A rare case of haemolytic disease of newborn with Bombay phenotype mother

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Abstract:
We are reporting a rare case of severe hemolytic disease of newborn (HDN) with Bombay phenotype mother. A retrospective study of a case with severe haemolytic disease of newborn with Bombay phenotype mother was done. Blood grouping, antibody screening, and lectin study was done on the blood sample of the baby and mother to confirm the diagnosis. Hematological and biochemical parameters were obtained from the hospital laboratory information system for the analysis. Blood group of the baby was A positive, direct antiglobulin test was negative. Blood group of the mother was confirmed to be Bombay phenotype. Hematological parameters showed all the signs of ongoing hemolysis and the bilirubin level was in the zone of exchange transfusion. Due to the unavailability of this rare phenotype blood unit, baby was managed conservatively. Anticipating the fetal anemia and HDN with mothers having Bombay phenotype and prior notification to the transfusion services will be of great help in optimizing the neonatal care and outcome.

Key words: Blood grouping, Bombay phenotype, hemolytic disease of newborn

Introduction
Bombay phenotype is a rare blood group with a prevalence of 0.004-0.005% in South Indian population.¹,² The presence of potent anti H antibodies capable of causing complement activation and intravascular hemolysis is the matter of concern in these people. Both the immunoglobulins, IgM and IgG components, were detected in these patients.² Transfusion support for patients with this phenotype should only be from Bombay phenotype donor, which is rarely available in any blood bank. This case illustrates the importance of blood grouping by the correct method and antibody screening during antenatal period, for early detection of such cases and appropriate management.

Case Report
We had received a sample of newborn baby for blood grouping, direct antiglobulin testing and cross-matching for the purpose of exchange transfusion. On performing the blood group, it was found to be ‘A’ Rh ‘D’ positive, reverse grouping was not done as per the departmental standard operating procedure (SOP) for blood grouping on samples from neonates. Direct antiglobulin test was negative. This baby was born in a peripheral hospital and referred to our center for the management of icterus at 20 h of life. The blood group of the mother was mentioned as O Rh D positive in the cross-match requisition form and mother’s sample was not available as she was admitted in the peripheral hospital. Since the probable diagnosis was hemolytic disease of newborn (HDN) due to ABO incompatibility we had cross-matched one unit of O Rh D positive packed red blood cell unit with the baby’s sample but it was incompatible. Same results were obtained when the test was repeated to rule out the technical error. At this point of time we requested them to get the mother’s sample and did the reverse typing and antibody screening on the serum from the baby’s sample. Reverse blood grouping showed 4+ reaction with the ‘O’ pooled cells and the antibody screening showed a 4+ reaction with the all the three cell panels thus proving the presence of some unexpected antibody against high-frequency red cell antigen. Once the blood sample of the mother was received, blood grouping and the antibody screening was done. The results of the immuno-hematological testing are as shown in the Table 1 indicating that the mother had Bombay phenotype and the anti-H antibody was the reason for hemolysis of the baby’s red blood cells (RBCs). Anti-H present in the mother’s serum was reacting at 4°C, room temperature, and at 37°C and the titer at room temperature was 256. Titer of anti H in baby’s serum was not done. Blood group of the father was A Rh D positive with normal H status. We incubated the 0.5 ml of baby’s serum sample with the 1 ml of packed O red cells at room temperature for one hour. On testing, the adsorbed serum with pooled A cells did not show any agglutination. Blood grouping was done using automated column agglutination technology (AutoVUE, by Ortho-clinical Diagnostics) and antibody screening was done using ID-DiaCell I, II, III cell panels (BIO-RAD, Switzerland). All the immuno-hematological tests
Table 1: Results of immuno-hematological testing

| Blood grouping: Mother’s sample | Antibody Screening: Mother’s Sample | Anti H lectin study (tube technique) |
|---------------------------------|-------------------------------------|-------------------------------------|
| Anti A                          | Anti B     | Anti D | A pooled cells | B pooled cells | O pooled cells | Auto control |
| 0                               | 0          | 4+     | Panel I        | Panel II       | Panel III      |
|                                 | 4+         |        | 4+            | 4+             | 4+             |

The first possibility is ruled out because baby’s serum showed incompatibility with the ‘O’ positive PRBCs on cross-matching and it did not react with pooled ‘A’ cells after removal of anti H by adsorption. Since the baby’s DAT was negative it indicated hemolysis of the all the antibody-coated red cells; antibody elution was not performed. The blood group of the mother was wrongly typed as O positive at the peripheral center, this error would not have happened if serum grouping was done using pooled ‘A’, ‘B’, ‘O’ cells routinely while doing blood grouping. Due to the rarity of this blood group our blood bank did not have any stock of Bombay blood group. Using our departmental rare-donor registry we tried to contact donors with Bombay phenotype but all our efforts failed, as one of the donor had recently donated blood and other two donors were unavailable. The mother was not fit to donate blood as her hemoglobin level was less than 11 gm%. Thus the baby was managed conservatively with phototherapy. This case shows the importance of proper blood grouping and the antenatal antibody screening of the mother.

Theoretically HDN is possible in babies with Bombay phenotype but practically there are no reports in literature. Bhattacharya et al. described a case of young lady with Bombay phenotype who had two successive uneventful pregnancies. Despite the high titer of IgG anti H antibodies (640) babies had escaped HDN. The relative mildness of the disease could be due to the weak expression of these carbohydrate antigens on RBCs in utero and in neonates. In countries like India where Bombay phenotype is more prevalent HDN, even the first baby is at risk for significant hemolysis. In countries like India where Bombay phenotype is more prevalent pregnant women with this rare phenotype must be monitored for the development of anemia in the fetus, and transfusion services must be intimated prior to arranging blood in case HDN is suspected.

Discussion

Hemolytic disease of newborn due to Oh phenotype of mother is a rare event and there are very few published reports. In this case there were two factors which could have caused the hemolysis of the baby’s RBCs. Firstly, it was because of the anti A present in the mother, as the baby’s blood group was ‘A’ positive and secondly, the anti H present in the Bombay phenotyped mother.
DM. Distribution of ABO and Rhesus-D blood groups in and around Bangalore. Asian J Transfus Sci 2010;4:41.

3. Moores PP, Smart E, Gabriel B. Hemolytic disease of the newborn in infants of an Oh mother. Transfusion 1994;34:1015-6.

4. Bhattacharya S, Makar Y, Laycock RA, Gooch A, Poole J, Hadley A. Outcome of consecutive pregnancies in a patient with Bombay (Oh) blood group. Transfus Med 2002;12:379-81.

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