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TEACHING FILES (GRAND ROUNDS)

A CASE REPORT OF MINOR BLOOD GROUP INCOMPATIBILITY (ANTI c) IN A NEONATE - IS THERE A NEED FOR ROUTINE MATERNAL ANTIBODY SCREENING?

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Clinical Problem:
A female baby with term delivery and a birth weight of 2 kilograms was born to a 27 years old G2P1L1A0 mother by normal vaginal delivery. There was no history of blood transfusion in the motherand no history of neonatal jaundice in the first sibling. Jaundice was noticed at 23 hours of life, for which the baby was referred to our hospital. On examination, icterus was seen up to palms and soles and there was hepatomegaly of 2 cm below the right costal margin and splenomegaly of 2cm below the left costal margin. There were no signs of bilirubin encephalopathy.

Investigations were taken on admission (Table 1) and the baby was kept under Intensive double surface phototherapy. Double volume exchange transfusion (DVET) was done at 25 hours of life and due to increasing serum bilirubin levels, DVET was repeated again at 43 hours of life. Thereafter, serial bilirubin values showed a decreasing trend.

As the neonate had a picture of immune hemolytic disease without ABO or Rh (D) incompatibility, blood group phenotyping and antibody screening of the parents were done (Table 2). Antibody identification revealed Anti-c antibody in mother and baby. A diagnosis of hyperbilirubinemia due to minor blood group incompatibility was made, the sensitizing antigen being c antigen in the neonate and antibody being anti-c antibody in the mother. The phenotyping for the baby could not be done as the baby had undergone DVET. Double surface phototherapy was discontinued at 96 hours of life at serum bilirubin of 11.9 mg% and the baby was discharged on the 7th day of life with the serum bilirubin of 8.2 mg%.

Is there a need for routine maternal antibody screening?

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Table 1. Hematological and biochemical profile of the baby

Hemoglobin	8.9 gms%
Total leukocyte count	16,000/cu.mm
Platelet count	2,00,000 per cu.mm
Total serum bilirubin	19.4 mg%
Indirect bilirubin	19 mg%
Direct bilirubin	0.4 mg%
Sr. LDH	1181 U/Lit
Reticulocyte count	13.5%
Sr. Uric acid	11 mg%
C Reactive Protein	Negative
Peripheral smear	Nucleated Red Blood Cells, polychromasia, and normoblasts
Mother's Blood Group	O Positive
Father's Blood Group	A1 Positive
Baby's Blood Group	O Positive

Table 2. Result of phenotypic analysis and antibody screening in parents and the neonate

Antigen detection:	**Father**	**Mother**
D	4+	4+
C	0	4+
c	4+	0
E	4+	4+
e	0	4+
Indirect Coomb's Test (Mother)	3+	
Direct Coomb's Test (Baby)	2+	
Antibodies responsible for hemolysis	Anti-c antibody in mother and baby	

Discussion:

As per the International Society of Blood Transfusion, there are 38 identified blood group systems in human beings so far, of which ABO and Rhesus systems are significant.[1] In the Rh blood group system 49 antigens are identified till now and among them D, c, C, e and E antigens were the most significant antigens causing alloimmunization and Hemolytic Disease of Newborn (HDN).[2] In the past few decades, the administration of anti D immunoglobulin to mothers led to a dramatic decrease in HDN.[3] Now, ABO incompatibility has emerged as the commonest cause of HDN. But about 3-5% cases of HDN are caused by non-ABO and non-Rh (D) antigens.[4] The pathophysiology of HDN due to minor blood group incompatibility is similar to that of Rh (D) incompatibility.[5] The spectrum of the HDN due to minor blood group incompatibility varies from subclinical hemolysis to severe hyperbilirubinemia requiring exchange transfusion or hydrops fetalis.[5,6]

In the present case, mother lacked c antigen and she had a positive indirect Coomb's test (Table 2). The neonate had a positive Direct Coomb's test. Thus the antibody responsible for hemolysis was anti c antibody, the sensitization of which would have happened either during the previous or present pregnancy. The hemolysis and hyperbilirubinemia in the present case was severe enough to require DVET twice. The treatment protocols described for minor blood group incompatibilities are similar to that of Rh D incompatibility. Few authors have also used Intravenous Immunoglobulin (IVIG) in minor blood group incompatibility.[7] The prevalence of alloantibodies other than anti D antibodies among the pregnant women in developing countries varies from 0.3% in the United Kingdom to 0.72% in the USA.[8,9] But prevalence of the same among the pregnant women in developing countries is unknown. Many developed countries have universal screening programs for identifying alloantibodies among pregnant women. Though similar universal screening program is optimal in developing countries also, they will require a huge financial commitment. Till then the treating pediatricians should always consider it as a differential diagnosis in all cases of HDN.

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Compliance with ethical standards

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