



INTRODUCTION

- In India, extent of problem of RhD-alloimmunisation is unknown. Without immunoprophylaxis, 14% of RhD-ve women will develop antiD-antibodies. Postpartum prophylaxis reduces it to 1.8-2% and with added antenatal prophylaxis to 0.1-0.2%.
- Adverse outcomes of alloimmunization include varying degrees of fetal anemia. MCAPSV is an excellent fetal anemia monitoring tool.
- In pregnancies with previous history of hydrops, fetal anemia monitoring should start by 15 weeks. Early second trimester fetuses can be severely anemic without signs of hydrops and timely IUTs can have survival rates >90 %

HISTORY

A 29 year, Rh-ve G5P0400 female attended ANC clinic at 5+4 weeks gestation. ICT titre (8+1 weeks) was 1:1024; non affording for IVIG. MCA-PSV was monitored weekly from 15wks. At 17wks, she received first Intrahepatic IUT – 12 ml (MCA-PSV - 1.74) followed by another 12ml IUT at 18wk. Subsequent IUTs were done three weekly with 50-65 ml PRBC (6th IUT at 30+3weeks). Spontaneous labour started at 31+6wks necessitating steroid cover. Live female child (1964 gm) was born by LSCS (Indication : BOH with 2 previous LSCS) with cord bilirubin 3.4 gm/dl, haematocrit 35 and negative DCT. Baby received single surface phototherapy till D7, had apnoea of prematurity (Caffeine responsive), was discharged on D14 (no neurodeficit)

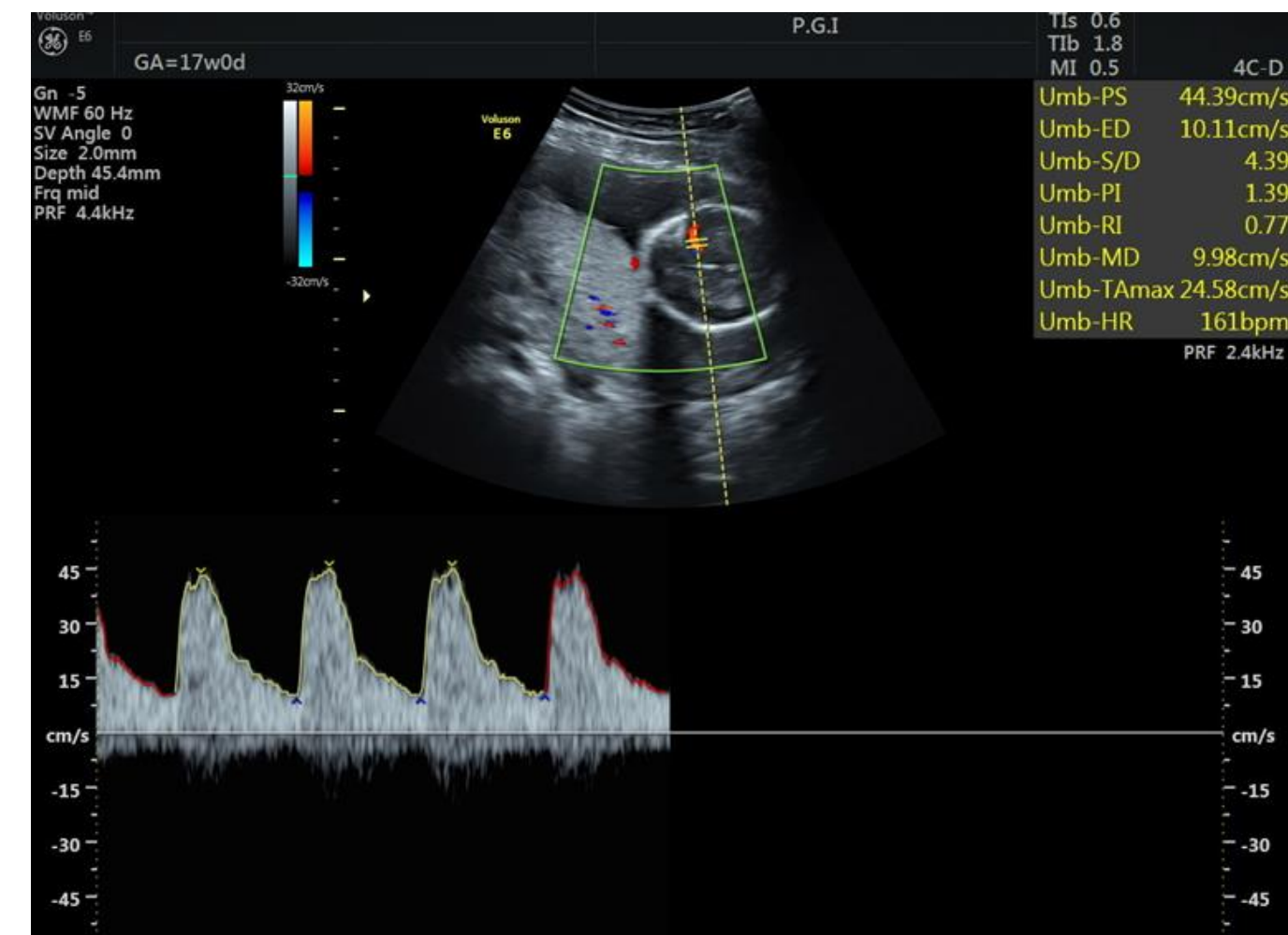
OBSTETRIC HISTORY

- G1 : 2014/ Spontaneous conception / Antenatally uncomplicated /Emergency preterm LSCS at 8th month gestation l/v/o footling breech presentation/ live born/ male/ 1600 gm/ died on day 12 in NICU with neonatal jaundice requiring phototherapy
- G2 : 2016/ Spontaneous conception / Antenatally uncomplicated/ IUFD at 8th month / LSCS / still born/ male/ birth weight unknown/ autopsy not done
- G3 : 2018/ Spontaneous conception / Antenatally uncomplicated/ IUFD at 7th month / VBAC /still born/ female/birth weight unknown
- G4 : 2020/ Spontaneous conception / Antenatally uncomplicated/ IUFD at 7th month / fetal echo - congenital heart disease/ VBAC at home/ still born/ male/birth weight unknown
- Did not receive anti D prophylaxis in antenatal period
- Received anti D prophylaxis in postpartum period in all pregnancies

FETAL ANEMIA MONITORING

NON INVASIVE : MCAPSV
*An axial section of brain, including the thalami and cavum septi pellucidum obtained at level of sphenoid bone.
*circle of Willis visualized and middle cerebral artery zoomed and viewed in entirety, examined close to its origin
* angle between ultrasound beam and direction of blood flow kept as close as possible to 0 degrees.
*Atleast three and fewer than 10 consecutive waveforms should be recorded.
*The highest point of the wave form (peak systolic velocity) measured and MoM value for that gestation calculated using calculators available online.
*Doppler images recorded at a time during absence of marked fetal body and respiratory movements.

Sensitivity : 88%.
Specificity : 82%
Reliable between 15-35 weeks.



Frequency : 1- 2 weeks

INVASIVE DIRECT : CORDOCENTESIS/ FETAL BLOOD SAMPLING - precise measurement of fetal Hb/Hct levels (done if MCAPSV values consistently high)
Blood for IUT kept ready in the same setting

INVASIVE NON - DIRECT : AMNIOCENTESIS- outdated.

EQUIPMENT:

- Chiba needle (20-22 gauge)
- 22 G spinal needle
- Blood transfusion set
- 3 way cannula
- Extension tubing
- Disposable sterile probe cover
- 10 ml lure lock syringe
- 5 ml syringes
- EDTA vacutainers
- Vecuronium
- Resuscitation set

BLOOD PREPARATION :

O negative Packed red blood cells
Buffy coat poor, saline washed
Fresh (3 - 5 days)
Irradiated
HIV, HbsAg negative
compatible with maternal blood
(extended phenotype matched)
Haematocrit - 70- 75%

CALCULATIONS:

- Target Hct : 45% - 55% (in absence of hydrops)
- Amount of blood required to raise Hct by 10% = EFW x 0.02
- Rate of reduction per day from post IUT Hct = 1%

Indication: MoM of MCAPSV> 1.5 or fetal hematocrit < 30%

Intrahepatic route is preferred in early gestation and when placenta is posterior.

Delivery planned at or beyond 36 weeks gestation, with LSCS reserved for obstetric indications.

Neonatal complications : need for exchange transfusions, phototherapy, top up transfusions, iron overload, thrombocytopenia, prematurity, IVH, developmental delays and hearing loss

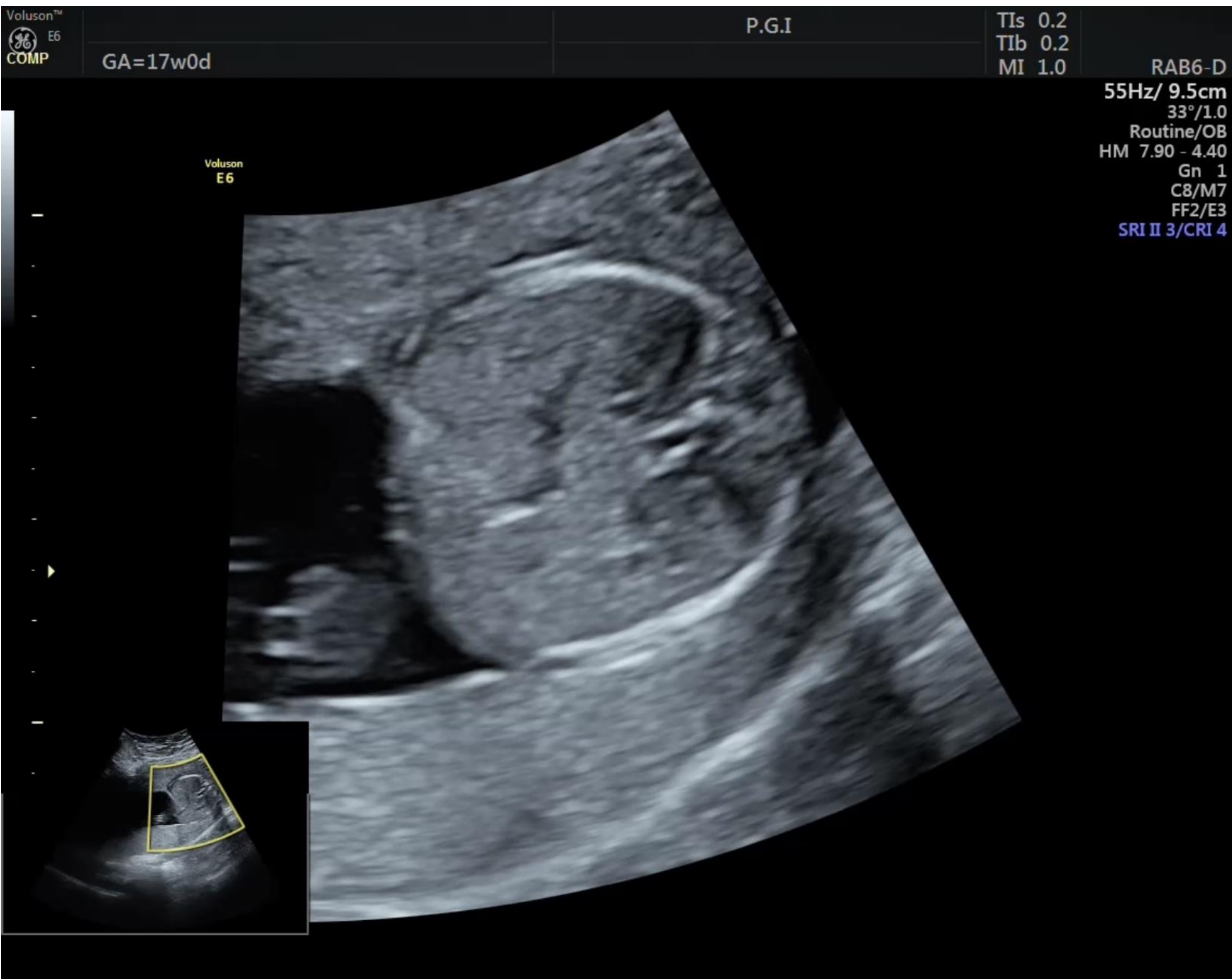
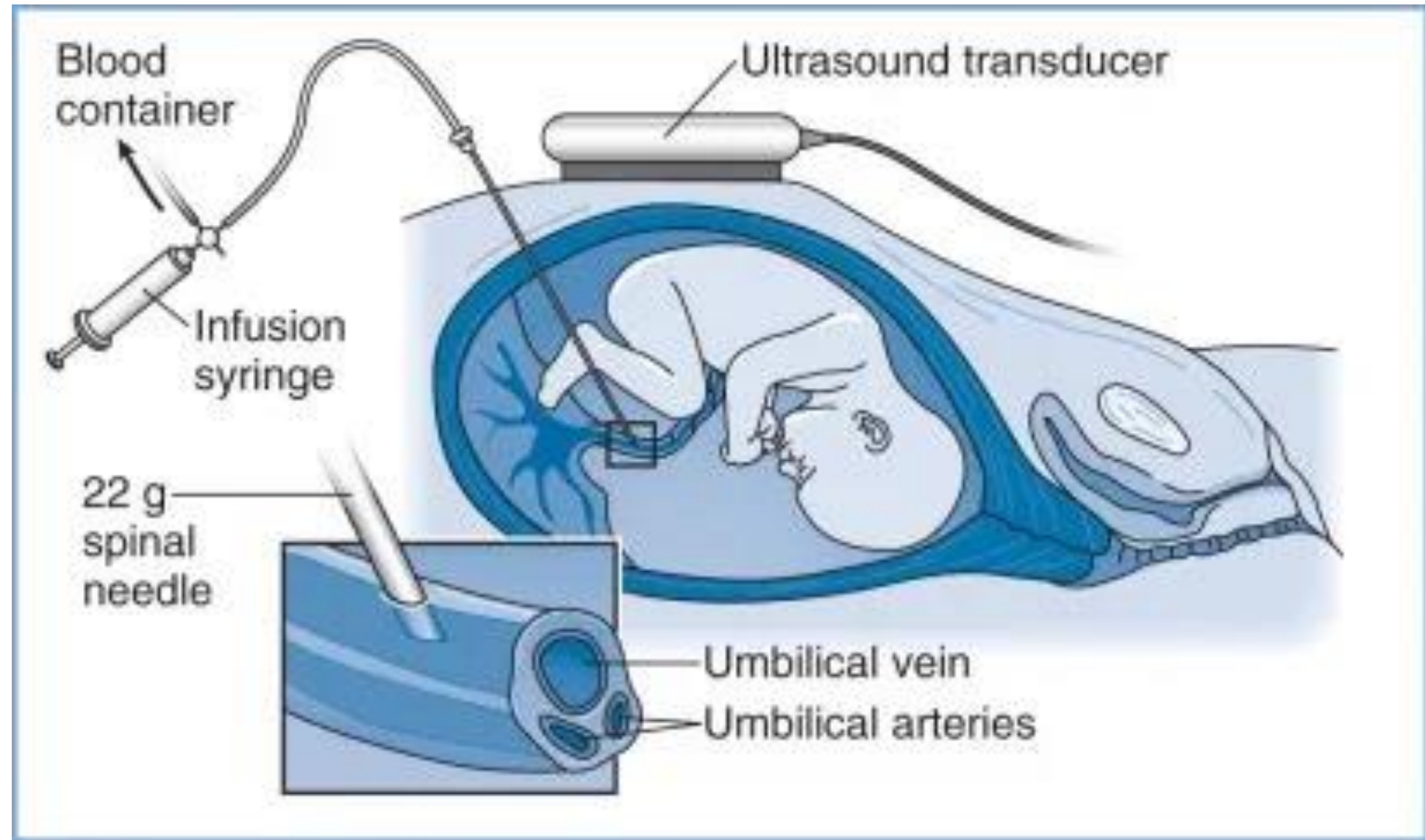
Period Of Gestation	Middle cerebral artery Peak systolic velocity MOM	Fetal hemoglobin/ Haematocrit (Pre IUT)	Volume transfused	Fetal Hemoglobin/ Haematocrit (Post IUT)	Route	EFW
17+0	1.74	3.9/9.5	12 ml	Could not be retrieved	Intrahepatic	163 gm
18+2	1.5	7.2/ 17.1	12 ml	15.3/ 36.2	Intrahepatic	273 gm
21+2	1.53	6.8/17.3	40 ml	14.9/38.1	Intrahepatic	443 gm
24+3	1.6	8/19	40 ml	14.5/35.6	Intrahepatic	687 gm
27+1	1.57	9.6/22.5	50 ml	17/42.5	Intrahepatic	879 gm
30+3	1.58	10.4/19.5	60ml	35.2/45	Intrahepatic	1872 gm

TECHNIQUE :

- Informed consent followed by steroid (if plan is to deliver in case of complications).
- OT staff and neonatologist to be briefed beforehand.
- MCAPSV, EFW, Fetal lie and attitude confirmed, placental location : posterior.
- Site for IUT is chosen and mother is sedated if she is anxious.
- Sterility of field and probe cover is ensured and medications are crosschecked.

Infiltrate with lignocaine after choosing needle track ➡ Once target is fixed, Chiba Needle advanced under Usg guidance - Doppler helps in identifying umbilical vein ➡ Needle tip rested on cord to see if it is indenting wall, cord entered with sharp jab ➡ Fetal paralysis achieved with vecuronium (0.01 mg/kg EFW) injected into fetal thigh / deltoid / gluteal region via spinal needle (especially in intrahepatic IUTs) or intravenous vecuronium given through Chiba needle in cord ➡ Fetal blood sampling performed and sent for ABO, Rh; HCT, MCV, Hb%, Bilirubin and DCT ➡ Three way stop cock connected to needle and PRBC transfused at the rate of 1-2ml / min ➡ Fetal FHR and maternal supine hypotension monitored.

At end of transfusion, post IUT sample retrieved and sent for hematocrit estimation ➡ Apparatus withdrawn swiftly ➡ Post procedure FCA shown to mother ➡ Sent home on the same day.



DISCUSSION

- One of the most common complications of IUT is fetal bradycardia but **sustained fetal bradycardia** is alarming. During the first transfusion, there was fetal bradycardia in this case, transfusion was stopped midway for a while and restarted after the fetal heart rate picked up

- Gaining access to the fetal circulation is technically difficult at early gestations- diameter of vessel is less than 3-5 mm
- Fetuses cannot tolerate acute hemodynamic changes even in case of successful transfusion - chances of circulatory overload and cardiac decompensation increases

- Patients with history of previously affected pregnancy can be treated by weekly doses of **1 gm/kg of intravenous immune globulin (IVIG)** starting at 11–14 weeks of gestation. This helps by **postponing the first transfusion to a safer gestational age** at which IUT is more likely to be successful

- In early transfusions less than 22 weeks, we prefer intrahepatic portion of umbilical vein and the use of 22G chiba needle reduces complications in our experience**

- Other sites of early transfusions are umbilical vein at cord insertion and intraperitoneal transfusions in very early pregnancies (which can be combined with IVIG therapy). Last resort is Intracardiac transfusions

CONCLUSIONS

This case highlights the importance of supervision and early referral of pregnancies at high risk of HDFN at tertiary centers with appropriate intrauterine interventional facilities and perinatal care to minimise adverse pregnancy outcomes by timely IUTs.

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