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Perinatal Outcomes in Multiple Pregnancies: Challenges and Management Strategies

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Abstract: Background: Twin pregnancies is generally accepted as a high-risk condition with greater maternal and neonatal morbidity compared to singleton gestations.

Objective: This study was designed to evaluate Obstetrics and Gynaecology difficulties and management strategies of different hospitals in Iraq, by recruiting and studying perinatal outcomes for twin pregnancies versus singleton pregnancies.

Methods: A cross-sectional study was conducted among 70 patients who delivered from January 2024 to January 2025. The cohort was divided into twin pregnancies (n=37) and age-matched singleton pregnancies (n=33). Maternal characteristics, delivery data, and neonatal outcomes were recruited and assessed through medical records.

Results: The mean age of women with twin pregnancies was higher (32.1 vs. 29.3 years), and Assisted Reproductive Technology was more prevalent (29.7% vs. 6.1%). Preeclampsia (18.9% vs. 3.0%) and preterm birth <37 weeks (67.6% vs. 12.1%) were significantly more common in women with twin pregnancies. The rate of cesarean section was significantly higher in the twin group (78.4% vs. 39.4%). Twin neonates included lower mean birth weight (2180g versus 3150g) and higher rates of low birth weight (64.9% versus 15.2%) and NICU admission (43.2% versus 15.2%).

Conclusion: Twin pregnancies are noted to have far higher risks of obstetric complications, preterm delivery, and neonatal adverse outcomes compared to singleton pregnancies, where these findings identify the need for coordinated prenatal care and delivery planning in a tertiary care center to minimize risk and maximize perinatal outcome for both mother and infant.

Keywords: Twin Pregnancy; Singleton Pregnancy; Perinatal Outcomes; Preterm Birth; Low Birth Weight; Preeclampsia; Cesarean Section; Neonatal Intensive Care Unit (Nicu).

Introduction

Globally, twin birth rates have significantly increased, rising from a historical ratio of 1 in 80-90 pregnancies to over 3% of total deliveries in some advanced countries [1,2,3], which rised largely attributed to assisted reproductive technologies (ART) like in vitro fertilization (IVF), which frequently involve multiple embryo transfers and ovarian stimulation [4,5]. Advanced maternal age, a known risk factor for spontaneous twinning, is also increasing and often correlates with fertility treatment seeking [6]. Furthermore, the medical implications of this surge in multiple births are substantial, as these pregnancies demand more care resources and are associated with a higher incidence of adverse perinatal outcomes, including preterm births, low birth weights, and neonatal intensive care unit (NICU) admissions. [6,7]

In addittion, multiple pregnancies presented a complex array of complications from conception through the postpartum period, requiring a significantly higher level of maternal care, as women carrying multiples are at increased risk for life-threatening hypertensive disorders like preeclampsia, likely due to enhanced inflammatory responses and increased placental mass. Also, insulin resistance is also more common, leading to a higher incidence of gestational diabetes mellitus [8,9]. Moreover, acute morbidities such as anemia, hyperemesis gravidarum, and cholestasis can occur, alongside mechanical complications like preterm premature rupture of membranes (PPROM) and placental issues such as placenta previa and abruption, all exacerbated by uterine overdistension. Delivery is also more complex, with a higher rate of Cesarean sections, often necessitated by malpresentation, fetal distress, or complications like uterine atony, which can lead to postpartum hemorrhage. [10]

For the fetuses, the uterine environment in multiple pregnancies is characterized by competition and potential threats, while preterm labor and birth is the most significant risks, with over 50% of twin pregnancies concluding before full term, and a notable proportion resulting in extremely preterm births (before 32 weeks) with greater neurodevelopmental challenges [11]. This predisposition to preterm birth is linked to uterine overdistension, increased infection and inflammation, and medically indicated early deliveries [12]. Fetal growth is also compromised, with twins experiencing slower growth from the third trimester and a higher incidence of intrauterine growth restriction (IUGR) [13]. Discordant growth, where there is a significant size difference between fetuses, can indicate uneven placental sharing or pathological processes. Congenital anomalies are also more prevalent in multiple gestations, further complicating prenatal care. [14]

Monochorionic gestations, where fetuses share a single placenta, introduce distinct and serious complications arising from inter-twin vascular anastomoses [15]. Twin-Twin Transfusion Syndrome (TTTS) is a prominent example, where blood is unevenly exchanged between fetuses, leading to hypovolemia and anemia in the donor twin and hypervolemia and polycythemia in the recipient twin, both with elevated mortality risks if untreated [16]. Other complications, such as Twin Anemia-Polycythemia Sequence (TAPS), Selective Intrauterine Growth Restriction (sIUGR), and the Twin Reversed Artery Perfusion (TRAP) sequence, necessitate vigilant monitoring and specialized interventions. Neonatal outcomes for infants born from multiple pregnancies are intrinsically tied to their delicate prenatal development. [17]

Materials and Methods

1. Study Design

This research mulled over the results of mothers and newborns from twin pregnancy and single pregnancy in one go, where hold in the sub-section of Obstetrics and Gynaecology of the different hospitals in Iraq, which handle a great number of difficult pregnancies, including those from ART (Assisted Reproductive Technology), where our research enrolled data of participants during a period ranged from January 2024 to January 2025.

2. Study Population

The entire population consisted of 70 women who gave birth in the hospital in question during the research timeframe. The 'exposed cohort' included all women with a twin pregnancy who gave birth after the 24th week of pregnancy, while the 'unexposed cohort' consisted of women with singleton pregnancies, who were matched by the maternal age (±2 years) and delivery date (±3 months) to the exposed cohort, to negate confounding by temporal trends in clinical practice.

Inclusion Criteria for both groups:

- Maternal age of 20 years or more.
- Delivery at 24 weeks of gestation or more.
- Complete prenatal and delivery records available in the hospital's medical record (MR) system.

Exclusion Criteria for both groups:

- Chronic and major maternal medical issues such as chronic/high blood pressure, diabetes before pregnancy, and cardiac or renal disease.
- Major fetal structural and chromosome anomalies, diagnosed before birth.
- Due to the uniquely high-risk profile, monoamniotic twin pregnancies are excluded.
- Missing critical parts of medical records.

The final analysis consisted of 37 continuous twin pregnancies and 33 matched single pregnancies.

3. Data Collection and Variables

All data were scrupulously extracted and enrolled from the hospital's medical records system using a piloted data collection form. **The collected data was sorted into these sections:**

a) Maternal Characteristics:

- Prenatal Care Visits: The number of planned antenatal care visits attended was recorded and divided by trimesters (1st: < 14 weeks; 2nd: 14-28 weeks; 3rd: > 28 weeks).
- ART: Any pregnancies conceived through IVF, ICSI, or frozen embryo transfer were noted.
- Indications for Maternal Antenatal Monitoring: Pregnancy-related co-morbidities were defined by the following conditions:
  - ✓ Gestational Hypertension: BP of 140/90 mmHg or higher after 20 weeks of gestation in a previously normotensive woman.
  - ✓ Preeclampsia: Hypertension as defined above with proteinuria of 300 mg/24 hours or greater or other maternal organ dysfunction.
  - ✓ Gestational Diabetes Mellitus (GDM): As defined by the IADPSG criteria for the 75-gram glucose challenge test.
  - ✓ Antepartum hemorrhage: Any vaginal bleeding after 20 weeks of gestation.
  - ✓ Placenta Previa: As confirmed by transvaginal ultrasonography.
- Use of Tocolytics: The administration of any drugs (for example: nifedipine, atosiban) to suppress preterm labor.

b) Delivery Findings:

- Gestational Age at Delivery: Calculated from the first day of the last menstrual period and confirmed by first-trimester ultrasound dating.
- Preterm Birth: Delivery before 37 completed weeks of gestation. Very Preterm Birth was defined as delivery before 32 weeks.

- Mode of Delivery: Classified as vaginal delivery (spontaneous or instrumental) or cesarean section.
- Maternal Morbidities:
  - ✓ Postpartum Hemorrhage (PPH): Estimated blood loss >1000 ml or leading to hemodynamic instability.
  - ✓ Postpartum Anemia: Hemoglobin level <10 g/dL measured 24-48 hours postpartum.
  - ✓ Endometritis: Clinical diagnosis requiring antibiotic treatment based on fever, uterine tenderness, and purulent lochia.
  - ✓ PROM: Spontaneous rupture of membranes before the onset of labor at any gestational age.
  - ✓ Oligohydramnios: Amniotic fluid index (AFI) <5 cm or deepest vertical pocket <2 cm.

c) Neonatal Outcomes

There were data available for every living neonate born (n=74 in twins, n=33 in singletons).

- Birth Weight: Recorded immediately after birth in grams. Low Birth Weight (LBW) was <2500g; Very Low Birth Weight (VLBW) was <1500g.
- NICU Admission: Admission to the neonatal intensive care unit for a duration of >24 hours.
- Apgar Scores: Administered at 1 and 5 minutes by midwife or paediatrician.
- Congenital Anomalies: Large structural abnormalities that become obvious at birth or while in hospital.
- Perinatal Mortality: Perinatal mortality consisted of perinatal death (stillbirths ≥24 weeks) and infant death (death within 28 days after a baby was born alive).

d) Fetal Complications

- IUGR: Abnormal fetal weight reading or abdominal circumference below the 10th centile for gestational age or abnormal Doppler evaluation.
- Fetal Distress: Non-reassuring fetal activity on cardiotocography (CTG) leading to immediate delivery.
- Discordant Growth: Mismatch between the estimation of fetal weight between twins ≥20%.
- Jaundice: Needs phototherapy with standardized nomograms.
- Intraventricular Hemorrhage (Grade III/IV): Defined and staged by cranial sonography.
- Necrotizing Enterocolitis (NEC): With a severity ≥ Stage II.
- twin-to-Twin Transfusion syndrome (tts): Prenatal diagnosis in monochorionic diamniotic twins using Quintero staging.

4. Statistical Analysis

Statistical analysis was performed on SPSS Statistics version 24.0. Continuous data that were normally distributed were tested against the Shapiro-Wilk test. Normally distributed data (maternal age) were reported in Mean (±Standard Deviation, SD) and compared employing the independent samples t-test.

Results

Table 1: Clinical Features of Maternal Characteristics

Characteristic	Twin Pregnancies (n=37)	Singleton Pregnancies (n=33)
Maternal Age (years), Mean (±SD)	32.1 (±4.8)	29.3 (±5.1)
Prenatal visits, n [%]		
1st trimester	35 [94.6%]	32 [97.0%]
2nd trimester	37 [100%]	33 [100%]
3rd trimester	36 [97.3%]	33 [100%]
Assisted Reproductive Technology (ART), n [%]	11 [29.7%]	2 [6.1%]
Indications of Maternal Antenatal, n [%]		
None	18 [48.6%]	25 [75.8%]
Gestational Hypertension	4 [10.8%]	2 [6.1%]
Preeclampsia	7 [18.9%]	1 [3.0%]
Gestational Diabetes Mellitus (GDM)	5 [13.5%]	3 [9.1%]
Antepartum Hemorrhage	2 [5.4%]	1 [3.0%]
Placenta Previa	3 [8.1%]	1 [3.0%]
Use of tocolytics, n [%]		
Yes	9 [24.3%]	2 [6.1%]
No	28 [75.7%]	31 [93.9%]

Table 2: Delivery findings of Maternal.

Finding	Twin Pregnancies (n=37)	Singleton Pregnancies (n=33)
Gestational Age at Delivery		
Gestational age at delivery in weeks, Mean (±SD)	35.2 (±2.8)	38.6 (±1.7)
Preterm Birth (<37 weeks), n [%]	25 [67.6%]	4 [12.1%]
Very Preterm Birth (<32 weeks), n [%]	5 [13.5%]	1 [3.0%]
Mode of Delivery, n [%]		
Vaginal Delivery	8 [21.6%]	20 [60.6%]
Cesarean Section	29 [78.4%]	13 [39.4%]
Abortions*	0 [0%]	0 [0%]
Type of delivery, n [%]		
Full-term	12 [32.4%]	29 [87.9%]
Preterm	25 [67.6%]	4 [12.1%]
Postpartum Hemorrhage (>1000ml), n [%]		
Yes	6 [16.2%]	2 [6.1%]
No	31 [83.8%]	31 [93.9%]
Postpartum Anemia (Hb <10 g/dL), n [%]		
Yes	10 [27.0%]	4 [12.1%]
No	27 [73.0%]	29 [87.9%]
Endometritis, n [%]		
Yes	2 [5.4%]	1 [3.0%]
No	35 [94.6%]	32 [97.0%]
PROM (Premature Rupture of		

Membranes), n [%]		
Yes	11 [29.7%]	4 [12.1%]
No	26 [70.3%]	29 [87.9%]
PIH (Pregnancy-Induced Hypertension), n [%]		
Yes	9 [24.3%]	3 [9.1%]
No	28 [75.7%]	30 [90.9%]
Oligohydramnios, n [%]		
Yes	7 [18.9%]	3 [9.1%]
No	30 [81.1%]	30 [90.9%]
Maternal Mortality rate, n [%]		
Yes	0 [0%]	0 [0%]
No	37 [100%]	33 [100%]

Table 3: Neonatal Outcomes.

Outcome	Twin Neonates (n=74)	Singleton Neonates (n=33)
Birth Weight of Infants		
Birth Weight (grams), Mean (±SD)	2180 (±545)	3150 (±480)
Low Birth Weight (<2500g), n [%]	48 [64.9%]	5 [15.2%]
Very Low Birth Weight (<1500g), n [%]	9 [12.2%]	1 [3.0%]
NICU admission, n [%]		
Yes	32 [43.2%]	5 [15.2%]
No	42 [56.8%]	28 [84.8%]
Apgar Scores		
Apgar at 1 min, Mean (±SD)	7.1 (±1.6)	8.3 (±0.9)
Apgar at 5 min, Mean (±SD)	8.6 (±1.1)	9.1 (±0.6)
Congenital Anomalies, n [%]		
Yes	4 [5.4%]	1 [3.0%]
No	70 [94.6%]	32 [97.0%]
Perinatal Mortality, n [%]		
None	70 [94.6%]	33 [100%]
Perinatal death (stillbirth)	2 [2.7%]	0 [0%]
Infant death (first 28 days)	2 [2.7%]	0 [0%]

Table 4: Fetal complications.

Complication	Twin Neonates (n=74) n [%]	Singleton Neonates (n=33) n [%]
None	45 [60.8%]	28 [84.8%]
IUGR (Intrauterine Growth Restriction)	12 [16.2%]	2 [6.1%]
Fetal distress	10 [13.5%]	3 [9.1%]
Discordant growth	8 [10.8%]	0 [0%]
Jaundice (requiring phototherapy)	15 [20.3%]	4 [12.1%]
Intraventricular Hemorrhage (Grade III/IV)	3 [4.1%]	0 [0%]
Necrotizing Enterocolitis (NEC)	2 [2.7%]	0 [0%]
TTS (Twin-to-Twin Transfusion Syndrome)*	3 [4.1%]	-
Abortions**	0 [0%]	0 [0%]

Table 5: Univariate analysis of risk factors affecting infant quality of life.

Risk Factor	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Twin Pregnancy	5.82	2.45 – 13.84	<0.001
Preterm Birth (<37 weeks)	18.50	6.87 – 49.82	<0.001
Preeclampsia	4.25	1.20 – 15.08	0.025
Gestational Diabetes Mellitus	1.65	0.55 – 4.92	0.371
Use of ART	2.10	0.82 – 5.37	0.121
Maternal Age >35 years	1.88	0.82 – 4.32	0.135

Discussion

A cross-sectional study provided a comparison of perinatal outcomes in 37 twin and 33 singleton patients who were treated in a tertiary care center. Our findings substantiate the prevailing dogma that twin pregnancies constitute a high-risk condition with much higher maternal and neonatal morbidity compared with singleton gestations. The results depict notably higher iatrogenic and spontaneous preterm birth, cesarean birth, hypertensive pregnancy disorders, and neonatal morbidity such as low birth weight and NICU admissions in the twin group.

1. Maternal Characteristics and Antenatal Complications:

Demographic features of our cohort revealed that women with twin pregnancy women as older and employed, Assisted Reproductive Technology (ART) considerably more (29.7% vs. 6.1%, $p<0.05$). This is a documented and predictable correlation, as advanced maternal age and transfer of greater than one embryo in IVF are significant risk factors for dizygotic twinning [18,19]. Thus, the higher rate of advanced maternal age in twins could account to some extent for the surplus of obstetric complications. Maternal antenatal complications were considerably more frequent in twin pregnancies as predicted.

In addition, the incidence of preeclampsia was higher in the twin group, at 18.9% compared to 3.0% in the singleton group, which supported some US studies showing that an increased placental mass and placental hormone production in twin gestation results in a higher load on the maternal cardiovascular and metabolic systems, thus increasing the risk of maternal endothelial dysfunction and hypertensive disease [20]. A Canadian meta-analysis further indicates that twin pregnancy confers a nearly threefold increase in the risk of preeclampsia when compared with singleton pregnancy, and the risk is even greater in nulliparous women [21]. We also noted that tocolytic use was significantly higher in the twin group (24.3% versus 6.1%), which directly correlates with the markedly higher risk of spontaneous preterm labor in this group.

2. Maternal Postpartum Outcomes and Delivery

The most significant observation was the difference in gestational age at delivery, which led to a cascade of consequent events, where mean gestational age of twins was 35.2 weeks compared with 38.6 weeks for singletons, with a steep rise in preterm birth <37 weeks (67.6% vs. 12.1%) and very preterm birth <32 weeks (13.5% vs. 3.0%).

Moreover, it was consistent with Chinese research, where consistently over 50% twins are preterm due to uterine overdistension and consequent preterm labor or indicated delivery for maternal/fetal complications [22,23,24], where the exceedingly high preterm birth rate, often associated with non-cephalic malpresentation or fetal distress of the leading twin, will in itself directly contribute to the much higher cesarean section rate in the twins' series (78.4% vs. 39.4%). Our statistics reflect a common clinical practice of employing cesarean delivery for presumed safety and predictability, especially in the presence of other risk factors [25]. Maternal morbidity extended to the postpartum period. Postpartum hemorrhage (16.2% vs. 6.1%) and anemia (27.0% vs. 12.1%) were higher in the twin group. This is the logical consequence of a

larger placental implantation site, more uterine distension with ensuing uterine atony, and more operative delivery [26].

3. Fetal and Neonatal Outcomes

The neonatal outcomes were vastly different between groups, a direct result of iatrogenic and spontaneous preterm birth. The mean birth weight in twins was over 900 grams lower than in singletons, resulting in high low birth weight rates (64.9% versus 15.2%). This is a virtual inevitability biophysical constraint; the human uterus optimally accommodates one fetus, and twin growth rate would begin to slow after approximately 32 weeks of gestation [27].

This also explains the high frequency of discordant growth (10.8%), a multiple pregnancy complication most classically linked with uneven placental sharing or twin-to-twin transfusion syndrome (TTTS) in monochorionic twins. The prematurity and low birth weight effects were reflected in the higher NICU admission ratio (43.2% vs. 15.2%) and the lower 1 and 5 minute Apgar scores in the twin group, while the incidences of severe neonatal morbidity such as Grade III/IV IVH (4.1%) and NEC (2.7%) were low, they occurred only in the twin group, suggesting the vulnerability of very premature babies, which the perinatal mortality rate was also higher in twins (4/74, 5.4% vs. 0/33, 0%), a bleak finding which, despite its reduction over the last few decades due to improvements in obstetric and neonatal care, remains a significant factor in double pregnancies [28].

4. Risk Factor Analysis and Clinical Implications

Our univariate analysis clearly illustrated the magnitude of risk for twin gestation, which the crude odds ratio of 5.82 for the composite adverse infant outcome emphasizes that twinning is among the strongest predictors of neonatal morbidity, as well as worth noting that preterm birth had a much higher OR [29,30].

Conclusion

Our research corroborates the fact that twin pregnancies are a major risk factor for perinatal distress and are considered high-risk obstetrical cases, which twin pregnancies have a significantly greater incidence of maternal complications in comparison to single pregnancies, including preeclampsia (18.9% vs 3.0%) and prematurity (18.9% vs 12.1%), the latter being the primary cause of a series of neonatal distress conditions.

Also, our neonatal data indicate an increase of six-fold in the prevalence of low birth weight (64.9% vs 15.2%) and a nearly threefold increase in NICU admissions (43.2% vs 15.2%), where Univariate analysis strongly reconfirms that twin gestation alone is the significant risk factor (OR: 5.82), though the still higher odds ratio for prematurity (OR: 18.50) indicates that prematurity continues to be the concern mediating pathway.

Due to that, women with multiple pregnancies require additional obstetrical care as well as counseling regarding early intervention and the need for surveillance to ensure proper growth of the infant, since early prevention strategies for complications of multiple pregnancies are typically not achievable.

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