Clin. Lab. 2023;69:XXX-XXX

CASE REPORT

A Rare Case of Hemolytic Disease of the Fetus and Newborn Caused by Anti-s Antibody in a Chinese Patient

Yang Liyan [1, 2], Jiang Yongmei [1, 2], Feng Jing [1, 2]

[1] *Department of Laboratory Medicine, West China Second University Hospital, Sichuan University, Chengdu, Sichuan, P.R. China*
[2] *Key Laboratory of Birth Defects and Related Diseases of Women and Children (Sichuan University), Ministry of Education, Sichuan, P.R. China*

SUMMARY

Background: **Anti-s is a rare alloantibody, and the reported cases of hemolytic disease of the fetus and newborn (HDFN) caused by anti-s are limited to non-Asian populations.**
Methods: **Here, we report the case of a Chinese woman with a history of multiple pregnancies who developed an alloantibody with anti-s specificity.**
Results: **Her newborn developed HDFN caused by anti-s but the clinical symptoms were not serious. After supportive treatment and bilirubin light phototherapy, the baby was discharged with a good prognosis.**
Conclusions: **This is the first reported case of anti-s-induced HDFN in a Chinese patient, highlighting the need for further research in the Asian population.**
(Clin. Lab. 2023;69:xx-xx. DOI: 10.7754/Clin.Lab.2022.220525)

Correspondence:
Jing Feng
Department of Laboratory Medicine
West China Second University Hospital
Key Laboratory of Birth Defects and
Related Diseases of Women and
Children Sichuan University
Ministry of Education
No. 20, Section 3, Renmin Nan Road
Wuhou District, Chengdu Sichuan 610041
P.R. China
Phone/Fax: +86 028-85502654
Email: 21380929@qq.com

KEYWORDS

hemolytic disease of the fetus and newborn, alloantibody, anti-s

INTRODUCTION

Hemolytic disease of the fetus and newborn (HDFN) is characterized by maternal blood group antibodies that cause fetal red cell destruction, which can lead to fetal anemia. In severe cases, it can progress to edema, ascites, heart failure, and even death [1]. In reported cases, ABO blood group system is commonly involved; however, the most clinically significant forms of HDFN are caused by irregular alloantibodies. Anti-s antibodies develop following red cell alloimmunization, and no natural antibodies have been reported. Anti-s usually causes a mild type of HDFN, but in rare cases, it can cause severe hemolysis and can be fatal [2,3]. A literature search revealed that anti-s antibodies are rare and limited to non-Asian populations. Herein, we present a rare case of HDFN caused by anti-s in a Chinese patient.

Case Report accepted June 19, 2022

Table 1. Review of published HDFN literature caused by anti-s.

Case	Antibody	Mother								Infant							
		Age	Gravida-Para	TF-history	ABO	RhD	DAT	IAT	Titer	ABO	RhD	DAT	IAT	Hb (g/dL)	TB (mg/dL)	Major Complication	Outcome
1[8]	Anti-s	NM	G3P2	NM	O	ccDEe	NM	POS	8	O	ccdee	NM	NM	NM	NM	NM	NM
2[2]	Anti-s	37	G3P2	no	O	CcDee	NM	POS	512	/	/	/	/	/	/	/	Fetal death
3[3]	Anti-s	35	G2P1	yes	O	ccdee	NM	POS	512	O	CcDee	POS(4+)	POS	9.3	8.7	jaundice,	Exchange transfusion
	Anti-D								512							anemia	
4[9]	Anti-s	NM	G3P1	yes	O	ccdee	NEG	POS	16	O	RhD(+)	POS(3+)	POS	16.3	3.0	HDN	Untreated
5[10]	Anti-s	33	G4P3	no	A	RhD(+)	NM	POS	128	O	RhD(-)	POS(3+)	POS	13.0	4.9	Pale skin	Untreated

ABO - blood type, DAT - direct antiglobulin test, IAT - indirect antiglobulin test, Hb - hemoglobin, TB - total bilirubin, NEG - negative, POS - positive, NM - not mentioned, TF-history - transfusion history, HDN - hemolytic disease of newborn.

CASE PRESENTATION

A 30-year-old Chinese woman, G6P1 at 38 weeks of gestation, presented to the clinic with abdominal pain lasting > 3 hours. Her first child was healthy with no history of HDFN at birth. She had four miscarriages, and unfortunately, no investigation was performed to determine the cause. The patient had no history of transfusion. On admission, her hemoglobin level was 9.0 g/dL (normal, 11 - 15 g/dL). Immunological serological testing revealed that her blood group was O RhD positive with a red cell phenotype of ccDEe and S(+)s(-), DAT(-), antibody screening was positive. Antibody identification in the plasma showed that the irregular antibody was IgG anti-s with a titer of 1:32, which could be completely adsorbed by s-positive cells but not by s-negative cells.

A baby boy was vaginally delivered after admission, weighing 3,940 g with an Apgar score of 10 points at 1, 5, and 10 minutes. The baby was noted to have mild jaundice on the day of birth. Laboratory results showed the following: hemoglobin level, 11.8 g/dL (normal, 17 - 21 g/dL); reticulocyte count, 0.2995 x 10^{12}/L (6.64%; normal, 0.024 - 0.084 x 10^{12}/L); total bilirubin, 20.48 mg/dL (normal, 0.58 - 11.11 mg/dL); indirect bilirubin, 18.65 mg/dL (normal, 0.58 - 10.53 mg/dL); and G6PD, 7.8 U/gHG (normal, >3.8 U/gHG). Considering the anti-s detected in the maternal plasma and the potential risks of HDFN, the baby's umbilical cord blood was collected for serological tests. The results showed that the baby's blood type was O RhD positive with a red cell phenotype of ccDEe and S(+)s(+), DAT was positive (3+), and antibody screening was positive. Anti-s was identified in both the plasma and eluate of the baby. Combined with the baby's clinical manifestations and laboratory results, he was finally diagnosed with anti-s-induced HDFN. Fortunately, the newborn's clinical symptoms were not serious, and through bilirubin light phototherapy and other symptomatic support treatment, his jaundice gradually resolved one week later, the total bilirubin concentration decreased to 7.33 mg/dL, and no further increase was observed. The patient was discharged with good prognosis.

DISCUSSION

Maternal alloimmunization can be triggered by prior incompatible blood transfusions or by fetomaternal hemorrhage in a previous or current pregnancy [4]; approximately 1% of pregnant women have clinically significant red blood cell antibodies [5]. In most countries and regions, antibody screening tests are routinely performed during pregnancy to ensure that all antibodies that have the potential to cause HDFN are monitored and facilitate the timely provision of compatible blood if required for the woman and/or the baby. According to the guidelines of the British Committee for Standards in Hmatology, the frequency of repeat tests for antibody screening and identification is determined by the specificity and strength of the antibody and whether an intrauterine transfusion has been administered [6]. Clinically significant antibodies should be titrated or quantified depending on their specificity. In most instances, high-risk HDFN was discovered based on red cell alloantibody titers. In general, antibody titers ≥ 32 run the risk of causing some degree of HDFN [7], although a clear association between titer and HDFN has not been established. However, this indicator may not necessarily apply to all antibodies, especially for antibodies with relatively low occurrence and few reports.

We searched Chinese language databases and PubMed and have summarized five representative examples of anti-s-induced HDFN. The earliest example of anti-s was discovered by Levine et al. [8], where an allelemorph of the S gene was found. In two cases, the mothers' antibody titers were 1:512. One of these pregnancies resulted in a stillbirth [2], while the other, combining anti-D, resulted in severe HDFN and required exchange transfusions [3]. The other two cases were not severe and did not receive any therapy [9,10]. All relevant reports are summarized in Table 1.

Anti-s is a rare alloantibody, especially in Asians. An investigation of irregular red blood cell antibody distributions in Chinese people revealed that anti-s only accounted for 0.09% of cases [11]. To the best of our knowledge, this is the first reported case of anti-s-induced HDFN in a Chinese individual. The antibody titer in our patient was 1:32, but the baby's clinical symptoms were not serious. This suggests that the risk of developing severe HDFN depends on several factors, including IgG class, specificity of the red cell alloantibodies, and level of expression of the involved blood group antigen on fetal red cells and other tissues. Although no further research has been conducted due to limited conditions, this case illustrates the possibility of alloimmunization in an S-negative Chinese mother, suggesting that the illness may be more prevalent than initially estimated. Thus, further research in the Asian population is needed.

Declaration of Interest:
The authors declare that they have no conflict of interest.

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