Red Cell Exchange Using Cell Separator (Therapeutic Erythrocytapheresis) in Two Children with Acute Severe Malaria

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Abstract

Red cell exchange using a cell separator (therapeutic erythrocytapheresis) has been used successfully in a large number of clinical conditions including acute severe cases of malaria. We report two children suffering from severe malaria (Plasmodium falciparum) with infestation rates of 75% and 67% respectively. They were treated successfully with erythrocytapheresis in combination with antimalarial treatment.

INTRODUCTION

Red cell exchange can be used successfully in a large number of clinical conditions such as acute severe malaria, acute crises of sickle cell anemia, refractory warm autoimmune hemolytic anemia and in porphyria.

Red cell exchange using a cell separator (therapeutic erythrocytapheresis) causes rapid removal of parasites from the circulation of patients with high parasite load with renal, pulmonary and cerebral complications. It offers a rapid approach to treat acute, severe cases of malaria. A few reports are available in the literature regarding the use of this modality of treatment in adult cases and in children. Here we report two children suffering from acute severe malaria who were successfully treated using this modality. In both the cases, the continuous flow cell separator from Cobe spectra was used.

CASE REPORT

Case 1

A 12 years boy was admitted suffering from high grade fever. Clinically he was febrile, icteric with hepatosplenomegaly. He was diagnosed as suffering from acute malaria (Plasmodium falciparum) with an infestation rate (IR) of 75%. His Hb was 7 gm/dl with a platelet count of 24 x 10^9 /L (Figs. 1, 2 and 3).

Therapeutic erythrocytapheresis using the cell separator was carried out immediately on diagnosis. His total blood volume as calculated by body weight and height was 2500 ml. In this procedure, 1700 ml of blood was exchanged with 1500 ml of packed red cells (PRBC) and fresh frozen plasma (FFP). The procedure took about 90 minutes. IR dropped down to 18% post-procedure and further dropped to 2% on day 2 of admission. Antimalarial treatment was started simultaneously which consisted of artesunate 3.2 mg - loading dose, 1.6 mg/kg a day x 5 days, switched to oral dose after 48 hrs of intravenous dose. His Hb improved to 11 gm/dl after
the procedure. Platelet count showed a gradual but remarkable change from $24 \times 10^9 / L$ on day 4 and $400 \times 10^9 / L$ on day 10 of admission. The patient had kidney dysfunction and required dialysis. The patient was discharged on day 10 with a Hb of 10 gm/L and normal clinical parameters.

Case 2

A 10 years boy presented with high grade fever. He was diagnosed as a case of acute severe malaria (*Plasmodium falciparum*) with an IR of 67%. His Hb was 5 gm/dl with platelet count of $23 \times 10^9 / L$. Therapeutic erythrocytapheresis was carried out immediately on diagnosis. His total blood volume was 2800 ml, 2400 ml was exchanged with 2300 ml of PRBC and FFP. The procedure took about 90 minutes. He was also started on antimalarials. Dose being the same as in first case. IR dropped down to 8% post-procedure which further dropped to 3.6 % on day 2 of admission. Hb increased to 8.9 gm / dl and platelet count to $128 \times 10^9 / L$ on day 4. The patient had an uneventful course and discharged on day 4 of the admission.

**DISCUSSION**

Therapeutic erythrocytapheresis or therapeutic red cell exchange (TREX) has been used over the years for a large number of applications. It is indicated if a remarkable damage of the erythrocytes is related to an organ failure (i.e. kidneys) which occurs for instance in acute crises of sickle cell anaemia or in severe malaria.\(^1\) It has been used in different disorders such as hemorrhagic disease of newborn (HDN), polycythaemia vera, managing complications of Sickle cell anaemia (by reducing HbS to less than 30%), paroxysmal nocturnal hemoglobinuria (PNH) and arsenic poisoning. Another important application is the emergency management of parasitic infections such as malaria and babesiosis.\(^2\) However, inspite of such wide applications, data concerning therapeutic erythroapheresis is quite limited.

*Plasmodium falciparum* malaria is the most dangerous form of malaria with high mortality depending on the degree of parasitaemia and development of complications such as cerebral malaria, renal or respiratory failure and disseminated intravascular coagulation (DIC).\(^3\) Erythrocytapheresis results in rapid correction of anaemia, a rapid decrease in the level of parasitaemia and elimination of parasitic toxins. It is a useful adjunctive measure to conventional medical management. Reports of use of erythrocytapheresis in adult cases are available\(^4,5\) but not much data is available in children. Since we used a continuous flow cell separator, hemodynamic fluctuations were minimal as extracorporeal blood volume was less at any given time during the procedure. Hence Therapeutic erythrocytapheresis offers a safe and rapid adjunctive therapy to treat severe cases of malaria even in children.

**REFERENCES**

1. Interdisciplinary European Society for Haemapheresis and Hemotherapy (ESFH) recommendations - Nov 24, 1998.