Immunohematology Case Studies 2016 - 9

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Clinical History

- A healthy woman with three pregnancies
- Normal first pregnancy
- A healthy girl by ceasarean section due to fetopelvic disproportion

Clinical History

Second pregnancy:

- At 27+5 weeks of gestation, the fetus showed signs of severe anemia and at 28+2 weeks of gestation, the hemoglobin (Hb) was 2.8 g/dL and reticulocytes 44 %
- Two intrauterine (IU) transfusions were needed
- Diagnosis remained unknown

Clinical History

Second baby

- Baby girl was delivered at 31+6 weeks of gestation by with a Caesarean Section, a Hb of 4.3 g/dL
- Newborn was treated with exchange transfusion, RBC transfusion, and platelet transfusion.
- The bilirubin level was 17, rising to 72 at two weeks of age when jaundice was also present, and normalized at four weeks of age. Biliary occlusion was suspected.
- The cause of anemia was unknown, but thought to be of non-immune origin

Serologic History

- In the first pregnancy the antenatal antibody screening was negative
- In her second pregnancy three years later, the antenatal antibody screening was also negative.
- RBCs from the The second baby were negative in the DAT

Current Sample Presentation Data

Third pregnancy

ABO/Rh: AB RhD pos, R1R2

DAT: negative

Antibody Screen Method: IAT gel card (Bio-Rad)

Antibody Screen Results: Negative

Challenge with the Current Presentation

- Mother underwent only the normal antibody screening protocol in her first two pregnancies without further antibody studies

- If the antibody screening is negative, it is easy to think the cause of anemia isn’t of immune origin.

Would you investigate further or conclude that the cause of anemia is not red cell immunization?

Third pregnancy

- In the beginning of third pregnancy, her case was discussed in a multidisciplinary meeting concerning the treatment of immunized mothers
- Given the mother’s history, this time her sample was tested against a full antibody identification panel

Routine Antibody Identification Panel

					Rhesus							MNS				P	Lewis		Kell		Duffy		Kidd		Lutheran			Dombrock		Xg			
Nro	Panel	Cell	ABO	Rh-hr	D	C	Cw	Cx	E	c	e	M	N	S	s	P1	Lea	Leb	K	k	Fya	Fyb	Jka	Jkb	Lua	Lub	Aub	Doa	Dob	Xg	Enz		
1	SPRV-1	1	O	R1r	+	+	0	0	0	+	+	0	+	0	+	+s	0	+	+	0	0	+	+	0	0	+	0	0	+	+	pap	-	-
2	SPRV-1	2	O	R1wR1	+	+	+	0	0	0	+	0	+	+	0	+	0	+	0	+	0	+	+	+	0	+	+	0	+	0	pap	-	-
3	SPRV-1	3	O	R1xR1	+	+	0	+	0	0	+	0	+	+	+	+w	0	+	0	+	+	+	+	0	0	+	+	0	+	+	pap	-	-
4	SPRV-1	4	O	R2R2	+	0	0	0	+	+	0	+	0	0	+	+	0	0	0	+	+	0	0	+	0	+	0	0	+	0	pap	-	-
5	SPRV-1	5	O	R2R2	+	0	0	0	+	+	0	0	+	+	0	+	0	+	0	+	+	+	+	0	0	+	0	+	+	+	pap	-	-
6	SPRV-1	6	O	r'r	0	+	0	0	0	+	+	+	+	0	+	0	0	+	+	+	+	+	+	+	+w	+	0	0	+	+	pap	-	-
7	SPRV-1	7	O	r''r	0	0	0	0	+	+	+	+	+	+	+	0	0	+	0	+	0	+	0	+	0	+	+	0	+	+	pap	-	-
8	SPRV-1	8	O	rr	0	0	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	+	+	+	0	/	+	+	+	+	pap	4+	M2+
9	SPRV-1	9	O	rr	0	0	0	0	0	+	+	+	+	+	+	+	0	+	+	+	+	0	+	+	0	+	0	0	+	0	pap	-	-
10	SPRV-1	10	O	rr	0	0	0	0	0	+	+	0	+	+	+	0	0	+	0	+	0	+	+s	0	0	+	+	0	+	+	pap	-	-
11	SPRV-1	11	O	rr	0	0	0	0	0	+	+	+	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	0	+	+	pap	-	-
12																																-	-

Rare blood group antigens on the basic panel

1	SPRV-1	1	Ch+w	pap	-	-
2	SPRV-1	2		pap	-	-
3	SPRV-1	3	LW(a+b+) Bgb	pap	-	-
4	SPRV-1	4		pap	-	-
5	SPRV-1	5	LW(a-b+) Bgc	pap	-	-
6	SPRV-1	6	Sd(a+s)	pap	-	-
7	SPRV-1	7	Vel var	pap	-	-
8	SPRV-1	8	Ul(a+) Co(a+b+) Bgc Ch-	pap	4+	2+
9	SPRV-1	9	Bga Ch+w	pap	-	-
10	SPRV-1	10	WES(a+) Ch+w	pap	-	-
11	SPRV-1	11	Kp(a+b+) Sd(a-) Ch+w	pap	-	-
12			AUTOK		-	-

Second identification panel

	Rhesus							MNS				P	Lewis		Kell		Duffy		Kidd		Lutheran			Dombrock		Xg	Other phenotypes		
Rh-hr	D	C	Cw	Cx	E	c	e	M	N	S	s	P1	Lea	Leb	K	k	Fya	Fyb	Jka	Jkb	Lua	Lub	Aub	Doa	Dob	Xga			
R1R1	+	+	0	0	0	0	+	0	+	0	+	+	+	0	0	+	+	+	+	0	0	+	+	+	+	+	Kp(a+b+)	-	-
R1xR1	+	+	0	+	0	0	+	+	0	+	+	+	0	+	0	+	+	+	+	0	0	+	+	0	+	0	LW(a-b+) Bga	-	-
R1R1	+	+	0	0	0	0	+	0	+	0	+	+	0	+	0	+	0	+	+	+	0	+	0	+	+	+	Co(a+b+) Bga	-	-
RzR1	+	+	0	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+	0	0	+	+	0	+	0	Yt(a+b+) Inka- Hukka-	-	-
R1wR1	+	+	+	0	0	0	+	+	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	0	/	+	WES(a+)	-	-
R1R1	+	+	0	0	0	0	+	+	0	0	+	0	0	+	0	+	+	0	+	0	0	/	/	/	/	/	Ls(a+)	-	-
R1R1	+	+	0	0	0	0	+	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	0	+	+	+	Ul(a+) Bga	4+	2+
R1wR1x	+	+	+	+	0	0	+	+	0	0	+	+	0	0	0	+	+	+	0	+	0	+	0	+	+	+	Bgc Rh:-51	-	-
R1R1	+	+	0	0	0	0	+	0	+	0	+	+	0	+	0	+	+	0	+	0	0	+	0	+	0	+	Co(a+b+) Bga Bgc	-	-
R1wR1	+	+	+	0	0	0	+	+	0	+	0	0	0	+	0	+	+	0	0	+	0	+	0	+	0	+	Kp(a+b+)	-	-
R1xR1	+	+	0	+	0	0	+	+	+	+	+	0	+	0	+	+	0	+	+	0	0	+	0	0	+	+	Bgc Sd(a-) Hukka-	-	-
																											AUTOK	-	-

Mother’s phenotype

C+ E+ c+ e+ K- Ul(a-) Fy(a-b+) Jk(a-b+) S+ s+ LW(b-)

Interim Antibody Identification

- Anti-Ul^a (KEL) antibody was identified

- Ul^a is a low-prevalence antigen in the KEL blood group system (KEL10)
- Ul^a was named after the last letters of the antibody maker (Karhula)
- The prevalence of Ul^a is <0.01% in most populations but was reported to be 0.46% in Japanese and 2.6% in Finns

Further Work

- Next follow-up sample was requested after in 1 month for identification and titration
- Sample of the father was requested for phenotyping
- Anti-Ul^{a} titer was 2 (IAT tube method)
- Father was typed Ul(a+) positive

Updated Clinical Information

Third pregnancy

- At 25+1 weeks of gestation, the fetus was hydropic and anemic,
    - (the PSV of the MCA was >1.5 MoM
- Umbilical cord sampling at 25+5 weeks revealed a Hgb of 2.8 g/dL)

- Altogether six IU transfusions were performed between 26+0 and 33+6 weeks.

- A baby girl was delivered by caesarean section at 35+1 weeks,
    - Hgb of 10.9 g/dL, a reticulocyte count of 2.3 %,
- The newborn received RBC transfusion and phototherapy was given 4 times until age of 4 days

Further Testing Results and Interpretations

- Mother:
  - The anti-Ul^{a} titer was 4 after delivery
- Newborn:
  - A positive DAT
  - Phenotyped Ul(a+)

- The two older children were also phenotyped Ul(a+)

Conclusions

The possibility of a rare antibody as the cause of severe HDFN should be kept in mind in cases where the antibody screening has been negative, and further antibody detection studies should be performed as part of fetal anemia investigations.

HDFN may develop even when the antibody titers are low. In the case of a pregnant woman with anti-Ul^a, close ultrasound monitoring of the fetus is important.

Summary of Case Challenges

- When the antibody screening result is negative, antibody identification will not be performed (without history of previous antibodies)

- Antibody screenings were negative and therefore, the cause of HDFN was suspected to be other than RBC immunization

Lessons Learned by the Case

- In cases of unknown fetal or newborn anemia, antibody identification can be useful even if the antibody screening has been negative

- HDFN may develop even when the antibody titers are low. In the case of a pregnant woman with anti-Ul^{a}, close ultrasound monitoring of the fetus is important

- Close collaboration between the immunohematology laboratory and the obstetric unit is essential

References

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