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BLOOD TRANSFUSION TRANSMITTED MALARIA IN A NON-ENDEMIC AREA

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ABSTRACT Transfusion transmitted malaria in non-endemic areas is a rare disease. Malaria in nonendemic area like Kashmir deserves a special attention. There are a lot of security forces posted from malaria endemic area of India who often voluntarilydonate blood in different blood donation camps at place of their posting in Kashmir. Due to rarity of disease and lack of suspicion about malaria delay in diagnosis and treatment may prove very harm full for such patients who receive from a donor from a malaria endemic area. We present a case who presented with fever and thrombocytopenia and Malaria was detected by chance while screening the patient'speripheral blood film for thrombocytopenia. The source of malaria infectionwastraced to be a blood transfusion,donor of which was asecurity forces person from a malaria endemic area in India.Kashmir although non endemic can get malaria transported by security forces,tourists and visitors to this valley, from malaria endemic areas.

KEYWORDS : Plasmodium falciparum, Transfusion-transmitted Malaria(TTM),Thrombocytopenia

INTRODUCTION:

Transfusion-transmitted malaria (TTM) is an accidental Plasmodium infection caused by the transfusion of whole blood or a blood component from a malaria infected donor to a recipient. This may cause morbidity and mortality especially in non-endemic areas, where individuals have no premunition to malaria. TTM was described for the first time by Woolsey in 1911. (1)Many blood donors are unaware that they have malaria. This may be latent and transmissible for a decade. Storage does not render blood safe. Prospective blood donors must be asked about malaria or whether they have been in a region where malaria is prevalent.

The incidence of transfusion-transmitted malaria is very low in non-endemic zone, and ranges from 0 to 2 cases per million transfusions, most of which are caused by Plasmodium falciparum. (2) The optimal strategy to mitigate the risk of transfusion-transmitted malaria in non-endemic countries without unnecessary exclusion of blood donations is still debated and asymptomatic carriers of Plasmodium species may still be qualified to donate blood for transfusion purposes. Blood donors who have a history of malaria, citizens from countries in which malaria is considered endemic and travelers who become residents in a malaria endemic country are deferred for three years,while travelers to endemic countries are deferred for one year.

Case description

A 35 year-oldfemale from south Kashmir was admitted with spiking fevers for four days at SKIMS Medical College hospital Bemina. Base line investigations revealed a low platelet count of 20x109/L but no evidence of bleeding. She was referred to Emergency Medicine department of our hospital SKIMS Soura Srinagar for further evaluation. She had history of fever since five days, had no urinary or chest symptoms, and drug intake. She had a history of receiving two blood transfusions three months back at a different hospital at time of her term delivery by caesarean section. There was no history of travel outside Kashmir any time in the past neither she lives near to any airport. She was conscious but febrile 39had moderate pallor, noicterus, oredema. Her blood pressure was 130/80mmHg; there were no needle injections marks or rash on her body. Her systemic examination was normal. She was evaluated for fever with thrombocytopenia and was empirically treated with intravenous ceftriaxone 1 gm. twice daily with the impression of typhoid fever. Investigation srevealed hemoglobin of 10gm%, WBC of 4.5X109, platelet 31x109/L.There was no evidence of hemolysis and had normal liver and kidney functions. Patient did not show any drop in fever in first 72 hrs. Her widal and brucella agglutination test were non-reactiveand blood cultures were reported sterile. We, reviewed the patient for change of antibiotics and this time we received report of peripheral blood film sent for evaluation of thrombocytopenia revealing malaria parasite falciparum. It was a great surprise for us. Because living in a malaria non endemic area we did not suspect malaria in a patient with fever. We stopped ceftriaxone and put the patient on intravenous artesunate 120 mg twice daily for day first and fallowed artusunate 120 mg daily for 03days and tabparacetmol.She was afebrile on day 3rd. of artesunate therapy. Treatment was continued for four days Her repeat platelet count had increased to 45x109. Complete blood counts on day 5th were Hb10.5gm%, WBC05x109, platelets 65x109.Patient was discharged home afebrile afterfivedays. The blood donor was traced from the blood donation records. The donor was a 36-year-old male soldier who was from Bihar state of India and had donated blood recently in a voluntary blood donation campat his place of posting in Kashmir. Although the blood donor was cleared for donation by clinical questionnaire but, retrospective screening by rapid malaria card test and thick and thin blood film was detected positive for Plasmodium falciparum in his blood but was asymptomatic. Hence we confirmed the diagnosis of transfusion transmitted malaria in our patient who presented to us with fever and thrombocytopenia.

DISCUSSION

Potential donor exposure to acquisition of malaria parasites is an increasing problem due to the substantial rise in global travelling and immigration. Therefore, it is more challenging than ever to ensure that the blood supply in non-endemic areas is devoid of potential malaria infections. We present the case of TTM in non-endemic area. It is possible that the blood donor was not screened properly by standard questionnaire and malaria testing is not utilized in general because of being from a malaria non endemic area. Malaria is an infectious disease caused by an intracellular protozoan parasite of the genus Plasmodium responsible for a potentially fatal acute febrile illness, following invasion and multiplication in human red blood cells (RBCs) during their complex life cycle. Five species of Plasmodium are currently known to cause malaria in humans: 1 Plasmodium falciparum 2. Plasmodium vivax,3.Plasmodium malariae, 4.Plasmodium ovale, 5. Plasmodium know lesi. Malaria parasites are naturally transmitted by the infective bites of female Anophelesmosquitoes during their blood meal. Malaria can manifest with severe symptoms leading to a fatal outcome in non-immune individuals, often young children and pregnant women in endemic areas or native adults in non-endemic settings, and remains asymptomatic in adults who have acquired a premonition maintained by repeated antigen exposure. Malaria is a real threat to blood transfusion. Depending on the number of parasites in the inoculums, symptoms may appear days or weeks after transfusion. The index of malaria infection following a blood transfusion varies greatly from

region to region. In non-endemic countries, itvaries from 0 to 2 cases per million donations. In endemic countries differentiating cases of TTM from natural infections is a challenge as malaria, occurring post-transfusion, can be the result of either a natural infection or transfusion-transmitted. Hence, the number of TTM in endemic countries is unquestionably under-reported. In striking contrast, in non-endemic countries the incidence of TTM is low, due to strict donor selection. Plasmodium falciparum, P. vivax and P. malariae are the species most frequently detected in TTM (3). Various aspects of the parasite biology make this accidental route of infection feasible such as the persistence of infection with P. falciparum can persist for at least 1 year before being cleared, P. vivax for 3 years whereas P. malariae is known to remain as a chronic infection at low density for decades (4). All Plasmodium species are able to survive in stored blood, even if frozen, and retain their viability f or at least 1 week, possibly well over 10 days depending on the conditions of storage; in fact, microscopically detectable malaria parasites were present even after 28 days of storage at 4 °C although a decrease of infectivity after 2 weeks was observed (4,5). An important difference between the natural infection and TTM is that the former undergoes an initial asymptomatic phase (pre-erythrocytic) which allows the activation of innate immunity against malaria parasites. This early phase has advantages on both sides of the host parasite arms race: the innate immunity gives the native host time to develop a more specific protective immunity; meanwhile the parasites manipulate the host's immune system in order to escape. Infected blood transfusions directly release malaria parasites in the recipient's bloodstream triggering the development of high risk complications and potentially leading to a fatal outcome [6]. Experimental evidence suggests that as few as 10 infected RBCs can be sufficient to transmit the infection; thus, even a small inoculum is potentially infectious. However, the mean incubation period for TTM is generally longer than the mean incubation period for the mosquito-transmitted malaria (MTM) for all Plasmodium species as reported by [7] Blood and its components are commonly transfused to treat various medical and surgical conditions therefore,Blood banks require a preliminary screening of a potential blood donor to exclude the risk of current or previous infections which can be transmitted by a blood transfusion, including malaria. Criteria for haemovigilance are defined by the World Health Organization (WHO) and are adapted to each country according to national guidelines. Some countries such as USA rely on a pre-donation questionnaire for the screening of potential infected donors whereas some others, including France, UK and Australia, use antibody testing on donors who are considered at risk on the basis of the preliminary questionnaire [3]. Appropriate diagnostic tools need to be employed in order to enhance the safety of the blood supply chain from donors to recipients tailored to the local TTM risk. The sensitivity and specificity of the screening strategy of blood donors remains the crucial issue in order to ensure the safety of blood transfusions particularly in the case of malaria: in fact, serological tests currently employed do not indicate the actual parasitaemia because antibody levels can remain elevated for many years after infection of P. falciparum and P. vivax (8). Delayed or missed diagnosis of P. falciparum in particular increases the risk of severe disease which may be fatal especially in non-immune individuals. The optimal strategy to minimize the risk of TTM in non-endemic countries without unnecessary exclusion of blood donations is still a matter of debate. Reesink and colleagues have provided an excellent overview of current strategies in a number of (mainly European) non-endemic countries [9, 10]. In short, most countries apply a strict donor deferral system based on travel history. However, this strategy is not optimal because many healthy donors are deferred unnecessarily, leading to donation loss, and lengthy deferrals may discourage return of donors in future. [11]. Despite these strict donor deferral systems, some asymptomatic carriers of Plasmodium spp. may still be accepted by error for blood donation, and therefore the possibility of TTM is not completely excluded (11, 12) as is the reason of TTM in our case report.

Therefore, it is more challenging than ever to ensure that the blood supply in non-endemic areas is devoid of potential malaria infections. Donor selection measures, such as geographical-risk questions in order to identify the donors at risk and to temporarily defer them, have been implemented by the blood bank community. In addition, some blood transfusion services in non-endemic areas implemented laboratory testing for shortened deferrals and/or to further reduce the risk of TTM. Donors can be tested by thick blood smear examination, malarial antibody testing and Plasmodium DNA detection by PCR [11, 13, 14]. It is widely accepted that none of these strategies is perfect, due to either lack of test sensitivity or unfavorable cost efficiency. The optimal approach for a given location will vary according to the background level of malaria risk faced by the donor and recipient population, in combination with the resources available.Furthermore, new technologies are available to selectively inactivate pathogens without damaging cells or plasma; a combination of riboflavin as a photosensitizer with a UV light illumination device (Mirasol System for Whole Blood; Terumo BCT, Lakewood, Colo.) proved to substantially reduce P. falciparum infectivity in whole blood samples without altering cell quality parameters. [15]This inactivation technology may well represent another layer of control to reduce the risk of TTM.Lastly, infected recipients who do not develop any clinical illness may become asymptomatic carriers and thus a reservoir of malaria parasites if competent vectors were to be present; this event has serious implications especially in non-endemic countries where the majority of the population has never been exposed to malaria parasites.

CONCLUSION:

1. This case demonstrates that individuals with asymptomatic P. falciparum infections from endemic area can travel to anon endemic area and donate bloodvoluntarily thus pose a continued threat to transfusion safety.
2. Since thrombocytopenia was the only abnormality associated with this P.falcifarum infection in the recipient, an unexplained low platelet count may be an indicator for asymptomatic malaria.
3. WHO regulations on blood donation needs to be reinforced as many of the TTM case reports observed even in the time span since blood safety guidelines were implemented could have been prevented if those guidelines had been applied strictly, as could have been adopted in our case.
4. Appropriate diagnostic tools need to be employed in order to enhance the safety of the blood supply chain from donors to recipients tailored to the local TTM risk.

Thus, different strategies need to be combined in order to ensure the safety of blood transfusions.

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