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Fetal Growth Restriction and Anemia in Both Fetuses of Monochorionic Diamniotic Twins with Suspected Chronic Abruption-Oligohydramnios Sequence: A Case Report

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ABSTRACT

We present a case of a primigravida woman at 30 weeks of gestation with monochorionic diamniotic (MCDA) twins, both affected by fetal growth restriction (FGR) and fetal anemia. One twin demonstrated absent end-diastolic flow on umbilical artery Doppler. Both twins had oligohydramnios. The placenta was enlarged (~110 mm in thickness) and showed gross clots at delivery, consistent with chronic placental abruption. Amniotic fluid was blood-stained during the cesarean section performed due to recurrent late decelerations. Placental pathology was normal except for mild vascular abnormalities. TORCH and antiphospholipid syndrome (APS) screenings were negative. This case highlights the diagnostic complexity of FGR and fetal anemia in both fetuses of MCDA twins and supports the chronic abruption-oligohydramnios sequence as the underlying cause.

Introduction

Monochorionic diamniotic (MCDA) twin pregnancies carry increased risks due to shared placental circulation, including selective and symmetrical fetal growth restriction (FGR), twin-to-twin transfusion syndrome (TTTS), and fetal anemia. Symmetrical FGR, affecting both fetuses equally, suggests global placental insufficiency rather than unequal placental sharing seen in selective FGR [1–3]. Chronic placental abruption, characterized by persistent partial placental detachment and intrauterine hemorrhage, can cause placental insufficiency, fetal hypoxia, anemia, and growth restriction. Most literature focuses on CAOS in singleton pregnancies, and reports involving twins are rare or absent. Given the higher risk of placental complications in twin gestations, CAOS in twins may present complex clinical challenges but remains poorly documented in existing research. This highlights the need for further reports and studies in twin pregnancies affected by CAOS.

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Case Presentation

A 28-year-old primigravida woman at 30 weeks of gestation was referred for evaluation of MCDA twins with FGR. Ultrasound examination revealed that both fetuses had abdominal circumferences and estimated fetal weights (EFW) below the 3rd percentile for gestational age, accompanied by oligohydramnios in both twins. Doppler ultrasound demonstrated absent end-diastolic flow in the umbilical artery of one twin and increased resistance in the other. Additionally, middle cerebral artery (MCA) peak systolic velocity (PSV) measurements indicated anemia in both fetuses. The placenta was markedly enlarged, measuring approximately 110 mm in thickness on ultrasound (Table 1, Figure 1).

Importantly, no polyhydramnios was observed in either twin, effectively excluding twin-to-twin transfusion syndrome (TTTS), which typically presents with a characteristic polyhydramnios–oligohydramnios sequence. Given that both fetuses demonstrated anemia, twin anemia–polycythemia sequence (TAPS) was also ruled out, as TAPS usually involves discordant anemia and polycythemia between twins. The presence of oligohydramnios in both fetuses, alongside an enlarged placenta, raised suspicion for chronic abruption–oligohydramnios sequence (CAOS). Cesarean delivery was performed due to recurrent late decelerations on fetal heart rate monitoring (Figure 2).

During cesarean section, the amniotic fluid was blood-stained, and the placenta appeared grossly enlarged with visible clots, consistent with chronic placental abruption. Histopathological examination of the placenta was unremarkable except for mild vascular abnormalities. TORCH infections and antiphospholipid syndrome (APS)/lupus panels were negative. Two preterm neonates were delivered via cesarean section. Arterial blood pH was 7.23 in both infants. Hemoglobin levels indicated severe anemia, measuring 6.5 g/dL in one twin and 8.0 g/dL in the other (Table 2).

Table 1. Sonographic parameters before delivery

parameter	Twin 1	Twin 2
Gestational Age by LMP (weeks+days)	30	30
Gestational Age by last ultrasound (weeks+days)	25	26+3
Abdominal Circumference	< 2nd percentile	< 2nd percentile
Estimated Fetal Weight	772 g (< 2nd percentile)	929(< 2nd percentile)
Amniotic Fluid (DVP)	< 2 cm (oligohydramnios)	< 2 cm (oligohydramnios)
Umbilical Artery PI	absent	1.5 (above 95th percentile)
MCA Doppler PSV (MoM)	1.89 MoM (anemia suggested)	1.54 MoM (anemia suggested)

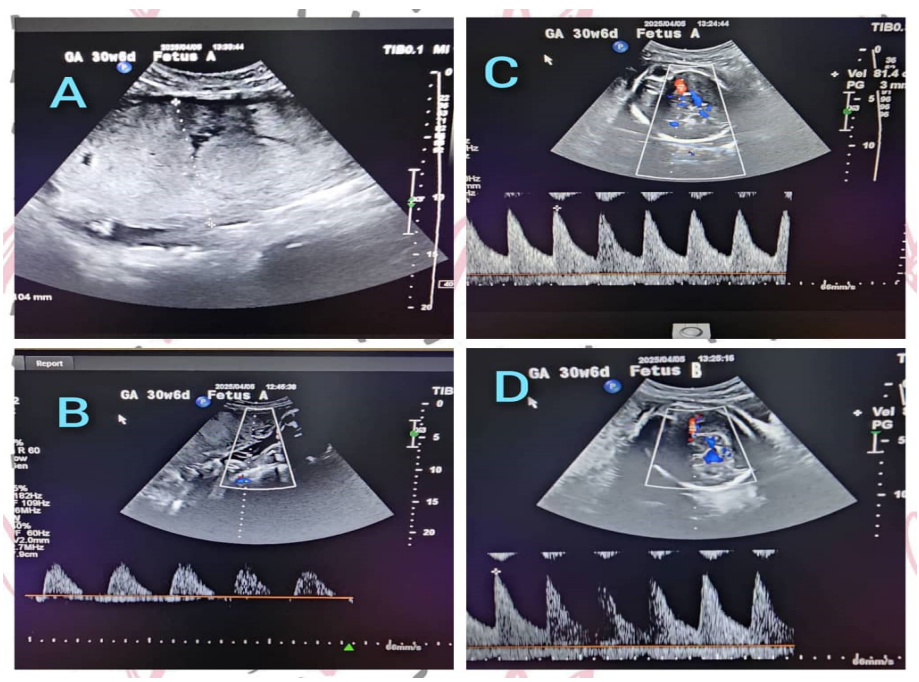

Fig. 1. Sonographic findings. A: Enlarged placenta demonstrating features of chronic abruption, B. Fetal umbilical artery Doppler showing absent end-diastolic flow, C and D: Middle cerebral artery Doppler with elevated MoM indicating fetal anemia

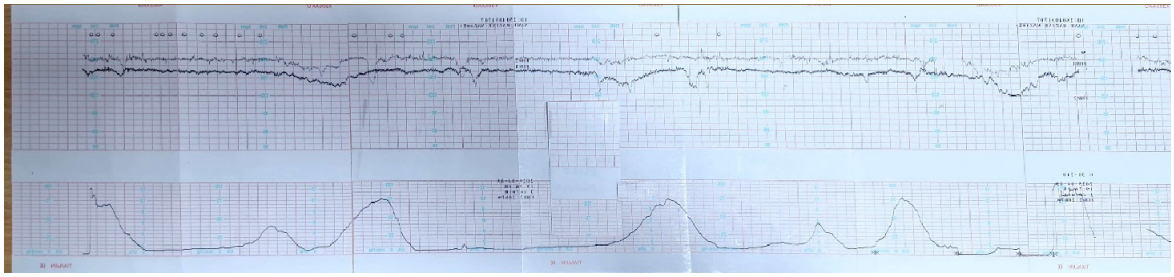

Fig. 2. Recurrent late decelerations on fetal heart rate monitoring in both fetuses

Table 2. Neonatal Data Table

parameter	Neonate1	Neonate2
Birth Weight (g)	700	800
Apgar Score (1 min)	3	3
Apgar Score (5 min)	5	5
| Hemoglobin (g/dl)	6.5	8
PH (ABG of umbilical cord)	7.23	7.23
Intubation	Yes	Yes
NICU Stay Duration	30 days	36 days
Outcome	Expired (pulmonary hemorrhage)	Expired (pulmonary hemorrhage)

Both twins were born with Apgar scores of 3 in the first minute and extreme prematurity, necessitating immediate intubation in the operating room and transfer to the neonatal intensive care unit (NICU) under mechanical ventilation.

In the NICU, both infants exhibited severe respiratory distress syndrome (RDS) and received intratracheal surfactant therapy. Echocardiography revealed cardiac insufficiency in each twin, prompting initiation of inotropic support. Broad-spectrum antibiotics were started after full sepsis evaluations, although blood and urine cultures remained negative in both cases.

The first twin remained dependent on high ventilator settings despite treatment, requiring a second dose of surfactant. Persistent cardiopulmonary insufficiency prevented weaning from ventilation. Serial cranial ultrasounds detected intraventricular hemorrhage, followed by the development of bronchopulmonary dysplasia (BPD). Echocardiography showed reduced ejection fraction, necessitating ongoing inotropic therapy. TORCH screening was negative. After 30 days of intensive care, the infant suffered cardiopulmonary arrest with pulmonary hemorrhage and expired despite full resuscitation.

The second twin also required prolonged ventilatory support due to severe RDS, receiving two doses of surfactant. Signs of systemic infection emerged during the NICU stay, with elevated CRP levels, though cultures remained negative, leading to escalation of antibiotic therapy. The infant developed severe coagulopathy requiring repeated transfusions of blood products, including fresh frozen plasma and platelets. Serial cranial ultrasounds revealed intraventricular hemorrhage, and persistent cardiac dysfunction necessitated continuous inotropic support. Like the first twin, TORCH screening was negative. Despite aggressive management, progressive multi-organ failure developed, culminating in cardiopulmonary arrest associated with pulmonary hemorrhage on day 36. Resuscitative efforts were unsuccessful.

Both twins presented with significant fetal and early neonatal anemia in the context of chronic abruption–oligohydramnios sequence—a condition marked by chronic placental separation and reduced amniotic fluid volume, leading to prolonged intrauterine hypoxia and possible occult fetomaternal hemorrhage. They required multiple packed red blood cell transfusions due to low hemoglobin, hemodynamic instability, and ventilator dependence. Extensive evaluation found no evidence of hemolysis: reticulocyte counts were normal, and direct Coombs tests were negative in both. These findings indicated non-hemolytic, hypoproliferative anemia secondary to chronic intrauterine compromise and extreme prematurity. The persistent anemia, coupled with severe respiratory and cardiac failure, complicated clinical management and contributed to the poor outcomes in both infants.

Discussion

This case of MCDA twins complicated by FGR and fetal anemia illustrates the profound impact of chronic placental pathology on perinatal outcomes. The detailed sonographic evaluations were performed by a maternal–fetal medicine (MFM) fellowship at a high-risk pregnancy referral center, ensuring expert assessment and accurate interpretation of findings crucial for diagnosis and management.

FGR affecting both fetuses similarly is indicative of global placental insufficiency rather than the unequal placental sharing seen in selective FGR or vascular imbalances characteristic of TTTS [1–3]. The absence of polyhydramnios and the presence of oligohydramnios in both twins effectively exclude TTTS, a diagnosis typically defined by discordant amniotic fluid volumes [8]. Furthermore, TAPS was ruled out by the presence of anemia in both fetuses rather than discordant hemoglobin levels.

Umbilical artery Doppler studies demonstrated absent end-diastolic flow in one twin and an elevated pulsatility index in the other, markers of severe placental insufficiency linked to poor perinatal prognosis [4,5]. MCA-PSV was elevated in both twins, consistent with fetal anemia. These Doppler abnormalities, combined with the enlarged placenta (~110 mm in thickness) and blood-stained amniotic fluid at cesarean section, strongly support the diagnosis of CAOS.

CAOS is a rare but critical entity characterized by chronic, partial placental abruption causing persistent maternal–fetal hemorrhage, placental separation, and resultant oligohydramnios [9]. The pathophysiology involves chronic low-grade peripheral placental bleeding compromising uteroplacental blood flow and fetal oxygenation. This leads to prolonged intrauterine hypoxia, reduced fetal urine output causing oligohydramnios, and the development of fetal anemia due to occult fetomaternal hemorrhage. Unlike the classical TTTS pattern, CAOS affects both twins similarly, explaining the severe pathology observed in this case.

Early identification of absent end-diastolic flow and abnormal MCA Doppler allowed timely clinical suspicion of chronic placental impairment. Despite negative TORCH and antiphospholipid syndrome panels and mild placental vascular changes on histopathology, the large placental volume, macroscopic clots, and blood-stained amniotic fluid confirmed chronic abruption as the principal cause of fetal compromise.

Clinically, both twins presented with severe fetal and early neonatal anemia, non-hemolytic in nature, as confirmed by normal reticulocyte counts and negative direct Coombs tests. This anemia, coupled with persistent cardiopulmonary insufficiency and respiratory distress syndrome requiring high ventilatory support and surfactant administration, contributed to the development of bronchopulmonary dysplasia (BPD), intraventricular hemorrhage, and ultimately fatal cardiopulmonary outcomes despite aggressive intensive care management [6,7].

A recent regional case series from the Kanto region of Japan collected cases of chronic abruption–oligohydramnios sequence (CAOS) from 2017 to 2022, including 82 cases in total. Among these, 70 cases delivered beyond 22 weeks of gestation, with only 2 involving twin pregnancies, illustrating that although twin involvement in CAOS is possible, it remains a rare occurrence [9].

Nagashima et al. reported an MCDA twin pregnancy complicated by CAOS and discussed the importance of differentiating CAOS from twin-specific complications [10]. Studies and case reports on chronic abruption–oligohydramnios sequence (CAOS) in twin pregnancies are very limited.

This case emphasizes that chronic placental abruption—manifested sonographically by placental enlargement, abnormal Doppler findings, and oligohydramnios—should be considered a critical differential diagnosis in MCDA twin pregnancies with FGR and fetal anemia. Earlier recognition and close multidisciplinary surveillance at a high-risk referral center with expertise in MFM may facilitate optimized timing of delivery and interventions aimed at mitigating adverse neonatal outcomes.

Conclusion

In MCDA twin pregnancies presenting with symmetrical FGR, fetal anemia, and absent umbilical artery end-diastolic flow, chronic placental abruption and CAOS should be strongly considered. Differentiation from TTTS is critical. Vigilant monitoring and multidisciplinary management are essential to improve perinatal outcomes.

Ethical Considerations

Compliance with ethical guidelines

This study was conducted in accordance with ethical standards and approved by the Institutional Ethics

Committee of the affiliated hospital. Written informed consent was obtained from the participant prior to data collection. Confidentiality and anonymity of the patient's clinical information were strictly maintained throughout the study. All diagnostic and therapeutic procedures were performed in accordance with established medical guidelines. The research adhered to the principles outlined in the Declaration of Helsinki to ensure the protection of participants' rights, safety, and well-being.

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Conflict of Interests

The authors have no conflict of interest to declare.

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