

Case study

A Case Report of Alloimmunization With Hyperhaemolysis In A Multiple Transfused Known SCD Patient At A Tertiary Hospital South Nigeria: A Challenge in Developing Countries.

ABSTRACT

Background: Hyperhaemolysis is a fatal life threatening haemolytic transfusion reaction which is common among sickle cell disease patient.

Aim: The aim is to create the awareness of the increasing trend of hyperhaemolysis among chronic transfused sickle cell patients and to educate on the means of ameliorating this menace.

Presentation of Case: The patient was a 14years old male known sickle cell anaemia (Hbss) patient that was diagnosed 13years ago with Haemoglobin electrophoresis. Patient was apparently well until 4years ago when patient crisis become so frequent with about 6-8 episode per year, which is so severe that at each episode patient is said to have received between 2-5 unit of whole blood. Further work up revealed a negative direct antiglobulin test (DAT) but Indirect antiglobulin test (IAT) was positive demonstrating the presence of anti-Jka alloantibodies. Patient RBC were phenotyped and was found to be JKa negative, whereas patient blood group is O⁺ and had received several blood transfusion in our centre where extended phenotyping is not done for the past 3 decades. Each transfusion precipitated a drop in Hb and Hct to levels lower than before transfusion; once transfusions were given, the patient slowly recovered.

Discussion: hyperhaemolysis in the setting of alloimmunization is a common complication among multiple transfused SCD which is life threatening requires prompt intervention if taking into consideration among managing physician and also ensure measure to prevent it from occurring.

Conclusion: multiple blood transfusion among SCD should be curtailed to the minimum. In case of transfusion, leucocyte depleted blood and extended red cell phenotyping should be encourage

Keyword: Alloimmunization, Hyperhaemolysis, Sickle cell disease, multiple blood transfusion.

Introduction

Alloimmunization of red cell is the process of immunogenic response of an individual to foreign red cell antigen from transfuse red cell. Chronic transfusion has remained one of the mainstays of management of sickle cell subject in developing countries. Alloimmunization to red blood cell antigen occur at a rate of 2-5% among all transfusion recipients.¹ Scd patient receive RBC transfusion for correction of anaemia, reduce the burden of

sickling cells.² There are paucity on information on alloimmunization in SCD patient in our environment. Thus a study by Ugwu reported a prevalence of 9.3% of red cell alloantibody in SCD patient in benin with Rhesus antigen contributing 87.5% (anti E 37.5%, anti C 25%, anti D 12.5%, anti e 12.5%) while Kell and Lutherance blood group makes up the remaining.³ Thus the prevalence varies from one region to another.^{4,5}

Hyperhaemolysis is a life threatening condition that is characterize with a drop in Haemoglobin (Hb) and hematocrit (Hct) to level lower than those present before transfusion.⁶⁻⁹ This condition is commonly found in sickle cell disease and β -thalassaemia.¹⁰

Case Report

The patient was a 14years old male known sickle cell anaemia (Hbss) patient that was diagnosed 13years ago with Haemoglobin electrophoresis. Patient was apparently well until 4years when patient crisis become so frequent with about 6-8 episode per year, which is so severe that at each episode patient is said to have received between 2-5 unit of whole blood.

Patient steady state packed cell volume was said to be 24%. A year ago patient presented with multiple complication (Acute chest crisis, Avascular necrosis of the head of femur, Gallstone delayed cholecystectomy) on account of this patient was admitted on examination, patient was in respiratory distress, febrile (37.8°C), pale deeply icteric acyanose, dehydrated. Laboratory evaluation showed Hb and Hct at 4.2g/dl and 12% respectively and evidence of haemolysis with lactate dehydrogenase at 1950iu/L (normal range <125), total bilirubin 155umol/L normal range (0.3-1.2mg/dl) with direct bilirubin 17umol/L (2-7umol/L), haptoglobin 14.3mg/dl (normal range 0.5-5mg/dl), Full blood count showed WBC= 13.1x10⁹/L, Neutrophil 53%, Eosinophil 61%, Lymphocyte 46%, platelet 302x10⁹/L, with mild left shift of Neutrophils. There was also a history of passage dark coloured urine and urine analysis confirmed presence of Haemoglobin. Further work up revealed a negative direct antiglobulin test (DAT) but Indirect antiglobulin test (IAT) was positive demonstrating the presence of anti-Jka alloantibodies. Patient RBC were phenotyped and was found to be JKa negative with blood group O⁺ whereas patient had received several blood transfusion in our centre where extended phenotyping is not done for the past 3 decades.

77 On the first day of admission, patient was transfused with 2unit of Jka
 78 negative RBC, his haemoglobin and heamatocrit initially rose to 5.1g/dl and
 79 15% directly after transfusion. On day two patients haemoglobin had drop
 80 to 4.4g/dl (Hct 13%) and he was transfused again with 2unit of JKa
 81 negative blood. Again his blood Hb and HCT rose to 5.5g/dl (16.3%), 24hrs
 82 after the Hb(4.5g/dl) and HCT(14%). A new blood sample was taken for
 83 Direct antiglobin test which was negative while Indirect antiglobin test
 84 remained positive due to anti-JKa alloantibody

85 Further investigation showed a poor reticulocyte response of 4.0% (normal
 86 range 0.5-2.5%) Ferritin was elevated 4250ug/L (normal range 8-
 87 252ug/L). B₁₂ and Folate level were normal, as were coagulation studies
 88 peripheral smear showed nucleated Red blood cell and spherocyte.

89 Transfusion was withheld due to the continous dropping Hb and Hct with
 90 each subsequent transfusion. A consult was sent to the Haematologist and
 91 patient was placed on iron supplementation and 2 weeks later it was
 92 noticed that the Hb and Hct was gradually increasing towards the patients
 93 steady state (7.4g/dl and 22%) and reticulocyte appreciated.

94 Discussion

95 Red blood cell transfusion is a major component of successful management
 96 of sickle cell disease in developing country. Transfusion helps to correct
 97 anaemia, improve oxygenation, reduced the propensity for sickling by
 98 diluting patient cells and temporarily suppresses the production of Hbss
 99 red cell.¹ Despite the importance of transfusion therapy in sickle cell
 100 disease, it is associated with several adverse short and long term
 101 complication which include transmission of infections, transfusion
 102 haemosiderosis, alloimmunization among others.²

103 Hyperhemolysis which is a sequel of alloimmunization is charecterized by
 104 destruction of both transfused and autologous RBCs, which leads to a
 105 consequent fall in post transfusion haemoglobin lower than the level
 106 present before transfusion.^{7,8,9} Hyperhaemolysis are of two type, an acute
 107 and delayed form of hyperhaemolysis. The acute form can be easy
 108 distinguish from acute haemolytic transfusion reaction, while the delay
 109 form can be distinguish from the delay haemolytic transfusion reaction
 110 (DHTR), with presence of alloantibody in the later and also involves the

destruction of transfused red blood cells only, while the former involves the destruction of both the transfused and autologous red cells.^{11,12}

The index patient was thought to have developed DHTR but the post-transfusion Hb and Hct level was consistently lower than those present before transfusion which is more consistent with hyperhaemolysis. Furthermore transfusion in hyperhaemolytic episode can exaggerate haemolysis causing a life threatening anaemia, which was seen in our with a JKa negative blood products further causes a drop in Hb and Hct in our patient, indicating autologous RBC destruction was occurring.¹³

Reticulopenia is a documented finding of hyperhaemolysis while haemolytic reaction is characterized by reticulocytosis. The Reticulopenia was previously attributed to secondary suppression of erythropoiesis from multiple transfusion. It is now hypothesized to be likely from peripheral consumption and destruction by hyperactivated macrophage.¹²⁻¹⁴

The concept of bystander haemolysis has also been suggested. It is a phenomenon where antibodies reacting with foreign antigen in transfused red cells causing activation of complement system.¹⁴ This can be supported by the fact that IVIG and steroid can increase blood reticulocyte. Hyperhaemolysis is further suggested by gradual appreciation of the reticulocyte count.¹⁵

This case is important to clinicians, to emphasize the complication of multiple transfusion in SCD patient especially hyperhaemolysis syndrome which is a sequel of alloimmunization. Early detection allows for abrupt intervention in order to minimize the adverse effects of red cell transfusion. Steroid and immunoglobulin administration has been found to be useful in ameliorating this condition.

Conclusion

Hyperhaemolysis in the background of alloimmunization is a common complication in multiple transfused SCD and should be looked out for, with prompt intervention. Also health practitioners should minimize the rate of transfusion among sickle cell patients and if transfusion is to be encouraged he should ensure the use of leucocyte depleted red cell and extended red cell phenotyping should be encouraged.

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