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CASE REPORT OF RH NEGATIVE PREGNANCY- A BIRTH BY A VIRTUE OF NEWFANGLED INVESTIGATION

Obstetrics & Gynaecology

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ABSTRACT

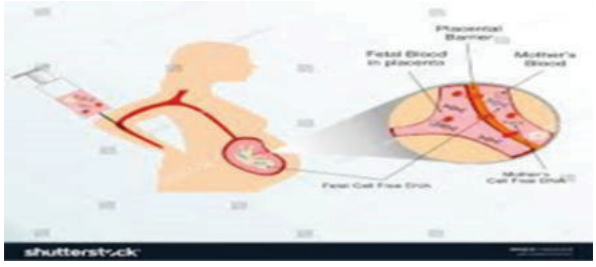
The advent of cell free fetal DNA in maternal plasma has evolved in field of molecular fetal medicine leading a way to non invasive prenatal diagnosis. Currently non invasive RH D genotyping by PCR has revolutionized the determination of fetal Rh D status in Rh negative pregnant women who are on the verge of Rh D alloimmunization.Before the evolution of Non invasive prenatal diagnosis, fetal Rh D status was determined using invasive procedure like CVS, Amniocentesis .The introduction of cell free DNA has obviated these risks to largest extent.

KEYWORDS

Cell free DNA , Isoimmunization , Rh negative pregnancy

INTRODUCTION

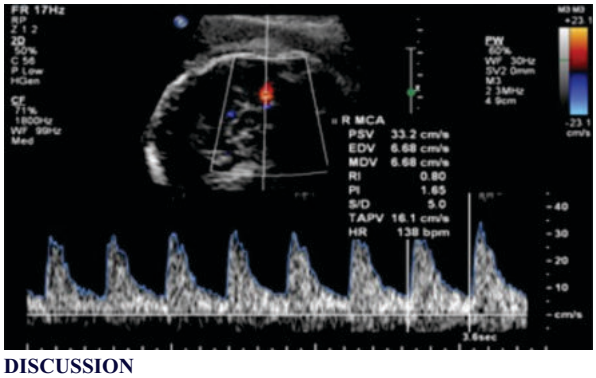
The emergence of cell-free fetal DNA in maternal plasma has revolutionized the field of molecular fetal medicine, paving the way for non-invasive prenatal diagnosis. Currently, non-invasive Rh D genotyping by PCR has profoundly transformed the determination of fetal Rh D status in Rh-negative pregnant women who are at risk of RhD alloimmunization. The introduction of cell-free DNA has significantly mitigated these risks.



Case Report

A 36-year-old, gravida 4, para 1, living child 1, abortion 1 (G4P1L1A1) woman sought care at Preethi Hospital immediately upon discovering a positive urine pregnancy test. She had previously experienced an eventful pregnancy. Her blood type was A negative, while her husband's was B positive.

1. Missed miscarriage at 10 weeks, medically induced termination of pregnancy performed, and Anti-D immunoglobulin administered.
2. A female child, now 12 years old, thriving and healthy, weighed 2.8 kg at birth. A term cesarean section was performed due to labor failure to progress in a general hospital. Rh alloimmunization assessment and prophylaxis were not provided, but postnatal Anti-D immunoglobulin was administered within 48 hours of birth. Although the baby experienced physiological jaundice, phototherapy was unnecessary. The patient was discharged on postoperative day 3.
3. A female child, born 6 years ago, weighed 2.5 kg at birth. A term cesarean section was performed due to a previous cesarean section and breech presentation in a private hospital. An indirect Coombs test conducted at 34 weeks gestation revealed a titer of 1:64. The newborn developed severe neonatal jaundice postpartum, with a positive direct Coombs test. Despite diagnosis and treatment, the baby succumbed 22 days after birth.
4. In the current pregnancy, the urine pregnancy test was positive at 70 days of amenorrhea, prompting the patient's presentation at Preethi Hospital for a booking visit. The patient expressed significant anxiety regarding continuing the pregnancy in light of her previous obstetric history. She received comprehensive counseling regarding the potential risks of continuing the pregnancy. Serial monitoring with indirect Coombs testing indicated rising titers upto 1:128. At 11 weeks, she underwent cell-free DNA testing, confirming the fetus to be Rh-negative. Subsequent antibody identification testing ruled out Kell, C, c, E, and e isoimmunization. With these results, the decision was made to proceed with the pregnancy. The patient, who had previously experienced impaired glucose tolerance, initiated medical nutritional therapy, followed by insulin therapy. Maternal and fetal surveillance, including weekly middle cerebral artery peak systolic velocity and amniotic fluid index assessments from 16 weeks gestation onward, was conducted under the guidance of a fetal medicine specialist. The patient had a history of polyhydramnios, which was managed conservatively. A term cesarean section was performed at 37 weeks gestation, resulting in the birth of a live male infant weighing 2.8 kg. The neonate was determined to have a blood type of A negative, and the postpartum period was uneventful.



DISCUSSION

Cell-free DNA (cf DNA) testing, also known as noninvasive prenatal testing (NIPT), is a valuable tool in managing Rh-negative pregnancies, especially in cases where Rh isoimmunization may occur.

Principle of cfDNA Testing

CfDNA testing analyzes small fragments of fetal DNA that circulate in the maternal bloodstream. This DNA is shed from the placenta and reflects the genetic makeup of the fetus. By analyzing these fragments, it's possible to determine the fetal Rh status and identify potential risks of Rh isoimmunization.

Rh isoimmunization in Rh-negative pregnancies: Rh isoimmunization occurs when an Rh-negative mother is exposed to Rh-positive fetal blood cells, leading to the production of antibodies against Rh antigens. This can result in hemolytic disease of the newborn (HDN) in subsequent pregnancies if not managed properly.

Role of cf DNA Testing in Rh-negative Pregnancies:
Early detection of fetal Rh status: Cf DNA testing can determine the fetal Rh status as early as 9-10 weeks of gestation, allows to assess the

risk of Rh isoimmunization and aids for timely intervention and management.

Guiding Rh immunoprophylaxis: Cf DNA testing results guide the administration of Rh immunoglobulin (Rh Ig) prophylaxis to prevent sensitization in Rh-negative mothers.

Advantages of Cf DNA Testing:

- **Noninvasive:** Unlike invasive procedures such as amniocentesis or chorionic villous sampling (CVS), cf DNA testing is noninvasive and carries minimal risk to the fetus.
- **High accuracy:** Cf-DNA testing has high sensitivity and specificity for detecting fetal Rh status, with reported accuracy rates exceeding 99%.
- **Early detection:** Early detection of fetal Rh status allows for timely intervention and appropriate management strategies.

Clinical Implications

- Preventing Rh isoimmunization: By accurately identifying Rh-positive fetuses, Cf DNA testing reduces the risk of Rh isoimmunization and subsequent HDN.
- Individualized patient care: Cf DNA testing results enable healthcare providers to tailor management strategies based on the specific risk profile of each Rh-negative pregnancy, ensuring personalized and effective care.

Considerations and Limitations

- Cost: Cf DNA testing may be associated with higher costs compared to traditional screening methods.

Other Antibody Identification Tests:
Kell antigen: The Kell antigen is a part of the Kell blood group system and is located on the surface of red blood cells. It is named after the patient in whom it was first discovered. Antibodies against the Kell antigen can cause hemolytic transfusion reactions and hemolytic disease of the newborn.

Rh antigens: The Rh blood group system consists of several antigens, with the D antigen being the most significant. In addition to the D antigen, there are other Rh antigens, including C, c, E, and e. These antigens can trigger immune responses if mismatched during blood transfusions or pregnancy.

In summary, Kell, C, c, E, e, and D are important antigens in the blood that play roles in various clinical scenarios, including blood transfusions, organ transplants, and hemolytic diseases.

CONCLUSION

In this case report, authors identified that the use of Cell free fetal DNA paves way for identifying at risk Rh negative pregnancies and managing them accordingly.

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