HEMOLYTIC DISEASE OF THE NEWBORN DUE TO UNRECOGNISED ANTI-Kp^a ANTIBODY

Ivana Talić Drlje[1,2] & Jurica Arapović[1]

[1] School of Medicine, University of Mostar, 88 000 Mostar, Bosnia and Herzegovina

[2] University Clinical Hospital Mostar, 88 000 Mostar, Bosnia and Herzegovina

Received on 26.08.2024. *Reviewed on 29.08.2024.* *Accepted on 08.11.2024.*

ABSTRACT

Background: Kp^a occurs in less than 2 percent of the Caucasian population. Antibody to this low frequency antigen causes mild to moderate delayed hemolytic transfusion reactions and hemolytic disease of fetus and newborn. Screening for antibodies to low frequency antigens such as Kp^a is not routine, so sensitization is more difficult to diagnose.

Case report: We present a case of hemolytic disease of the newborn due to anti-Kpa antibody unrecognised during regular considered first pregnancy.

Results: Newborn, blood group O RhD positive**,** has been diagnosed with neonatal jaundice and positive direct antiglobuline test. Mother's screening test for irregular antibodies was negative three times during pregnancy. Elution was negative with screening red blood cells, but in identification using gel technology with cell's panels, anti- Kp^a has been identified.

Conclusion: Screening for antibodies to low frequency antigens such as Kp^a is not routine, so immunisation to low incidence antigens is hard to diagnose, but very important. This case should alert us that there really is potential of antibodies to low incidence antigens to cause severe reactions.

Keywords: Kell blood group system; Hemolytic disease of newborn; red cell alloimmunisation

Corresponding authors: Ivana Talić Drlje, ivanatalic@yahoo.com & Jurica Arapović, jurica.arapovic@mef.sum.ba

INTRODUCTION

The Kell blood group system is complex and contains many highly immunogenic antigens (1). Antibodies against these antigens are usually immunoglobulin class G. Anti-K, anti-k, and anti- Kp^a can cause severe hemolytic transfusion reactions (HTR), and severe hemolytic disease of the fetus and newborn (HDFN). Following ABO and Rh blood group system antibodies, antibodies to Kell blood group system are the most common immune red cell antibodies. It is very important and well known that the titer of anti-K does not correlate with the severity of HDFN because these antibodies cause suppression of erythropoiesis in the fetus and severe anemia(1) (2). Kp^a occurs in less than 2 percent of the Caucasian population. This low frequency antigen causes mild to moderate delayed hemolytic transfusion reactions (DHTR) and HDFN (3). Kell antigen as highly immunogenic is the common cause of antibody production in mismatched blood transfusions, HTR and maternal alloimmunization, which causes severe anaemia in neonates. However, among the anti-Kell antibodies anti-Kp^a is extremely rare antibody (4) (1).

CASE PRESENTATION

We report a case of hemolytic disease of the newborn (HDN) caused by unrecognized anti- Kp^a alloantibody. We recieved blood sample from baby who was diagnosed as neonatal jaundice in first day of his life. Baby was blood group O RhD positive; Rh phenotype CCee and K antigen negative. Direct antiglobulin test (DAT) was positive, DAT IgG positive. Eluat indirect antiglobulin test (IAT) was negative, but an anti- Kp^a was diagnosed by identification using gel technology with commercially made cells panels. So, we searched for mother's history of laboratory findings. It was her first pregnancy, with no abortion, blood transfusion or transplantation previously. She was blood group B RhD positive; Rh phenotype CCee and K antigen negative. According to our procedure IAT was performed three times during this pregnancy, but she has never been diagnosed with positive IAT. Since anti- Kp^a was eluted from babies red blood cells after delivery, we performed IAT again. It was negative but in identification using gel technology with commercially made cell's panels anti- Kp^a has been identified. Mother was typed as Kp^a negative, newborn and father as Kp^a positive. Laboratory findings of the newborn are presented in the Table 1.

Table 1. *Laboratory findings of the newborn*

Day of life	Erythrocytes (3,90-5,5)	Hemoglobin (136-199)	Hematocrit (0,391-0,585)	(150-450)	Total bilirubin (0-100)	Direct bilirubin (10)
1	5,56	178	0,541	138	108,8(0-100)	15,0
2					180,5(0-100)	15,9
3	5,94	196	0,542	86	303	19,9
4					256,7 (0-200)	23,5
5	5,15	158	0,458	132	214,8	25,3
6					204,3 (0-200)	27,3
7	5,39	166	0,490	164	182,8(0-200)	16,1
10	4,78	143	0,425	158	125,2 (0-200)	20,0
11	5,14	153	0,458	184		
13	4,74	139	0,420	294	58,2 (0-200)	14,0
15	4,73	141	0,410	393		
25	3,39	99	0,290	473		

Newborn has been treated with phototerapy and immunoglobulins.

DISCUSSION

As abovementioned Kell blood group system contains many highly immunogenic antigens which antibodies following ABO and Rh blood group system are the most common immune red cell antibodies. Although antibodies to low frequency antigen Kp[a] were identified in 2-5 percent of those multiple transfused patients with alloantibodies, there are just few cases reported with haemolytic reaction caused by anti- Kp[a]. In literature there is a case of an eldery woman who was presented with sudden onset of rigorous chills, elevated temperature, tachycardia, hypertension and uremia, elevated creatinine, positive DAT, and low haptoglobin in laboratories testing. This acute haemolytic reaction was caused by serologic detected anti- Kp[a] antibody (5). There is a case of severe DHTR attributed to anti- Kp[a] after multiple red blood cell (RBC) transfusions. It was a 52-year-old Caucasian woman who received multiple units of RBCs for a lower gastrointestinal bleed. As antibodies screening was negative anti- Kp[a] was identified when an additional RBC panel was tested (6). Likewise it is well known that the titer of anti-K doesn't correlate with the severity of HDFN because antibodies causes suppression of erythropoiesis in fetus and severe anemia. There is reported a case involving anti- Kp[a] in which one twin was anemic and the other was not. The laboratory findings and clinical course of the affected twin showed suppression of erythropoiesis in addition to immune RBC destruction. PCR-based assays showed affected twin was KEL*841T/C (KEL*03/KEL*04), which is predicted to encode Kp(a+b+) an the other was KEL*841C/C (KEL*04/KEL*04), which is predicted to encode Kp(a–b+). It was the first reported case of probable suppression of erythropoiesis attributable to anti-Kp[a] (2). There is also a reported case of fetal hydrops in third pregnancy for which no cause was found as the antibody screening cells used to investigate the fetal hydrops were Kp[a] negative. After that in fourth pregnancy during routine antenatal screening in 17 weeks gestation anti- Kp[a] was detected (7). There is also a case of severe hemolytic disease of fetus due to

anti-Kp[a] and treatment for presumed acute parvovirus B19. Six intrauterine and one neonatal RBC transfusion were required (8).

CONCLUSION

All of these cases should alert us that there really is potential of low incidence antigens to cause severe reactions. Acute and DHTR, suppression of fetal erythropoiesis and hemolytic disease of the newborn still occur due to undetected anti- Kp[a] alloantibody. Screening for antibodies to low frequency antigens such as Kp[a] is not routine so sensitization from uncommon antigens is more difficult to diagnose. Antibody screening cells used in our reported case were also Kp[a] negative so we didn't diagnosed immunisation until positive DAT and neonatal jaundice occured. We have to think of this possibility even IAT is negative.

REFERENCES

1. Mangwana S, Gangwar V. Anti Kpa alloantibody: Development of a rare alloantibody in a non-Hodgkin's lymphoma patient of Indian origin. Asian J Transfus Sci. 2018;12(1):81–4.
2. Tuson M, Hue-Roye K, Koval K, Imlay S, Desai R, Garg G, et al. Possible suppression of fetal erythropoiesis by the Kell blood group antibody anti-Kp(a). Immunohematology. 2011;27(2):58–60.
3. Padmore R, Berardi P, Erickson K, Desjardins D, Giulivi A, Tokessy M, et al. Acute extravascular hemolytic transfusion reaction due to anti-Kpa antibody missed by electronic crossmatch. Transfus Apher Sci. 2014 Oct 1;51(2):168–71.
4. Osaro E, Ladan MA, Zama I, Ahmed Y, Mairo H. Distribution of Kell phenotype among pregnant women in Sokoto, North Western Nigeria. Pan Afr Med J. 2015;21:301.
5. Sunassee A, Mackey J, Anderson KA, Huntington MK. Acute Hemolytic Transfusion Reaction Due to Anti-Kpa Antibody. S D Med J S D State Med Assoc. 2018 May;71(5):222–3.
6. Koshy R, Patel B, Harrison JS. Anti-Kpa-induced severe delayed hemolytic transfusion reaction. Immunohematology. 2009;25(2):44–7.
7. Smoleniec J, Anderson N, Poole G. Hydrops fetalis caused by a blood group antibody usually undetected in routine screening. Arch Dis Child Fetal Neonatal Ed. 1994 Nov;71(3):F216-217.
8. Q Rossi K, Scrape S, Lang C, O'Shaughnessy R. Severe hemolytic disease of the fetus due to anti-Kpa antibody. In: International Journal of Blood Transfusion and Immunohematology [Internet]. 2013 [cited 2024 Apr 15]. p. 1–4. Available from: http://www.ijbti.com/archive/2013-archive/100012IJBTIKQR2013-rossi/100012IJBTIKQR2013-rossi-full-text.php

HEMOLITIČKA BOLEST NOVOROĐENČETA UZOKOVANA NEPREPOZNATIM ANTI-Kp^a PROTUTIJELOM

Ivana Talić Drlje[1,2] & Jurica Arapović[1]

[1] Medicinski fakultet, Sveučilište u Mostaru, 88 000 Mostar, Bosna i Hercegovina

[2] Sveučilišna klinička bolnica Mostar, 88 000 Mostar, Bosna i Hercegovina

SAŽETAK

Uvod: Kp^a se pojavljuje u manje od 2 % bijelaca. Protutijelo na ovaj antigen niske učestalosti uzrokuje blagu do umjerenu odgođenu hemolitičku reakciju i hemolitičku bolest fetusa i novorođenčeta. Test pretraživanja na antigene niske učestalosti kao što je Kp^a nije rutinski, zbog čega se imunizacija teže i dijagnosticira.

Prikaz slučaja: Prikazan je slučaj hemolitičke bolesti novorođenčeta uzrokovan anti-Kp^a protutijelom koje nije prepoznato u uredno kontroliranoj prvoj trudnoći.

Rezultati: U novorođenčeta krvne grupe O RhD pozitivna s novorođenačkom žuticom detektiran je pozitivan direktni antiglobulinski test. Indirektni Coombs test majke bio je negativan tri puta tijekom trudnoće. Indirektni Coombsov test eluata bio je negativan, ali je identifikacijom s panel eritrocitima u gel mikrokarticama detektirano anti-Kp^a protutijelo.

Zaključak: Test pretraživanja na protutijela na antigene niske učestalosti kao što je Kp^a nije rutinski, zbog čega je prepoznavanje imunizacije otežano ali jako važno. Ovaj slučaj bi nam trebao biti upozorenje da protutjela na antigene niske učestalosti mogu uzrokovati ozbiljne reakcije.

Ključne riječi: Kell sustav krvnih grupa; hemolitička bolest novorođenčeta; aloimunizacija na eritrocitne antigene.

Autori za korespondenciju: Ivana Talić Drlje, ivanatalic@yahoo.com & Jurica Arapović, jurica.arapovic@mef.sum.ba