CASE REPORT

Fetal Medicine Unit: Need of the Hour at Tertiary Care Centers in India?

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Abstract

Aim: The aim of the article was to emphasize the need for a fetal medicine unit at tertiary care hospitals.

Background: The incidence of Rh-negative in India is 5–10%. The issue of Rh incompatibility arises when the mother is Rh-negative and the fetus is Rh-positive. Rh alloimmunization can lead to fetal anemia, hydrops fetalis, and even intrauterine death. It leads to perinatal loss of 1–2.5%. Fetal anemia is a serious complication in pregnancy and is associated with perinatal morbidity and mortality. Intrauterine transfusion (IUT) is a good treatment option for fetal anemia due to Rh incompatibility. Intravascular transfusion offers the best chance of survival to fetuses severely affected with Rh isoimmunization, overall survival exceeding 80%. In the cases with detectable antibodies, prenatal monitoring of maternal antibody titers and fetal middle cerebral arterial-peak systolic velocity (MCA-PSV) Doppler ultrasound assessment helps to plan fetal blood sampling and IUT procedures. Thus, the establishment of fetal medicine unit at tertiary care centers in India is need of the hour.

Case description: We report a case of 32-year-old G4P3L1END1IUD1 with Rh-negative sensitized pregnancy with fetal anemia, managed successfully with IUT.

Clinical significance: Early diagnosis of fetal anemia by serial MCA-PSV measurements and referral to fetal medicine unit are important for improving the outcome in Rh-negative sensitized pregnancies.

Conclusion: Establishment of fetal medicine unit at tertiary care centers is the need of the hour to improve the fetal outcome in high-risk pregnancies like Rh-negative pregnancy.

Keywords: Fetal anemia, Intrauterine transfusion, Rh-negative.

Journal of South Asian Federation of Obstetrics and Gynaecology (2021): 10.5005/jp-journals-10006-2003

Background

Rhesus hemolytic disease of the newborn is the result of an immune response generated in an RhD-negative mother to paternal expression of the RhD gene on the fetal erythrocytes. Maternal alloimmunization occurs, when fetal erythrocytes gain access to the maternal circulation. Fetal red cells trickle into the maternal circulation and may stimulate her immune system to produce antibodies against the D antigen. The initial response is in the form of production of immunoglobulin M (IgM) antibodies, which is later followed by the production of immunoglobulin G (IgG) antibodies. The latter crosses the placenta freely leading to destruction of RhD-positive fetal red cells, fetal anemia, and its consequences in the fetus and the newborn. Hydrops fetalis is a severe, life-threatening hemolytic anemia and is associated with a significant mortality rate estimated to be more than 50%. Timely and accurate identification of degree of anemia is crucial in fetuses at risk of the disease, because intrauterine transfusion (IUT) improves the prognosis and chances of survival in most cases. Middle cerebral arterial-peak systolic velocity (MCA-PSV) ≥1.5 multiples of median (MoM) is a reliable tool for prediction of fetal anemia. Monitoring alloimmunized pregnancies with serial MCA-PSV Doppler ultrasound helps to plan IUT procedures.

Case Description

We report a case of 32-year-old female $G_4P_3L_1END_1IUD_1$ with previous two Cesarean sections at 29 weeks of gestation with Rh-negative sensitized pregnancy. The patient's indirect Coombs test (IDCT) result was repeatedly negative, but ultrasound was suggestive of fetal cardiomegaly, pleural effusion, and ascites. Hence, IDCT was done with a newer method and the result was found to be positive. In Doppler studies, MCA-PSV was 66 cm/second. Cordocentesis revealed fetal Hb—3 g%. An IUT was given with 130 mL of O-negative blood under ultrasound guidance into the intrahepatic portion of umbilical vein, as the placenta was posterior and cord insertion at the placenta was not easily accessible. Posttransfusion Hb was found to be 15.7 g%. Posttransfusion patient was admitted for observation and fetal heart rate monitoring. A course of antenatal steroids was given to the patient for fetal lung maturity, and magnesium sulfate was given for neuroprotection. The posttransfusion MCA-PSV was found to be 29 cm/second. In the follow-up ultrasound studies, the features of fetal ascites and pleural effusion were resolving (Fig. 1). After 3 weeks, a second IUT was given. Pretransfusion Hb was 10 g% and MCA-PSV was 66 cm/second. Ninety milliliters of O-negative blood was transfused. Posttransfusion Hb improved to 15.5 g%

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How to cite this article: Syed SA, Patankar AM, Chhajjed N, *et al*. Fetal Medicine Unit: Need of the Hour at Tertiary Care Centers in India? J South Asian Feder Obst Gynae 2021;x(x):xx–xx.

Source of support: Nil

Conflict of interest: None

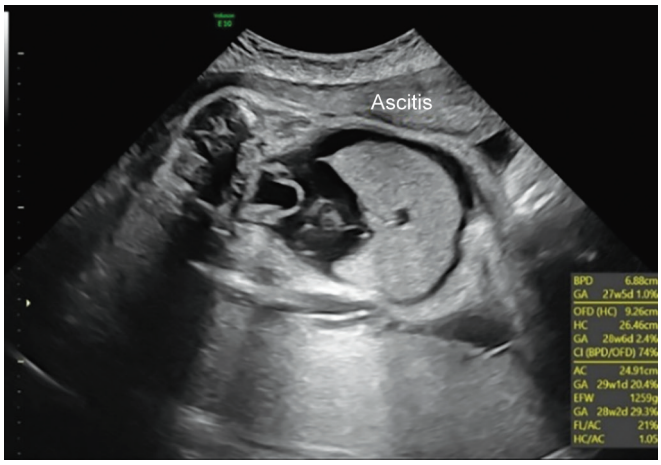

Fig. 1: Pretransfusion ultrasonography showing fetal ascites

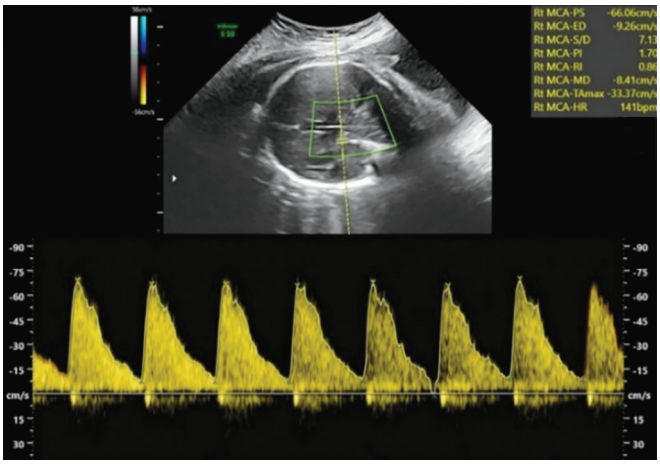

Fig. 2: Pretransfusion middle cerebral artery Doppler

and MCA-PSV was found to be 48 cm/second. The patient was admitted for elective Cesarean section at 37 weeks of gestation, and on investigations, the patient was found to be positive for coronavirus disease-2019 (COVID-19). An elective cesarean section was performed for this patient at 37 weeks of gestation and a full-term male child weighing 2.25 kg was delivered successfully with an Apgar score of 10. The baby did not require any neonatal exchange transfusion in the early neonatal period. The baby's blood group was found to be O-negative, because of IUTs, and hence, the result of the direct Coombs test was negative. The baby was followed up for a period of 6 months postnatally and is alive and well.

Discussion

Various tools to detect fetal anemia have been proposed, one such being Doppler evaluation of fetal MCA-PSV (Fig. 2). In general, MCA-PSV values correlate well with fetal hemoglobin levels. The quick response of fetal cerebral arteries to hypoxemia can be determined by measuring the peak velocity of systolic blood flow using Doppler ultrasound. MCA-PSV is a moderate predictor of moderate-severe anemia in untransfused fetuses, but its accuracy declines with an increasing number of previous IUTs.[1] In the cases with detectable antibodies, prenatal monitoring of maternal antibody titers and fetal MCA-PSV Doppler ultrasonography (USG) assessments can help to plan fetal blood sampling and IUT procedures.

Sir William Liley pioneered intraperitoneal transfusion in 1963. Introduction of ultrasound-assisted intraperitoneal transfusion increased survival rate by avoiding the risk of fetal death from traumatic complications, such as damage to intra-abdominal and intrathoracic viscera, which earlier contributed to 50% of the mortality rate. The presence of ascites appeared to prevent adequate absorption of erythrocytes from the peritoneal cavity. In order to overcome these problems, Rodeck et al. in 1981 described the technique of fetal intravascular transfusion by needling the umbilical artery under direct fetoscopic vision. They reported a survival rate of 84% in 19 fetuses who received their first transfusion on or before 25 weeks of gestation. Ultrasound-guided techniques have since replaced the need for fetoscopy. Techniques used for intrauterine blood transfusion include the injection of blood into the umbilical cord, into the baby's peritoneal cavity (intraperitoneal transfusion), into a blood vessel in the baby's liver (intrahepatic transfusion), and occasionally directly into the baby's heart (intracardiac transfusion). Intravascular transfusion offers the best chance of survival to fetuses severely affected with Rh isoimmunization, the overall survival exceeding 80%. Complications following IUT include preterm prelabor rupture of membranes (PPROM), infection (chorioamnionitis), preterm labor, and fetal distress.[2] Also IUT can suppress the baby's ability to produce its own red blood cells. This results in repeat procedures during the course of pregnancy, and the need for top-up transfusions after the baby's birth.

In a study on perinatal outcome of IUT by Savkli et al.[3] in 2020, the survival rate after transfusion was 80.95%. The procedure-related complications were found in 12.7% of cases. The survival rate was lower and perinatal mortality was higher in fetuses with hydrops fetalis. They concluded that IUT is a safe and effective procedure that can be used for the treatment of fetal anemia in experienced centers.

Similarly, in a study on intrauterine fetal blood transfusion by Riyami et al. in Oman,[4] the overall survival rate was 61.5%. They concluded that IUT seems to result in a favorable outcome for hydropic fetuses.

Clinical Significance

Early diagnosis of fetal anemia by serial MCA-PSV measurements and referral to the fetal medicine unit are important for improving the outcome in Rh-negative sensitized pregnancies.

Conclusion

Hence, we concluded that to have a full-fledged fetal medicine unit at tertiary care centers in India is the need of the hour, to improve the fetal outcome in high-risk pregnancies like Rh-negative pregnancy.

Acknowledgment

Authors would like to thank Dr Neelam Chhajjed for carrying out the procedure of IUT and giving new lease of life to the fetus *in utero*.

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