Case Study: Identification of Anti-Jk^a and Its Clinical Significance When Reactive at Immediate Spin

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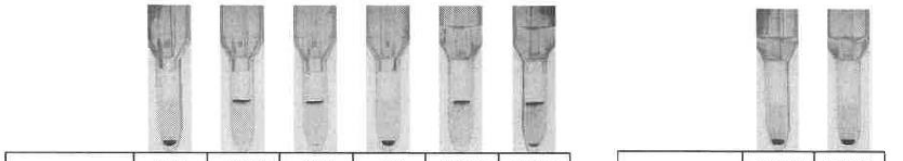
Background/Case Studies: In 1951 anti-Jk^a was identified and named for Mrs. Kidd's sixth child, John Kidd, who was diagnosed with hemolytic disease of the newborn. The antithetical antibody, anti-Jk^b, was discovered 2 years later. The Kidd Blood Group (JK) is located on chromosome 18 and its products are the Kidd glycoprotein and the urea transporter UT-B. Kidd antigens are found on red blood cells (RBCs) and kidney cells but are absent from white blood cells (WBCs) and platelets. The Jk^a antigen is commonly expressed by 77% of Caucasians, 92% of Blacks, and 72% of Asians. Reactivity is enhanced by enzymes and unchanged by dithiothreitol (DTT).

Anti- Jka may be IgG, IgG plus IgM, or IgM. Its optimal testing technique is Indirect Antiglobulin Test (IAT) using enzymes, polyethylene glycol (PEG), or column agglutination technology (CAT). Anti- Jka can bind complement when IgM is present and can cause hemolysis. Transfusion therapy is sometimes complicated by anti- Jka as serologically detectable levels of the antibody can wax and wane and are often associated with delayed hemolytic transfusion reactions.

In this case, anti- Jk^a was detected in an 83-year-old female who presented on 2/3/2021 with septic shock and deep vein thrombosis (DVT). Her hemoglobin was 6.3 g/dL and hematocrit was 19.6%. The hospital blood bank found an ABO discrepancy and submitted a sample to the Immunohematology Reference Lab (IRL) for resolution.

Study Design/Methods: On 1/20/2021, the patient tested as Group B, Rh positive with a negative antibody screen by CAT. She was subsequently transfused with 2 Group B, Rh positive RBC units and was discharged. When the patient returned on 2/3/2021, her antibody screen was still negative, but an ABO discrepancy was detected.

Using the Ortho Vision® analyzer the hospital results showed the forward type as Group B and the reverse type as Group O by CAT. Mixed field agglutination was noted in the B cells column. Weaker reactivity was observed with B cells using Prewarm Method. Cell 1 of the two-cell antibody screen was undetermined but when inspected visually, it was determined to be negative. Cell 2 was negative by automated results and visual inspection.



Result	Anti-A	Anti-B	Anti-D	Ctrl	A1-Cells	B-Cells
Original	0	4+	4+	0	4+	3+
Modified						

Result	0.8-Sel I	0.8-Sel II
Original	?	0
Modified	0	

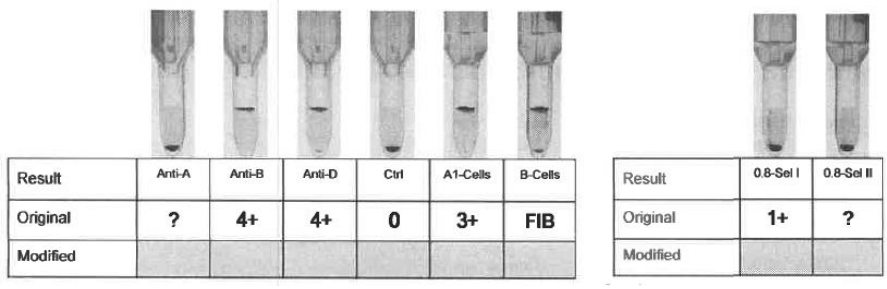
Figure 1: Initial ABO/Rh and Antibody Screen testing performed by the referring hospital.

One group O RBC tested for compatibility by immediate spin was 2+ reactive. The hospital performed the saline replacement technique to address the unexpected reactivity; however, neither the reverse grouping nor the compatibility testing was resolved (see Table 1).

Hospital Testing	Donor RBC	Reverse Cells	
	O	A_1	B
Immediate Spin (IS)	2+	4+	3+
Saline replacement	1+	4+	1+

Table 1

A new patient sample was collected, and testing was repeated. The forward type showed questionable results with Anti-A and no change with Anti-B. The reverse type showed slightly weaker reactivity with A1 cells and questionable results with B cells (FIB*) as shown in Figure 2. The antibody screen showed Cell 1 as 1+ and questionable results were given for Cell 2.



Result	Anti-A	Anti-B	Anti-D	Ctrl	A1-Cells	B-Cells
Original	?	4+	4+	0	3+	FIB
Modified						

Result	0.8-Sel I	0.8-Sel II
Original	1+	?
Modified		

Figure 2: Testing results for second sample. FIB = fibrinogen

Because of the ABO discrepancy and variable results using CAT, the sample was sent to the Red Cross IRL in Columbus for investigation. Initial testing by the IRL was as follows in Tables 2, 3, and 4.

ABO/RH Tube Method	Anti-						Cells				
	A	B	A,B	A_1	D	Ctrl	A_1	A_2	B	$*A_1$	*B
IS	0	4+			4+		4+		$+^W$	4+	$+^W$

Table 2

* Saline Replacement

DAT-Tube Method			
	IgG	C3	Control
IS	$+^m$	0	0
RT		$+^W$	0

Phenotype (Pre-Tx cells)				
C+	c-	E-	e+	K-
Fya+	Fyb+	Jka-	Jkb+	
M+	N+	S+	s+	

Table 3

	D	C	E	c	e	f	K	k	Fy^a	Fy^b	Jk^a	Jk^b	Le^a	Le^b	P_1	M	N	S	s		IS	*	PEG		LISS	
																							IgG		37°C	IgG
1	+	+	0	0	+	+	0	+	0	+	+	0	0	+	w	+	0	+	0		2+	2+	2+		0	$+^w$
2	+	0	+	+	0	0	0	+	+	+	0	+	0	+	+	+	+	0	+		$+^m$	0	$0^✓$		0	$0^✓$
3	0	0	0	+	+	+	+	+	+	0	+	0	+	0	+	0	+	+	+		2+	2+	2+		0	$+^w$
4	+	+	0	+	+	+	+	0	+	+	0	+	0	0	w	+	o	+	+		$+^m$	0	$0^✓$		0	$0^✓$
5	+	0	+	+	0	0	0	+	0	+	0	+	+	0	0	+	0	+	0		$+^m$	0	$0^✓$		0	$0^✓$
6	0	0	0	+	+	+	0	+	+	0	0	+	0	0	0	0	+	0	+		$+^m$	0	$0^✓$		0	$0^✓$
7	+	+	0	0	+	0	0	+	0	+	+	0	0	+	w	+	0	+	0		2+	2+	2+		0	$+^w$
																		Auto			$+^m$	0	$+^W$		0	$+^w$

Table 4 *Saline Replacement

Rouleaux seen with immediate spin testing was resolved using saline replacement technique. The panel revealed anti- Jk^a at immediate spin, LISS-AHG, and PEG-AHG. Reverse cells negative for Jk^a were used to resolve the ABO discrepancy.

An elution was performed using tube testing with no reactivity observed. Since a delayed transfusion reaction was suspected, the IRL attempted to perform a second elution using a more sensitive method; however, the sample amount was insufficient to prepare a second eluate.

Conclusions: Anti- Jk^a was identified in the patient's plasma even though the antibody screen initially did not seem to indicate an antibody was present. Although the automated CAT instrument did not clearly show an antibody, it was able to flag results that should be investigated.
The IRL's investigation using LISS and PEG clearly demonstrated the anti-Jk^a. This case is an excellent example of how reactivity may vary using different methods and how an antibody of clinical significance could be missed by attempting to prewarm immediate spin reactivity prior to antibody identification.

References

- Reid, Lomas-Francis. The Blood Group Antigen FactsBook. Third Edition, 2012.
- Issitt P, Anstee D. Applied Blood Group Serology, Fourth Edition, 1998.