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Leukemoid Reaction in Patients with *Echis carinatus* Bite: A Two-Case Report

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Abstract

Snake bite is a major environmental hazard in the rural areas. Venom induced coagulopathy is a significant cause of both morbidity and mortality in these patients. Leukemoid reaction is a rare phenomenon after snake bite. Here we report two cases who developed venom induced coagulopathy and leukemoid reaction after viperine bite. These patients treated with anti snake venom, and completely recovered after 14 days. To the best of our knowledge, these are the first two cases report to do so.

Keywords: *Echis carinatus*, Hemolysis, Leukemoid Reaction

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1. Introduction

Viperine snake bite (*Echis carinatus*) is common in western Rajasthan. Bleeding complications are very common after viper bite. Snake bite has been associated with wide variety of haematological derangement as acute hemolysis, anemia, thrombocytopenia, renal failure and disseminated intravascular coagulation. The *Echis carinatus* is primarily vasculotoxic. Its venom is a highly complex mixture of a variety of biological substances including protein (enzymes & nonenzyme polypeptides) and non protein toxins[1] . The snake venom causes haemostatic derangement through the combined pro-coagulant, fibrinolytic, antiplatelet, and haemorrhagic components.[2] Leukemoid reaction is very rare after snake bite. Here we report two cases who developed leukemoid reaction after *Echis carinatus* bite. They were treated successfully with Anti Snake Venom (ASV) with supportive measures and they recovered completely after 14 days.

2. Case History

Case-1 A 24-yr-old female came to us after one day of being bitten on her right foot. She developed hematuria on the next day. She had mild cellulites on bite site. At the time of admission her hemogram was normal. On the 3rd day she had severe anemia and severe leukocytosis with hemoglobin 5.9 g/dl and white blood cell (WBC) 52,420/mm3. Her leukocyte alkaline phosphatise (LAP) (reference range: 50-100) score was 178 and coagulation profile was deranged. A peripheral smear showed numerous segmented neutrophils and bands. Spleen was not palpable.

Case-2 A 30-yr-old female presented to us after 5 hours of being bitten on her left leg. She also had coagulopathy in the form of hematuria and anemia. On day 3rd her WBC was 45,730/mm3. She also had increased LAP score, deranged liver function and PT/INR.

At the time of the admission, both the patients had stable vitals parameters. The Whole Blood Clotting Time (WBCT) was more than 20 min in both cases. Coagulation profile including BT, CT, and PT/INR were deranged in both. Their RFTs and electrolytes were within normal limit. LDH, LAP score and CRP were high. There was no any focus of infection on the body. A septic workup, including blood culture, and urine culture were all negative. Chest X-ray, Ultrasonography and ECG did not reveal any significant abnormality. They were treated with ASV, Fresh Frozen Plasma (FFP), packed cell transfusion

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and supportive measures. CBC revealed normalisation of WBC on the 10th day. Both these patients were discharged after 14 days with normal haematological parameters and fair general condition.

3. Discussion

Leukemoid reaction is a hematological reaction refers to reactive leukocytosis exceeding more than 40,000/mm^3 outside the bone marrow and has been described in response to inflammation, severe or disseminated infection, tissue destruction or other marrow stimulants. It is characterized by a significant increase in mature neutrophils in the peripheral blood and a differential count showing marked left shift[3,4]. The common causes of Leukemoid reactions include infections, intoxication, malignancies, severe hemorrhage or acute hemolysis[5]. These reactions have been attributed to increased cytokine production. Cytokines implicated in this process include granulocyte-macrophage colony-stimulating factor (GM-CSF), granulocyte colony stimulating factor (G-CSF), interleukin 3 (IL- 3) and interleukin 6 (IL-6).[6,7]

The diagnosis of Leukemoid reaction should be done after exclusion of other causes of leukocytosis ie. CML and CNL. The presence of immature cells, normal value of LAP score, bone marrow examinations consistent with leukemia and presence of BCR-ABL translocation confer the diagnosis of CML. Our patients had leukocytosis with increases levels of ESR, LAP score and CRP, which were consistent with the diagnosis of Leukemoid reactions. Both patients had severe anemia because of viperine toxin induced coagulopathy and hemolysis. Leukocytosis occurs in hemolysis due to bone marrow hyperplesia[8]. Both of the two patients had no evidence of infection and haematological malignancy. These patients had normalisation of WBC after 14 days of treatment. Thus we assumed that viper toxins induced hemolysis and toxin induced cytokinines release must be trigger for Leukemoid reactions. Hence Leukemoid reaction should be considered as a differential diagnosis in patients of leukocytosis after snake bite.

Table 1. laboratory investigations

Parameters	Case 1					Case 2			
	Day 1	Day 3	Day 5	Day 7	Day10	Day 1	Day 3	Day 8	Day 11
Hemoglobin (g/dL)	9.0	5.9	6.1	7.9	10.9	12.3	9.0	8.8	10.4
TLC (cells/mm^3)	9530	52420	35680	28810	7870	5030	45730	11210	6350
Polymorphs (%)	82	84.1	84.5	86.7	78.5	60	87.8	68.7	72.1
Lymphocyte (%)	14	10.2	10.1	8.0	15.5	33.2	8.6	28.8	22.3
Monocytes (%)	04	4.9	5.1	5.2	4.6	5.0	3.2	4.4	4.1
Platelets (lakhs/mm^3)	236000	78000	93000	178000	197000	22100	262000	309000	298000
C-reactive protein (mg/L)		>6					>6		
LAP Score		178			50		153		54
LDH (U/L)		952	865		220		525		
S. Billirubin (mg/dL)		3.6	3.5				2.8		

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