Immunohematology Case Studies
2019 - #10

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Clinical History

- A 60 year old Finnish woman, with a Caesarean Section and one RBC transfusion previously
- She needed hand surgery because of a trauma.
- Two RBC units were transfused
- After the operation, she got post-operative infection and needed another surgery
- After the second operation Hgb was 83g/l
Serologic History

• Antibody screening was negative before the first operation
• After the second operation antibody screening was positive and all antibody identification panel cells were positive at the university hospital laboratory
• A sample was sent to the national reference laboratory for further antibody identification with an urgent need of blood transfusion
Current Sample Presentation Data

ABO/Rh: O RhD negative
DAT: weakly positive
Antibody Screen Method: IAT gel column
Antibody Screen Results: positive
Antibody Identification Method: gel column and tube, both with papain treated cells (direct aggl.) and untreated cells (IAT)

Antibody Identification Preliminary Results: all test cells reacted strongly
Challenge with the Current Presentation

- All panel cells were positive, autocontrol positive, DAT weakly positive
- Panagglutinin or an antibody against high prevalence antigen?
- Phenotype: C- E- c+ e+ K-, Jk(a+b+), P+
- Excluded anti-Jk3 and anti-P
- All crossmatched units (C- E- K-) were incompatible, but because the patient needed a transfusion, two of them were sent for transfusion
## Basic panel

### Gel and tube methods

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Interim Antibody Identification
Possible Answers and Next Steps

• Anti-Jk3 and anti-P antibodies were excluded.
  • They are the most common antibodies against high prevalence antigens enhanced by papain treatment in the Finnish population
• Blood transfusion was needed urgently in night time and it was not possible to use any special methods for antibody identification at that time.
• Incompatible RBC units were sent to the hospital with a warning of a possible transfusion reaction
Updated Clinical Information

• After the transfusion of first incompatible RBC unit patient had a acute hemolytic transfusion reaction and needed intensive care

• A day after the transfusion reaction, a surgeon called to the reference lab to ask what kind of blood to transfuse and to tell about the transfusion reaction. He wanted to transfuse more blood before moving the patient to another hospital
Further Work

- k phenotype was performed to exclude $K_0$
- Patient’s phenotype proved to be $K$-k-
- DTT-treated antibody identification panel cells were prepared and tested with patient’s plasma

|     | D | C | Cw | Cx | E | c | e | M | N | S | s | P1 | Lea | Leb | K | k | Fya | Fyb | Jka | Jkb | Gel | DTT | IAT |
|-----|---|---|----|----|---|---|---|---|---|---|---|----|-----|-----|---|---|-----|-----|-----|-----|-----|-----|
| 1   | + | + | 0  | 0  | 0 | + | + | 0 | + | 0 | + | +s | 0   | +   | +  | 0  | 0   | +   | +   | 0   |
| 2   | + | + | 0  | 0  | 0 | 0 | + | 0 | + | + | 0 | +w | 0   | +   | 0   | +  | ++  | 0   | ++  | +   |
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| 10  | 0 | 0 | 0  | 0  | + | + | + | 0 | 0 | + | 0 | 0  | +s  | 0   | 0   | +   | +   | 0   | +   |
| 11  | 0 | 0 | 0  | 0  | + | + | + | + | + | 0 | 0 | +  | 0   | 0   | 0   | +  | ++  | +   | +   | 0   |
| Auto|    |   |    |    |   |   |   |    |    |    |    |    |      | 2+  |     |   |   |      |     |     |     |

International Society of Blood Transfusion
Further Work

- Anti-Ku (anti-KEL5) antibody was suspected, other antibodies excluded (with DTT treated cells only)
- One frozen O RhD pos K₀ RBC unit was crossmatched for the patient and it was compatible
Genotyping Results

- Genotype was tested with RBC-Ready Gene KKD (SSP), Innotrain and IDCORE\textsuperscript{XT}(SSO), Grifols kits
- \textit{KEL}^{*}01 was neg but \textit{KEL}^{*}02 pos with both kits

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\textit{KEL}^{*}01 was neg but \textit{KEL}^{*}02 pos with both kits.
Further Testing Results and Interpretations

- Patient’s two siblings and a daughter were tested
  - all were K- k+
- KEL sequencing revealed *KEL*02N.19 corresponding to the c.2023 C>T change, predicted to encode the p. Arg675Ter amino acid change
  - first described in Austria (Körmöczi et al 2007)
- $K_0$ phenotype was confirmed
Updated Clinical Information

- In Finland
  - only one other K₀ person, who is O RhD pos and unable to donate anymore
  - one frozen O RhD pos K₀ unit (→ could have been used for this patient in emergency)
- The patient needed another operation later
- One O RhD neg K₀ unit was received from Japan and frozen to wait for a possible transfusion
- Both K₀ units were crossmatched to confirm the antibody identification and they were compatible
- Before the operation the patient donated two times for herself and units were frozen
Summary of Case Challenges

• Antibody was undetectable before transfusion
• Positive autocontrols caused staff to think this was an autoantibody
• Only one other known anti-Ku reported in Finland → no one thought this case could be another one
• Used genotyping methods that did not recognize the $KEL^{*02N.19}$ mutation
• No O RhD neg K₀ donors available in Finland
Lessons Learned by the Case

• Alloantibodies can cause positive autocontrol, if a patient has received recent blood transfusions
  • Look for mixed field
    • Tube test is better at detecting mixed field than gel test
  • Eluate may help allo vs. auto antibody determination
• When suspecting an antibody against a high prevalence antigen, remember also null types
ISBT Terminology of the System

Kell Blood Group System

- ISBT symbol KEL (006)
- 36 antigens
- Chromosomal location 7q33
- Several null alleles
Brief Review of the Blood Group Antibody

- K₀ persons can make anti-Ku antibody
- Anti-Ku is potentially clinically significant
  - Hemolytic transfusion reactions reported
  - Hemolytic Disease of the Fetus and Newborn reported
References

Clinical Significance of an Alloantibody against the Kell Blood Group Glycoprotein.

Genetic diversity of KELnull and KELel: a nationwide Austrian survey.

Kell and Kx blood group systems.
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