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Successful management of early onset fetal growth restriction: A case report

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Abstract

FGR (Fetal Growth Restriction) is a condition in which a fetus fails to attend its predetermined biological genetic growth potential. Growth-restricted fetuses are at increased risk of perinatal mortality and morbidity. Growth restricted babies also have poor long term outcomes of cardiovascular, neurological, cognitive or neurological system. The present case of Early FGR where patient presented to us at at 29+6 weeks of gestation with lag in fetal growth of 3 weeks & an Amniotic fluid Index of 3.2 cm and her pregnancy could be successfully prolonged up to 35+2 two weeks of gestation. The protocol for management of the fetus was as per Delphi consensus and ISUOG guidelines, and we could prolong pregnancy to the maximum possible gestation and delivered a low birth weight fetus with good Apgar score and who did not require Neonatal Intensive Care Unit admission. Tools for diagnosis and follow up of FGR fetus are customized growth charts, sequential ultrasound measurements focusing on declining/crossing growth centiles, functional parameters such as Doppler waveform analysis (umbilical artery (UA), fetal middle cerebral artery, and ductus venosus), Biophysical profile scoring, Cardio tocography and serum biomarkers.

Keywords: fetal growth restriction, biometry, antepartum fetal surveillance, fetal doppler, Small for gestaional age

Introduction

Fetal growth is a dynamic process and its evaluation remains the primary objective of prenatal care Fetal growth depends upon several factors, like maternal nutrition, maternal cardiovascular, endocrine or metabolic disease, uteroplacental factors, smoking, drug abuse, maternal or fetal infection, fetal aneuploidy, or genetic condition and its evaluation [1].

FGR (Fetal Growth Restriction) is a condition in which a fetus fails to attend its predetermined biological genetic growth potential. However, growth-restricted fetuses with biometry > 10th centile may not meet their growth potential, and they may remain undiagnosed despite being at increased risk of adverse outcomes [2]. SGA, however, differs from FGR principally because it encompasses constitutionally small but healthy fetuses at lower risk of abnormal perinatal outcome [3-4].

Growth-restricted fetuses are at increased risk of perinatal mortality and morbidity [1, 5]. growth restricted babies also have poor long term outcomes of cardiovascular, neurological, cognitive or neurological system [6-7].

Case History

A 27 yrs old female, referred to our tertiary hospital from Primary heath Centre at 29+6 weeks of gestation with lag in fetal growth of 3 weeks & an Amniotic fluid Index of 3.2 cm for further evaluation and management. Her Dating scan, Early anomaly scan, Detailed anomaly scan, and Dual marker /Quad test were not done. There was nothing significant in her past medical, surgical & family history. She got married nine months back, and it was a spontaneous conception. Her previous cycles were regular at intervals of 28-30 days. She did not give any relevant significant history in her current pregnancy, which could be the suspected cause of FGR.

Her repeat sonography was done at our hospital, which showed a single live intrauterine fetus in breech presentation with fetal growth lag of 3 weeks and reduced liquor (5.04 cm) was confirmed. Estimated fetal weight (EFW) was found to be1180 gms (<3 centiles), suggestive of Stage 1 FGR as per Barcelona staging, and Her ANC Profile was done in which OGTT was found to be deranged, managed with diet and lifestyle modifications. She received hydration therapy and was discharged after five days with the advice of a twice-weekly follow-up in OPD. She again got admitted to the antenatal ward at 33+1 weeks POG for feto-maternal surveillance. Along with her vitals monitoring, her daily NST and biweekly Doppler were done for fetal monitoring. She was receiving a high-protein diabetic diet with adequate hydration.

Table 1: Chart depicting her Serial USG parameters after she was being followed in our institute.

FETAL BIOMETRY					DOPPLER PARAMETERS							
GA (As LMP)	GA (As USG)	Estimated fetal weight		AFI	UA		MCA		Ut A		DV	
		In gms	%		PI	%	PI	%	Mean PI	%	PI	%
28+6	26+3	992	1	4.6								
30+2	27+6	1180	1	8.8	1.1	58	1.4	4	0.6	13	0.53	44
33+1	29+1	1331	0	3.1	1.1	67	1.9	4	0.6	36	0.59	60
33+6	30+1	1385	0	9.4	0.78	27	1.03	1	0.7	47	0.67	85
34+3	30+5	1608	0	7.3	1.24	84	1.08	1	0.8	89	0.69	89
35+2	31+1	1603	0	6.2	1.49	97	0.85	<1	1.06	98	0.78	97

GA-Gestation age; AFI-Amniotic fluid index; UA-Umbilical artery; MCA-Middle cerebral artery;

DV-Ductous Venosus

At 35+2 weeks of gestation, her emergency LSCS was done because of her poor biophysical profile score (≤4-Non Reactive NST & AFI-2cms, Absent fetal movement). She delivered a pre-term alive male baby of weight 1.52 kg by breech. Baby cried well immediately after birth. Baby APGAR at 5 and 10 minutes were 7/10 and 9/10. The baby was doing fine at the time of discharge. Baby was followed up for four weeks, and the baby was doing well with normal developmental milestones and reflexes.

Discussion

FGR may be classified as early or late-onset depending upon its manifestation, whether it appears before or after 32 weeks, respectively. The table below is from ISUOG guidelines 2020.

Table 2: Main clinical characteristics of early- and late-onset FGR [8]

Characteristic	***Early-onset FGR***	***Late-onset FGR***
Main clinical challenge	Management	Detection
Gestational Age at Presentation	<32 weeks	>32 weeks
Prevalance	30%	70%
Ultrasound Finding	Fetus may be very small	Fetus not necessary small
Doppler velocimetry	Spectrum of Doppler alterations that involve umbilical artery, middle cerebral artery and ductus venosus.	Cerebral blood-flow redistribution
Biophysical profile	Maybe abnormal	May be abnormal
Hypertensive disorders of pregnancy	Frequent	Not frequent
Perinatal mortality	High	Low
Placental histopathological findings	Poor placental implantation	Less specific placental findings, mainly altered diffusion.
Maternal cardiovascular hemodynamic status	Low cardiac output, high peripheral vascular resistance	Less marked maternal cardiovascular finding

Table 3: Consensus-based definitions for early and late fetal growth restriction (FGR) in the absence of congenital anomalies-{Delphi consensu} (9)

Early FGR: GA < 32 weeks, in the absence of congenital anomalies	**Late FGR: GA ≥ 32 weeks, in the absence of congenital anomalies**
AC/EFW < 3rd centile *or* UA-AEDF	AC/EFW < 3rd centile
Or	*Or at least two out of three of the following*
1. AC/EFW < 10th centile *combined with*	1. AC/EFW < 10th centile
2. UtA-PI > 95th centile *and/or*	2. AC/EFW crossing centiles >2 quartiles on growth centiles*
3. UA-PI > 95th centile	3. CPR < 5th centile *or* UA-PI > 95th centile

- * Growth centiles are non-customized centiles.
- AC- fetal abdominal circumference; AEDF- absent end-diastolic flow; CPR,-cerebroplacental ratio; EFW-estimated fetal weight; GA -gestational age; PI - pulsatility index; UA - umbilical artery; UtA - uterine artery.
- The pathophysiology behind Early FGR is particularly placental vascular malperfusion, characterized by abnormal trophoblastic invasion of the spiral arteries, pathologic features of the placental villi, and multifocal infarction; these disease components result in so-called 'placental insufficiency [10-11]. In Late FGR, there is milder placental lesions or more specific placental lesions or alteration in oxygen and nutrient diffusion. For follow-up of late-onset FGR, MCA-PI and its ratios to UA-PI (CPR) are the required Doppler parameters. At least once or twice weekly monitoring is recommended in the presence of UA-PI > 95th percentile [12-13].

These are the ISUOG recommendations for delivery in Late FGR [8]:

1. At any gestation age with any of these features present
   - Spontaneous repeated, persistent unprovoked fetal heart rate decelerations
   - Altered BPP (score 4)
   - Maternal indication (e.g., severe preeclampsia, HELLP syndrome) or obstetric emergency requiring delivery
   - cCTG STV < 3.5 ms at 32+0 to 33+6 weeks and < 4.5 ms at ≥ 34+0 week
   - Absent or reversal of UA-EDF
2. 36+ 0 to 37+ 6 weeks: deliver if UA-PI > 95th percentile or AC/EFW < 3rd percentile
3. 38+0 to 39+0 weeks: deliver if there is evidence of cerebral blood-flow redistribution or other features of FGR.

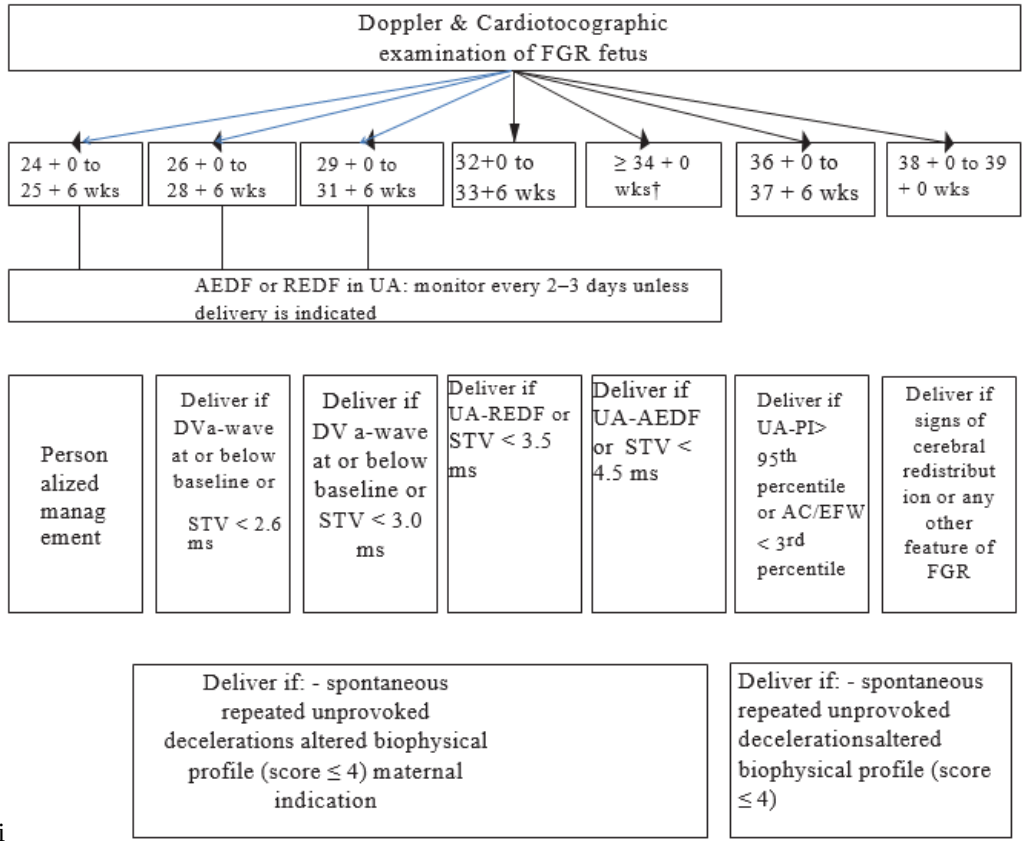
Fetal growth depends on uteroplacental function, and Doppler velocimetry helps to evaluate this by assessment of maternal uterine arteries and fetal umbilical (UA) & middle cerebral arteries (MCA).

Tools for diagnosis and follow up of FGR fetus are customized growth charts, sequential ultrasound measurements focusing on declining/crossing growth centiles, functional parameters such as Doppler waveform analysis (umbilical artery (UA), fetal middle cerebral artery, and ductus venosus), Biophysical profile scoring, Cardiotocography and serum biomarkers [14].

Early gestational age at delivery and low birth weight are the primary quantifying parameters that adversely impact the neonatal outcome of fetuses with early-onset FGR.

Flow chart showing the management of early-onset FGR (ISUOG Guidelines-2020) [8].

Fig 2: Recommended management of pregnancies with fetal growth restricti



on (FGR), based on computerized cardiotocography and Doppler findings. *****Permitted after 30 0 weeks. †Permitted after 32 0 weeks. AC, fetal abdominal circumference; AEDF, absent end-diastolic flow; DV, ductus venosus; EFW, estimated fetal weight; PI, pulsatility index; REDF, reversed ernd-diastolic flow; STV, short-term variation; UA, umbilical artery; wks, gestational weeks.

The present case of Early FGR where patient presented to us at at 29+6 weeks of gestation with lag in fetal growth of 3 weeks & an Amniotic fluid Index of 3.2 cm and her pregnancy could be successfully prolonged up to 35+2 two weeks of gestation. The protocol for management of the fetus was as per Delphi consensus and ISUOG guidelines, and we could prolong pregnancy to the maximum possible gestation and delivered a low birth weight fetus with good Apgar score and who did not require Neonatal Intensive Care Unit admission. Baby was discharged timely at fourth postoperative day and did not develop any neonatal complication. After four weeks of follow up of mother and baby, both were fine and doing well and baby had normal developmental milestone. We did not give unnecessary magnesium sulfate and steroids for cerebral neuroprotecton and lung maturity too as pregnancy was prolonged beyond 34 weeks. Every 1-week prolongation of pregnancy brings down morbidity and mortality and increases the survival of the newborn.

Conclusion

Early diagnosis, careful monitoring, and timely intervention play a vital role in both short-term and long-term outcomes of growth-restricted fetuses. Once the diagnosis of FGR is made, there are multimodal assessment and monitoring tools available for antepartum fetal surveillance such as cCTG, doppler flow velocimetry, Biophysical score. Delphi consensus, ISUOG guidelines, and Barcelona staging are the most popular available guidelines to guide us for timely intervention and delivery of these babies. Prolonging the pregnancy to the maximum possible limit improves not only the Apgar score but also lessens the financial burden of NICU admission and the total number of days of stay in the hospital.

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