Swisstransfusion Jahreskongress, 05.-06. September 2024, Neuchâtel

Unraveling the Complexity of Fetomaternal Transfusion from an Immunohematological Perspective

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Background

Fetomaternal transfusion, the transfer of fetal red blood cells into the maternal circulation, remains a critical aspect of maternal-fetal immunology. Understanding the causes and potential risks associated with this phenomenon is crucial in managing pregnancy complications.

Aims

This case elucidates a specific case where massive fetomaternal transfusion and inadequate dosage of RhD Immunoglobulin led to the formation of anti-RH1, anti-RH2 and anti-RH12 antibodies.

Methods

The investigation included a comprehensive set of immunohematological techniques as serological typing of ABO and RH (Grifols, CH), direct (DAT) and indirect antiglobulin test (IAT) (ID-system, BioRad/Grifols, CH and SCARF), elution and antibody titration (in-house). We also conducted a G-absorption/elution technique to differentiate between anti-RH1, anti-RH2 and anti-RH12 (in-house).

Results

Due to decreasing child movements, the patient was hospitalized in the 38th week of pregnancy, initially showing a negative antibody screening. Three days later she gave a spontaneous stillbirth with massive fetomaternal transfusion, reflected by mixed field reactions in maternal RH determination. Double dosage of RhD Immunoglobulin was administered postnatal. Anti-D detected in both maternal serum and eluate, supported the suspected perinatal fetomaternal hemorrhage. However, three months later, three alloantibodies were differentiated: Anti-RH1, Anti-RH2, and Anti-RH12.

Summary

The subsequent formation of anti-RH1, anti-RH2 and anti-RH12 antibodies after massive fetomaternal transfusion raised questions about the adequate dosage of RhD immunoglobulin. The ensuing discussion revolves around determining the optimal preventive measures to avert anti-D alloimmunization. Unfortunately, the extent of the fetomaternal hemorrhage was not determined with a suitable method (eg. Kleinhauer-Betke or flow cytometry) as it is recommended to administer additional doses of RhD Ig accordingly to the amount of fetal red blood cells.

With sufficient administration of RhD Immunoglobulin the alloimmunization against the anti-RH1 could have been prevented. Further, clear distinction between anti-RH1, anti-RH2 and/or anti-RH12 is indispensable to provide accurate recommendations for future pregnancies. The subsequent pregnancy, marked by vigilant monitoring and control measures, ultimately resulted in the birth of a healthy baby boy showing the phenotype RH:-1,-2,-3,4,5,-12.