New York Blood Center

Practical Problems in Transfusion Medicine

Immunohematology Case Study 1

Part 2: Analysis of Initial Test Results and Further Studies

Observation:

The patient's serum reacts in the antihuman globulin (AHG) phase with all three antibody detection cells. The reaction strength is identical (2+) with all cells.

Possible causes:

- The patient's serum may contain a single antibody that reacts with an antigen present on all three cells.
- The patient's serum may contain more than one antibody, and each reagent cell is reacting with at least one of them.

Observation:

Typing results of the patient's red cells indicate that she is Group A, Rh(D) positive. However, her red cells react only 2+ with anti-A, somewhat weaker than would be expected with a normal strength A antigen.

Possible Causes:

- The patient's red cell type may be a subgroup of A.
- The patient's blood sample may contain Group O as well as Group A red cells.

Communication with the Intensive Care Unit (ICU)

You tell the ICU that the patient presents a serological problem and that further studies are in progress. You also request information about the patient's transfusion history.

After talking with the patient the ICU physician calls you back. The patient says she was hospitalized last month after an automobile accident while vacationing in another state. She received some blood transfusions and remembers being told she needed a special type. The physician says they will monitor the patient and check back with you in an hour to see what additional information you may have at that time. In the meantime your supervisor places a call to the out-of-state hospital.

Antibody Identification Studies:

Panel Study - LIS added

	Rh-hr					Kell		Kidd		Duffy		Lewis		MNSs				P			(Anti-IgG)
cells	D	C	E	c	e	K	k	Jk^a	Jk^b	Fy^a	Fy^b	Le^a	Le^b	M	N	S	s	P_1	RT	37°C	AHG
1	+	+	0	0	+	0	+	+	0	0	+	+	0	0	+	0	+	+	0	0	0
2	+	+	0	0	+	+	+	0	+	+	0	0	+	+	+	0	+	+	0	0	2+
3	+	0	+	+	0	0	+	+	+	+	+	+	0	0	+	+	+	0	0	0	2+
4	+	0	+	+	0	0	+	0	+	+	0	0	0	+	0	+	0	+	0	0	2+
5	+	0	+	+	+	0	+	+	+	0	+	0	+	0	+	0	+	0	0	0	2+
6	0	0	0	+	+	0	+	0	+	0	+	+	0	+	0	+	0	0	0	0	2+
7	0	0	0	+	+	+	+	+	0	+	0	0	+	+	+	+	+	+	0	0	2+
8	0	0	0	+	+	0	+	+	0	+	+	0	+	0	+	+	+	+	0	0	2+
9	+	0	0	+	+	0	+	+	+	0	+	0	0	+	0	0	+	+	0	0	2+
10	+	0	0	+	+	0	+	+	0	0	0	+	0	+	+	0	+	0	0	0	0
auto																			0	0	1+mf

HELPFUL FACTS
Positive Autocontrol

A test of the patient's serum with his/her own cells is always included in antibody identification studies. A positive autocontrol may indicate that

- the patient's serum contains autoantibody.
- the patient's serum contains alloantibody directed toward an antigen that is present on donor cells in the patient's sample. In this case, the reaction is generally weak and displays a mixed field pattern.

The autocontrol may also be reactive if the patient has a drug-induced positive DAT.

Direct Antiglobulin Test (DAT)

Tests of cells with:

Polyspecific AHG	Anti-IgG	Anti-C3
1+ mf	1+ mf	0

Repeat ABO Typing

Tests of cells with:

Anti-A	Anti-B
2+ mf	0

Phenotyping Tests

Cells tested	Tests of cells with:				
	Anti-C	Anti-E	Anti-c	Anti-e	Anti-K
Patient	3+	1+ mf	3+ mf	3+	0
Ag pos control	3+	3+	3+	3+	3+
Ag neg control	0	0	0	0	0

- **What can you conclude from these serological results?**
- **What additional testing is needed to resolve this problem?**
- **What type of blood would you provide at this point if the physician feels there is a critical need to transfuse the patient immediately?**
- **What risks are involved with immediate transfusion?**
- **What other information would be helpful?**

HELPFUL FACTS

Mixed Field Agglutination (mf) is the reaction pattern that occurs in serologic testing when one population of red cells in the sample is reactive and another population is non-reactive.

- It is best seen by reading tests microscopically; large agglutinates are visible over a background of free cells.
- It is frequently seen in tests of red cells from patients who have been recently transfused or received stem cell transplants.

HELPFUL FACTS

Direct Antiglobulin Test (DAT)

The DAT detects antibody (IgG) and complement (C3) bound to red cells *in vivo*.

A positive test with anti-IgG may indicate:

- autoantibody bound to the patient's own cells
- alloantibody bound to circulating donor cells
- maternal antibody bound to neonate cells

C3 may also be present

- **with** IgG if the antibody is capable of binding complement.
- **without** IgG if complement has been bound by an IgM antibody, such as a cold-reactive autoantibody.*

*IgM reacts at temperatures below 37°C and will not remain attached to cells *in vivo*. It is not detected by the DAT.

Some medications may also cause a positive DAT.