

# Successful Management of Hemolytic Anemia Due to Rh-immunization, Diagnosed Antenatally

Sevinch Mahmudova, Gulnar Elizade, Nezrin Hesenli, Turab Janbakhishov, Sarkhan Elbayiyev

Azerbaijan Medical University, Department of Educational Surgery, Clinic of Neonatology, Baku, Azerbaijan

## ABSTRACT

Hemolytic disease of the fetus and newborn (HDFN) remains a significant concern in maternal-fetal medicine, despite advancements in prevention and management. HDFN occurs when maternal alloimmunization leads to the production of immunoglobulin G (IgG) antibodies that cross the placenta and trigger fetal red blood cell hemolysis. Severe HDFN can cause hydrops fetalis and fetal death if left untreated, whereas survivors often face complications like neonatal anemia and hyperbilirubinemia, potentially causing kernicterus. A 42-year-old Rhesus (Rh)-negative woman with Rh-positive fetal anemia underwent intrauterine transfusions at 23 and 29 week of gestation. The fetus received Rh-negative donor blood during cordocentesis, which led to improvement in hemoglobin levels and normalization of Doppler parameters. Delivery at 34 weeks was via cesarean section because of premature membrane rupture. Postnatal management included exchange transfusion, phototherapy, and Ig therapy, resulting in stabilized hemoglobin and bilirubin levels. This case highlights the critical role of antenatal and postnatal interventions in managing severe HDFN. Regular monitoring and timely intervention, including Doppler ultrasound for anemia assessment and transfusion strategies, can significantly improve outcomes for high-risk neonates.

**Keywords:** Rhesus, newborn, anemia

## INTRODUCTION

Hemolytic disease of the fetus and newborn (HDFN) still poses a significant risk to pregnant women, despite advancements in managing and treating affected pregnancies and stopping red blood cell alloimmunization during pregnancy [1]. HDFN occurs when a mother is alloimmunized, either by being exposed to red blood cell antigens that are not compatible with the fetus or by receiving blood that is not compatible. The placenta actively transports the resulting immunoglobulin G (IgG) antibodies, leading to fetal hemolysis and anemia [2,3]. If left untreated, progressive fetal anemia results in hydropsing of the fetal body and, eventually, fetal death. If the fetus survives, ongoing hemolysis causes neonatal anemia and hyperbilirubinemia, which, if untreated, ultimately leads to serious cerebral injury (“kernicterus”) [1].

HDFN has no cure. Therefore, interventions have focused on prevention and minimizing the adverse effects of associated complications. By providing Kell-negative donor blood and using Rhesus (Rh) Ig as a preventative measure, women of childbearing age can lower the risk of red blood cell alloimmunization and the number of Rh(D)- and K-mediated

HDFN. However, the gap between supply and demand for anti-Rh(D) drugs remains large in low-income countries and is below optimal thresholds in high-income countries. Moreover, although the disease still poses a significant risk of mortality and morbidity in developing countries, it is considered treatable with favorable outcomes in developed countries [4].

## CASE PRESENTATION

A 42-year-old repeat pregnant woman presented to the department of obstetrics and gynecology with the diagnosis: fetal anemia due to Rhesus immunization. The mother's blood group was A (II) Rh (-), and father's was B (III) Rh (+). We determined the fetal blood group to be AB (IV) RH (+). The woman underwent cordocentesis and fetal hemotransfusion at 23 and 29 weeks. According to the examination results at week 23, the fetal weight was 527 g, and the preoperative tests showed a hemoglobin level of 3 g/dL and an middle cerebral artery peak systolic velocity (MCA-PSV) of 79.165 m/s (2.604 MOM). During the surgery, the fetus received 87 mL of donor blood [0 (I) Rh (-)]. There were no complications in the postoperative period, laboratory parameters of the hemogram



**Address for Correspondence:** Sarkhan Elbayiyev MD, Azerbaijan Medical University, Department of Educational Surgery, Clinic of Neonatology, Baku, Azerbaijan

**E-mail:** serxanelbayiyev@gmail.com **ORCID ID:** 0000-0002-2113-5591

**Received:** 30.10.2024 **Accepted:** 03.12.2024



Copyright© 2024 The Author. Published by Galenos Publishing House on behalf of Azerbaijan Gastroenterology and Invasive Endoscopy Society. This is an open access article under the Creative Commons Attribution-Attribution-NonCommercial 4.0 (CC BY-NC 4.0) International License.

improved, and the MCA-PSV level normalized (37.14; 1.222 MOM). We repeated the hemotransfusion at 29 gestational weeks. The preoperative examination results showed that the fetal weight was 1.213 g, the hemoglobin level was 8.2 g/dL, and the MCA-PSV was 67.77; 1.76 MOM. The fetus received a transfusion of 100 mL of donor blood [O (I) Rh (-)] during repeat cordocentesis. The postoperative period was uneventful. The laboratory results showed positive dynamics: the hemoglobin level increased to 14.3 g/dL, and the MCA-PSV normalization was 41.17; 1.042 MOM.

At 34 weeks of gestation, due to premature rupture of the membranes and the presence of a uterine scar, emergency cesarean section was performed. The neonate was born with a body weight of 2170 kg and an Apgar score of 6/7 points. The infant's condition stabilized, leading to his transfer to the intensive care unit. Due to signs of respiratory failure, he received respiratory support in the form of nasal continuous positive airways pressure during the 24-hour period. The umbilical vein and artery. Complete blood count revealed a hemoglobin level of 8 g/dL. It is decided to perform an isovolumetric double-volume exchange blood transfusion, considering the neonate's condition, RH-immunization, hemoglobin, and bilirubin levels. We transfused 350 mL of donor blood to the infant within 30 minutes and extracted 320 mL of the recipient blood. Hemodynamic parameters were stable during hemotransfusion, and posttransfusion complications were not observed. During hospitalization, the neonates underwent continuous phototherapy and received two injections of Ig at a rate of 1 g/kg at 24-hour intervals. We monitored the patient's blood tests and noted positive dynamics in the form of an increase in hemoglobin and a decrease in total bilirubin. The newborn were discharged in a stable condition, and the relevant recommendations were made.

## DISCUSSION

Rh hemolytic disease can be mild (mild anemia and jaundice) or severe (severe anemia, hydrops fetalis, and death). Therefore, antenatal and postnatal follow-up of high-risk babies is important [1]. Currently, the peak systolic velocity of the midbrain artery with Doppler ultrasound, a non-invasive method, is measured to determine the severity of fetal anemia and to perform intrauterine transfusions (IUT) if necessary. This procedure is performed to prevent severe fetal anemia and other complications [5].

Two IUT and postnatal exchanges were performed in this case. Following the exchange, blood tests revealed a hemoglobin level

of 16.7 g/dL. The serum bilirubin level decreased more effectively because the exchange took longer to allow for extravascular and intravascular bilirubin equilibration. Serum bilirubin level was 6.9 mg/dL after exchange transfusion. The newborn underwent phototherapy after the exchange transfusion, and the intravenous immune globulin treatment was successful. In this case, we did not observe any vascular complications, infection, coagulopathic, electrolyte abnormalities, acidosis, alkalosis, necrotizing enterocolitis, nutritional intolerance, anemia, polycythemia, hypothermia, hyperthermia, graft-versus-host disease, apnea and bradycardia, hypotension, or hypertension [6].

We conclude that severe hemolytic diseases requiring IUT may also occur during the postnatal period. Although easy and postnatal exchange transfusions may be necessary, the duration of postnatal phototherapy and transfusions may vary.

## Ethics

**Informed Consent:** Written informed consent was obtained from the parents for the publication of this report.

## Footnotes

## Authorship Contributions

Surgical and Medical Practices: T.J., S.E., Concept: S.E., Design: N.H., Data Collection or Processing: G.E., Analysis or Interpretation: S.M., Literature Search: S.M., G.E., Writing: S.M.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

## REFERENCES

1. de Haas M, Thurik FF, Koelewijn JM, van der Schoot CE. Haemolytic disease of the fetus and newborn. *Vox Sang.* 2015;109:99-113.
2. Dziegiel MH, Krog GR, Hansen AT, Olsen M, Lausen B, et al. Laboratory monitoring of mother, fetus, and newborn in hemolytic disease of fetus and newborn. *Transfus Med Hemother.* 2021;8;48:306-15.
3. Çetinkaya M, Özkan H, Köksal N, Akkus H, Kimya Y. Effect of intrauterine transfusion on neonatal outcomes in Rh hemolytic disease. *J Curr Pediatr.* 2010;8:1-6.
4. Legler TJ. RhIg for the prevention Rh immunization and IVIg for the treatment of affected neonates. *Transfus Apher Sci.* 2020;59:102950.
5. Madazli R. Noninvasive Doppler and ultrasound parameters to predict fetal anemia due to red blood cell alloimmunization. *Marmara Med J.* 2006;20:172-8.
6. Bany-Mohammed F, Eyal FG, Gomella TL. Gomella's neonatology: management, procedures, on-call problems, diseases, and drugs. 8th edition ed. New York: McGraw-Hill. 2020.