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CHORIONICITY AND PERINATAL OUTCOME IN TWINS

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ABSTRACT

Introduction: Monochorionic twins are at increased risk of complications, compared to Dichorionic. Hence, determination of chorionicity antenatally is important.

Methodology: 87 twin gestations were followed up through their antenatal, intrapartum and post partum periods and the perinatal course of their babies was followed up. Outcome measures were assessed for MC and DC twins separately and compared, with respect to:

- Mean gestational age at birth
- Mean birth weight
- Incidence of growth discordance, TTTS, single fetal demise
- Need for NICU admission
- Perinatal mortality rate

Results: The mean gestational age at birth and the mean birth weight were significantly lower in the MC compared to DC twins. Growth discordance was found in 36.3% of DC and 57.1% of twins (p value 0.05). The incidence of single fetal demise was similar in both groups. There was only one case of TTTS (4.8% of MC twins). The perinatal mortality rate was significantly higher in MC than in DC group (p value of 0.02). 52.7% of the DC and 82.9% of MC twins needed NICU admission, p value <0.001.

Conclusion: We found that Monochorionic twins are at significantly higher risks for preterm births, low birth weights, growth discordance, perinatal mortality and NICU admission, than Dichorionic twins.

INTRODUCTION:

Twins, triplets and other higher order multiples have always been things of joy and fascination to the world. But the fact is that these beautiful creations of nature have made their way from the womb into this world, tiding over a lot more hurdles than the rest.

Multiple pregnancies are at an increased risk of a variety of complications, compared to singleton pregnancies. Twins account for upto 95% of the multiple births every year[1]. Of late ,there has been a steep increase in the incidence of twin pregnancies worldwide as well as in India, owing to the advances in Assisted Reproductive Techniques and the increasing proportion of older age mothers over the last 3 decades[2].

Twins may be dizygotic which are always Dichorionic Diamniotic, or monozygotic which may be Dichorionic Diamniotic, Monochorionic Diamniotic, Monochorionic Monoamniotic or conjoined. There are increased rates of complications including increased perinatal mortality and morbidity in the monochorionic group compared to the dichorionic group. Hence assessment of chorionicity antenatally is very important.

Determination of chorionicity antenatally can be done by a transvaginal ultrasound between 11-14 weeks of gestation which is more than 95% sensitive in determining the chorionicity and amnionicity in twin gestations. . On TVS, a twin peak or Lambda sign and a thick (>2mm) intervening membrane indicates a DCDA twin, while a T-sign with a thin 2-layered intervening membrane suggests an MCDA twin[3]. This would help us to ensure that the monochorionic group gets more vigilant antenatal care, intrapartum and neonatal care and thus improve the perinatal outcome in twin gestations.

Objectives of the study:

1. To assess the perinatal outcome in twins, and
2. To correlate the perinatal outcome with the type of chorionicity.

METHODOLOGY:

This was a prospective observational study undertaken at the Department of Obstetrics and Gynecology, Jubilee Mission Medical College and Research Institute, Thrissur between January 2017 and August2018.

SAMPLE SIZE:

The minimum sample size required for the study, based on the prevalence of twin deliveries at the hospital was calculated to be 60. We could collect a sample of 87 twin gestations during the study period, in accordance with the inclusion and exclusion criteria for the study.

INCLUSION CRITERIA:

All pregnant women (spontaneous, OI or ART conception) with twin gestations, delivering at Jubilee Mission Medical College by vaginal delivery or caesarean section.

EXCLUSION CRITERIA:

1) Singleton, triplet or higher order multiple pregnancies
2) Twin gestations with a vanishing twin before 14 weeks of gestation

METHODS:

The 87 women with twin gestations included in our study were followed up through their antenatal, intrapartum and post-partum course and the perinatal course of their babies was followed up. Relevant history such as the use of ovulation inducing agents or ART, family history of twinning etc were noted. Also the routine as well as special investigations done (like OGTT, Doppler, Ultrasound) in all cases were recorded in the proforma. The chorionicity of placenta was assessed by a Trans-vaginal Ultrasound done between 11-14 weeks and was confirmed at birth by examination of the placenta. The subjects included in the study were thus grouped into Monochorionic and Dichorionic twins. Perinatal outcome of the babies was analysed with respect to the following outcome measures.

Outcome measures:

1) Mean gestational age at birth
2) Mean birth weight
3) Incidence of growth discordance (> 15% difference in birth weights)
4) Incidence of single fetal demise
5) Incidence of Twin to Twin Transfusion Syndrome
6) Need for admission to NICU
7) Perinatal mortality rate (for study population and study period)

The outcome measures enumerated above were calculated and compared between the Monochorionic and Dichorionic twin gestations. Any difference noted in the outcomes between the two groups was tested for statistically significant association.

Statistical methods:

All numerical variables in the study were expressed in terms of Mean and Standard Deviation, and categorical variables were expressed as frequency and percentage. To test the mean differences between the study variables based on the chorionicity, independent 2 sample t test was applied for parametric variables and Mann Whitney U test was applied for non-parametric variables. To obtain the association of the study variables with chorionicity, Chi-square or Fischer's exact test was applied.

RESULTS:

Total cases: 87 twin gestations - DCDA twins: 66/87 (75.86%) , MCDA twins: 20/87 (22.98%) , and MCMA twins: 1/87 (1.15%).

General demographic features of the study population:

The mean age of mothers in the monochorionic group was 26.67 ± 3.69 years while that in the dichorionic group was 26.32 ± 4.82 years, no statistically significant difference (p value of 0.762). The subjects in the study group who were pregnant for the first time were grouped as primigravidas and those who have had a previous pregnancy were grouped as multigravidas regardless of the outcome of their previous pregnancy. Of the 87 mothers in the study group, 48 (55.17%) were primis and 39 were multis (44.83%). Among the 48 primis, 14 (29.2%) had MC twins and 34 (70.8%) had DC twins. Among the 39 multis in the study group, 7 (18%) were MC twin gestations and 32 (82%) were DC twin gestations. Of the 87 twin gestations studied, 69 (79.3%) were conceived naturally, 9 (10.3%) resulted from ovulation inducing agents, 4 (4.6%) from IUI and 5 (5.8%) from ART. Among the 66 DC twins, 50 (75.8%), and among the 21 MC twins, 19 (90.5%) were spontaneously conceived. Among the 69 spontaneously conceived twin gestations in the study, 19 (27.5%) were MC. While of the 18 twin gestations conceived by infertility therapy, only 2 (11.1%) were monochorionic. Thus in our study, the frequency of monochorionicity was higher in the naturally conceived twin gestations than in those resulting from various infertility therapies.

Table 1 : Study Results

Sl no:	Outcome measure	Monochorionic twins	Dichorionic twins	P value
1	Mean gestational age at birth	33.24 ± 3.11 weeks (n=21)	35.48 ± 2.10 weeks (n=66)	0.005**
2	Mean birth weight	1.58 ± 0.46 kg (n=42)	2.01 ± 0.52 kg (n=132)	<0.001**
3	Incidence of growth discordance	57.1% (12/21)	36.3% (24/66)	0.05**
4	Incidence of Single fetal demise	4.8% (1/21)	4.5% (3/66)	1.00
5	Need for NICU admission	82.9% (34/41)	52.7% (68/129)	<0.001**
6	Incidence of TTTS	4.8% (1/21)	-	-
7	Perinatal mortality rate	16.7% (7/42)	4.5% (6/132)	0.023**

** -statistically significant

Table 2: Gestational age at birth: Distribution according to chorionicity

Classification	MC (%) (n = 21)	DC (%) (n = 66)	Total (n = 87)
≥37 weeks (Term)	2 (9.5%)	23 (34.8%)	25 (28.7%)
34 -36^{+6} weeks (Late preterm)	12 (57.1%)	31 (47%)	43 (49.4%)
32 – 33^{+6} weeks (Early preterm)	1 (4.8%)	8 (12.1%)	9 (10.3%)
28 -31^{+6} weeks (Very preterm)	5 (23.8%)	4 (6.1%)	9 (10.3%)
<28 weeks (Extreme preterm)	1 (4.8%)	0 (0%)	1 (1.2%)

Among the 66 dichorionic twin gestations, 23 (34.85%) were delivered at term ,whereas among the 21 monochorionic twin gestations,only 2 (9.5%) reached upto 37 weeks.

Birth weight:

Table 3: Distribution of birth weights in the study groups

Birth weight (in kg)	MC (n = 42)	DC (n =132)	Total N =174
>2.5	-	24	24 (13.8%)
2-2.49	9	51	60 (34.5%)
1.5-1.99	16	29	45 (25.9%)
1-1.49	11	24	35 (20.1%)
<1	6	4	10 (5.7%)

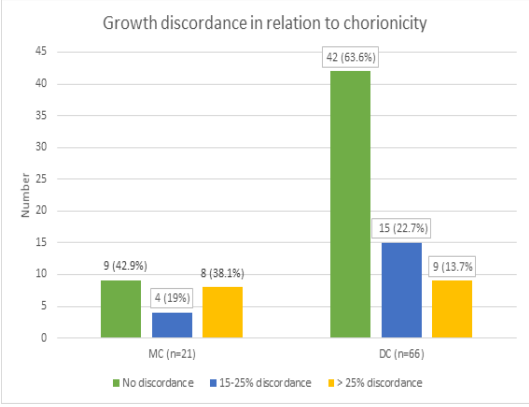
Out of the 132 DC twins born in the study group, majority (34.5%) had a birth weight between 2 and 2.5 kg. While majority, 38% of the MC twins had a birth weight between 1.5 to 2 kg.

Growth discordance:

A difference of more than 15% between the birth weights of the twins was taken as evidence of discordant growth. More than 25% discordance was considered as severe discordance.

Growth discordance was calculated as :
Birth weight of the larger twin - Birth weight of the smaller twin x 100 / Birth weight of the larger twin

Figure 1: Growth discordance in relation to chorionicity



Severe growth discordance was much higher in the MC group than in the DC group (38.1% versus 13.7%).

Need for NICU admission: 82.9% of the MC twins required NICU admission while only 52.7% of the DC twins needed admission to NICU ; p value of <0.001.

The indications for NICU admission were prematurity, Respiratory distress syndrome, FGR/Low birth weight, Hypoglycemia, sepsis and birth asphyxia

Perinatal mortality rate:
No:of late fetal deaths (>28 weeks) + still births + early neonatal deaths (0-7 days) x 100 / Total no:of births (live + still births) in the study group in the study period

Perinatal mortality in relation to chorionicity:
Among the 42 MC twins , there was 1 late fetal death, and 6 early neonatal deaths. Among the 132 DC twins there were 3 late fetal deaths and 3 early neonatal deaths.

The perinatal mortality rate in the dichorionic group was 4.5% while that in the MC group was found to be 16.7%, with a p value of 0.023. That is, the monochorionic group had a significantly higher incidence of perinatal mortality compared to the DC group.

DISCUSSION AND CONCLUSION:

In our study, 71.2% of the twin gestations were delivered at a gestational age of less than 37 weeks (preterm). Around 40% of the preterm births in our study (42.1% in MC and 37.2% in DC twins) were following spontaneous onset preterm labour and the others (57.9% in MC and 62.8% in DC twins) had to be terminated preterm, the common indications being PPROM and Pre-eclampsia. Similar to this finding in our study, Ananth et al had found that 50% of the preterm births in twins are medically indicated, one third spontaneous and 10% after PPROM[4]. In a study by Lekshmi Murukesan et al, 75.4% of twins were found to be born preterm[5]. In our study, the incidence of preterm births in the DC group was 65.15% and in the MC group 91%. A similar incidence was also reported in a recent study in China by Caixia Zhu et al (76.3% in the DC group versus 93.4% in the MC group)[6]. The mean gestational age at birth in MC twins in our study was 33.24 weeks (SD =3.11), while that in the DC group was 35.48 weeks (SD =2.1), which was a statistically significant difference ($p < 0.005$). In the study by Lekshmi Murukesan et al, the mean gestational age at birth was found to be 33.2 weeks in MC and 35.6 weeks in DC twins[5]- quite similar to our finding. Majority (49.4%) of the twin births in our study occurred between 34 to 36^{+6} weeks of gestation, which was similar to the finding by Hatkar P.A et al.[7]

In our study the mean birth weight among all the twin gestations was 1.9 $\pm$0.54 kg; 1.58 $\pm$0.46 kg in MC twins and 2.01 kg $\pm$ 0.52 in DC twins ($p < 0.001$). This difference may be explained by the increased incidence of preterm births in the MC group, leading to a lower mean birth weight. Prasanna Premkumar et al reported a gestational age adjusted mean birth weight of 2.054 kg in MC and 2.14 kg in DC twins[8]. Richard L Naeye et al in their study also showed that MC twins were both smaller and had a greater weight discordance than DC twin pairs[9]. In our study too, majority of the DC twins weighed between 2-2.5 kg, while majority of the MC twins weighed between 1.5 to 2 kg. In contrast to the above studies, in a study by Ruth J.F Loos et al, chorionicity was not found to affect birth weights in twins[10].

In our study, 57.1% of the MC twins and 36.3% of the DC twins showed a discordance of more than 15%, which was found to be statistically significant ($p = 0.05$). A greater frequency of growth discordance in MC twins compared to DC twins was also reported by Victoria et al[11]. Severe growth discordance was found to complicate 38.1% of the MC twins and 13.7% of the DC twins. However, in the study by Sebire N.J et al, the proportion of twin pregnancies with severe birth weight discordance was found to be similar in MC and DC twins, i.e, 11.3% and 12.1% respectively[12]. R Acosta Rojas et al also reported a similar incidence of selective IUGR in MC and DC twins (7% and 5% respectively)[13].
Overall, 60% of the twins in our study required NICU admission – 52.7% of DC twins and 82.9% of MC twins, with a p value < 0.001. The most common causes for NICU admission were prematurity and respiratory distress. In the study by K.E.A Hack et al, 80% of the MC twins and 66% of the DC twins required admission to the neonatal nursery[14]. The risk of NICU admission was found to be more, 31.3% in MC than in DC twins (21.1%), in the study by Lekshmi Murukesan et al[5].

In the present study, the overall incidence of single fetal demise was found to be 4.6% (4.5% in the DC and 4.8% in the MC group), which was not statistically significant, $p = 1.00$. In a study by Kilby M.D et al, 5.85% of the twin gestations was found to be complicated by single fetal demise[15]. Also, in a Japanese study by Morikawa M et al. the incidence of single fetal demise at 22 weeks or more of gestation was found to be 2.5% in MCDA twins and 1.2% in DC twins[16].

The incidence of TTTS in the MC group in our study was found to be 4.8% similar to the finding in the study by Lekshmi Murukesan et al ,5.2%[5]. According to Simpson L.L, TTTS was found in 8-10% of the MC twin gestations[17].

The overall perinatal mortality rate among the twins in our study was 7.47%. The perinatal mortality was significantly higher in the MC twins (16.7%), compared to the DC group (4.5%), p value of 0.023. Hatkar P.A et al in their study had reported a perinatal mortality rate of 17.64% in MC twins and 8.88% in DC twins[7]. Also, in a study by K.E.A Hack et al, the perinatal mortality rate was 11.6% in MC twins and only 5% in DC twins[14].

Thus, similar to most of the previous studies, our study also found the Monochorionic twins to be at a higher risk for adverse perinatal events than Dichorionic twins, with respect to preterm births, low birth weights, incidence of growth discordance, increased need for NICU admission and increased perinatal mortality. But there was no significant difference in the incidence of single fetal demise between the MC and DC twins. This study thus reinforces the emphasis on antenatal ultrasonographic assessment of chorionicity in all twin gestations by the 11-14 weeks TVS. The MC group can thus be ensured to receive better antenatal care with more frequent antenatal visits and serial growth scans, strict intrapartum monitoring and good neonatal intensive care whenever necessary.

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