A fatal case caused by massive honey bee stings

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Bee venom is a complex substance which acts in different ways; local or systemic anaphylaxis associated with IgE and direct toxic effects of the large volume of injected venom. We report a 10- year-old boy who was the vulnerable of 5989 honey bee attacks.

To the best of our knowledge, this case had the ultimate number of honey bee stings in the literature, until now. He was admitted to pediatric intensive care unit after 3 hours of incident. Plasmapheresis was started to remove circulating venom that can cause many systemic side effects. Unfortunately, multiorgan failure developed on the 2nd day of admission due to severe hemolysis and rabdomyolysis. Additional therapies modalities, mechanical ventilation, hemodialysis, and antihypertensive drugs were added to the treatment during the disease process. Despite all of the treatments, the patient was failed on 12th day of hospitalization.

Key words: honey bee, massive, multiorgan failure.

Bee venom is a complex substance, which acts in several tissues[1]. Although severe allergic reactions have occurred after one or more stings, several deaths have been reported without allergic manifestations, emphasizing the toxic effects of massive poisoning. A number of about 100-1000 stings have been considered necessary to cause death by direct toxicity, but as few as 30-50 stings have proved lethal in childen.[1,2] On the other hand LD_{50}= 2.8 ml/kg or 19 stings/kg is reported fatal[3]. According to this count, 760 honey bee stings were fatal dose for our patient. We report a fatal case involving multiorgan failure due to highest number of honey bee stings to date.

Case Report

A ten-year-old boy was attacked by a large number of honey bees while playing with bee hive. He was initially treated with subcutaneus adrenalin at a district hospital and referred because of massive honey bee stings. He had 5989 sting marks all over the body and more prominent on his face. Severe petechia and ecchymosus were seen on his body (Figs. 1A, 1B). The imbedded stings were removed after arrival and then tetanous vaccine was given (Fig. 2). Initial laboratory was normal except white blood cell count $31.6x10^9$/L. Forty eight-hours after the hemoglobin level had fallen to 7.2 g/dl, the peripheral smear showed evidence of hemolysis with anisopoikilocytosis and polychromatic eritrocystes, platelet count was $59x10^9/\mu$L. Prothrombin time, partial thromboplastin time and fibrinogen concentration were normal. Troponin Ths level was 3.4 ng/ml. Blood urea, serum creatinine, AST and LDH had risen to 94 mg/dl, 2.2 mg/dl, 2485 U/L and 2942 U/L respectively. CPK had also risen 46750 U/L, CPK-MB 8900 U/L (Table I). Serum tryptase level was not evaluated. Patient was treated with intravenous fluid, diuretic, antibiotic, steroid, antihistaminic drug and sodium bicarbonate. Plasmapheresis was started

Table I. Laboratory Values at Hospital Admission and Follow-Up

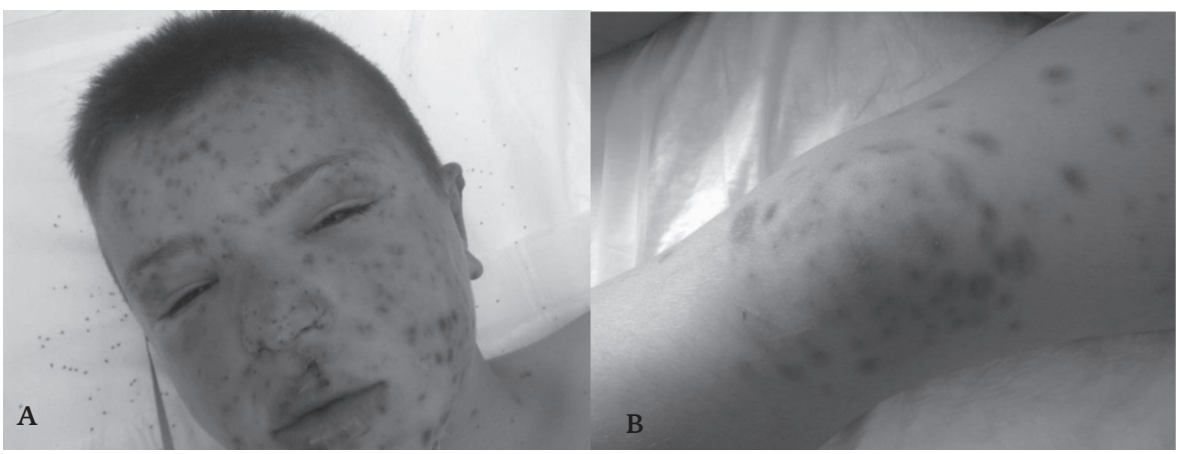
	Day					
Laboratory test	Admission	1	2	3	7	12
White blood cell count, x10^9/L	31.6	28.3	25.9	23.2	18.0	12.0
Hemoglobin, g/dl	15.0	12.9	7.2	10.6	9.8	10.5
Hematocrit, %	44.9	38.9	22.4	31.0	29.5	31.3
Platelet counts, x10^9/L	344	273	59	85	102	96
Aspartate aminotransferase, U/L	278	1122	2485	1950	129	73
Lactate dehydrogenase, U/L	1378	2154	2942	832	430	254
Creatine phosphokinase, U/L	3034	6066	46750[a]	25055	2724	560
Blood urea nitrogen, mg/dl	35	42	94[b]	58	21	18
Creatinine, mg/dl	0.9	1.7	2.2	1.4	0.8	0.7
Troponine, ng/ml	3.4	2.1	0.6	0.05	0.01	

a, b: initial values of plasmapheresis and hemodialysis

to remove venoms from body circulation and to control severe hemolysis, progressing to organ failure on the 2 nd days. Plasmapheresis was repeated twice daily for 3 days. Hemodialysis was performed for renal failure. The patient had severe generalized tonic-clonic convulsion and respiratory failure on the 3rd day. He was followed by mechanical ventilation after this event. In cranial MR imaging with diffusion weight scene, bilaretal iscemic infarcts were detected in basal ganglion and parietooccipital cortex (Fig. 3). Low molecular weight heparin was started for intracranial infarct in addition to treatment. Systemic hypertension resistant to nitroprusside, nitroglycerin, captopril and minoxidil was developed on the fifth day. It persisted for 3 days. After 2 hours of hypertensive–hypotensive episodes, spontaneus respiration efforts were lost on 10th day. In his neurologic exam, brain stem reflexes were negative. Bilateral dilated pupil and no light response were detected. He died on the 12th day of hospitalization because of the multiorgan failure.

Discussion

It is of paramount importantance that parents warn their children to keep them away from bee hives. By this way one could avoid potential worrisome results due to bee stings. Various manifestations after bee sting have been described.[2,4] Generally, three major reactions occur after bee inoculation as 1) local reactions at the site of stings such as edema, erythema, burn-like sensation, pruritus, 2) generalized anaphylactic responses, and 3) serum sickness like symptoms, which include hemolysis, disseminated intravascular coagulation, rhabdomyolisis, etc.[5,6]. Components



Figs 1A-1B. 5989 bee stings more prominent on his face and severe petechia and ecchymosis on his body.

Fig.2. Removed stings are seen on the surface.

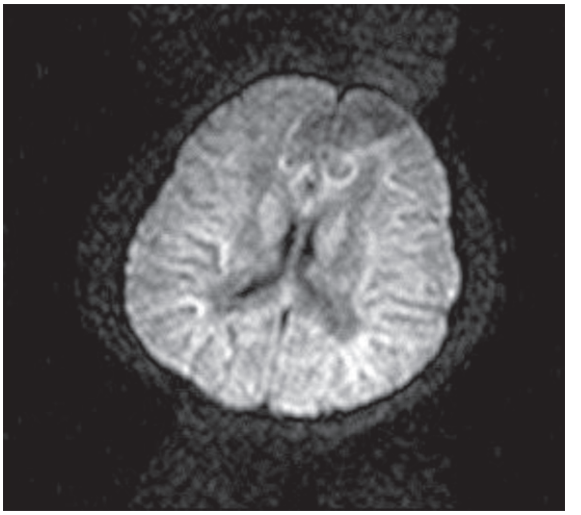


Fig.3. Bilateral iscemic infarcts are shown in basal ganglia and parietooccipital kortex in cranial MR imaging with diffusion weight scene.

of the venom responsible of these clinical presentations include toxic surface-active polypeptides (mellitin and apamin), enzymes (phospholipase A_2 and hyaluronidase), and low molecular weight agents (histamine and amino acids)[2,7]. Mellitin and phospholipase A_2 are important components causing rhabdomyolysis following a toxic action on striated muscles and also act on the red cell membrane and provoke hemolysis[1,2,7]. PLA_2 is also known to cause coagulation abnormalities as a rare complication of bee stings[8]. We though that the patient's clinical findings associated with systemic toxic effects of bee stings. Hence, serum tryptase level was not evaluated. A raised tryptase may be a useful clue to the diagnosis of anaphylaxis but should only be ordered if the diagnosis is unclear such as in unexplained and life-threatining cardiac or respiratory collapse. Serum tryptase returns to normal with in hours of anaphylaxis, and a normal serum tryptase does not exclude anaphylaxis. Serum tryptase is unstable and must be transported to the laboratory quickly[9,10].

Systemic toxic reactions due to venom compounds are usually observed after 50 to 100 bee stings[11]. In our case, exposed to many bee stings: hemolysis, rhabdomyolysis, and elevation of serum hepatic transaminase developed within 48 hours. Finally multiorgan failure occurred due to possible toxic effects of the venom. In the literature, it is recommended that plasmapheresis should be used for the treatment of life-threatening multisystem organ failure due to stings of members of the order Hymenoptera (honey bee, bumble bee, wasp, hornet, yellow jacket)[12]. We performed plasmapheresis earlier than literature recomendation due to excessive circulating venom load and severe hemolysis. It was administrated twice daily for 3 days. Renal failure progressed despite urine alkalization and enough output due to severe rabdomyolisis and hemolysis. We also started hemodialysis in addition to the other treatments. Besides, intracranial infarct was detected on the 3rd days of admission. Bee venom itself contains histamine, thromboxane, leukotrienes, and other vasoactive and inflammatory mediators. Both thromboxane and leukotrienes have been shown to cause vasoconstriction resulting in cerebral ischemia[5,13]. Additionally, releasing endogenous cathecolamines by phospalipase and mellitin can cause hypertension and cerebral infarct. Despite of the antihypertensive treatment such as nitroprusside, nitroglycerin and minoxidil, our patient remained severe hypertensive for 3 days. We failed the case despite of all treatments becaue of multiorgan failure. There were only two fatal pediatric cases due to delayed toxic reactions except our case[14,15]. Additionally, our case report enclosed the major complications reported in the literature due to bee stings such as renal failure, intracranial infarct, hypertension, and convulsion, hepatic failure, peripheral neuropathy, etc[15-21].

As a conclusion, pediatricians dealing with emergent conditions should be aware about

delayed toxic reactions for all children who have more than 50 stings.

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