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Case report

Sickle cell hemoglobinopathy protection against malaria: is it changing?

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ABSTRACT

Sickle cell hemoglobinopathy has a world wide occurrence, although more concentrated in some specific areas and tribes. It has been thought to originate in malaria endemic areas e.g; Africa and central parts of India for protection from malarial parasite. Reports of association of malaria (vivax or falciparum) with sickle cell anemia are available from South Africa but surprisingly rare from other parts of the world. The first detailed report on the importance of malaria as a cause of morbidity and mortality in patients living with SCA was published in January 2010.We, at west coast of India, came across 5 cases of sickle cell anemia (both trait and disease) which were infected with malarial parasites (4 with falciparum and 1 with vivax). All were complicated irrespective of the degree of parasitemia and species of parasite. We report these cases to highlight the severity of malaria in cases of sickle cell hemoglobinopathy (which is known to have evolved as a protection against malaria) and to emphasise upon the need for detailed research to find out association between SCA and severity of malaria.

1. Introduction

The global annual birth prevalence of sickle cell disease is 3,00,000 children [1], the predominant genotype being homozygous HbSS sickle cell anemia (SCA). In India, sickle haemoglobin was first discovered by Lahmann and Cutbush about 50 years ago among the tribals of Nilgiri Hills of Southern India. Later, subsequent studies reported its high frequencies throughout Central India (namely Gujarat, Madhya Pradesh, Maharashtra and some tribal areas of Rajasthan) and parts of Southern India.

The common causes of morbidity and mortality in sickle cell anemia (SCA) in developed countries have been well documented through projects such as the Cooperative Study of Sickle Cell Disease in the United States and the Jamaican Cohort study but descriptions of the role of malaria as a cause of morbidity and mortality in patients with SCA remain limited. Increasing evidence elucidating protection against malaria by HbS particularly in heterozygous carriers (HbAS) has been published.[2-4] There is compelling evidence to suggest that patients with SCA are protected from malaria, both in terms of a lower prevalence of malaria infection and a lower parasite density [5-9]. The first detailed report on role of malaria as a cause of morbidity and mortality in patients with SCA was published in January 2010[10].We present a series of 5 patients of sickle cell anemia with malaria admitted at SBKS Medical college & DGH, Vadodara, Gujarat, a state on western coast of India. Out of these, 4 had falciparum and 1 had vivax infection. Contrary to present belief, 2 out of 4 with falciparum had heavy parasitemia. All patients including the one with vivax had complications and took longer than usual time to recover.

2.Cases

Case 1: 20 yr old female presented with history of fever with chills since 7 days, jaundice, decreased urine output and breathlessness since 3 days. On examination patient was severely pale and mildly icteric. Tachycardia, tachypnea and bilateral basal crepitation on chest were also noted. Lab investigations revealed Hb – 6.1gm%, TLC-9000, Platelets-90,000. Serum Creatinine was 15.9. The peripheral smear showed presence of rings and gametocytes of *P.falciparum* with heavy density along with few sickle shape RBCs. The solubility test for sickling was positive and electrophoresis confirmed the presence of sickle cell disease (Homozygous). Patient deteriorated initially and had to undergo repeated dialysis and multiple blood transfusions along with anti-malarial treatment. She took 25 days for complete recovery from the illness.

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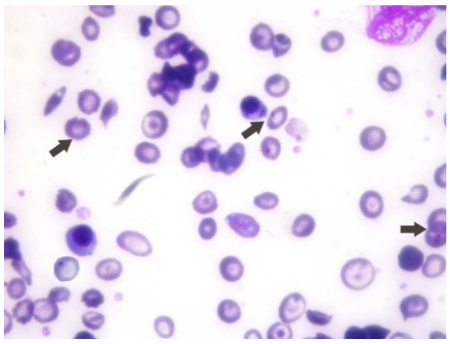
Case 2: 40 yr old female patient came with complaints of fever with rigors since 4 days and headache with altered sensorium since 1 day. Patient was drowsy and disoriented.Temp-99.4oF, pulse – 110bpm and BP was 100/60mmHg. She was pale and plantars were bilaterally extensor. On investigation, Hb-8.8 gm%, TC 13,100, Platelets-2.73lacs. Renal and liver functions tests were within normal limits. Peripheral smear showed rings of *p. falciparum.* Patient's community and area raised a suspicion of sickle cell anemia and sickling test was ordered. Solubility test was positive for sickling and electrophoresis showed heterozygous sickle cell trait. Patient was diagnosed as severe complicated cerebral malaria and treated appropriately. Restoration of health took 9 days.

Case 3: 35 yr old tribal male patient was brought to emergency with complaints of fever with chills, jaundice and dragging abdominal pain since last 3 days. He gave history of recurrent jaundice in past. Patient was conscious and oriented but febrile. He had tachycardia and hypotension. Per abdomen, spleen was palpable 4 cm below left subcostal margin. On investigation, Hb-5 gm%, TLC-22,100 and Platelets -1.85 lacs. Total billirubin was 8.2 with direct bilirubin level of 2.9. S. creatinine was normal. Peripheral smear and RDT radial diagnostic test confirmed presence of p1- falciparam heavy parasitemia with 500 – 600 rings per field.(Image -1). Again due to community background, hemoglobin electrophoresis was asked for which revealed Homozygous sickle cell disease. Patient did not respond to initial treatment with injectable artemisin derivatives and had to be treated with combination of 3 anti-malarial drugs. Patient took 20 days for complete recovery.

Image 1: Peripheral smear (stained with Field's stain and seen through Nikon two headed microscope) showing Sickled cells with *P.falciparum* rings



Case 4: 18 year male came with complaints of bonepains, fever with chills, abdominal pain, malaise and generalised weakness. Past history of recurrent self-limiting bonepains was present. On examination, patient was conscious, oriented but febrile. He was also severly pale and mildly investigation, Hb – 5.4gm%, TC-3600 and platelets - 76,000. Total bilirubin was slightly above normal range and S. Creatinine was normal. Peripheral smear showed presence of *P. Vivax* parasites and schizonts and sickle shaped RBCs. Patient was initially treated with chloroquin, but the general condition did not improve so he was started on parenteral artesunate. He took 9 days for complete recovery.

Case 5: 20 year old male patient presented with history of fever since 5 days, weakness and breathlessness. He had pallor and icterus, with tachycardia, tachypnoea and bilateral crepitations. Investigations revealed Hb - 4.1gm% ,TLC-41000 , platelets -71000. S.bilirubin was 2.8, s.creatinine was normal. Peripheral smear showed 3-4 P. falciparum rings. CXR showed bilateral infiltrates, ABG was suggestive of acute lung injury. He was treated with ACT with antibiotics and Bipap and took 10 days for recovery from ALI.

3.Discussion

The first detailed report published on role of malaria as a cause of morbidity and mortality in patients with SCA observed that there was lower prevalence of malarial parasitemia in patients with SCA than in patients without SCA, both at the outpatient clinic and during hospitalization. However, they also noted that parasitemia was significantly associated with mortality during hospitalization.

The striking feature of our observation is that severe complications and heavy parasitemia were found in patients of sickle cell anemia contrary to the current thought that sickle gene protects against heavy parasitemia. All were complicated .Therefore the consequences of malaria in SCA appear to be severe during acute illness, as previously suggested by Molineaux et al[11]. These findings highlight the requirement of further detailed studies on consequences of malarial infection in patients with sickle cell anemia and importance of prompt and effective management of malaria in patients with SCA.

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