PS-4-8

PREGNANT SCD PATIENT WITH ANTI-D^{w} AMONG MULTIPLE ALLOANTIBODIES

Young-Lan Song[1], Stefan Meyer[2], Gabriella Rizzi[1], Inga Hegemann[3], Christoph Gassner[2], Beat M. Frey[1], Charlotte Engström[1]

[1]Immunohematology, Blood Transfusion Service Zurich, Swiss Red Cross, Switzerland,
[2]Molecular Diagnostics and Flow Cytometry, Blood Transfusion Service Zurich, Swiss Red Cross, Switzerland,
[3]Department of Medical Oncology und Hematology, Zurich University Hospital, Switzerland

Introduction

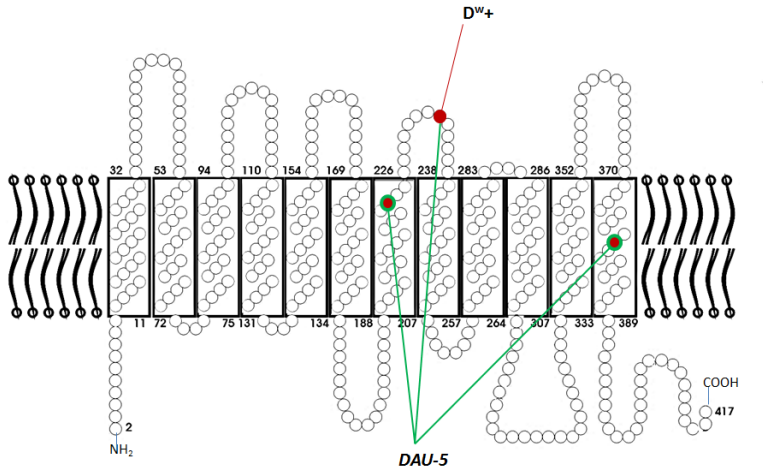
In Switzerland extended antigen-matching for Duffy, Kidd and MNS - besides Rhesus and Kell - is recommended for sickle cell disease (SCD) patients. The ethnic diversity of red blood cell (RBC) antigen polymorphism engender that these patients are often transfused with RBCs from donors of African origin. This strategy, however, increases the likelihood of being exposed to certain low-prevalence antigens, such as D^{w} (Rh23), as these are almost exclusive to African populations [1].

D^{w} is encoded by several types of *RHD*DV* alleles as well as by *DAU-5* (*RHD*10.05*) [2]. Anti-D^{w} is associated with delayed hemolytic transfusion reactions (HTR) and may cause moderate hemolytic disease of the fetus and newborn (HDFN).

Previously, we reported a case of a pregnant woman with SCD and rare anti-Fy^{5} amongst other more common alloantibodies, the latter presumably a consequence of earlier pregnancies (DGTI, 2017). Only four registered Swiss blood donors were compatible to supply her with a total of eight RBC products during pregnancy.

Methods

Standard serological methods were used for antibody specification (BioRad, Cressier, CH and in-house). Crossmatches were carried out by indirect antiglobulin test (IAT) at 37°C. Molecular typing of donors' and parental blood group antigens was performed by PCR-SSP (inno-train GmbH, Kronberg i. T, D and in-house).



(F223V, E233Q, T379M)

Figure 2: Model of the Rhesus D protein on the erythrocyte membrane [3]. Colored circles show the amino acid substitutions endcoding the *RHD* allele *DAU-5 (RHD*10.05)* of the two donors causing positive crossmatches. D^{w} is defined by the amino acid exchange E233Q (red dot).

Results

The patient's predicted phenotype was O R$_{o}$r, K-k+, Fy(a-b-), Jk(a-b+) and D^{w}-.
Pretransfusion testing showed strong positive crossmatches with two of the compatible donors. Further serological analysis (INTS, Paris) revealed an anti-D^{w} in addition to anti-Fy^{5}, anti-E and anti-Jk^{a}.
Genotyping of the two donors causing positive crossmatches presented heterozygosity for *RHD*10.05* which encodes D^{w}.

Figure 1:
positive (3+) crossmatch (IAT, 37°C, gel-card) with RBCs of antigen compatible donor

The newborn's phenotype was A R$_{o}$r K-, Fy(a-b+) and most likely D^{w}- and Jk(a+b+), considering both maternal and paternal (A R$_{o}$r, K-k+, Fy(a-b+), Jk(a+b-), D^{w}-) predicted phenotypes.
The neonatal serum contained maternal anti-A$_{1}$, anti-D^{w} and anti-E.
The direct antiglobulin test was positive but elution only showed nonspecific reactions with papain-treated cells. Latter might have been caused by anti-Fy^{5} possibly in combination with anti-Jk^{a}.
The newborn showed no clinical signs of HDFN.

Conclusion

Recently, we reported a pregnant SCD patient with a specific anti-public-antibody (anti-Fy^{5}) amongst other alloantibodies.
During her present pregnancy we were able to demonstrate that two positive crossmatches of two former compatible donors were caused by a new alloantibody against a low-prevalence antigen, namely anti-D^{w}, derived from several D^{w}+ RBC transfusions during the previous pregnancy.

Despite this challenging blood supply we were able to support the patient with a total of ten antigen compatible and crossmatch negative RBC units from French and Swiss donors until delivery. This case illustrates the growing importance of national and international collaboration for provision of rare blood products.

References

[1] Floch et al., Transfusion, 2018
[2] Flegel et al., Transfusion, 2008
[3] modified from Wagner EF, Flegel WA, Immunohematology, 2004

Acknowledgements

We would like to thank all members at the Service d'immunohématologie spécialisée (CNRGS) of the Institut National de Transfusion Sanguine (INTS) in Paris for confirming our results and supplying us with compatible RBC products - fresh ones as well as frozen ones.