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Kell Blood Group Maternal-Fetal Incompatibility in Lubumbashi (D. R. Congo), Case Report

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Abstract: Introduction: The anti Kell is a major cause of hemolytic disease of the newborn; the third cause after ABO and Rhesus in frequency; and the second in terms of severity after rhesus type incompatibility. In Africa, 60% of the population is Kell negative. In Congo, Kell blood group determination is not systematically performed and almost non-existent in perinatology. We aimed to report a case of this immunization in routine practice. Method: This study is a clinical report of Kell immunization. Physical examination was performed and blood group determined. Clinical and biological follow up of the case: a review of the literature of Kell immunizations is included. Result: A female newborn on day 4 of life with weight of 3,250 g born at term admitted to Sendwe's Hospital emergency for pallor and respiratory distress. History reveals jaundice at birth. The mother is P1G4A3D0, blood group Orh+. Clinically the child is pale, jaundiced, present tachycardia, hepatomegaly, polypnea Brh+. The diagnostic orientation is a maternal-fetal incompatibility. The realization of blood grouping Kell, Duffy and irregular antibodies research Kell type confirms the diagnosis of Kell hemolytic disease of the newborn. We discharged him after 14 days. Conclusions: The Kell type IFME is a purveyor of grave hemolytic disease of the newborn. His knowledge, prevention and proper care by a multidisciplinary team can prevent dramatic situations.

Key words: Kell system, allo immunization, neonatal jaundice, neonatal anemia, irregular antibodies research.

1. Introduction

Since discovered in 1946, the Kell blood group is known to be the third blood group responsible of immune reactions after ABO and Rhesus groups [1]. The found was made on Mrs Kelleher who gave her name to this group. Mrs Kelleher's baby developed a hemolytic disease of the newborn and an unknown antigen was found on its red cell. When they put baby's red cells in contact with maternal serum agglutination, it occurs with maternal antibody. The antigen Kell was found. Nowadays, there are 25 Kell antigens known [1]. It's an important cause of hemolytic disease of the newborn. Kell blood group incompatibility is founded on mothers previously transfused but also on Kell-sensitized by Kell+ pregnancies. Contrary to ABO and Rhesus incompatibility, anti-Kell leads to inhibition of fetal red cell production. The presence of Kell antigens on erythroid early progenitor cells induces their immune destruction by liver fetal macrophages mediated by Kell antibodies rather than mature red cells. Thus, the erythrocytes production is inhibited. The lack of hemoglobin in erythrocytes precursors, which produces bilirubin after hemolysis, is the reason of non-icteric hemolysis shown in this type of newborn disease but anemia here is more severe [1].

Foeto-maternal incompatibility occurs when maternal antibodies met unkwown antigen herited by father carried by baby's red cell, the consequence is foetal hemolysis [2-4]. HDFN (haemolytic disease of the foetus and newborn) has many clinical expressions:

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neonatal jaundice, neonatal anemia, foetal anasarque, and intra uterine death in severe case [2-5].

The four blood groups inducing the most immune responses are ABO, Rhesus, Kell and Duffy [3, 4, 6, 7]. The Rhesus maternal-fetal group incompatibility is the most described as responsible of severe immunizations when in black people, 60% are in the O group, 60% of them are Kell negative , 85% Duffy negative and just 15% are Rhésus negative [5]. Rhésus incompatibility is the most studied and known incompatibility. It was responsible of majority of severe case of incompatibility but actually there's a way to prevent it and to care for. However many authors report severe case of incompatibility in ABO, Kell, Kidd, Duffy, Wright and there is no preventionnal traitement in this kind of incompatibilities [1, 8-12].

The aim of this report is to illustrate an anti-Kell maternal-fetal incompatibility in an African country.

2. Methods

The study is a case report of blood incompatibility in the pediatric intensive unit of Sendwe Hospital (in Lubumbashi, democratic republic of Congo).

The physical examination was done on the baby and the mother history of transfusion and previous pregnancies was collected.

Blood groups identifications of mother were performed by the Beth Vincent test. The irregular agglutinins search by antiglobulin indirect test on the mother serum and direct Coombs with elution to the newborn.

3. Report

A female newborn born 4 days ago in pediatric intensive unit of Sendwe hospital for anemia. The mother said to have noticed an icterus after deliver. The delivery was non-complicated and the mother started breast feeding soon after. Baby urine was clear and the stools were yellowish. The mother was 32 years old and had received a transfusion when 2 years old. She had a minimal follow-up during pregnancy and had genital bleeding of 2 days on the first trimester. She had 4 pregnancies with 3 abortions and 1 parturition. The first abortion was 3 months after fecundation, the second after 1 month and a curettage made to; the third at 7 months in a intrauterine death. The mother blood group was O, rhesus positive. The father of baby was of AB group, rhesus positive.

The newborn weight was 3,250 gr, her height 48 centimeters, her cranial perimeter 35 cm and thoracic 34 cm. She was pale, icteric with dyspnea and tachycardia. She had sibilant in lungs hepatomegaly. Her blood group was a rhesus positive, a hemoglobin of 12 gr/dL, the total bilirubin was 10 mg%, indirect bilirubin = 8 mg%, direct bilirubin of 2 mg%.

The first diagnosis was a hemolytic icterus (of ABO, Kell or Duffy group?), a non-tolerated anemia and neonatal infection. The baby received a transfusion but the blood was not completely checked for all the blood groups because it's not systematically done before transfusions in Lubumbashi. She was put on antibiotics also, exposed to sun and the icterus decreased after 7 days.

After that the Kell and Duffy group researches for both mother and newborn revealed that mother was Kell and Duffy negative (Fya- Fyb-); the new born was Kell positive and Duffy negative (Fya- Fyb-). The Coombs test was negative for both but an indirect Coombs test on anti-globulin specific Kell was positive on mother.

Thus the final diagnosis was a hemolytic disease of the newborn from a maternal-fetal incompatibility of Kell blood group. The baby was kept in hospital during 10 days because of a new onset of dyspnea. The chest radiography showed a large thymus. On the end of hospitalization, the hemoglobin was 17 g/dL. At one month of life it decreased at 16.9 g/dL, at 2 months of 13.4 g/dL, at 3 months of 12.6 g/dL.

The baby is now growing normally according to her weight and height and she's followed up monthly by pediatrician and clinical biologist till her 6 months of life when she will lose mother antibodies.

4. Discussions

Kell antibodies are IgG immunoglobulins which can cross placental membrane. The incompatibility became effective when the fetus carried maternal antibodies [3, 13]. Those antibodies react on Coombs test. The anti-Kell antibody is the most found after anti-D among irregular antibodies about 0.1 for Caine (1986) [13], 0.1 to 0.2% for Grant [14] and 0.16 to 0.21 for Queenan and Poleski on series of 18,378 and 43,000 patients [15]. In a Turkey series the first allo anti bodies were anti-E and anti-Kell [16].

The hemolytic disease of the newborn from a maternal-fetal incompatibility of Kell blood group is not easy to diagnose in our city because antibodies research is not systematically performed before blood transfusions. Because of that the diagnosis could not been found at first pregnancy. Gariod et al. [1] reported 2 cases when the diagnosis was antenatal in France where the search was systematically performed.

In this report, the alloimmunization of mother came probably on mother transfusion to explain the consecutive abortions and the curettage potentialized that immunization. Gariod et al. [1] reported 2 cases of alloimmunization: one on an interrupted pregnancy and the second on immunization after curettage.

The importance is appreciated depending on authors. Some anti-Kell immunizations lead neither to fetal lost due to immunization nor to neonate death [1]. For others the way of sensitization is the key to pregnancy issue. And the sensitization during pregnancy is the worst [13]. Comparing the sensitization during pregnancy and after transfusions, Grant did not find significative differences [14].

In our report the mother was Gestation 4, Abortion 3, Parturition 1; in Gariod report 5 pregnancies, 1 abortion, 3 parturitions for the first case and 3 pregnancies, 1 abortion and 1 parturition for the second. The diagnostic was antenatal in the two cases. This shows the disparity of manifestations in Kell incompatibility in comparison with Rhesus incompatibility where the gravity increases with number of gestation [1, 17, 18].

In this report, there were no follow-up of maternal antibodies during pregnancy as was done in Gariod report. During all pregnancy the antibody titers were done. They also performed echography that permits to diagnose fetal anemia and leads to intra uterine exsanguino-transfusion 2 in the first case and 6 in the second case [1]. In our report there was also lack of fetal echography that could have showed fetal anemia. With intra uterine exsanguino-transfusion perhaps the third pregnancies could have been saved.

Our newborn had an icterus at birth and a maximal anemia at third day of life. The 2 newborns of Gariod series in France were icteric at birth with maximal anemia at the 26th day of life (for case 1) and at 24th day and 48th day (for case 2) [1]. Saade [19] showed that transfusion was useful in 50% of cases to babies at a median age of 38 days. Those children have less reticulocytes at the last intra uterine transfusion, a high hemoglobin at birth and more red blood cells at Kleihauer test. The mechanism of decreased reticulocytes is unknown maybe due to high levels of medullar antibodies which then persist during the 6 first weeks of life. An asymptomatic child with 50-60 g/L of hemoglobin should receive blood transfusion. Subcutaneous injections of 200 U/kg of erythropoietin can be given three times a week [20]. In our two observations we supplemented babies in iron and folic acid, our baby after 6 month did not required transfusion any more.

5. Conclusions

Anti-Kell maternal-fetal incompatibility is rare and sporadic. Its incidence is the most important after rhesus incompatibility. According to that, all studies reported just few cases and conclusions did not give optimal guidelines for care and post care. The diagnosis is possible in African country when practicians can think of it. Integrate systematically Kell blood grouping in transfusion management and in pregnants women will prevent this hemolytic disease

of newborn.

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