was in shock with Glasgow Coma Scale score of 10/15. Ten necrotic sting marks were noticed all over the body including left side of the neck with surrounding scalp oedema, trunk and extremities [Table/Fig-1,2]. The sting marks were circular, 2-4 centimeters in diameter, centrally necrotic, with surrounding induration, warm and tender. The abdomen was distended with enlarged liver (span 13 cm). Respiratory system examination was normal. Her weight and height were 11 kg and 78 cm.

She received normal saline boluses for treatment of shock. Further treatment included intravenous antibiotics, inotropes and oxygen. Blood gas analysis done on admission was suggestive of metabolic acidosis. Investigations were suggestive of acute renal failure with dyselectrolytemia and toxic liver injury [Table/Fig-3].

Further, the child was managed conservatively with intravenous fluids, renal sparing antibiotics, nebulization with beta agonists, loop diuretics, inotropes, fresh frozen plasma and intravenous high dose steroid (Methyl Prednisolone 30 mg/kg/dose). Urine output remained poor. Blood chemistry showed persistent wide anion gap metabolic acidosis with hyperkalemia. Based on the presentation, rhabdomyolysis was clinically suspected and confirmed later [Table/Fig-3].

[Table/Fig-1]: Scab marks on the chest, measuring 2×2 cm and 1×1 cm, circular in shape with central haemorrhagic/necrotic area and surrounding induration.

[Table/Fig-2]: Sting over the right posterior triangle associated with scalp oedema. A central pustule noticed over the center of the bite.

Parameters	At admission	After 12 hours	Laboratory Reference Range
Haemoglobin (gm/dL)	10.3	Not done	11-14
Total Counts (/mcL)	23,500	Not done	4000-10000
Differential Counts	Neutrophils 72 Lymphocyte 28	Not done	Neutrophil 40-80 Lymphocyte 20-40
Platelet Count (/mcL)	385000	Not done	200000-500000
CRP (mg/L)	36.74	Not done	<6
Urea (mg/dL)	146	198	10-45
Creatinine (mg/dL)	2.3	3.4	0.4-1.4
Uric Acid (mg/dL)	13.5	16.1	2.2-5
Creatine Phosphokinase (IU/L)	Not done	105849.7	10-45
Serum Na^+ (mEq/L)	129	131	136-149
Serum K^+(mEq/L)	7.69	7.56	3.5-5.3
Serum HCO_3^- (mEq/L)	8.7	8	23-27
Serum Cl^- (mEq/L)	91.8	92.9	98-111
Serum Ca^{2+} (mEq/L)	6.9	6.8	7.6-11
Serum Mg^{2+} (mEq/L)	2.64	Not done	1.6-2.6
SGOT (IU/L)	18348	9274	5-40
SGPT (IU/L)	4827	3676	5-40
ALP (IU/L)	684	568	<462
Total Protein (g/dL)	4.8	Not done	6-8.3
Albumin (g/dL)	3.2	Not done	3.2-5.5
Total Bilirubin (mg/dL)	12.34	13.42	0.3-1.2
Direct Bilirubin (mg/dL)	10.42	11.71	Up to 0.2
Prothrombin time	22	Not done	13.9
I.N.R	1.75	Not done	1.1
Blood arterial gas-pH	7.249	7.2	7.35-7.45
pCO_2	29.3	27	35-45
pO_2	123	174	80-100
Oxygen Saturation	96.6	98	94-100
Base Deficit	13.3	16.3	Up to 2
Urine Routine-Glucose	2+	Not done	NIL
Protein	3+	Not done	NIL
Red cells	4-6/hpf	Not done	0-5/hpf
Casts	Amorphous urate crystals	Not done	NIL

[Table/Fig-3]: Timeline of laboratory investigations.

It was planned to start peritoneal dialysis in view of rising creatinine and oliguria unresponsive to diuretics. However, the child deteriorated and had a cardiac arrest the same day evening. The child was resuscitated, intubated and connected to a ventilator. She could not survive till the peritoneal dialysis and succumbed to death the same night.

DISCUSSION

Vespa affinis is a hornet species widely distributed in India. They aggressively sting victims who venture near their nesting sites. Unsupervised children especially toddlers are more likely to be stung. However, mortality after hornet stings in children is less common. There has been only a single reported case of fatal sting by *Vespa affinis* in an 11-year-old boy from Malaysia [1]. The index report is of a two year six-month-old girl with toxic liver injury and rhabdomyolysis induced renal failure following multiple stings by *Vespa affinis*.

Bilo B et al., have extensively studied and reviewed the classification, epidemiology and components of the Hymenoptera venoms that causes allergy. The family Vespidae under Hymenoptera order has been described as almost hairless, with truncated junction between thorax and abdomen with black and yellow stripes. The venom allergy for Vespidae has been attributed to Phospholipase A1, hyaluronidase and antigen 5. The toxicity has been classified as normal local reaction, systemic anaphylaxis, systemic toxic reactions and unusual reactions. The risk factors affecting the outcome of anaphylactic reactions include shorter duration between stings, adult, elderly age, history of venom sensitization, the insect type, elevated systemic tryptase levels and systemic mastocytosis. Hornet stings have been described to be three times more life endangering than those of bees and wasps [2,3].

The prevalence of local reaction after insect sting may range from 2.4 to 26.4% with 19% in children. However, systemic reactions in children are lower being 0.15 to 10% as compared to 25 to 70% in adults. A 60% of systemic sting reactions in children is mild and the mortality rate is very low. There is only one reported case of a child dying from *Vespa affinis* bite and cause was attributed to anaphylaxis [1-3]. Although, it has been reported that number of *Vespa affinis* stings more than 50 is associated with higher mortality and morbidity among adults [4], only 10 stings were fatal for the two year six-month-old child reported in the present study.

Some of the known toxic effects of *Vespa affinis* venom are shock, acute haemolysis, rhabdomyolysis, acute renal failure secondary to acute tubular necrosis, hepatic injury, myocardial involvement and central nervous system toxicity. Multiple hymenoptera stings have been second leading cause of acute renal failure due to venomous animals after snake bite. The renal failure persists beyond three days and is frequent presenting complaint in those who seek late treatment. The prognosis of acute kidney injury is promising in those who receive renal replacement. The number of stings (>50) are an important factor in the risk for renal failure and the need for dialysis [2,4-8]. The child reported by us had rhabdomyolysis with acute renal failure and altered sensorium. Dialysis was not done as child presented late and deteriorated very rapidly.

Acute toxic hepatitis has been described as a rare association. Tsai CL et al., described a case of isolated acute hepatitis in a 50-year-old man with history of chronic hepatitis B after multiple hornet stings (identified as *Vespa affinis*) [9]. Another case of age group similar to the present case has been described by Weizman Z et al., [10]. The reported case was of a 19-month-old girl with history of multiple hornet stings (*Vespa orientalis*) who developed hepatic encephalopathy with acute tubular necrosis. Investigations reflected elevated transaminase levels, with altered coagulation profile, elevated and hyper-amonemia. The liver biopsy was described as micro vesicular steatosis with mitochondrial pleomorphism, both features along with the clinical presentation suggestive of Reyes syndrome. The patient received supportive treatment with hydration, antibiotics, electrolytes and corticosteroids. The renal functions improved after 36 hours of treatment without dialysis and gradually the child improved after three weeks.

Another unusual feature in the present case was cutaneous necrotic lesion with induration. Yanagawa analysed 14 adult cases of wasp bite (*Vespa manderinia*) published in Japanese medical journals from the year 1983 to 2006, all of which had liver injury and rhabdomyolysis. The cause of death in victims was anaphylaxis or sudden cardiac arrest, multi-organ dysfunction including kidney injury, rhabdomyolysis, respiratory failure, hepatic injury and disseminated intravascular coagulation. Cases with skin haemorrhage and necrotic changes after stings were associated with multi-organ failure. They also observed that the average number of stings in patients who died was significantly greater than that observed in surviving patients [11].

In this child, peritoneal dialysis was considered in view of persistent hyperkalemia with oliguria despite diuretics. Haemodialysis was ruled out in view of haemodynamic instability and multi-organ failure. There was no specific contraindication for peritoneal dialysis [12].

The drawback of the reported cases was that insect bites reported did not specify the genus and the general term of 'wasps' is used for all the insect bites of Vespidae family.

CONCLUSION

Vespa affinis stings have lower incidence of mortality among children. Local or systemic reactions after stings are under reported. Multiple sting bites and haemorrhagic bites could cause multi-organ failure like in adults. The child we reported was brought after 72 hours of sting with only 10 stings and could not be salvaged. The above case emphasizes the need for early and aggressive management of hornet bite with observation for delayed manifestations. Since hornet bite does not have any known anti venom, good supportive care is the only treatment. Presently no consensus guidelines are available on use of steroids or initiation of peritoneal dialysis in acute kidney injury due to insect stings.

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