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Case Series

Optimizing delivery timing in selective fetal growth restricted dichorionic diamniotic twins: lessons from a case series

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ABSTRACT

Authors aim to analyze the maternal and fetal outcomes in IVF -conceived dichorionic diamniotic (DCDA) twin pregnancies complicated by FGR in women of advanced maternal age, focusing on complications and management strategies. A retrospective analysis of five IVF-conceived DCDA twin pregnancies in women aged 30-49 years was conducted at our tertiary care center between August-October 2024. Establishment of presence of FGR in one or both twins, was done using Delphi criteria. Cases underwent systematic monitoring via serial ultrasound scans with Doppler and comprehensive maternal-fetal surveillance. The mean maternal age was 39.8 years, with a mean gestational age at delivery of 33+5 weeks. All deliveries were performed via cesarean section and the notable complications included a case of Edwards syndrome diagnosed postnatally, and one intrauterine fetal death at 34 weeks in a severely growth-restricted fetus. Maternal complications included pre-eclampsia, hypothyroidism, and obstetric cholestasis. The birth weight was in a range of 1.01-2.48 kg. The significant incidence of FGR and growth discordance in our cases emphasizes the need for regular fetal surveillance and Doppler studies in twin pregnancies. Our findings suggest that preventive cervical cerclage, timely antenatal corticosteroid administration, and appropriate timing of delivery are crucial elements in managing these pregnancies. The goals of management in these high-risk pregnancies are to optimize the time of delivery, minimize risks to both fetuses and balance risks of prematurity against risks of continued in-utero stay. Counselling the expecting couple is of paramount importance and due consideration should be given to maternal choice.

Keywords: Selective fetal growth restriction, Dichorionic diamniotic, In vitro fertilization, Growth discordance

INTRODUCTION

Twin pregnancies are associated with a higher risk of prenatal complications, including selective fetal growth restriction (sFGR), preterm birth, and increased perinatal morbidity and mortality. While (sFGR) is less common in dichorionic (DC) than in monochorionic (MC) twin pregnancies, with reported prevalences of 10.5% and 19.7% respectively, it remains a significant concern in obstetric care.[1] sFGR in DC twins is thought to result from placental insufficiency affecting one fetus, which may explain the higher incidence of pre-eclampsia observed in DC twins with sFGR compared to MC twins. Recent research has suggested that the natural history of sFGR in DC twins may differ from that of singleton pregnancies, with a longer interval between the development of umbilical artery Doppler abnormalities and birth in DC twins compared to growth-restricted singletons. However, the management of sFGR in DC twins has largely been extrapolated from guidelines for growth-restricted singleton pregnancies.[2]

The classification and diagnosis of sFGR have shown significant variation in the literature, making it challenging to compare prevalence and outcomes across studies. The International Society of Ultrasound in Obstetrics and

Gynecology (ISUOG) defines sFGR in DC twins as an estimated fetal weight (EFW) <10th centile in one twin and inter-twin EFW discordance is >=25%.3 More recently, a Delphi consensus has proposed new diagnostic criteria for sFGR in DC twins, aiming to achieve uniformity in diagnosis and reporting. These criteria include either an EFW <3rd centile in one twin, or the presence of two out of three parameters: EFW <10th centile in one twin, EFW discordance >=25%, or umbilical artery pulsatility index >95th centile in the smaller twin.

This case series aims to elaborate the course of sFGR in DC twins in 5 in vitro fertilization (IVF) conception patients, with particular attention to doppler findings, timing and indication of delivery. By providing insights into the course and outcomes of sFGR in DC twins, we hope to add onto the making of clinical management strategies and improve perinatal outcomes in these high-risk group of pregnancies.

CASE SERIES

Case 1

This case presents a DCDA twin pregnancy complicated by sFGR. Twin A demonstrates appropriate growth till 31 weeks with normal Doppler whereas Twin B shows early-onset growth restriction, with EFW dropping from the 5th to the 2nd percentile over the monitoring period. The inter-twin weight discordance remained between 21-27%, suggesting a chronic rather than progressive pattern of growth restriction.

The timing of delivery was decided considering the progression of doppler abnormalities in twin B, EFW and growth trajectories of both twins, and the potential development of additional complications. The preservation of normal ductus venosus flow in the growth-restricted twin provided some reassurance and allowed for continuation of pregnancy with adequate monitoring. In our case however on counselling the parents they wanted to terminate the pregnancy due to a high chance of IUD in twin B and 3% risk of death in co-twin A.

Case 2

In this case of DCDA twin pregnancy with FGR the pathophysiological features are particularly noteworthy. The hemodynamic changes followed a sequential deterioration pattern, with twin B showing early severe compromise leading to demise, followed by Twin A's later deterioration to AEDF. The amniotic fluid dynamics were markedly different between the twins, with Twin B showing early severe oligohydramnios while Twin A maintained adequate fluid volumes throughout.

The presentation of severe growth restriction affecting both twins in a DCDA pregnancy is unusual and suggests possible underlying maternal vascular pathology, supported by the diagnosis of PIH. The disease progression demonstrates the classic sequential deterioration pattern, illustrating the critical nature of early-onset FGR and highlighting the importance of CPR and UA Doppler as prognostic indicators. The presence of multiple maternal risk factors, including advanced maternal age, IVF conception, PIH, and hypothyroidism, likely contributed to the severity and early onset of the condition.

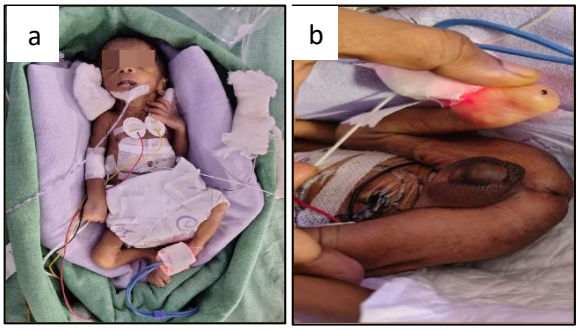

Figure 1 (a and b): Case 1, Twin B-Ambiguous genitaila due to severe hypospadias, Testis in the scrotal swellings and B/L hydronephrosis.

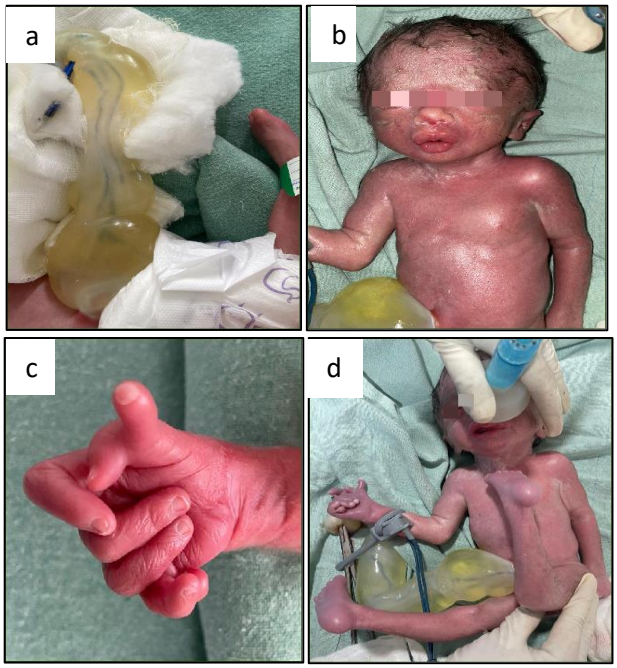

Figure 2 (a-d) Twin A-Edwards syndrome - presented with dysmorphic features including a mega umbilical cord with multiple cysts, polydactyly, and rotated, hyper-extended lower limbs.

Case 3

In this case of DCDA twins with selective fetal growth restriction (sFGR), Twin A demonstrated significant growth restriction, with estimated fetal weight consistently below the 3rd percentile (1389 g at 33+2 weeks and 1667 g at 34+2 weeks), while Twin B maintained appropriate growth between the 67th-77th percentile (2280 g to 2580

g), establishing clear growth discordance. Despite the severe growth restriction in Twin A, notably, Doppler parameters remained normal throughout the surveillance period. This normal doppler finding in the context of sFGR was particularly significant as it helped guide the timing of delivery. The maintenance of normal Doppler readings, even in the presence of severe growth restriction, suggested that despite the genetic etiology (later confirmed as Edward Syndrome) and cardiac anomaly (Hypoplastic Left Heart), there was no significant placental insufficiency affecting the blood flow. This information was valuable in allowing the pregnancy to be continued until 34+6 weeks, optimizing lung maturity while maintaining close surveillance.

Furthermore, it raises important ethical considerations in the management of multifetal pregnancies with discordant anomalies and highlights the increased risk of chromosomal abnormalities, in pregnancies conceived at advanced maternal age.

Case 4

This case presents an interesting progression of growth patterns and Doppler findings in DCDA twins from 16 weeks until delivery. A notable divergence in growth trajectories began to emerge by 21 weeks, with Twin 1 at 36th centile and Twin 2 dropping to 20th centile. The growth discordance pattern evolved uniquely, with both twins eventually demonstrating growth restriction. The case is particularly noteworthy as it demonstrates the evolution from selective growth restriction to concordant growth restriction, while maintaining normal Doppler parameters, which aided in pregnancy continuation under close surveillance until 34 weeks 6 days.

Chronic hypertension can impair placental development and uteroplacental blood flow increasing the risk of both PE and fetal growth restriction. In DCDA twins, the increased placental mass and metabolic demands create a unique environment that predisposes to both PE and FGR, with the two conditions often coexisting and exacerbating each other.

Case 5

The management approach in this case of DCDA twin pregnancy complicated by sFGR reflects contemporary evidence-based practice. The decision for delivery at 33+4 weeks was guided by progressive deterioration in Twin B's Doppler parameters, evidence of brain-sparing effect and significant inter-twin growth discordance. The case also highlights the increased risk of obstetric complications as evidenced by the postpartum hemorrhage requiring surgical intervention. This complication may be attributed to the increased uterine distension and altered placental implantation commonly seen in IVF pregnancies.

Table 1: Maternal profile.

	Case 1	Case 2	Case 3	Case 4	Case 5
Age (in years)	30	40	47	41	49
IVF cconception and indication	IVF Oligoasthenazoospermia	ICSI Oligoasthenoteatozoospermia donor oocyte (ppremature ovarian failure)	IVF Hypospermia	IVF Azoospermia	IVF Grade 4 endometriosis
Obstetric history	Primi	Primi	Primi	Primi	G4A3
Maternal co-morbidities prior to conception		Hypothyroidism		Chronic hypertension, hypothyroidism	Hypothyroidism, asthma, endometriosis requiring right salpingo-oophorectomy and left tubal clipping hhistory of 3 previous spontaneous aabortions.
1st trimester management	Enoxaparin, aspirin, progesterone, folic acid	Enoxaparin, aspirin, thyroxine, progesterone, folic acid.	Folic acid, progesterone, aspirin, enoxaparin	Aspirin, enoxaparin, folic acid	Progesterone, aspirin, enoxaparin, folic acid, hyroxine
2nd trimester management	Iron and calcium supplement, Td immunization done	Iron and calcium supplement, Td	Iron and calcium supplement, Td	Iron and calcium supplement, Td	Iron and calcium supplement, Td immunization done

Continued.

	Case 1	Case 2	Case 3	Case 4	Case 5
		immunization done	immunization done.	immunization done	
Ccervical cerclage	15 weeks	15 weeks	16 weeks	13 weeks	16 weeks
3rd trimester management	Routine care	Routine care	Routine care, URSO deoxy cholic acid started in view of development of obstetric cholestasis	Routine care	Routine care, UDCA in view of OC
Aantenatal corticosteroids given	27 weeks	28 weeks	29 weeks	31 weeks	30 weeks

Table 2: In-patient management.

GA on admission	31 Weeks 5 days	30 Weeks 4 days	34 Weeks 1 day	34 Weeks 6 days	31 Weeks 4 days
Presenting complaints	Decreased fetal movement	Lower abdominal pain with dysuria for 3 days.	Safe confinement required FGR in 1 twin	Safe confinement required FGR in both twins	Safe confinement required FGR in 1 twin
General evaluation	Vitals stable, systemic examination within limits	Elevated BP	Stable vital signs with systemic examination within limits	Vitals stable, systemic examination within limits	Vitals stable, systemic examination within limits
Maternal complications developed during pregnancy		Pregnancy induced hypertension (PIH)	Gestational hypothyroidism, Obstetric cholestasis	Chronic hypertension with superimposed pre-eclampsia	Obstetric cholestasis
NT Scan	Normal	Normal	Normal	Normal	Normal
Anomaly Scan	Early FGR in Twin B	Early FGR in Twin B. Uterine Artery PI>95th centile	Twin A: IUGR with Hypoplastic left heart with multiple umbilical cord cysts	Normal	Normal
Gestational age at start of FGR	17^{+3} weeks	18^{+4} weeks	19^{+1} weeks	26^{+3} weeks	29^{+1} weeks
Ultrasound parameters	Twin A-203gms (54th centile) SDP -3 cm Doppler-UA Reduced EDF	Twin A-21 gms (11th centile) SDP -4 cm Doppler-UA Normal	Twin A-190gms (2nd centile) SDP -3.2 cm Doppler-UA Normal	Twin A-844gms (12th centile) SDP -3.7 cm Doppler Normal CPR-2.15	Twin A-1403gms (54th centile) SDP-5.3 cm Doppler UA Normal
	Twin B- 151gms (5th centile) SDP-4.5 cm Doppler- Reduced EDF	Twin B- 140gms (< 2nd centile) SDP-4.5cm Doppler-UA Normal	Twin B-280gms (50th centile) SDP-4 cm Doppler-UA Normal	Twin B- 750gms (3rd centile) SDP-3.9 cm Doppler- Normal CPR- 2.21	Twin B- 1038gms (<2nd centile) SDP-6.7 cm Doppler-UA Normal
	Twin Discordance 25.6%	Twin Discordance 32%	Twin Discordance 24%		Twin Discordance 29%
Gestational age of twin A at start of FGR	31 weeks	30 Weeks	19 Weeks	32 weeks	NA

Continued.

GA on admission	31 Weeks 5 days	30 Weeks 4 days	34 Weeks 1 day	34 Weeks 6 days	31 Weeks 4 days
Twin A Doppler	Normal	UA, MCA-Normal CPR-1.43 DV-Forward flow	Normal	Normal	Normal
Gestational age of Twin B at start of FGR	17 Weeks	18 Weeks	-	26Weeks	29 Weeks
Twin B Doppler	UA AEDF	UA reduced EDF		Normal	Normal
Fetal monitoring	The Doppler studies of Twin B worsened from reduced EDF to AEDF at 28 weeks of gestation. Conservative management was done with USG twice weekly and daily CTG and DFMC.	At 30^{+3} weeks, both fetuses demonstrated FGR. Twin B having EFW 556gms, UA increased PI, AEDF in some loops, CPR 0.63, indicative of brain-sparing physiology. By 33^{+4} weeks, IUFD of Twin B occured while Twin A continued to exhibit FGR but maintained normal Doppler indices. Conservati-ve manageme-nt was done with USG twice weekly and daily CTG and DFMC	Conservative management was done with USG twice weekly and daily CTG and DFMC	Both twins showing growth below the 3rd percentile by 32 weeks. A notable divergence in growth trajectories began to emerge by 21 weeks, with Twin A at 36th centile and Twin B dropping to 20th centile. The growth discordance pattern evolved uniquely, with both twins eventually demonstrating growth restriction. Even with severe FGR in both twins, Doppler parameters remained reassuring throughout the surveillance period, with normal umbilical artery Doppler flow. Conservativ-e managemen-t was done with USG twice weekly and daily CTG and DFMC	Doppler at 31 weeks 5 days, Twin B exhibited high resistance flow in umbilical artery with a CPR of 1.015. The estimated fetal weights were 1732g for Twin A and 1377g (3rd centile) for Twin B, representing a 20% inter-twin growth discordance. Follow-up scans demonstrated continued worsening of Twin B's Doppler parameters, with CPR declining to 0.929 and middle cerebral artery measurements reaching the 2nd centile, indicating brain-sparing effect at 33^{+1} weeks.
Ultrasound parameters guiding the decision for termination of pregnancy	32 weeks Twin A-1.5 kg (7^{th} percentile) SDP -4.8 cm Doppler-Normal Twin B-1.1 kg (2^{nd} percentile) SDP-4.2 cm Doppler-UA AEDF DV-Forward flow Twin Discordance-26%	34^{+4} weeks, Twin A-1.1 kg (<1 percentile) SDP -3.6 cm Doppler-AEDF Twin B-IUFD	34^{+2} weeks Twin A-1.7kg (2^{nd} percentile) SDP -3.6 cm Doppler-Normal Twin B-2.6 kg (77^{th} percentile) SDP-3.9 cm Doppler-Normal, Twin Discordance-35%	35^{+5} weeks, Twin A-1.9 kg (<2^{nd} percentile) SDP -3.6 cm Doppler-Normal Twin B-2 kg (<2^{nd} percentile) SDP-4.0 cm, Doppler-Normal, No discordance	33^{+3} weeks, Twin A-2.2 kg (50^{th} percentile) SDP -4.2 cm Doppler-Normal Twin B-1.4 kg (<2^{nd} percentile) SDP-2.6 cm Doppler- UA AEDF DV-Forward Flow Twin Discordance-36%
Gestational age on delivery	32 Weeks 2 Days	34 Weeks 4 Days	34 Weeks 6 Days	36 Weeks	33 Weeks 4 Days
Indication for cesarean section	Development of FGR in Twin A at 31	AEDF in Twin A at 34^{+4} weeks	Fetal distress with OC	FGR in both twins.	CPR<1 in Twin B's with brain-sparing effect and

Continued.

GA on admission	31 Weeks 5 days	30 Weeks 4 days	34 Weeks 1 day	34 Weeks 6 days	31 Weeks 4 days
	weeks with decreased growth velocity.				significant inter-twin growth discordance
Prolongation of pregnancy towards term	4 days	4 weeks	5 days	1 week 1 day	2 weeks
Post partum maternal complication	Uneventful	Uneventful	Uneventful	Uneventful	Haemorrhage

Table 3: Fetal outcome.

Twin A birth weight	1.6 Kg	1.07 Kg	1.45 Kg	1.88 Kg	2.1 Kg
APGAR score	1 min-6/10 5 min-7/10	1 min-5/10 5 min-8/10	1 min-3/10 5 min-5/10	1 min-7/10 5 min-8/10	1 min-7/10 5 min-9/10
Gross features	Normal	Meconium-stained amniotic fluid, Umbilical cord revealed a true knot	Presented with dysmorphic features including a mega umbilical cord with multiple cysts, polydactyly, and rotated, hyper-extended lower limbs	Normal	Normal
Twin B birth weight	1.01 kg	680 grams	2.5 Kg	1.90 Kg	1.37 Kg
APGAR score	1 min-7/10 5 min-8/10		1 min-7/10 5 min-9/10	1min-7/10 5min-8/10	1 min-7/10 5 min-9/10
Gross features	Ambiguous genitalia due to severe hypospadias	Delivered stillborn.	Normal	Normal	Normal
Twin A-NICU stay (Days)	25	37	23	9	10
Twin B-NICU stay (Days)	45		7	9	14
Twin A-Complications during NICU stay	Respiratory distress required intubation, neonatal jaundice, retinopathy of prematurity.	Sepsis, coagulopathy, episodes of hypoglycaemia, respiratory distress and congenital hypothyroidism.	Edwards syndrome (Figure 2(a, b, c, d) Died on day 23 of life	Neonatal jaundice	Neonatal jaundice
Twin B-Complications during NICU stay	Respiratory distress, retinopathy of prematurity. Karyotype of Twin B revealed 46, XY karyotype and USG showed testis in the scrotal swellings and B/L hydronephrosis Figure 1 (a, b)	Not applicable	Respiratory distress	Respiratory distress	Neonatal jaundice

DISCUSSION

This case series presents five cases of DCDA twin pregnancies with various complications, highlighting several crucial aspects of contemporary maternal-fetal medicine. The maternal age range in our series was 30-49 years, with 80% of cases involving advanced maternal age (≥35 years).This demographic profile aligns with current trends in assisted reproduction, where Jacobsson et al, reported increased rates of twin pregnancies in women over 35 years.[4]

All pregnancies were conceived through IVF (In Vitro fertilization), reflecting the growing prevalence of ART (assisted reproductive technology) conceived multiple gestations in modern obstetric practice.[5] A striking finding across all cases was the high incidence of FGR (fetal growth restriction), with 100% (5/5) of the pregnancies demonstrating growth discordance. The inter-twin growth discordance ranged from 20% to 35%, exceeding the critical threshold of 20% associated with adverse perinatal outcomes.[1]

This observation supports findings by Khalil et al., who demonstrated that growth discordance ≥20% in DCDA twins significantly increases the risk of adverse perinatal outcomes.[3]

The series demonstrated varied patterns of doppler abnormalities

Normal doppler indices despite FGR (2/5 cases), progressive deterioration of CPR (cerebro-placental ratio) (2/5 cases).

The cerebro-placental ratio emerged as a particularly valuable prognostic indicator, with values <1.5 correlating with adverse outcomes. This finding aligns with Townsend et al.'s work establishing CPR as an independent predictor of adverse outcomes in growth-restricted fetuses.[6] In our case series maternal complications were PIH (pregnancy induced hypertension) (Case 2) and hypothyroidism (Cases 2, 3 and 5). Preterm delivery (<34 weeks) was seen in 3 out of 5 cases and perinatal mortality was 20%.

These outcomes underscore the high-risk nature of DCDA twin pregnancies complicated by growth discordance, particularly in the context ART conception.[7] Typically, delivery is not recommended before 32-34 weeks' gestation to balance fetal maturity with potential intervention risks.

Early-onset IUGR (intrauterine growth restriction) defined as occurring before 32 weeks' gestation, demands a comprehensive approach to fetal surveillance. Delivery decisions are primarily guided by critical parameters including late ductus venosus changes, compromised cCTG (computerized cardiotocography) and specific umbilical artery Doppler findings. Clinicians should pay close attention to detailed markers such as A-wave changes, short-term variability in fetal heart rate, and spontaneous persistent decelerations.

Late-onset IUGR presents a different clinical picture, with delivery recommendations based on nuanced biophysical assessments and maternal indications. Key considerations include fetal heart rate patterns, biophysical profile scores, and gestational age-specific measurements. Umbilical artery pulsatility index, cerebral blood flow redistribution, and specific cCTG parameters guide clinical decision-making from 32 weeks onwards. A particularly complex scenario emerges in twin pregnancies complicated by a single intrauterine death (Case 2).

In dichorionic pregnancies, this event carries significant risks: a 3% chance of co-twin death, 54% probability of preterm delivery, 16% likelihood of abnormal postnatal cranial imaging and a 2% risk of neuro developmental impairment for the surviving twin (FOGSI: GCPR, 24).

This case series on DCDA twins with FGR highlights several important clinical aspects like the need for intensive surveillance in DCDA twins conceived through ART, particularly in women of advanced maternal age, role of serial Doppler assessment in guiding management decisions in cases of FGR and the importance of a multidisciplinary approach in managing complex multiple gestations. The small number and retrospective nature of this case series limit broad generalizations. Additionally, the cases were all from a single tertiary center, potentially introducing selection bias.

CONCLUSION

This series of five cases having IVF conceptions, advanced maternal age had FGR as a common complication across all cases, affecting at least one twin in each pregnancy and the other one later with the advancement of gestational age thus emphasizing the importance of regular and thorough ultrasound monitoring with Doppler studies in twin pregnancies to detect growth discordance and Doppler abnormalities early on. Balance between prolonging pregnancy to improve fetal maturity and intervening early to prevent adverse outcomes is of paramount importance and the expectant couple needs to counselled sensitively throughout. Delivery timing ranged from 32 to 36 weeks, highlighting the individualized approach according to the evolving Doppler changes in each case. The neonatal outcomes varied significantly, from relatively uncomplicated NICU stays to more severe complications like retinopathy of prematurity and Edwards Syndrome. This highlights the need for PGS (preimplantation genetic screening) in cases of IVF conception, keeping in mind the age of the conceiving mother. Multidisciplinary care is essential for managing these high-risk pregnancies in tertiary care hospitals with a well-equipped NICU facility.

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