

FEATURED CASE #19-08

(Case study by Jim Perkins, © 2019)



History: A 74 year old woman fell while playing tennis in Italy sustaining a femoral neck fracture. Three days later, after returning to the U.S., she was admitted to the hospital where she underwent a total hip arthroplasty on the third hospital day. The patient had delivered 3 children. She had pernicious anemia for which she received monthly vitamin B12 injections, and her admission hemoglobin (hgb) was 12 G/dL. On post-operative day 3 her hgb was 9.0, and because of concern that her anemia might compromise her rehabilitation she was transfused 2 units of RBCs, finishing early on the 4th post-op. day, and was discharged. Pretransfusion testing performed on admission and on post-op. day 3 demonstrated that she was group A, Rh positive and her blood group antibody screen by the “gel” column agglutination method was read as negative on both occasions. Of note, the patient was 5’2” tall and weighed 48.5 KG. Her pulse rate hours before and after transfusion was 80/min. the pulse did increase to 102 at the end of the first unit, but there was no fever. The following day she was discharged to a rehabilitation facility with a hgb of 11.8.

Thirteen days after the transfusion the patient reported fatigue, loss of appetite, and brown urine at the rehabilitation facility, and she was re-admitted to the hospital. Her hgb was 9.8. The urine now appeared clear and straw colored; there was “3+ blood” but only 5-10 RBCs/hpf. The total bilirubin was 1.8 mg/dL and dropped to 0.8 the following day (it was 1.4 on admission for fracture). The following immunohematologic test results were obtained:

ABO and Rh Typing

<A	<B	A1 cells	B cells	6% alb	<D	<D/AHG	CCC	Interp
4+	0	0	4+		4+			

Antibody Screen

	Gel
SCI	0
SCII	4+

Direct Antiglobulin Test (tube)

	Poly	IgG	<C3
AHG	0		
CCC	2+		

Initial panel, post-transfusion specimen

Lot# 8RA186	Rh system	Kell												Duffy		Kidd		Xg	Lewis		MNSs				P	Lutheran		Other			
Cell	Rh	D	C	E	c	E	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b	Typings	Cell	Gel	
1	R1wR1	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	0	+	0	+	0	+	0	+	+	0	+	C ^w	1	0	
2	R1R1	+	+	0	0	+	0	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	0	+	0	+		2	0
3	R2R2	+	0	+	+	0	0	0	+	0	+	0	+	0	+	+	+	+	0	+	+	0	+	0	+	0	+		3	4+	
4	Ror	+	0	0	+	+	0	0	+	0	+	+	+	0	0	+	+	+	0	0	0	+	+	0	+	0	+		4	3+	
5	r'r	0	+	0	+	+	0	0	+	0	+	0	+	0	0	+	+	0	+	0	+	+	0	+	+s	0	+		5	2+	
6	r''r	0	0	+	+	+	0	0	+	0	+	0	+	+	+	0	+	+	0	+	0	+	0	+	+	0	+		6	3+ ^s	
7	rr	0	0	0	+	+	0	+	+	0	+	0	+	0	+	+	+	+	0	0	0	+	+	0	+	0	+		7	3+	
8	rr	0	0	0	+	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	0	+		8	3+
9	rr	0	0	0	+	+	0	0	+	0	+	0	+	0	+	0	+	0	0	+	0	+	0	+	0	0	+		9	3+	
10	rr	0	0	0	+	+	0	0	+	0	+	+	+	0	0	+	0	+	0	0	+	+	+	+	+s	0	+		10	3+	
11	R1R1	+	+	0	0	+	0	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	0	+	0	0	+		11	0	

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Questions:

1. What blood group antibody(ies) do you think is present? Is more work needed to prove this hypothesis? What do you think is going on here clinically? What testing would you like to do to investigate this possibility?

The following additional workup was performed:

Selected cells, post-transfusion specimen

Cell	Rh	Rh system					Kell					Duffy		Kidd		Xg	Lewis		MNSs				P	Lutheran		Other Typings	Cell	Gel	
		D	C	E	c	E	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Le ^a	Le ^b	S	s	M	N	P1				Lu ^a
1	RzR1	+	+	+	0	+	0	0	+	0	+	0	+	+	+	0	+	0	+	0	+	+	0	+	0	+		1	4+
2	RzR1	+	+	+	0	+	0	0	+	0	+	0	+	+	0	+	+	0	+	0	+	+	+	+	0	+		2	4+
3	RzR1	+	+	+	0	+	0	0	+	0	+	+	+	+	0	+	+	+	0	0	+	+	+	+s	0	+		3	4+
4	R1R1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	+	+	0	+	0	+	0	+	0	+		4	0

Extended Phenotype (controls not shown)

	Rh system				Kell				Kidd		Duffy		Lewis		MNSs				I	H	A ₁									
	C	E	c	e	K	k	Kp ^a	Js ^a	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	S	s	M	N							P1					
Patient	+	0	0	+																										
Unit #1		+	+																											
Unit #2		+	0																											

Transfusion reaction workup

	ABO and Rh Typing						DAT (tube)	Antibody screen, gel		AHG crossmatch (saline/tube IAT w 4 drops plasma)					
	<A	<B	A1 cells	B cells	<D	Interp	Poly	SCI	SCII	Donor 1			Donor 2		
										IS	37°, 30'	AHG	IS	37°, 30'	AHG
Pre-transfusion specimen	4+	0	0	4+	4+		0	0	w+						
Post-transfusion specimen	4+	0	0	4+	4+		0	0	4+	0	2+	4+	0	2+	4+

FEATURED CASE #19-08

Selected cells, pre-transfusion specimen, PEG/tube technique

Cell	Rh	Rh system						Kell						Duffy		Kidd		Xg		Lewis				MNSs				P	Lutheran		Other Typings	Cell	AHG
		D	C	E	c	e	V	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Xg ^a	Le ^a	Le ^b	S	s	M	N	P1	Lu ^a	Lu ^b						
1	RzRz	+	+	+	0	0	0	0	+	0	+	0	+	+	+	0	+	0	+	+	0	+	+	0	+	+	0	+	+		1	0	
2	rr	0	0	0	+	+	0	+	0	0	+	0	+	0	+	+	0	+	0	+	+	+	+	0	0	+		2	2+				

2. Questions:

Is the hypothesis regarding the patient's post-transfusion antibody specificity proved? What about the hypothesis regarding the DHTR? Are there any surprises in this workup? How might this transfusion reaction have been avoided?

The patient was not transfused after being readmitted. The adjacent figure shows the time course of the patient's hemolytic reaction.

Patient Hemoglobin levels

