CASE OF D-ANTIGEN BLOCKING IN A NEWBORN WITH SEVERE HDFN

Young-Lan Song[*1,2], Saara Roininen[1], Mascha Frick[1], Nicole Heim[3], Beat M. Frey[1], Sonja Heer[3], Michael Zürcher[1,3], Stefan Meyer[4], Charlotte Engström[1]

[1]Immunohematology, Blood Transfusion Services Zurich, Schlieren ZH, Switzerland
[2]Clinic of Medical Oncology and Hematology, Municipal Hospital Zurich Triemli, Zurich, Switzerland
[3]Blood Transfusion Services Chur, Chur, Switzerland
[4]Molecular Diagnostics and Cytometry, Blood Transfusion Services Zurich, Schlieren ZH, Switzerland

BLUTSPENDE SRK ZÜRICH

BLUTSPENDE SRK GRAUBÜNDEN

Background

- In the presence of hemolytic disease of the newborn due to a maternal antibody, correct antigen determination of the corresponding antigen. in the newborn is absolutely required for plausibility testing of the cause of hemolysis.
- False antigen negativity may lead to further diagnostic testing which in the worst case can cause delay of adequate therapy of the newborn.

Aim

- We report a case of Rhesus D antigen blocking in a neonate with severe hemolytic disease of the newborn caused by high titre maternal (G III, inadequate Rhesus D prophylaxis at G II) anti-D (4096), beside an anti-Jk^a (64) and anti-C (2).
- No intrauterine transfusion during pregnancy were needed.
- After early delivery (week 36 + 0) due to hemolysis and reduced fetal mobility the newborn needed top-up transfusions (ccddee, Jk^a-). Initially, the neonate was typed Ccddee, Jk^a positive and the direct antiglobulin test was strongly positive (IgG 4+, C3d 3+). The eluate showed anti-D, anti-Jka and anti-C.

Methods

- To elucidate the discrepancy between the declared Rhesus phenotype (Ccddee) and eluate specificity (anti-D), a sample (neonate EDTA heel blood) was sent to our reference laboratory.
- Pheno- and genotype analysis was performed using standard techniques including two different saline reactive anti-D antisera (Grifols, Duedingen, Switzerland) and commercially available PCR-SSP kits (inno-train, Frankfurt, Germany).
- The neonatal Rhesus phenotype was reevaluated serologically after dissociating the maternal IgG ab from the RBC by EGA treatment (EDTA Glycine-Acid Kit, Immucor, Dreieich, Germany).
- Direct antiglobulin test was performed using a polyspecific anti-human globulin card (BioRad, Cressier, Switzerland) before and after EGA treatment.
- Standard serological methods for antibody identification were applied (gel-card; BioRad, Cressier, Switzerland) on heat eluted neonate erythrocytes.
- Clinical and laboratory findings of the neonate and postnatal therapies as top-on transfusions and supportive therapy, as well as data on mother's antibody-titres and prior pregnancies were kindly provided to us by the physicians in charge.

Table 1: Antibody titres during pregnancy
WG: week of gestation

Antibody	WG 30	WG 36
Anti-D	64	4096
Anti-Jk^a	4	64
Anti-C	1	2

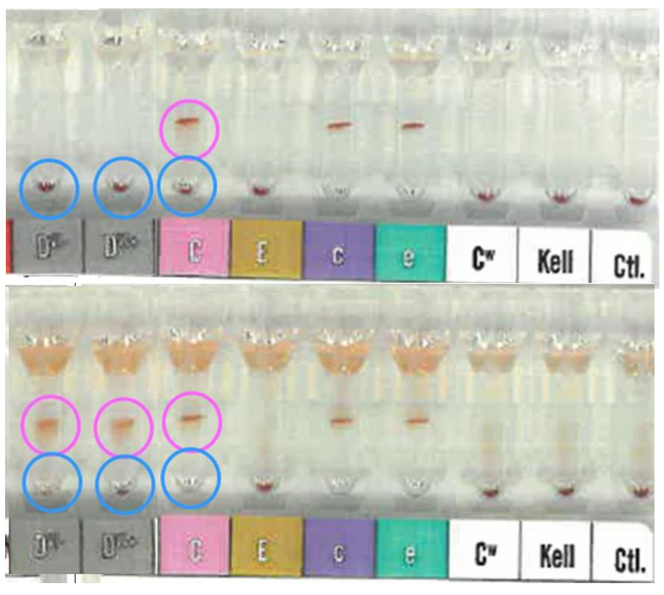

Fig. 1:
Newborn's phenotyping
before(above) and after (below)
EGA treatment
Newborn's phenotype in pink, phenotype of top up transfusion in blue

Parameter	Newborn
Blood group	O RhD neg
Rhesus phenotype	Ccddee, rr', K-
DAT monospecific	IgG4+, C3d 3+
Antigen determination	Jk^a+
Antibody specification **serum/eluate**	Anti-D (4+/4+), Anti-C (+/-/1) Anti-Jk^a(3+/3+)

Table 2:
Initial immunohematological parameters of the newborn

Method	Untreated RBC	EGA-treated RBC
Gel card	D negativ	mixed field with Anti-D
DAT IgG	3+	1+
	ISBT	**Predicted phenotype**
Genotyping	*RHD*01* |. *RHCE*01*|*RHCE*02*	CcD.ee

Table 3:
Serological results of pretransfused newborn's RBC before and after EGA treatment.

Results

- Untreated red blood cells were clearly typed as Rhesus D negative, an observed mix field reaction with anti-C was consistent to the top-up transfusion directly after birth.
- Three consecutive EGA treatments revealed an additional mixed field reaction with anti-D, predicting two separate RBC populations, namely CcD.ee and ccddee.
- The initially strongly positive direct antiglobulin test (IgG 4+, C3d 3+) decreased markedly after EGA treatment (1+), as expected.
- A subsequent genotyping confirmed the suspected serological typing as CcDdee, Jka positive.
- Due to prolonged anemia the newborn received a total of three top-up transfusions (ccddee, Jka negative), directly after birth (Hb 64 g/L), on day 9 (65 g/L) and day 28 (84 g/L).
- Additionally, intensive photo- and O_2-therapy were given to treat hyperbilirubinemia and low saturation levels.

Conclusion

- Here, we present a case of Rhesus D antigen blocking by maternal Anti-D in a neonate initially mistyped as RhD negative.
- After dissociation of maternal high titre IgG by EGA the RhD positive phenotype of neonatal RBC became detectable and was confirmed by genotyping.
- Timely consideration of antigen blocking in cases with severe fetal anemia in the presence of high titre maternal antibodies helps to rapidly establish a diagnosis and to initiate the necessary potential life-saving therapy.

Reference

[1] Sulochana et al Blocked D phenomenon, a rare condition with Rh D haemolytic disease of newborn a case report, Int J Lab Hematol 2008 30 244 247
[2] Lee E Blocked D phenomenon, Blood Transfus 2013 11 10 1

International blood transfusion society (ISBT) congress 2023, Gothenborg

Abstract