



MULTIFACETED OBSTETRIC RISK: SUCCESSFUL MANAGEMENT OF DICHORIONIC DIAMNIOTIC TWIN PREGNANCY FOLLOWING EARLY HETEROTOPIC PREGNANCY COMPLICATED BY GESTATIONAL DIABETES MELLITUS AND PRETERM PREMATURE RUPTURE OF MEMBRANES—A CASE REPORT

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ABSTRACT

Background: Heterotopic pregnancy, defined as the simultaneous occurrence of intrauterine and extrauterine gestations, is an uncommon but potentially life-threatening obstetric condition. The coexistence of a successfully continuing dichorionic diamniotic (DCDA) twin pregnancy following conservative management of heterotopic pregnancy is exceptionally rare. Additional complications including gestational diabetes mellitus (GDM), previous cesarean delivery, and preterm premature rupture of membranes (PPROM) further increase maternal and neonatal morbidity. **Case Presentation:** A 21-year-old gravida 2 para 1 living 1 ectopic 1 woman with a previous lower-segment cesarean section presented at 35+1 weeks of gestation with a DCDA twin pregnancy complicated by PPRM and GDM managed with oral hypoglycemic agents. Earlier in pregnancy, she had been diagnosed with heterotopic pregnancy, which was managed conservatively with successful continuation of the intrauterine twin gestation. In view of PPRM, previous cesarean scar, and twin pregnancy, emergency lower-segment cesarean section was performed. Two live preterm male neonates weighing 2.22 kg and 2.14 kg were delivered. Both required short-term neonatal intensive care support and were shifted to the mother's side on postoperative day three in stable condition. Maternal recovery was uneventful. **Conclusion:** This case illustrates that successful maternal and neonatal outcomes can be achieved despite multiple coexisting high-risk obstetric conditions through early diagnosis, close surveillance, multidisciplinary care, and timely surgical intervention.

KEYWORDS

Heterotopic pregnancy; Dichorionic diamniotic twins; Gestational diabetes mellitus

INTRODUCTION

Heterotopic pregnancy (HP), defined as the simultaneous occurrence of intrauterine and extrauterine gestations, is a rare but potentially life-threatening obstetric condition. The incidence of heterotopic pregnancy in spontaneous conception has traditionally been estimated at approximately **1 in 30,000 pregnancies**, although this frequency increases substantially with assisted reproductive technologies (ART), with reported rates approaching **1 in 100 to 1 in 1,000 pregnancies** depending on the ART population studied. (1) The increased incidence following ART is attributed to factors including multiple embryo transfer, tubal pathology, altered pelvic anatomy, and the underlying infertility factors among affected women. (2) Despite advances in reproductive medicine and early pregnancy imaging, heterotopic pregnancy remains a diagnostic challenge because confirmation of an intrauterine pregnancy frequently results in reduced suspicion for a concurrent ectopic gestation. (3) Delayed diagnosis may lead to tubal rupture, significant intra-abdominal hemorrhage, maternal hemodynamic instability, and loss of the intrauterine pregnancy, emphasizing the importance of maintaining a high index of suspicion and performing careful adnexal evaluation during early pregnancy ultrasonography, even when an intrauterine pregnancy has been identified. (4)

The diagnosis of heterotopic pregnancy has improved considerably with the routine use of high-resolution transvaginal ultrasonography and serial assessment of maternal symptoms. Nevertheless, early diagnosis remains difficult because clinical manifestations—including abdominal pain, vaginal bleeding, and adnexal tenderness—are frequently nonspecific and may mimic threatened miscarriage, corpus luteum cysts, or other early pregnancy complications. (5,6) Furthermore, serum β -human chorionic gonadotropin (β -hCG) measurements have limited diagnostic value in heterotopic pregnancy because hormone levels primarily reflect the viable intrauterine pregnancy. Consequently, meticulous ultrasonographic evaluation of both adnexa during first-trimester scans is essential, particularly in women presenting with pelvic pain, hemoperitoneum, or known risk factors for ectopic implantation. (7,8) Successful continuation of the intrauterine pregnancy following treatment or conservative management of heterotopic pregnancy has been increasingly reported, although it remains an uncommon clinical outcome. (6,7) Management strategies depend on the location of the ectopic pregnancy, maternal hemodynamic stability, gestational age, and the viability of the intrauterine pregnancy. Surgical removal of the ectopic gestation, usually by laparoscopic salpingectomy or salpingostomy, remains the standard treatment for tubal heterotopic pregnancies, while carefully selected patients may be managed using ultrasound-guided local injection therapies or expectant management. (5) Regardless of the chosen approach, preserving the intrauterine

pregnancy while minimizing maternal morbidity requires prompt diagnosis, individualized treatment planning, and close multidisciplinary follow-up. (6)

Twin pregnancies, particularly dichorionic diamniotic (DCDA) gestations, are independently associated with substantially increased maternal and perinatal morbidity compared with singleton pregnancies. (9) Maternal complications include gestational diabetes mellitus (GDM), hypertensive disorders of pregnancy, anemia, postpartum hemorrhage, and increased rates of operative delivery. Fetal and neonatal complications include preterm birth, fetal growth restriction, respiratory distress syndrome, neonatal intensive care unit (NICU) admission, and increased perinatal mortality. (10) The coexistence of additional obstetric complications further magnifies these risks and often necessitates individualized surveillance and multidisciplinary management. (9,10)

Gestational diabetes mellitus is one of the most common medical disorders complicating pregnancy and occurs more frequently in multiple gestations due to increased placental mass and enhanced insulin resistance mediated by placental hormones. (11) Poor glycemic control is associated with adverse maternal and neonatal outcomes, including hypertensive disorders, cesarean delivery, neonatal hypoglycemia, respiratory morbidity, and prolonged hospitalization. (12) Similarly, preterm premature rupture of membranes (PPROM), which complicates approximately 3–4% of pregnancies and accounts for nearly one-third of preterm births, presents additional challenges in twin gestations because of the increased risks of ascending infection, placental abruption, umbilical cord prolapse, and neonatal prematurity. Management requires careful balancing of the risks of expectant management against those associated with early delivery. (12,13)

Previous cesarean delivery adds another layer of complexity to obstetric decision-making in twin pregnancies complicated by PPRM. Factors such as uterine scar integrity, fetal presentations, gestational age, and maternal and fetal condition influence the timing and mode of delivery. —(10,14) In many such cases, cesarean section is favored to reduce the risks of uterine rupture, fetal compromise, and intrapartum complications, particularly when multiple high-risk factors coexist. —(10,14)

The simultaneous occurrence of a successfully continuing dichorionic diamniotic (DCDA) twin pregnancy following early heterotopic pregnancy, subsequently complicated by gestational diabetes mellitus, preterm premature rupture of membranes, and previous cesarean delivery, represents an unusual and clinically complex obstetric scenario that is rarely described in the literature. (5,6,15) This

combination represents a unique clinical challenge requiring coordinated multidisciplinary management involving obstetricians, fetal medicine specialists, anesthesiologists, diabetologists, and neonatologists. We present this case to highlight the importance of early diagnosis, comprehensive antenatal surveillance, individualized management, and timely surgical intervention in achieving favorable maternal and neonatal outcomes despite the presence of multiple coexisting high-risk obstetric conditions.

CASE PRESENTATION

A -year-old gravida 2 para 1 living 1 (G2P1L1E1) woman with a history of one previous lower-segment cesarean section (LSCS) presented to the Department of Obstetrics and Gynaecology at Saphthagiri Institute of Medical Sciences at 35 weeks and 1 day of gestation with complaints of leaking per vaginum for suggestive of preterm premature rupture of membranes (PPROM). She denied uterine contractions at presentation and was not in active labor. Her current pregnancy was a spontaneous dichorionic diamniotic (DCDA) twin gestation, complicated by gestational diabetes mellitus (GDM) that was adequately controlled with oral hypoglycemic agents during the antenatal period.

The pregnancy had been diagnosed as a heterotopic pregnancy at approximately one month of gestation. Ultrasonographic evaluation demonstrated a viable intrauterine DCDA twin pregnancy coexisting with an ectopic gestation. (Figure 1, Figure 2) As the patient remained hemodynamically stable and the intrauterine pregnancy was viable, conservative management was undertaken with close clinical and ultrasonographic surveillance. The ectopic pregnancy resolved without the need for surgical intervention, allowing successful continuation of the intrauterine twin gestation. Throughout the remainder of the pregnancy, regular antenatal follow-up demonstrated satisfactory fetal growth and maternal well-being. During routine antenatal care, the patient was diagnosed with gestational diabetes mellitus and commenced on oral hypoglycemic therapy, with satisfactory glycemic control achieved.

At 35 weeks and 1 day of gestation, the patient presented with spontaneous rupture of membranes without the onset of labor. Clinical evaluation confirmed PPRM in the setting of a previous cesarean scar and twin gestation. Considering the increased maternal and fetal risks associated with PPRM, previous LSCS, and DCDA twin pregnancy, the decision was made to proceed with an emergency lower-segment cesarean section after appropriate preoperative assessment and informed consent.

A live preterm male infant (Twin A) in cephalic presentation was delivered at 05:42 hours, weighing 2.22 kg. This was immediately followed by the delivery of a second live preterm male infant (Twin B), also in cephalic presentation, weighing 2.14 kg. Both neonates were transferred to the neonatal intensive care unit (NICU) for observation and management of prematurity. Twin A required respiratory support with Bubble Continuous Positive Airway Pressure (Bubble CPAP), whereas Twin B received supplemental oxygen via nasal prongs. Both infants demonstrated satisfactory clinical improvement and were transferred to rooming-in care with their mother on the third postoperative day.

The mother's postoperative recovery was uneventful. She remained hemodynamically stable throughout her hospital stay, with no evidence of postpartum hemorrhage, wound infection, or other postoperative complications. Glycemic control remained satisfactory, and both the mother and her neonates were discharged in stable condition with advice for routine postnatal and neonatal follow-up.

DISCUSSION

Heterotopic pregnancy (HP), defined as the coexistence of intrauterine and extrauterine gestations, remains one of the most diagnostically challenging conditions encountered in early pregnancy. (7) Although historically considered an exceedingly rare event in spontaneous conception, with a reported incidence of approximately 1 in 30,000 pregnancies, its frequency has increased substantially following the widespread use of assisted reproductive technologies (ART), ovulation induction, and embryo transfer. (1,6) Nevertheless, spontaneous heterotopic pregnancy remains uncommon and is frequently associated with delayed diagnosis because confirmation of an intrauterine pregnancy may reduce clinical suspicion for a concurrent ectopic gestation. (6,7) This diagnostic challenge may

result in tubal rupture, significant intraperitoneal hemorrhage, maternal hemodynamic instability, and loss of the intrauterine pregnancy if prompt recognition and appropriate intervention are not achieved. (5,7)

The present case is particularly **noteworthy** because of the coexistence of several independent high-risk obstetric conditions within a single pregnancy. The patient initially presented with a heterotopic pregnancy that subsequently progressed to a viable dichorionic diamniotic (DCDA) twin gestation, which was later complicated by gestational diabetes mellitus (GDM), preterm premature rupture of membranes (PPROM), and a previous lower-segment cesarean section (LSCS). (5,7,9,16) Although each of these conditions independently contributes to increased maternal and neonatal morbidity, their coexistence represents an unusual and clinically complex obstetric scenario that considerably complicates antenatal surveillance, delivery planning, and perinatal management. (7,16,17) The favorable maternal and neonatal outcomes observed in this case highlight the importance of individualized care, timely obstetric intervention, and coordinated multidisciplinary management in optimizing outcomes despite multiple overlapping obstetric risks. (5,9)

Twin pregnancies independently carry increased maternal and neonatal morbidity compared with singleton pregnancies. (18) Maternal complications include hypertensive disorders of pregnancy, GDM, anemia, postpartum hemorrhage, and higher rates of operative delivery, whereas fetal and neonatal complications include preterm birth, fetal growth restriction, respiratory morbidity, neonatal intensive care unit (NICU) admission, and increased perinatal mortality. (19) DCDA twins generally have more favorable outcomes than monochorionic twins; however, they remain associated with substantially greater risks than singleton pregnancies. (20) Consequently, twin pregnancies require structured antenatal surveillance, including assessment of fetal growth, maternal complications, and individualized delivery planning. (21)

In the present case, successful continuation of the DCDA twin pregnancy to 35+1 weeks despite multiple overlapping risk factors represents a favorable outcome. Twin gestation is independently associated with increased maternal and neonatal morbidity, including higher rates of hypertensive disorders, postpartum hemorrhage, operative delivery, preterm birth, and neonatal complications, thereby necessitating enhanced antenatal surveillance and individualized management. (9,20) Furthermore, heterotopic pregnancy requires careful follow-up because, even after successful management of the ectopic component, the ongoing intrauterine pregnancy may remain at increased risk of adverse outcomes. (22) The clinical course of the present case demonstrates that a previous high-risk event does not necessarily preclude favorable outcomes when appropriate surveillance, timely interventions, and multidisciplinary care are implemented. (17,22)

Gestational diabetes mellitus (GDM) further increased the complexity of this pregnancy. Twin gestations are associated with a higher incidence of GDM compared with singleton pregnancies, likely related to greater placental mass and increased production of diabetogenic hormones that contribute to maternal insulin resistance. (12,23) Maternal hyperglycemia is associated with adverse outcomes, including hypertensive disorders, operative delivery, postpartum complications, and neonatal metabolic and respiratory morbidity. "(24) Effective glycemic control is therefore essential to reduce these risks, particularly in pregnancies already complicated by multiple obstetric risk factors." (24,25)

In the present case, GDM was managed with oral hypoglycemic therapy, with satisfactory maternal glycemic control maintained throughout pregnancy. Adequate metabolic control may have contributed to the absence of major neonatal complications such as severe hypoglycemia or excessive birth weight despite late preterm delivery. (25,26) This case highlights the importance of early recognition and structured metabolic monitoring in twin pregnancies, where increased physiological demands may predispose to complications associated with abnormal glucose metabolism. (12,23) The subsequent development of preterm premature rupture of membranes (PPROM) represented a significant turning point in the clinical course. PPRM is a major contributor to preterm birth and is associated with increased maternal and neonatal morbidity due to risks of ascending infection, chorioamnionitis, placental abruption,

umbilical cord complications, and complications related to prematurity. (13,27) Management requires individualized assessment of gestational age, maternal infection risk, fetal well-being, and the balance between the potential benefits of pregnancy prolongation and the risks associated with continued membrane rupture. (13,28)

Decision-making becomes more complex in twin pregnancies because multifetal gestation is independently associated with spontaneous preterm birth and increased neonatal morbidity. (20) In pregnancies complicated by PPROM beyond 34 weeks, delivery is generally recommended when the risks of infection or fetal compromise outweigh the benefits of prolonging pregnancy. (13,28) In this patient, PPROM occurred at 35+1 weeks in the setting of a DCDA twin pregnancy and previous LSCS; therefore, delivery represented an appropriate balance between minimizing maternal and neonatal risks associated with prolonged rupture of membranes while avoiding complications associated with earlier prematurity.

The previous lower-segment cesarean section added further complexity to delivery planning. Although trial of labor after cesarean (TOLAC) may be considered in carefully selected women, decision-making becomes more individualized when additional factors such as twin gestation, PPROM, and other pregnancy complications coexist. Considerations include fetal presentations, maternal condition, cervical status, previous obstetric history, and institutional resources. — (17,29) In the present case, the combination of a scarred uterus, DCDA twin pregnancy, membrane rupture, and multiple antenatal complications supported repeat cesarean delivery as an appropriate approach to optimize maternal and fetal outcomes.

Twin pregnancies also require careful consideration regarding the timing and mode of delivery. While uncomplicated dichorionic diamniotic (DCDA) twin pregnancies are generally delivered near term, earlier delivery may be indicated when maternal or fetal complications occur. (17,20) In this case, delivery at 35+1 weeks following PPROM was clinically justified, balancing the risks of prolonged membrane rupture against the potential complications associated with late preterm birth. (13,17)

Despite the presence of multiple antenatal risk factors, neonatal outcomes were favorable. Both neonates were appropriate for gestational age, with birth weights of 2.22 kg and 2.14 kg, respectively. Twin A required Bubble Continuous Positive Airway Pressure (CPAP), while Twin B required supplemental oxygen through nasal prongs, reflecting the increased risk of respiratory morbidity associated with late preterm birth. (20,30) Importantly, both neonates demonstrated satisfactory postnatal progress and were transferred to maternal care by postoperative day three. This outcome emphasizes the importance of planned delivery in an appropriately equipped facility with access to neonatal support. (31)

The favorable neonatal outcome likely reflects the combined effect of adequate antenatal optimization, appropriate timing of delivery, multidisciplinary preparation, and prompt neonatal assessment. In high-risk twin pregnancies, coordinated care involving obstetricians, fetal medicine specialists, anesthesiologists, and neonatologists is essential to anticipate complications and improve maternal and neonatal outcomes. (17,31)

The successful outcome of this pregnancy highlights the importance of a multidisciplinary approach in managing complex obstetric conditions. A pregnancy complicated by heterotopic pregnancy, DCDA twin gestation, GDM, PPROM, and previous LSCS requires coordinated care to optimize maternal health, monitor fetal well-being, anticipate complications, and ensure appropriate timing and mode of delivery. Structured antenatal surveillance and coordinated peripartum planning have been associated with improved outcomes in high-risk pregnancies. (17,32)

This case highlights the importance of individualized management when multiple high-risk obstetric conditions coexist. Confirmation of an intrauterine pregnancy should not exclude the possibility of heterotopic pregnancy when clinical suspicion persists, particularly in the presence of suggestive symptoms or risk factors. (6) Successful treatment of the ectopic component does not eliminate the need for ongoing surveillance, as subsequent complications related to twin gestation and maternal comorbidities may continue to influence outcomes. (8)

The coexistence of DCDA twin pregnancy, GDM, PPROM, and previous LSCS required integrated clinical judgment rather than management of individual complications in isolation. Decisions regarding timing and mode of delivery were guided by gestational age, maternal condition, fetal well-being, and the balance between risks of expectant management and complications of prematurity. (13,20)

Although limited by the nature of a single case report, this experience provides valuable insight into the management of a rare combination of obstetric complications. Favorable maternal and neonatal outcomes were achieved through early recognition, appropriate antenatal optimization, timely intervention, and multidisciplinary care. — (8,29)

CONCLUSION

Heterotopic pregnancy remains a rare but clinically important condition requiring a high index of suspicion despite confirmation of an intrauterine pregnancy. This case demonstrates that successful continuation of a DCDA twin pregnancy following heterotopic pregnancy is possible with vigilant surveillance, individualized management, and multidisciplinary care, even in the presence of additional complications such as gestational diabetes, PPROM, and previous cesarean delivery. Early diagnosis, optimized maternal care, and coordinated obstetric, fetal medicine, anesthetic, diabetic, and neonatal management are essential to achieving favorable maternal and neonatal outcomes in complex high-risk pregnancies.

FIGURES:



Figure 1.



Figure 2

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