

A Prospective Study Showing Relationship between Early Detection of Twin Chorionicity and Pregnancy Outcomes

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Abstract: To assess the influence of chorionicity in twin pregnancy on maternal and fetal outcome and to foreground the importance of early antenatal registration and first trimester ultrasonography. And so forth plan the management of twin pregnancy depending on the chorionicity.

Material & Methods: This study is a hospital based prospective study including 200 twin pregnancies registered in 1st trimester after applying exclusion criteria women were followed till term. Perinatal outcome obtained in terms of birth weight, Apgar score, NICU admissions, weight discordance, still birth. Statistical analysis done using chi square test, t test and $p < 0.05$ considered as statistically significant.

Results: Among 200 twin pregnancy included in the study, 57(28.50%) were monochorionic and 143(71.50%) were dichorionic. Mean gestational age at delivery was 33.07 wks in monochorionic lower than dichorionic ($p < 0.001$). Mean birth weight weight in dichorionic was 2.14 kg higher than monochorionic ($p < 0.001$). Similarly, lower mean apgar (5.27 vs 6.55) and higher nicu admissions (19% vs 12.25%) among the monochorionic twins compared to dichorionic twins. Weight discordance between 1st and 2nd twin was observed more in monochorionic twins (26.32% vs 16.78% $p = 0.125$). Perinatal mortality in monochorionic was much higher than dichorionic twins (29.04% vs 4.2%). No significant difference was found in maternal complications.

Conclusion: Early diagnosis of chorionicity ,regular antenatal checkups and timely intervention during the intrapartum period by trained obstetricians helps improving the fetal outcomes especially in monochorionic pregnancies.

Keywords: chorionicity, monochorionic pregnancies, dichorionic.

1. INTRODUCTION

Twin pregnancies are a unique but common obstetrical occurrence that has attracted the attention of both the obstetrician and the common man since time immemorial.¹ Advances in assisted reproduction and increasing proportion of older mothers have contributed to steep increase in twin pregnancies.¹ Multiple gestations currently accounts for 3% of all pregnancies. Twins account for 94% of all multiple births each year.¹ Chorionicity, different from zygosity, refers to the type of placentation and it directly impacts obstetric management.² Distinguishing the placental chorionicity plays a critical role in clinical practice since perinatal mortality rates are 2-5 times higher in cases of monochorionicity, which is present in 20% of all twin pregnancies.^{2,3} Currently, early sonographic study is the gold standard for the antenatal twin chorionicity prediction. When assessed before 14 weeks' gestation it is extremely precise, with reported accuracy rates ranging from 77 to 100%.^{4,5}

Multiple pregnancies are strongly associated with greater maternal morbidity. Studies demonstrate a maternal mortality risk as much as three times higher and the numbers of intensive care unit admissions are nearly twice as those in singleton.⁶ Major obstetric complications include: miscarriage, growth retardation, pre-eclampsia, gestational diabetes, caesarean section, preterm delivery and post-partum hemorrhage.⁷

Children born out of multifetal pregnancy are with higher incidence of congenital anomalies and also increased lifetime risk of developing medical complications, mainly due to the high rate of preterm delivery and low birth weight. Furthermore, twinning phenomenon is associated with a higher incidence of congenital anomalies, especially among monozygotic pregnancies.^{6,8}

2. MATERIAL & METHOD

This hospital based prospective study was conducted in the Department of Obstetrics and Gynecology, SMS Medical College and Attached Group of Hospitals Jaipur, during the period from 2015-2016 in women with twin pregnancy visiting the antenatal clinic. Women with the antenatal visit in the 1st trimester were enrolled from the antenatal clinic and follow up done till term. These women were subjected to 1st trimester ultrasonography for the diagnosis of chorionicity using the lambda sign or T sign. All women fulfilling the inclusion criteria and gave a written informed consent became the study group. **Inclusion Criteria:** All cases of twin pregnancies presenting in the first trimester were included in the study. **Exclusion Criteria:** Presence of more than two fetuses, women with history of any medical disorder like chronic hypertension, Diabetes Mellitus, Epilepsy, Heart disease etc. Unbooked and emergency cases were excluded.

The fetal outcome was analyzed based on the gestational age, birth weight, APGAR scores, congenital malformations, NICU admissions and factors like stillbirth and neonatal death. Chorionicity of the placentae was confirmed after the delivery of both babies. The data was analyzed using SPSS software version 17.0.

3. RESULTS

Out of 200 twin pregnancies taken in study, 143(71.50%) were dichorionic and 57(28.50%) were monochorionic twins.

Distribution of Cases According to Chorionicity

Type of Placentation	No.	%
Monochorionic	57	28.50
Dichorionic	143	71.50
Total	200	100.00

Distribution of Cases According to Gestational Age at The Time of Delivery

Gestational Age (in wks)	Monochorionic		Dichorionic		Total	
	No.	%	No.	%	No.	%
< 34	32	56.10	13	9.10	45	22.50
34 - 37	24	42.10	113	79.00	137	68.50
>37	1	1.80	17	11.90	18	9.00
Total	57	100.00	143	100.00	200	100.00
Mean	33.07		35.67			

$$\chi^2 = 52.8$$

$$p < 0.001$$

Sig

Distribution of Cases According to Weight Discordancy and Chorionicity

Dicordancy	Monochorionic		Dichorionic	
	No.	%	No.	%
Present	15	26.32	24	16.78
Absent	42	73.68	119	83.22
Total	57	100.00	143	100.00

$$\chi^2 = 2.359$$

$$p = 0.125$$

NS

Distribution of Cases According to Mode of Delivery

Mode of Delivery	Monochorionic		Dichorionic		Total	
	No.	%	No.	%	No.	%
NVD	30	21.81	89	62.24	119	59.50
LSCS	26	45.61	52	36.36	81	40.50
Both	1	1.75	2	1.40	3	1.50
Total	57	100.00	143	100.00	200	100.00

$\chi^2 = 1.561$

$p = 0.458$

NS

Distribution of Newborns According to Mean Birth Weight and Chorionicity

Birth Weight	Monochorionic		Dichorionic		T-value	p-value
	Mean	SD	Mean	SD		
Twin 1	1.6	0.46	2.16	0.39	8.4	<0.001
Twin 2	1.53	0.5	2.12	0.38	8.9	<0.001
Mean Birth Weight	1.57	0.43	2.14	0.35	9.4	<0.001

Mean APGAR Score of Twins

APGAR Score	Monochorionic		Dichorionic		T-value	p-value
	Mean	SD	Mean	SD		
Twin 1	5.47	1.7	6.53	1.11	5.14	<0.001
Twin 2	5.07	2	6.58	0.95	7.2	<0.001
Mean APGAR Score of Both	5.27	1.73	6.55	0.91	6.79	<0.001

Distribution of Newborns According to NICU Admission

NICU	Monochorionic		Dichorionic	
	1 st Newborn	2 nd Newborn	1 st Newborn	2 nd Newborn
NICU Admission	38 (66.66%)	38 (66.66%)	24 (16.78%)	25 (17.48%)
No NICU Admission	19 (33.33%)	19 (33.33%)	119 (83.22%)	118 (82.52%)
Total	57 (100.00%)	57 (100.00%)	143 (100.00%)	143 (100.00%)

$\chi^2(1^{st} \text{ Newborn}) = 47.411 \text{ d.f.} = 1$

$p < 0.000$

Sig

$\chi^2(2^{nd} \text{ Newborn}) = 45.691 \text{ d.f.} = 1$

$p < 0.000$

Sig

Distribution According to Neonatal Outcomes of Twins

Neonatal Outcome	Monochorionic		Dichorionic	
	No.	%	No.	%
Live	81	71.05	274	95.80
Still Birth	11	9.65	4	1.40
Neonatal Mortality	22	19.30	8	2.80
Total	114	100.00	286	100.00

$\chi^2 = 68.077$

$p < 0.000$

Sig

Distribution of Cases According to Chorionicity and Maternal Complications

Maternal Complications	Monochorionic		Dichorionic		p-value	χ^2 value
	No.	%	No.	%		
PIH	10	17.50	29	20.30	0.659	0.194
Eclampsia	2	3.50	1	0.70	0.140	2.177
Severe Preeclampsia	3	5.30	5	3.50	0.565	0.331

Accidental Haemorrhage	1	1.80	4	2.80	0.670	0.182
Placenta Previa	1	1.80	1	0.70	0.498	0.458
Anaemia	2	3.50	3	2.10	0.564	0.333
Manual Removal of Placenta	1	1.80	0	0.00	0.112	2.521
Malpresentation	1	1.80	2	1.40	0.852	0.035
Scar Rupture	0	0.00	1	0.70	0.527	0.401
Cord Prolapse	1	1.80	2	1.40	0.852	0.035
PPH	7	12.30	15	10.50	0.715	0.134
PPROM	17	29.80	18	12.60	0.004	8.387

4. DISCUSSION

In the study of 200 twin pregnancies, it was observed that majority of women were in the age group of 21-25 yrs i.e. 38 (66.7%) in monochorionic group and 100 (69.9%) in dichorionic group with mean maternal age of 24.56 ± 3.49 yrs in monochorionic compared to 24.64 ± 3.6 yrs in women with dichorionic placenta(p). Similar result was found in the study done by Alsam S et al (2010)⁹ with mean maternal age in monochorionic group 26.12 ± 3.724 yrs and in dichorionic group 25.23 ± 2.805 yrs.

Maximum number of women in the study were nulliparous i.e. 76 (38%) followed by primipara i.e. 69 (34.5%). It is known that incidence of twinning rises with increasing parity, but this was not observed in our study. Instead incidence of twinning decreased with increasing parity. Mahseer S et al (2015)¹⁰ found 79 (84.9%) primipara in monochorionic group and 250 (90.9%) in dichorionic group, 14 (15.1%) multipara in monochorionic group, 25 (9.1%) in dichorionic group.

32 (56.1%) women with monochorionic placenta had delivered at gestational age <34 wks which was significantly higher as compared to women in dichorionic group i.e. 13 (9.1%). This could be due to early termination of pregnancy in anticipation of high complication rate in monochorionic placentation as compared to dichorionic.

The mean gestational age at the time of delivery in dichorionic group was 35.65 wks and monochorionic group was 33.07 wks which was statistically significant ($p < 0.001$). Carter EB et al (2015)¹¹ found that monochorionic twin delivered earlier at mean gestational age of 34.2 wks compared to 35 wks for dichorionic twin.

Similarly, Masheer S et al (2015)¹⁰ found the mean gestation age at the time of delivery in monochorionic twin was 34.4 ± 3.57 wks and 35.5 ± 2.88 wks in dichorionic twins.

Weight discordancy was more in monochorionic placentation as compared to dichorionic (26.32% vs 16.78% $p = 0.125$). Radhakrishnan R et al (2014)¹ found discordancy between 1st and 2nd twin, 31 (25%) cases of dichorionic pregnancy and 21 (28%) cases of monochorionic pregnancy ($p = 0.57$).

Giuseppe Puccio et al (2014)¹² studied 70 twin pregnancies for weight discordance and found 6 (23.08%) cases in monochorionic group and 20 (76.92%) cases in dichorionic group. The study showed that weight discordance increases slightly with the increase of gestational age. Hatkar PA et al (1999)¹³ studied that monochorionic twins showed increased incidence of discordant growth (34.48%) as compared to that of dichorionic twins (14.08%).

In our study 119 (59.50%) women delivered vaginally and 81 (40.50%) by caesarean section i.e. the rate of LSCS in our study was 40.50%. This was comparable to other studies by Persad VL et al (2001)¹⁴, Mutahir JT et al (2007)¹⁵ and Kontopoulos et al (2004)¹⁶ separately in a population based study showed caesarean rate of 38.9%, 43.1% and 45% respectively.

Caesarean rate is more in monochorionic twin as compared to dichorionic twin because of poor Bishop Scores, failed induction and anticipated complications in antepartum period in monochorionic twin.

Our study was comparable to the study done by Alsam S et al (2010)⁹. They found that 17 (54.84%) women delivered vaginally, 13 (45.16%) by LSCS in monochorionic group and 22 (56.41%) delivered vaginally and 17 (43.59%) by LSCS in dichorionic group.

In this study rate of vaginal delivery was 59.50% which was higher than caesarean rate i.e. 40.50%, the possible reason for high rate of vaginal delivery in our study was timely follow-up and planned delivery for the booked women.

In monochorionic group, maximum number of newborns weighed between 1500-1999 gms i.e. 44 (38.61%), whereas 10 (8.77%) newborns weighed <1000 gms i.e. extremely low birth weight. In dichorionic group, maximum number of newborns i.e. 153 (53.50%) between 2000-2499 gms (low birth weight), whereas 2 (0.70%) newborns weighed <1000 gms (extremely low birth weight).

Akaba GO et al (2013)¹⁷ found out of 600 twin babies, 300 (50.3%) had normal birth weight, 250 (41.7%) had low birth weight, 30 (5%) and 17 were (2.8%) very low birth weight and extremely low birth weight respectively. The mean birth weight of both twins either individually or aggregate was significantly higher in dichorionic twin i.e. 2.14 kg as compared to monochorionic twin i.e. 1.57 kg. Mean APGAR of both twins either individually or aggregate was significantly higher in dichorionic placenta (6.55 vs 5.27 $p < 0.001$). Shirm A et al (2010)¹⁸ found that monochorionic twin had lower APGAR i.e. (8.5 vs 8.9 p -value < 0.001)

76 (19%) newborns in monochorionic and 49 (12.25%) in dichorionic were admitted in NICU. ($p < 0.000$) In retrospective study by Hack KEA et al (2008)¹⁹ noted that the proportion of twins admitted to the NICU was higher for monochorionic twins than for dichorionic twins (29.4% and 19.5% respectively). Similarly, Shrim A et al (2010)¹⁸ studied 93 pair of monochorionic twin and 428 dichorionic twin and found higher rates of admission to NICU in monochorionic as compared to dichorionic group (55.91% v/s 36.657%, $p < 0.001$).

Perinatal mortality in monochorionic twins was higher as compared to dichorionic twins (29.04% vs 4.2%). Hack KEA et al (2007)¹⁹ studied 1407 twin pregnancies and found that the perinatal mortality was 11.6% in monochorionic twin pregnancies and 5% in dichorionic twin pregnancies ($p < 0.001$) with high incidence of stillbirths

Stillbirth was observed in 11 (9.65 %) monochorionic newborns compared to 4 (1.40%) in dichorionic newborn twins. Abasiattai AM et al (2010)²⁰ showed stillbirth rate of <201 per 1000. The high stillbirth rate have been contributed by the unbooked status of the women.

No statistically significant difference among monochorionic and dichorionic group was found with respect to individual maternal complications. But the overall complication rate was higher in monochorionic group as compared to dichorionic group (80.70% v/s 51.64%). This could be explained by single placenta in monochorionic placentation and early intervention in anticipation of complications.

5. CONCLUSION

Our study highlights the importance of determining chorionicity at early pregnancy, as the results in our study clearly demonstrate that fetal complications are more common in monochorionic twins compared to dichorionic twins. As the incidence of twinning is on the rise, early detection of chorionicity will help the obstetricians to plan the antenatal care and treat antenatal complications like growth discordancy, low birth weight, preterm etc. to improve the fetal outcome and reduce perinatal mortality.

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