Case report

Acute Renal Failure secondary to massive Honey bee stings

Ramesh R Pol, Raghavendra N Vanaki, BhuvaneshvariYelamali,GopalHongal
Department of Pediatrics, S. Nijalingappa Medical College, Bagalkot.

Abstract

Honey bee sting can produce mild to severe allergic reactions as well as deaths. Multiple stinging events can prove life threatening via the toxic action of the venom injected in large amounts. Bee venom is a complex substance consisting of proteins which can affect various tissues and can cause serious effects like hemolysis, rhabdomyolysis, acute renal failure and shock. Acute renal failure is believed to be due to hypovolemia, anaphylactic shock, myoglobinuria, hemolysis, acute tubular necrosis and from direct toxicity. Herein, we present a case of 2 year old male child presenting with angioedema and acute renal failure following about 200 honey bee stings all over the body. The child expired secondary to sepsis and MODS, even after appropriate management with antibiotics, steroids and peritoneal dialysis.

Key words: Multiple stings,Acute renal failure, Rhabdomyolysis, Bee venom, Peritoneal dialysis.

Address for correspondence
Dr. Ramesh Pol,
Assistant Professor, Department of Pediatrics, S. N. Medical College, Bagalkot
E-Mail: rameshpol@ymail.com

Introduction

Honey bees belonging to order Hymenoptera, are social creatures that sting following provocation. The bee attacks are characteristically massive, and, excluding the cases of anaphylaxis, the injected venom intensity and the prognosis are directly associated with the number of bee stings[1,2,3]. Multiple bee stings are capable of causing death, which is probably due to a direct toxic effect of the venom[4,5].

The incidence of anaphylaxis caused by insect stings has been estimated from 0.3 to 3% in the general population[6]. Large local reactions occur in 15 – 16% of those stung[7]. Unusual but serious reactions such as intravascular hemolysis, vasculitis, nephrosis, acute renal failure, rhabdomyolysis, hepatic dysfunction and serum sickness are also rarely reported[8,9]. Herein, we report a case of 2 year old male child presenting with angioedema and acute renal failure following multiple honey bee stings. This case report highlights a rare complication of this common form of envenomation.

Case report

A 2 year old male child from rural area presented to the emergency department with history of multiple honey bee stings 1 day before coming to the hospital, which was followed by facial puffiness, not able to speak and swallow. The facial puffiness was progressive in nature, involving upper half of the body. Before coming to our hospital child had received the doses of steroid (Inj. Dexamethasone) and antihistaminics (Inj. Pheniramine) but stings were not removed.

On admission, about one day after the sting, the child was conscious but irritable. On examination revealed severe angioedema of the face, periorbital region, neck, arms and chest. Multiple (around 200 – 300) erythematous sting marks were noted over the face, neck, chest and extremities with pitting edema over the scalp and extremities (Fig. 1). Nearly around 50-60 stings were removed from the body. Pulse rate was 110 per minute, respiratory rate of 40 per minute and blood pressure was 100/60 mm Hg. Auscultation of the chest revealed bilateral coarse crackles and rhonchi. Emergency investigations showed Hb - 4.6 gms%, TLC – 26,800, Platelets – 1,66,000/cumm, RBS – 74 mg/dl and peripheral blood picture showed microcytic hypochromic anemia with neutrophilic leukocytosis. Treatment was started with IV Fluids, antibiotics (Ceftriaxone), Hydrocortisone and parenteral antihistaminics (Inj. Pheniramine) andnebulization.Initial total leucocyte count was high may be due to stress, as there was no other features of sepsis.

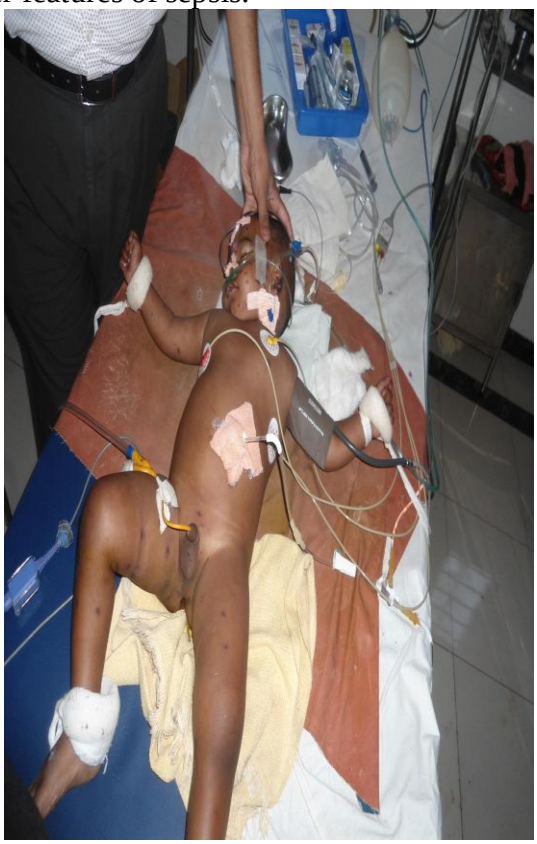

Figure. 1 Multiple bee stings over child's face, trunk limbs with PD catheter insitu.

On the day of admission, child had passed 100 ml of cola coloured urine, there after he remained oliguric with raising urea and creatinine even after optimal fluid challenges. Urine examination showed albumin 1+, cola coloured with no RBCs on microscopy and no growth on urine culture. His renal function continued to deteriorate although his blood pressure remained well preserved. Child did not show any signs of fluid intolerance. There was some evidence of hemolysis and rhabdomyolysis as evidenced by anemia (Hb-4.6 gms), cola coloured urine and raised CPK levels (>750 in 3 occassions). Peripheral smear study showed reticulocytosis with hemolytic picture. The laboratorial data during hospitalization are summarized in Table 1. The ultrasound of the abdomen showed kidneys with increased size with grade 1 renal parenchymal changes, compatible with acute renal failure. CT brain was normal.ABG showed metabolic acidosis and which was corrected by using sodium carbonate. Fractional excretion of sodium (FeNa) could not be done in this case as urinary sodium and urinary creatinine tests are not available in our hospital.

Na+	138	140	143	138	145	13
K+	4.1	5.5	4.8	4.2	4.6	4.8
Cl-	98	102	101	99	104	10
Blood C/S				NG		
Stool R				NAD		
CT Brain				N		
CXR				Cmeg		
U.O.	100	300	400	300	450	40
ABG						M
PD analysis						
CPK		852	1258		768	450

Initially child was managed with IV fluids, steroids, antihistaminics, IV antibiotics and whole blood transfusion was given as child was severely anemic. Child was initiated with Peritonial dialysis. The constant increasing in the serum urea and creatinine levels, and persistent oliguria, were indication for Peritonial dialysis. 60 cycles of peritoneal dialysis was done as there was persistent azotemia and oliguria. Peritonial fluid analysis was done on 2 occasions and both the time it was normal. On 10th day of admission, child went into respiratory failure and was put on mechanical ventilationfor 2 days and on 12th day child expired secondary to sepsis and MODS (Multi organ dysfunction).

Discussion

Honey bee venom is capable of producing reactions which may vary from mild allergic reactions to fatal anaphylactic consequences. Massive attacks by bees can cause severe complications like hypotension, hemolysis, rhabdomyolysis, coagulation disturbances and hepatic involvement which are directly related to the number of stings[1,2,9]. Systemic toxic responses of bee venom are generally seen in patients with more than 50 stings. Systemic damage may develop within 24 hours, although there are instances of

Table 1. Laboratory findings

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Hb	4.6		6.4		12.3			11.5		10.3
Platelets	166000		132000		176000			235000		198000
TC	26800		16500		19700			19000		14500
Eosinophils	10%		20%		11%			26%		12%
Urea	56	128.6	98	101	138	166.6	163	107	90	64
Creatinine	1.2	2.3	1.8	2.1	3.2	3.8	3.3	2.1	2.4	1.8

delayed onset (2-6 days)[10,11]. In our case, the systemic damage was started before coming to the hospital i.e. within 24 hours of sting.

Bee venom contains several active components such as Mellitin (50% by dry weight), is the main pain inducing compound. Mellitin works in concert with phospholipase A_2 (PLA_2), has both hemolytic and vasoactive properties[12]. Other toxic compounds include mast cell degranulating peptide, Apamin (a neurotoxin), Hyaluronidase (spreading factor) and histamine, are responsible for laysis of red blood cells, leucocytes, platelets and damage to vascular endothelium[12].

Acute renal failure secondary to bee stings is likely to be secondary to arterial hypotension due to direct vasoactive toxic effects of the venom, hemoglobinuria due to hemolysis and myoglobinuria due to rhabdomyolysis. These results in significant renal tubular injury, intraglomerularclotting, and precipitate acute renal failure[4,5]. Acute renal failure is also believed to result from direct nephrotoxic effects of venom[5,13]. The mechanisms of injury are complex but may be related to vasoconstriction, precipitation of the pigments in the tubular lumen and heme-protein induced oxidant stress[13,14]. The elevated levels of enzymes CPK and aspartate aminotranferase suggest rhabdomyolysis and hemolysis is evidenced by anemia, unconjugated hyperbilirubinemia, reticulocytosis, increased serum LDH and hemoglobinuria[15,16]. Our patient had features of both rhabdomyolysis and hemolysis as evidenced by raised muscle enzymes, cola coloured urine and peripheral blood picture showing reticulocytosis and hemolytic picture. Serum amylase and lipase were increased in one of the patient who presented with abdominal pain after bee sting[16]. Acute tubular necrosis was the most common biopsy histological finding in cases of acute renal failure induced by stings[9]. Damage is usually reversible, responding well to dialysis; complete recovery may require 3-6 weeks. Management of the rapidly developing acute renal failure in the above case warranted prompt renal replacement therapy – Peritoneal dialysis. In our case, peritoneal dialysis was carried out considering patients age and overall general condition.

The time between the accident and the treatment is important in determining the patient's prognosis. The patients who received medical support seven hours after the bee stings had severe acute renal failure as compared to patients whose treatment was given half hour after the attack, the renal dysfunction was mild and rapidly reversed after aggressive fluid infusion.

Honey bees will leave detached stings in the victim, which continue to inoculate the venom into the body, and these should be removed as soon as possible whatever method is quickest. The method of removal does not seem to affect the quantity of venom received[17]. Removal of bee stings that have been embedded for more than one minute will have little or no effect in reducing envenomation since most of the venom empties from detached honey bee stings within 10-20 seconds[18].

Several cases of death due to massive insect stings have been reported, and the mortality rates have been estimated to be 15-25 %[2,3,8,9]. The cause of death was not described in most cases. These deaths have occurred within 16 hours to 12 days after the stinging incident for honey bee stings[2,3]. In our case, the baby died secondary to sepsis and MODS.

In summary, the pathogenesis of acute renal failure in these patients is probably due to pigment nephropathy caused by precipitation of myoglobin and

hemoglobin in renal tubules. Early recognition of this syndrome is crucial and early removal of stings before envenomation have better prognosis. Mortality remains significant but there is generally complete recovery of renal functions in those who survive.

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