

Twin Birth Weight Discordance: Associated Factors and Outcome

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ABSTRACT

Objective: To determine the frequency of twin birth weight discordance and compare the maternal characteristics and neonatal outcome in discordant and concordant twin gestations.

Study Design: Cross-sectional comparative study.

Place and Duration of Study: MCH Centre, Unit-II, Pakistan Institute of Medical Sciences, Islamabad, from January 2005 to December 2007.

Methodology: All twin gestations delivered at > 28 weeks gestation were included. Birth weight discordance was defined as > 20% twin birth weight difference and two groups were developed accordingly. Prenatal complications, gestational age at delivery, mode of delivery and neonatal outcome were compared using chi-square and Fischer exact test with significance at $p < 0.05$.

Results: Two hundred and fifty three pairs of twins were delivered during the three years. The frequency of birth weight discordance was 19% (48 verses 205 concordant twin pairs). Preterm delivery (68% vs. 25%), pre-labour rupture of membranes (33% vs. 9%) and pregnancy induced hypertension (22% vs. 12%) were significantly more frequent in birth weight discordant compared to concordant gestations. The cesarean section rate was 29% and 21% respectively. Twelve (12%) discordant and 29 (7%) concordant infants required NICU admission. There were 10 intrauterine deaths (10%) and one (1%) neonatal death among the discordant twins while 18 (4%) intrauterine deaths and 10 (2.4%) neonatal deaths occurred in concordant twins, resulting in uncorrected PNMR of 114.5 and 43.9 per 1000 births respectively.

Conclusion: Twin pregnancies with birth weight discordance are at higher risk of prenatal complications and have less favourable perinatal outcome. Their timely antenatal detection is, therefore, important for closer surveillance and timely delivery.

Key words: Twin pregnancy. Discordant twins. Intrauterine growth restriction. Neonatal outcome.

INTRODUCTION

Twin gestations when compared to singletons are associated with higher perinatal morbidity and mortality.¹ The addition of discordant fetal growth adds the potential for further complications. Discordant fetal growth has been variously reported to occur in 15-29% of twin pregnancies.^{2,3} Serial ultrasound to detect significant growth difference has become a mainstay in treatment of twin gestations.⁴ Some difference in birth weights among twin pairs can be explained given the number of influences on fetal growth.⁵

Twin growth discordance is most often defined by using the larger twin as the standard for growth. The birth weight difference of 15-25% is used as definition for discordance. This has been reported to be associated with poorer perinatal outcome including higher perinatal death rates. However, other studies suggest that intra-pair birth weight difference is non-specific and majority of twins do well despite the weight difference.^{4,6} Prematurity and birth weight below the tenth percentile

may be a greater threat to the newborn than the birth weight discordance.⁶ A review of Pakistani literature revealed numerous studies reporting the outcome of twin gestations in hospital settings,^{7,8} comparison among booked and non-booked patients,⁹ as well as some reports of outcomes among the second twins compared to the first twin.¹⁰

The uncertainty about the significance of birth weight difference among twins and lack of any reported study in Pakistani national literature led the author to undertake this study. The aim was to study twins with > 20% weight difference and their associated factors.

METHODOLOGY

This cross-sectional comparative study was undertaken from 1st January 2005 to 31st December 2007 at Unit II, MCH Centre, Pakistan Institute of Medical Sciences, Islamabad. The MCH Centre is a 150 bedded tertiary care Obstetric and Gynaecology postgraduate teaching public health facility in the capital city of Islamabad. All twin gestations delivering beyond 28 weeks of gestation during the study period were included. Birth weight discordance was defined as > 20% difference between heavier and lighter twins expressed by the following formula:

$$\text{Birth weight discordance} = \frac{\text{weight difference between twins (grams)} \times 100}{\text{larger twin weight (grams)}}$$

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The data was entered into pre-designed study proforma from the mother case notes and the neonate's notes in cases of infants requiring admission in the early neonatal period. The twin pairs were stratified into two categories namely discordant, where the weight difference was > 20%, and concordant with difference < 20%.

The compared maternal outcome measures included age, parity, mode of conception, booking status, prenatal complications and mode of delivery. The infant outcomes were perinatal morbidity defined for study purposes as need for admission to the intermediate care nursery or the neonatal intensive care unit (NICU). The indications for admission were ascertained. Frequency of malformations was determined. Intra-uterine fetal deaths were noted, as were deaths post delivery and perinatal mortality ratio estimated.

The difference in outcome between concordant and discordant twin pairs was determined. Independent sample t-test was used to compare the means of quantitative variables in both the groups. Chi-square test and Fisher's exact test were applied to compare the proportions of qualitative variables in the two groups. A p-value of < 0.05 was considered significant.

RESULTS

A total of 10,380 deliveries were conducted at MCH Centre Unit II during the three year study period out of which, 253 were twins delivered beyond 28 weeks resulting in twin rate of 1:41 births (1.6%). Forty eight (19%) of twins were discordant and 208 (81%) were concordant. One hundred and sixty four mothers (65%) were booked at hospital while the rest presented late in pregnancy or during labour. On comparing the two groups (Table I), 77% of mothers carrying discordant twins were booked and 62% of concordant twin mothers were booked (p=0.01). The mean age of women with discordant twins was 32 years versus 28 years in the other group (p=0.01). Grandmultiparae delivered 42% of discordant twin pairs while among the concordant twins only 8% were born to grand multiparous women (p=0.001).

Table I: Maternal demographics and prenatal complications in twin gestations.

Variable		Discordant twin gestation n=48	Concordant twin gestation n=205	p-value
Mean age	Years	32 (range 24-40)	28 (range 18-33)	0.01*
Primipara	n (%)	10 (21%)	43 (21%)	0.983
Multipara	n (%)	18 (37%)	146 (71%)	0.00*
Grandmultipara	n (%)	20 (42%)	16 (8%)	0.00*
Spontaneous twins	n (%)	40 (83%)	177 (86%)	n.s
Booked	n (%)	37 (77%)	127 (62%)	0.01*
Preterm labour	n (%)	33 (68%)	51 (25%)	0.000*
PROM	n (%)	16 (33%)	18 (9%)	0.000*
PIH	n (%)	10 (22%)	05 (12%)	0.004*

*p-value significant < 0.05; n.s = not significant.

Spontaneous twin conceptions were 217 and among these 40 (18%) were discordant. Thirty six twin pairs were conceived by ovulation induction, 31 by clomiphene induction and 4 (13%) of these were discordant. Five twins were conceived by IVF/ICSI and none had discordance. Only 4 (11%) of the 37 booked discordant twin gestations were diagnosed on antenatal ultrasound. Pre-labour rupture of membranes (33% vs. 9%) and pregnancy induced hypertension (22% vs. 12%) was significantly more frequent in discordant twin gestations compared to birth weight concordant pregnancies (Table I).

The cesarean section rate was 29% for discordant twin gestations and 21% among the concordant twin pregnancies. Preterm deliveries were 33 (68%) in weight discordant and 51 (25%) in concordant twins (Table I). The mean birth weight of preterm discordant twin infants was 1592 g compared to 1897 g for concordant preterm neonates (p=0.001). The mean birth weight of term discordant twin infants was 2897 g similar to 2843 g for concordant term twin pairs. On analyzing the gender distribution there were 274 (54.2%) girls and 232 (45.8%) boys. As data on chorionicity was not available, twin pairs of same gender were evaluated as a surrogate for monochorionic twins. The discordant twins had 29 (61%) same gender pairs while the concordant group had 122 (59.5%) same gender twins revealing no association with birth weight discordance (Table II).

Table II: Comparison of neonatal outcome between birth weight concordant and discordant twins.

Variable		Discordant twin infants (n=96)	Concordant twin infants (n=410)	p-value
Same sex pairs	n (%)	29 (61%)	122 (59.5%)	n.s
Respiratory distress syndrome	n (%)	12 (12.5%)	12 (3%)	0.000*
Malformations	n (%)	8 (8.3%)	8 (2%)	0.000*
Intraventricular haemorrhage	n (%)	5 (5.2%)	13 (3.1%)	0.007*
Sepsis	n (%)	2 (2%)	13 (3.1%)	0.009*
Anaemia	n (%)	nil	15 (3.6%)	0.001*

** p-value significant < 0.05; n.s = not significant.

Among the 96 discordant twin infants, intermediate care nursery admission was required for 15 (16%), neonatal intensive care unit (NICU) admission for 12 (12.5%) and 10 (10.4%) were intrauterine deaths. In comparison among the 410 concordant twin neonates, intermediate care nursery admission was required for 32 (7.8%), NICU admission for 29 (7%) and 18 (4.3%) were intrauterine deaths. One infant among discordant twin pairs while 10 among the concordant twins expired in the neonatal period. There were 8.3% vs. 2% malformed infants in the discordant and concordant groups respectively. The uncorrected PNMR was 114.5 for discordant twins verses 43.9 for concordant twins per 1000 births. The neonatal complications are shown in Table II with higher frequency of RDS, intraventricular

haemorrhage and malformations in the discordant twins. The weight concordant twins had higher frequency of anaemia and sepsis.

DISCUSSION

The clinical significance of twin weight differences is controversial. In addition the threshold for significant intrapair birth weight discordance is unclear. Earlier studies considered weight discordance on ultrasound greater than 15% to be significant.³ For this study a threshold of 20% was defined. Others have defined mild birth weight discordance as 15-25% birth weight disparity, severe as > 25% and extreme birth weight discordance as > 35% birth weight difference.^{10,11} These definitions are arbitrary and without particular reference to perinatal outcomes. The frequency of discordant twins in this data was 19% which is similar to the reported rates of 15-29%.^{2,3,12}

It was found that the older, booked, grandmultiparous women and those with hypertension were more likely to deliver discordant twins. Cohen *et al.* however, reported on association of extreme birth weight discordance with primiparity and pre-eclampsia.¹¹ Hollier *et al.* found no association of maternal hypertension to intrapair twin birth weight differences.⁴ Others did not find any significant difference with respect to maternal age, parity, maternal weight at delivery or ethnicity among asymmetric discordant twin pairs, symmetric discordant twins and symmetric concordant pairs.⁴⁻¹⁸ In Pakistan where a number of women deliver at home, significantly more booking among mothers with discordant twins at the study centre may be related to the associated grandmultiparity and hypertension in these women resulting in seeking better care for their twin conception. In this study, the frequency of discordant twins was 18% in spontaneous conceptions, 13% with clomiphene ovulation induction and nil among the five ICSI conceptions. This may be related to greater chances of dichorionic gestations with assisted conception. Cohen *et al.* however, found an association of discordance with *in vitro* fertilization.¹¹ Other researchers have found no differences related to placental chorionicity.⁵

Chang found that sonographic examination within 28 days of delivery is a reliable predictor of twin birth weight discordance.¹⁹ Low rates of ultrasound based, prenatal detection of birth weight discordance in this study is a cause for serious concern. Possible reasons include patient non-compliance with ultrasound and antenatal clinic appointments, ultrasound performed remote from the time of delivery as well as relative inexperience of the primary sonologist usually a senior obstetric postgraduate resident.

The discordant twin gestations in this study had significantly more frequent pre-labour rupture of membranes and preterm births when compared to birth

weight concordant pregnancies. Preterm births in discordant twin gestations are often related to obstetric interventions mainly due to IUGR and fetal distress. Moreover, twin birth weight discordance and intrauterine growth restriction are also interrelated. Indeed Smiljan *et al.* have suggested that prematurity often iatrogenic and not discordant growth *per se* has more important influence on neonatal outcome.¹² Data from the USA reported by Wen *et al.* find association of increased intra twin birth weight discordance with higher risk of preterm birth warning the clinicians to beware of this complication when managing discordant twin gestations.¹³

There was a significant difference in mean weights of premature discordant and concordant twins in this data, while this did not hold true for twins sets at term. The differences in mean weights of the preterm twin pairs in the two groups may indicate higher iatrogenic as well as spontaneous preterm delivery rates of the more severely discordant twins with lower mean birth weights. However, the discordant twin pairs reaching term gestations had similar mean birth weights to the concordant pairs. Among preterm, live born, non-malformed twins, Vergani *et al.* found birth weight discordance an independent predictor of adverse neonatal outcome.¹⁵ Appleton *et al.* reporting on near term birth weight discordant twins did not find adverse perinatal outcomes including perinatal mortality except when one of the newborn discordant twins was also small for gestational age.¹⁶

The cesarean section rate was higher among discordant twin gestations compared to the concordant pregnancies. Smiljan *et al.* also report significantly more elective cesarean sections in discordant term and preterm twins.¹² Hollier *et al.* report progressively increasing cesarean section rate with increasing discordance.⁴ Dashe *et al.* noted higher cesarean section rates only in asymmetric growth restricted discordant twins and not among the symmetric discordant and concordant groups.¹⁷

The intrauterine deaths were 10% among discordant twins and 4.3% among the concordant twins in this study. Malformed infants were four times more frequent in the discordant than concordant twin sets. Twin birth weight discordance has been associated significantly with stillbirths, malformed infants and uncorrected neonatal deaths.^{5,16} Severe twin discordance increases the risk of intrauterine deaths. At the same time it increases neonatal morbidity due to pre-maturity as a result of early delivery to avoid fetal demise. Higher frequency of intraventricular haemorrhage and malformations occurred among the discordant twins in this study. Cohen *et al.* and Talbot *et al.* reported no significant difference in neonatal outcomes apart from increased rate of hyperbilirubinaemia. Others have however, found increased perinatal mortality, respiratory distress,

bronchopulmonary dysplasia and sepsis in discordant twins. The weight concordant twins had higher frequency of anaemia and sepsis which suggest that intra pair birth weight difference is non-specific and prematurity and birth weight below the tenth percentile may be a greater threat to the newborn than the birth weight discordance.⁶ A local study has also reported high frequency of prematurity and low birth weight from unstratified twin data resulting in high perinatal morbidity.²¹

The gender distribution of the two groups was similar in this study as was noted by some researchers,⁵ while others have found discordancy > 25% more frequently in twins with dissimilar gender.²²

CONCLUSION

Twin pregnancies with birth weight discordance are at higher risk of prenatal complications and have less favourable perinatal outcome mainly related to preterm birth often iatrogenic as well as due to malformations. Timely antenatal detection by serial ultrasound by experienced sonologist is, therefore, important for closer antenatal surveillance and timely delivery.

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