

A 3 year old baby with wasp stings-induced multiorgan dysfunction

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Article Info

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Presentation of Case

Dr. Md. Asaduzzaman: A 3 year old healthy female baby had been stung with a swarm of wasps on her entire body while passing a coconut tree containing wasp nest at Chakoria, Cox's Bazar. She developed severe pain and itching at the site of stings and swelling of the body within minutes. Immediately she was seen by a local physician and was treated with the injection of hydrocortisone and pheniramine maleate. On the following day, she gradually developed yellowish tint of the whole body (Figure 1), followed by passage of reddish scanty urine. For these reasons, she was referred to Chittagong Medical College and Hospital and was treated with injection cefotaxime, flucloxacillin, hydrocortisone and dopamine. During the hospital stay, she became drowsy and her renal function tests worsen. Therefore, she was referred to Square Hospitals Ltd. Dhaka for further evaluation and management with the anticipation of requiring hemodialysis.

Dr. Mahfuzur Rahman: On examination on admission, she was confused, drowsy, extremely restless, icteric, mildly pale, afebrile, not dyspnoic, moderately dehydrated, not cyanosed and no lymphadenopathy. Skin survey revealed there were generalized multiple sting marks which were erythematous and edematous along with occasional blackish scaling. She was hemodynamically stable. She had puffy face and periorbital swelling. Neurological examination- Glasgow Coma Scale- Eye response: 3; motor response: 3; verbal response: 1; pupil: normal size; reacting to light and cranial nerves: normal. All jerks (superficial and deep) were normal. Bilateral planter flexor were normal. Chest shows bilateral fair air entry with vesicular breath sound and no added sound. Abdomen was soft and not distended. The liver was palpable 3 cm from costal margin in the midclavicular line and other systems revealed no abnormalities.

Dr. Zahidul Hasan: Table I shows laboratory results following admission in the Pediatric Intensive Care Unit at Square Hospitals Ltd. Elevated levels of CK-MB (creatine kinase-myoglobin binding protein), creatinine phosphokinase and lactate dehydrogenase were

suggestive of rhabdomyelitis. High alanine aminotransferase indicated hepatic failure, raised blood urea nitrogen/creatinine ratio (48.4) were suggestive of acute renal failure.

Dr. Muhammad Humayun Kabir: Ultrasonography of the whole abdomen showed the presence of hypoechoic area in the liver with periportal accentuation suggestive of hepatitis (Figure 2).

Dr. Ahmed Sayeed: Her dehydration was corrected initially with normal saline fluid boluses followed by high fluid infusion to ensure urinary volume of more than 4 mL/kg/hour. Alkalinization of urine kept the urine pH between 6.5-7.4 in order to prevent acute tubular necrosis and injection mannitol drip (0.1 g/kg/hour) to flush the kidney tubules.

Injection *n*-acetylcysteine drip was initiated for its role on non-acetaminophen-induced liver failure. Though her creatine kinase-MB was high indicating myocardial involvement, echocardiography revealed good ventricular function and normal ejection-fraction and pulmonary artery pressure. Gradually, from day 5 onwards she started to improve clinically. The



Figure 1: Multiple sting marks surrounded erythema, yellowish tint of skin, puffy eyelid and swollen upper extremities



Figure 2: Ultrasonography of whole abdomen

Table I

Laboratory result

Parameter	Initial values (normal range)	Values on day 7	Values on Week 6
White blood cell	26.3 (4-11 K/ μ L)	21.3	
Hemoglobin	9.8 (11-16 g/dL)	11.7	
Platelets	3.2 (1.5-3.5 K/ μ L)	248	
Neutrophils	78.9% (50-80%)	41.5	
Alanine aminotransferase	2131 (5-45 U/L)	411	28
Alkaline phosphatase	779 (100-320 U/L)		
Albumin	2.8 (3.5-5.0 g/dL)		
Bilirubin, total	17.6 (<1.5 mg/dL)	2.0	
Blood urea nitrogen	38.7 (5-18 mg/dL)		
Creatinine	0.8 (0.20-0.73 mg/dL)	0.4	0.3
Sodium	137 (135-145 mmol/L)	135	
Potassium	4.3 (3.4-4.7 mmol/L)	3.6	
Chloride	99 (97-107 mmol/L)	92	
TCO ₂	19 (24-30 mmol/L)	29	
Lactate dehydrogenase	9390 (110-295 U/L)		
CK-MB (creatinine kinase-myoglobin binding)	>600 (<16.0 U/L)		
Creatine phosphokinase	47181 (20-180 U/L)	3651	65
<i>Urine routine examination</i>			
Specific gravity	1.025	1.005	
Blood	Trace	Trace	
Albumin	(++)	(+)	
Leukocytes	Trace	Trace	
Urobilinogen	(+)	(+)	
Red blood cell	30-35	14-18	
Pus cells	12-15	6-8	
White blood cell cast	Present	Nil	
Echocardiogram	Normal finding		

level of consciousness improved in parallel of her improved liver function tests. HyperCKemia and renal function tests approximated towards the normal. Angioedema was reduced and the general well-being improved. She was discharged from the hospital on day 8. During the review on week 6, she

was perfectly well supported by the normal blood investigation reports.

Differential Diagnosis

Rhabdomyolysis due to wasp stings

Dr. Farzana Ahmed: The patient, presented severe rhabdomyolysis which was diagnosed clinically by the presence of severe bodyache and laboratory evidence of elevated level of muscle enzymes. In rhabdomyolysis, striated muscles are injured and cause severe body pain and muscle ache.¹ Our patient developed severe bodyache from the day of incidence and investigation result shows high CPK level on day 3.

The underlying mechanism of rhabdomyolysis is not yet understood. It is assumed that muscular tissues might be directly injured by venom.^{2,3} Renal insufficiency is a common consequence of rhabdomyolysis which might be caused by pigment nephropathy. Other explanations for acute renal failure in such situations are the intravascular hemolysis or acute tubular necrosis due to hypotension and acute interstitial nephritis by direct effect of venom.^{2,5}

Acute renal failure due to wasp sting

Dr. Sayeed: She presented with oliguria, puffy face, periorbital swelling, high colored urine, raised BUN/creatinine ratio, high creatine phosphokinase and high lactate dehydrogenase which proved rhabdomyolysis as the cause of her pre-renal azotemia.^{6,7}

Provisional Diagnosis

Multiorgan failure due to wasp sting

Discussion

Dr. Masudul Rahman: Being a social insect bees or wasps usually attack in response to threat to their colony.⁸⁻¹² Victims often present with wide ranges of clinical manifestations starting from non-specific skin lesions to anaphylactic shock in previously sensitized person.¹³ Systemic toxicity commonly observed in cases of mass envenomation.^{13,14}

Wasp venom contains toxic hyaluronidase, acid phosphatase, histamine, melittin, apamine, phospholipases A1 and degranulating peptide mastoparan.^{14, 15} These components have both indirect and direct cytotoxic (renal, hepatic and myocyte membrane) properties, which can lead to intravascular hemolysis and rhabdomyolysis.¹⁶

Dr. Laila Bithi: What are the common manifestation

of wasp stings?

Dr. Suraiya Islam: Local pain and tenderness along with erythematous swelling around the site of sting are the common features. The maximum diameter of the swelling commonly observed between 24 and 48 hours; if 10 cm or more, is referred to as a large local reaction.¹⁷ Severity of clinical features depend on the site of involvement even without any systemic involvement. Stings in or around the mouth may lead to serious airway obstruction even in victims who were not previously hypersensitive to venom. Others features of hypersensitivity reactions following wasp strings are hypotension, bronchoconstriction, respiratory distress, syncope, laryngeal edema and death.^{18, 19}

The manifestations other than allergic reactions are muscle cramp due to rhabdomyolysis, acute renal failure, heart failure due to myocardial necrosis and infarction, hepatic failure due to centrilobular necrosis of liver and bleeding manifestation due to thrombocytopenia as a result of direct platelet toxicity.²⁰⁻²⁶

Dr. Sadia Rahman: How common are the incidence of complications following swam stings?

Dr. Aftab Yusuf Raj: Previously many studies had been conducted worldwide on this topic. All of them showed significant association of multiorgan dysfunction following mass envenomation by wasp. Of them one multicenter retrospective study²⁷ which were conducted on 1091 hospitalized victims of wasp sting showed 21% victims developed acute renal failure. 24.1% had rhabdomyolysis, hemolysis in 19.2% patients, acute hepatic failure in 30.1% patients, and 22.5% patients developed coagulopathy. Our patient presented with passage of reddish scanty urine, oliguria, raised BUN/creatinine ratio and high creatine phosphokinase, which probably secondary to massive rhabdomyolysis as the cause of her azotemia as creatine phosphokinase and lactate dehydrogenase were highly elevated. The treatment was initiated accordingly with the intravenous bolus with normal saline and 6% correction of dehydration ensuring urinary volume of >4 mL/kg/hours. Alkalinization of urine keeping the urine pH between 6.5-7.4 to prevent acute tubular necrosis and injection mannitol drip (0.1 g/kg/hours) to flush the kidney tubules.^{28, 29}

Dr. Zeena Salwa: What is hyperCKemia?

Dr. Sayeed: Persistent elevation in the serum level of a muscle enzyme, creatine kinase is called hyperCKemia^{30, 31}

Dr. Ahsan Habib: How can we treat and prevent acute tubular necrosis following rhabdomyolysis?

Dr. Lutfun Nahar: Early and aggressive fluid resuscitation with crystalloid solutions to ensure optimal hydration and to restore renal perfusion

along with judicious use of alkalizing agent decrease the incidence and severity of acute tubular necrosis following rhabdomyolysis.³²⁻³⁵

Dr. Susoma Saha: How liver can be injured in rhabdomyolysis? What are the treatment options?

Dr. Ahmed: Hepatic dysfunction occurs in approximately 25% patients with rhabdomyolysis.³⁶ Proteases released from the injured muscle may cause hepatic inflammation.³⁶ Mumtaz et al. (2009)³⁷ and Kortsalioudaki et al. (2008)³⁸ suggested that *n*-acetylcysteine is helpful in non-acetaminophen-induced acute liver failure. We also started injection *n*-acetylcysteine drip for its role on non-acetaminophen-induced liver failure.

Dr. Kobirul Islam: Is there any chance of long-term complications for victim of wasp sting?

Dr. Ahmed: Pramanik and Banerjee (2007).³⁹ reported that following wasp sting, the outcome is good in children if single or two systems involve, whereas with severe multisystem involvement, the risk of fatality is high. Our patient, other than having severe local reaction to the stings, showed evidence of massive rhabdomyolysis, pre-renal azotemia, hepatic encephalopathy stage 1 and myocarditis. Severity of involvement in this child is presumed to be related to large volume of toxin compared to small body mass. Despite of all complications aroused following wasp sting, the baby survived due to proper management.

Final Diagnosis

Multiorgan failure due to wasp sting

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