Comparative Study of Perinatal Outcome in Uncomplicated Monochorionic Diamniotic versus Dichorionic Diamniotic Twins at a Specialized Twin Clinic—A Prospective Study

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J Fetal Med 2023;10:1–8.

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Abstract

Background Monochorionic twins have higher perinatal morbidity and mortality than dichorionic twins. However, there is conflicting data on outcomes of uncomplicated monochorionic twins.

Purpose of the Study The aim of this study is to compare the outcomes of apparently uncomplicated monochorionic twins to dichorionic twins.

Methods This is a prospective study conducted from August 2019 to December 2020 at a specialized twin clinic. All twins, whose chorionicity was determined before 14 weeks with two live fetuses at 24 weeks, were recruited. Complicated monochorionic diamniotic (MCDA) twins with twin-to-twin transfusion syndrome, twin anemia polycythemia syndrome, selective fetal growth restriction before 24 weeks and single or double fetal demise before 24 weeks were excluded. Other exclusion criteria were major congenital and chromosomal abnormalities, higher order multiples, monoamniotic twins, and twins with undetermined chorionicity antenatally. Both the groups were followed till delivery and neonates followed till 28 days. Maternal and neonatal outcomes were studied and compared.

Results One-hundred forty-eight mothers with dichorionic diamniotic (DCDA) and 74 with uncomplicated MCDA were studied. Mean gestational age at delivery was 35 weeks in both the groups. Maternal, fetal, and neonatal morbidities were similar in both, except early onset preeclampsia that was higher in the DCDA group. Prospective risk of stillbirth for DCDA and MCDA after 24 weeks was 1.35 and 4.05%, respectively. Prospective risk of stillbirth for DCDA and MCDA after 30 weeks was 1.49 and 0%, respectively.

Conclusion The maternal and perinatal outcomes in uncomplicated MCDA twins are similar to DCDA twins. Prospective risk of stillbirth after 30 weeks is extremely low. Hence, uncomplicated MCDA twins should not be delivered electively before 36 weeks.

Keywords
- chorionicity
- twins
- perinatal outcome
- uncomplicated MCDA

article published online
May 16, 2023

DOI https://doi.org/10.1055/s-0043-57002.
ISSN 2348-1153.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

Introduction

The worldwide incidences of multiple gestation have increased in last the few decades, representing approximately 3 to 4% of all pregnancies,[1] mainly due to delayed childbearing as well as due to the use of assisted reproductive techniques.[2] Though they contribute to a small number deliveries overall, the perinatal morbidity and mortality associated with multiple gestations are significantly higher compared with singleton pregnancies.[1] Monochorionic twins have higher perinatal morbidity and mortality than dichorionic twins.[1,3]

Some complications, such as twin-to-twin transfusion syndrome (TTTS) and twin anemia polycythemia syndrome (TAPS), are specific to monochorionic twins. They occur as a result of unbalanced blood flow through placental anastomoses between twins. TTTS occurs at a frequency of 8 to 15% in monochorionic twins and it is a significant contributor to increased risk of preterm birth and perinatal morbidity in monochorionic diamniotic (MCDA) twins.[4] The majority of these cases are diagnosed during the second trimester.[5] Single fetal demise (SFD) carries 30% risk of co-twin demise or severe neurological injury.[6] However, there is a conflicting data on outcomes of apparently uncomplicated monochorionic twins, where some studies showed uncomplicated monochorionic and dichorionic twins have similar perinatal outcomes[7,8] others showed significant increased risk of stillbirth even in uncomplicated monochorionic twins.[9]

Aim and Objectives

1. To compare the mean gestational age at delivery of uncomplicated MCDA twins with dichorionic diamniotic (DCDA) twins.
2. To compare the combined adverse perinatal outcomes in twins in relation to chorionicity.
3. To study the maternal, fetal, and neonatal morbidity.

Sample Size Calculation

From literature, it was observed that perinatal outcome in twins is related to chorionicity and gestational age at the delivery. Gestational age at delivery is significantly lower in monochorionic group (33.4 vs. 34.3 weeks; $p < 0.05$).[2] Assuming a difference of 0.8 in mean gestational age between MCDA and DCDA and common standard deviation (σ) = 2, a minimum sample size of 74 MCDA and 148 DCDA mothers was required for conducting the study.

Material and Methods

This is a prospective study conducted at a specialized twin clinic from August 2019 to December 2020. The study was approved by the institutional ethical committee. Informed consent was taken before enrolling the mothers into the study.

All the twins whose chorionicity was determined before 14 weeks and with two live fetuses at 24 weeks were included in the study. Complicated MCDA twins were defined as those with TTTS, twin anemia polycythemia syndrome (TAPS), and selective fetal growth restriction (sFGR) before 24 weeks and were excluded from the study. Other exclusion criteria were pregnancies with major congenital or chromosomal abnormalities, higher order multiples, monoamniotic twins, and twins with undetermined chorionicity antenatally. Even after ruling out TTTS, sFGR, and TAPS, MCDA twins are at increased risk of perinatal mortality, increased incidence of preterm birth, low birth weight, and prolonged stay in neonatal intensive care unit (ICU).[10]

One-hundred forty-eight mothers with DCDA and 74 mothers with uncomplicated MCDA twins were recruited at 24 weeks gestational age into the study. Chorionicity was confirmed at delivery by examination of placenta and membranes. All these mothers were followed till discharge after delivery in a specialized twin clinic with maternal fetal medicine experts. The newborns were followed till discharge, or 28 days after birth whichever is later, for the onset of complications. The differences in pregnancy outcomes and neonatal morbidity and mortality were compared between both the groups.

Gestational age was determined by the patient's last menstrual period or date of fertilization in cases of assisted reproduction. When the menstrual period was not known or discordant with first trimester ultrasound measurements, the ultrasound-based dating criteria were used. If the disparity was 5 days before 9 weeks or 7 days between 9 and $13^{6/7}$ weeks, estimated due date was assigned with ultrasound crown rump length.[11]

DCDA pregnancies were monitored every 4 weeks for fetal weight and amniotic fluid. Multivessel Doppler was performed weekly if either of the fetuses was less than 10th centile or discordancy more than 20%. MCDA twins were monitored every 2 weeks for fetal weight, amniotic fluid, umbilical, middle cerebral artery, and ductus venosus Doppler. Multivessel Doppler was done weekly if either of the fetuses is less than 10th centile or discordancy more than 20%.[12,13] MCDA twins were electively delivered at 36 to $36^{6/7}$ weeks if undelivered by that time and DCDA twins at 37 to $37^{6/7}$ weeks.[13] Prespecified definitions were used for maternal and fetal complications.

Prospective risk of stillbirth was calculated as the number of stillbirths after a given week of gestational age divided by the total number of ongoing pregnancies at the start of that particular week of gestational age.[8,9,14] Prospective risk of perinatal death was calculated by dividing the number of stillbirths and neonatal deaths after any given week by the number of fetuses remaining in utero at the beginning of that week.[8,15]

Statistical Methods

Statistical analysis was done using IBM SPSS version 22 software.[16]

All quantitative variables were checked for normal distribution within each category of explanatory variable by using visual inspection of histograms and normality Q-Q plots.

Shapiro–Wilk test was also conducted to assess normal distribution. Shapiro–Wilk test *p*-value of more than 0.05 was considered as normal distribution. For normally distributed quantitative parameters, the mean values were compared between study groups using independent sample *t*-test (two groups). Categorical outcomes were compared between study groups using chi-squared test. *p*-Value less than 0.05 was considered statistically significant.

Results

We studied 222 pregnant women, with 148 in DCDA group and 74 in MCDA group. Of them, three mothers had SFD and one mother had double fetal demise. Hence, out of 444 babies, 439 were liveborn. Of these 439 babies, 13 babies were transferred to other hospitals by parent's choice; hence, neonatal morbidity and mortality were analyzed for 426 babies with 292 babies in DCDA group and 134 babies in MCDA group.

Maternal characteristics were analyzed for 222 mothers, as mentioned in ►**Table 1**. The mean maternal age was 29.80 ± 4.82. The mean body mass index (BMI) at booking was 26.91 ± 4.59. Mothers with dichorionic pregnancy were with higher age, nulliparous, and had conceived with artificial reproductive techniques (ART) as expected. Mean gestational age at booking to the twin clinic was 15.96 ± 8.52.

The maternal complications like anemia, hypertensive disorders, gestational diabetes, preterm labor, premature rupture of membranes, antepartum hemorrhage, need for cesarean delivery, postpartum hemorrhage (PPH), and ICU admission were equally prevalent in both the groups.

Mean gestational age at delivery was 244.58 ± 19.51 days, with 244 days (35weeks) in each group. Twenty-one percent of dichorionic and 25% of monochorionic twins delivered before 32 weeks of gestation.

►**Table 2** shows the comparison of growth status of the babies on antenatal scan and at birth between both the groups. About 27.4% of the pregnancies had one fetus small for gestational age on antenatal scan, and 9% had both fetuses small for gestational age. About 8.5% of the pregnancies had discordance of more than 25% in estimated fetal weight on the antenatal scan, and 8.1% had sFGR without any significant difference between both the groups. There were two stillbirths in DCDA group, three in MCDA group, and the difference was not statistically significant.

►**Table 3** shows the comparison of discordancy at birth between both the groups. Mean discordance was 12% with 8.6% of the pregnancies had discordancy of more than 25% at birth, 15.7% of mothers had one baby which was small for gestational age at birth, and 5.4% of mothers had both the babies small for gestational age at birth. However, there was no significant difference in growth status of babies between both the groups.

►**Tables 4** and **5** show the neonatal characteristics between both the groups. Mean birth weight in our study group was 2.06 ± 0.55 kg, which was almost same in both the groups. Higher percentage of babies in MCDA group were small for gestational age at birth with 20% in MCDA group and 10% of babies in DCDA group.

Mean neonatal intensive care unit (NICU) stay was 4.66 ± 11.8 days, with 5.07 ± 12.2 in DCDA group and 3.30 ± 11.1 in MCDA group. Six babies had neonatal death with four in DCDA group and two in MCDA group. Of the six babies, three babies had birth weight less than 700 gm. ►**Table 6** shows the details of these babies who succumbed. Significant morbidity was due to respiratory distress syndrome, neonatal jaundice, and sepsis in both the groups.

Discussion

The complications specific to monochorionic twins are well known and are associated with earlier gestational age at delivery and adverse perinatal outcome. However, the optimal timing of delivery of uncomplicated MCDA twins has always been controversial. NICE guidelines recommend elective delivery of uncomplicated MCDA twins at 36 weeks.[13] This study was conducted prospectively at a specialized twin clinic in a tertiary perinatal center in India.

The mean maternal age was 29.80 ± 4.82. There was increased maternal age, nulliparity, and conception with ART in DCDA comparable to the previous published data.[14,20,21]

About 21.6% of the mothers were anemic, 30.6% of the mothers were having hypertensive disorders, 10% had early onset preeclampsia before 34 weeks of gestational age, 30% of mothers had gestational diabetes mellitus, and 4.5% had pregestational diabetes mellitus. The incidence of hypertensive disorders and diabetes mellitus is higher than that reported by Sullivan et al and Young et al.[15,17] There was no difference in hypertensive disorders, diabetes, preterm labor, premature rupture of membranes, Antepartum hemorrhage (APH), PPH, cesarean sections between MCDA and DCDA, similar to that reported by Sullivan et al and Young et al.[15,17] However, early onset preeclampsia was more commonly seen in DCDA group probably due to the higher mean maternal age and nulliparity.

Cesarean section rate was 88.7%, significantly higher than that reported in literature.[17] In their retrospective study done over 20 years, cesarean section rate for twins progressively increased from 58.9% in 1998 to 2002 to 84.1% in 2013 to 2017.

Mean gestational age at delivery was 244.58 ± 19.51 days, with 244 days (35 weeks) in each group, which was lesser than that reported by Young et al.[17] The rate of preterm delivery in our cohort before 34 and 37 weeks of gestation were 22.9 and 82.8%, respectively, which is higher than that reported in literature. Young et al reported 10.3 and 42%,[17] and Fox et al reported 16 and 53%.[18] This was due to higher medical complications noted in our cohort, causing the iatrogenic prematurity. The percentage of women delivered less than 37, less than 34, less than 32, or less than 30 was similar in both groups, as shown by Young et al.[17] However, Sullivan et al reported significantly higher deliveries less than 32 weeks in MCDA twins.[15]

sFGR in MCDA twins is thought to be caused by an unequal sharing of the placenta and distribution of blood through

Table 1 Comparison of maternal characteristics (baseline and clinical) between DCDA and MCDA ($n = 222$)

Parameters	Chorionicity		*p*-Value
	DCDA ($n = 148$)	MCDA ($n = 74$)	
Maternal age (years)	30.6 ± 4.86	28.2 ± 4.36	<0.001
Mean BMI at booking	27.07 ± 4.49	26.61 ± 4.8	0.484
Nulliparous	114 (77.03%)	46 (62.16%)	0.020
Mode of conception			
Spontaneous	42 (28.38%)	67 (90.54%)	<0.001
Assisted non-IVF	34 (22.91%)	2 (2.7%)	
IVF	72 (48.65%)	5 (6.76%)	
Mean GA at booking (in weeks)	15.81 ± 8.55	16.26 ± 8.52	0.714
Comorbidities			
Anemia	42 (28.39%)	6 (8.11%)	<0.001
Hypertension			
Gestational hypertension	23 (15.54%)	13 (17.57%)	0.322
Preeclampsia	24 (16.21%)	8 (10.81%)	
Early onset pre-eclampsia	19 (12.84%)	3 (4.05%)	0.039
Diabetes mellitus			
Gestational diabetes	41 (27.70%)	26 (17.57%)	0.552
Pregestational diabetes	7 (4.73%)	3 (2.02%)	
Preterm labor	17 (11.49%)	9 (12.16%)	*0.883*
Premature rupture of membranes	28 (18.92%)	8 (10.81%)	*0.122*
Antepartum hemorrhage	2 (1.35%)	0 (0%)	*
ICU admission	6 (4.05%)	1 (1.35%)	0.429
Postpartum hemorrhage	26 (17.57%)	6 (8.11%)	0.059
Need for antenatal corticosteroids	56 (37.84%)	20 (27.03%)	0.237
Mode of delivery			
Vaginal delivery	20 (13.51%)	5 (6.76%)	0.133
Caesarean delivery	128 (86.49%)	69 (93.24%)	
Mean GA at delivery (in days)	244.78 ± 19.67	244.19 ± 19.31	0.833
GA at delivery			
<28 weeks	6 (4.05%)	4 (5.41%)	0.734
<30 weeks	14 (9.46%)	6 (8.11%)	0.740
<32 weeks	21 (14.19%)	10 (13.51%)	0.891
<34 weeks	32 (21.62%)	19 (25.68%)	0.498
<37 weeks	119 (80.41%)	65 (87.84%)	0.166

Abbreviations: BMI, body mass index; DCDA, dichorionic diamniotic; GA, gestational age; ICU, intensive care unit; IVF, in vitro fertilization; MCDA, monochorionic diamniotic.

placental anastomoses, whereas in DCDA twins, from placental insufficiency in one of the placentas.[19] The classification of sFGR in MCDA twins depends on the pattern of end-diastolic velocity in the umbilical artery.[20] In Type I, the umbilical artery Doppler waveform has positive end-diastolic flow. In Type II, there is absent or reversed end-diastolic flow (AREDF). In Type III, there is a cyclical/intermittent pattern of AREDF. In dichorionic twin pregnancy complicated by sFGR, the timing of delivery should be determined based on a risk–benefit assessment and according to the wishes of the parents, guided by obstetric and neonatal counseling. As these twins have separate circulations, the pregnancy can be followed as in growth-restricted singleton pregnancy, monitoring for progressive deterioration of umbilical artery, Middle Cerebral Artery (MCA) and Ductus Venosus (DV) Doppler, and of biophysical profile scores. These pregnancies should be managed in specialist centers with the relevant expertise. There is limited evidence to guide the

Table 2 Comparison of fetal growth status between DCDA and MCDA ($n = 222$)

Parameters	Chorionicity		*p*-Value
	DCDA ($n = 148$)	MCDA ($n = 74$)	
Discordancy on scan $\geq$ 25%	11 (7.43%)	8 (10.81%)	0.396
Small for gestational age on scan			
One baby	41 (27.7%)	20 (27.03%)	0.983
Both babies	13 (8.78%)	7 (9.46%)	
sFGR on scan	10 (6.76%)	8 (10.81%)	0.297
Stillbirth	2 (0.68%)	3 (2.03%)	0.339
Small for gestational age at birth			
One baby	19 (12.84%)	16 (22.22%)	0.065
Both babies	6 (4.05%)	6 (8.33%)	

Abbreviations: DCDA, dichorionic diamniotic; MCDA, monochorionic diamniotic; sFGR, selective fetal growth restriction.

Table 3 Comparison of discordancy at birth between DCDA and MCDA ($n = 218$)

Parameter	Chorionicity		*p*-Value
	DCDA (146)	MCDA (72)	
Mean discordancy at birth	11.82 ± 9.3	12.62 ± 9.95	0.565
Discordancy at birth $\geq$ 25%	10 (6.85%)	9 (12.5%)	0.164

Abbreviations: DCDA, dichorionic diamniotic; MCDA, monochorionic diamniotic.

Table 4 Comparison of neonatal parameters between DCDA and MCDA ($n = 439$)

Parameters	Chorionicity ($n = 439$)		*p*-Value
	DCDA ($n = 294$)	MCDA ($n = 145$)	
Small for gestational age at birth	31 (10.54%)	30 (20.69%)	0.004
Mean birth weight (in kg)	2.08 ± 0.55	2.06 ± 0.5	0.708
Birth weight <1 kg	20 (6.76%)	7 (4.73%)	0.399
Needed NICU Admission	124 (42.18%)	72 (49.66%)	0.138
APGAR at 1 minute <5	9 (3.06%)	7 (4.83%)	0.353
APGAR at 5 minutes <5	3 (1.02%)	1 (0.69%)	1.000
APGAR at 10 minutes <5	3 (1.02%)	1 (0.69%)	1.000
Resuscitation required	14 (4.76%)	5 (3.45%)	0.525

Abbreviations: APGAR, Appearance, Pulse, Grimace, Activity, Respiration; DCDA, dichorionic diamniotic; MCDA, monochorionic diamniotic; NICU, neonatal intensive care unit.

management of monochorionic twins affected by sFGR. Options include conservative management followed by early delivery, laser ablation, or cord occlusion of the growth-restricted twin (to protect the cotwin).[12]

Discordancy on antenatal scan and at birth more than or equal to 25% was noted in 8.5% of pregnancies, which was comparable to 8 to 14% reported in literature.[21,22] There was no difference in pregnancies with discordancy more than or equal to 25%, at least one baby being SGA, both babies being SGA, SFD, mean birth weight and need for steroids between MCDA and DCDA similar to Young et al.[17] However, Sullivan et al reported higher risk of stillbirth and lower mean birth weight in MCDA twins.[15] The lower mean birth weight in MCDA in Sullivan et al could be due to the lower mean gestational age at delivery for MCDA (34.5 weeks) compared with DCDA (35.4 weeks).[15]

Three mothers had SFD, two in DCDA group, and one in MCDA group. The two SFDs in DCDA group were anticipated due to severe fetal growth restriction in one of the fetuses where parents have chosen conservative management to prevent the risks of preterm delivery to the appropriately grown fetus. The suspected cause for the growth restriction in these cases was placental insufficiency in one of the placentae and one mother had early onset preeclampsia as well. One SFD in MCDA group occurred at 28 weeks with prior antenatal scans being unremarkable. She went into

Table 5 Comparison of neonatal morbidity and mortality between DCDA and MCDA ($n = 426$)

Parameters	Chorionicity ($n = 426$)		*p*-Value
	DCDA ($n = 292$)	MCDA ($n = 134$)	
Neonatal deaths	4 (1.37%)	2 (1.49%)	1.000
Mean NICU stay (d)	5.07 ± 12.2	3.30 ± 11.1	0.155
Respiratory distress syndrome	86 (29.45%)	38 (28.36%)	0.817
Neonatal jaundice	82 (28.08%)	42 (31.34%)	0.491
Meconium aspiration syndrome	0 (0%)	1 (0.75%)	[a]
Sepsis	25 (8.59%)	5 (3.73%)	0.070
Hypoglycemia	8 (2.74%)	8 (5.97%)	0.103
Seizures	0 (0%)	3 (2.24%)	[a]
Hypothermia	0 (0%)	0 (0%)	[a]
Necrotizing enterocolitis	4 (1.37%)	1 (0.75%)	1.000
Intraventricular hemorrhage	3 (1.03%)	1 (0.75%)	1.000
Hydrops	0 (0%)	0 (0%)	[a]
Birth trauma	0 (0%)	0 (0%)	[a]

Abbreviations: DCDA, dichorionic diamniotic; MCDA, monochorionic diamniotic; NICU, neonatal intensive care unit.
[a]As number of cases in one of the study groups is zero, *P* value couldn't be calculated.

Table 6 Data of neonatal deaths

	Chorionicity	GA at delivery (wk)	Birth weight (g)	Antenatal risk factors	Antenatal corticosteroids	Apgar's score at 1/5/10 minutes	Day of NND	Cause of death
1	DCDA	$34^{2/7}$	1,870	PPROM at 33 + 1 weeks	Yes	2/6/7	7	Perinatal depression, subgaleal hemorrhage, shock, refractory acidosis, acute kidney injury
2	DCDA	$29^{5/7}$	660	PE with severe features, GDM, anemia	Yes	6/7/8	3	ELBW, RDS, DIC, pulmonary hemorrhage
3	DCDA	$26^{2/7}$	500	PPROM at 26 weeks	Yes	3/5/8	1	Extreme prematurity, ELBW, RDS, parents opted for withdrawal of care on day 1
4	DCDA	$26^{2/7}$	620	PPROM at 26 weeks	Yes	3/5/8	1	Extreme prematurity, ELBW, RDS, parents opted for withdrawal of care on day 1
5	MCDA	$27^{5/7}$	910	Chronic previable PROM from 16 weeks, chorioamnionitis	No	4/5/6	3	Extreme prematurity, RDS, pulmonary hypoplasia, encephalopathy, acute kidney injury
6	MCDA	$27^{5/7}$	1,040	Chronic previable PROM from 16 weeks, chorioamnionitis	No	6/7/8	2	Extreme prematurity, RDS, pulmonary hypoplasia, primary pulmonary hypertension, refractory hypoxemia and refractory shock

Abbreviations: ELBW, extremely low birth weight; DCDA, dichorionic diamniotic; DIC, disseminated intravascular coagulation; GA, gestational age; GDM, gestational diabetes mellitus; MCDA, monochorionic diamniotic; NND, Neonatal death; PE, pulmonary embolism; PPROM, Preterm Premature Rupture of Membranes; RDS, respiratory distress syndrome.

preterm labor at 32 weeks, and had an emergency cesarean for breech presentation. Postnatal magnetic resonance imaging brain was normal. One woman in MCDA group had a double intrauterine fetal death (IUFD) at 25 weeks, after an unremarkable antenatal scan at 23 weeks, placental histopathology did not reveal any features of TTTS. External examination of fetuses did not show any abnormalities; however, couple declined fetal autopsy and cause of IUFD is unknown.

The NICU admission rate in our cohort was 44.6%; however, a variable rate of 25 to 50% is quoted in literature.[23,24] There was no difference in need for resuscitation, NICU stay, neonatal morbidity, or mortality between both the groups, similar to Young et al.[17] However, Sullivan et al observed significantly higher length of NICU stay, neonatal morbidity, and mortality in MCDA group.[15]

Multiple linear regression analysis was done for the chorionicity and maternal parameters expected to affect

Table 7 Multiple linear regression analysis of maternal parameters associated with GA at delivery

Maternal parameters	Adjusted beta coefficients	95% CI for unadjusted odds ratio		*p*-Value
		Lower	Upper	
Chronicity (baseline = DCDA)	0.02	−0.61	0.66	0.946
Chronicity (baseline = MCDA)	−0.02	−0.66	0.61	0.946
Mode of conception				
Assisted non-IVF	0.27	−0.52	1.07	0.486
Assisted IVF	0.33	−0.33	0.98	0.329
BMI	−0.02	−0.07	0.04	0.567
Hypertension	−0.18	−0.76	0.40	0.543
Early onset preeclampsia	0.92	0.01	1.82	0.048
Preterm labor	−0.95	−1.77	−0.12	0.025
Premature rupture of membranes	−0.88	−1.62	−0.13	0.021

Abbreviations: BMI, body mass index; CI, confidence interval; DCDA, dichorionic diamniotic; GA, gestational age; IVF, in vitro fertilization; MCDA, monochorionic diamniotic.

the gestational age at delivery. As shown in ►**Table 7**, chorionicity, maternal BMI, mode of conception, and hypertension do not have statistically significant effect on gestational age at delivery; however, early onset preeclampsia, preterm labor, and premature rupture of membranes have significant effect.

Prospective risk of stillbirth for DCDA and MCDA twins after 24 weeks was 1.35% and 4.05%, respectively. Prospective risk of stillbirth after 26 weeks for both was 1.36%. Prospective risk of stillbirth for DCDA twins after 30, 32, and 34 weeks was 1.49, 1.57, and 0.86%, respectively. Prospective risk of stillbirth for MCDA twins after 30 weeks was zero in our study due to the strict surveillance and early intervention if required. The higher risk in DCDA could also be due to maternal risk factors like higher age, more conceptions with in vitro fertilization, and higher early onset preeclampsia. Barigye et al calculated the prospective risk of uncomplicated MCDA twins more than 32 weeks as 4.3%.[9] Prospective risk of stillbirth in apparently normal MCDA twins after 30 to 33 weeks was 1.7%, increased to 2% at 34 weeks, and remained constant till 38 weeks in a study by Lee et al.[14] Prospective risk of stillbirth in MCDA twins after 30 to 32 weeks was 1.2% and decreased to 0.7% at 36 weeks in a study by Lewi et al and most of the fetal losses are less than 24 weeks.[25] Prospective risk of stillbirth in MCDA twins after 30 to 32 weeks was 1.1% and decreased to 0.4% at 36 weeks in a study by Simões et al.[26] The varying results in the literature were due to the differences in inclusion criteria and monitoring.

Prospective risk of perinatal death after 24 weeks for DCDA and MCDA twins was 2.34 and 3.37%, respectively. Prospective risk of perinatal death after 34 weeks for DCDA and MCDA twins was 1.53 and 0%, respectively and these were comparable to the previous studies by Burgess et al and Sullivan et al. Burgess et al showed the prospective risk of perinatal death for DCDA and MCDA twins after 34 weeks was 0.4 and 0%, respectively.[8] Sullivan et al reported the prospective risk of perinatal death for MCDA twins at 32 weeks as 0.14%, and at 37 weeks 0.46%.[15]

The strengths of our study are that it is a prospective study, conducted at a specialized twin clinic with a uniform protocol for surveillance and chorionicity was determined in all cases antenatally and confirmed postnatally. The limitations of our study are as follows: TTTS, one of the important predictors of perinatal outcome in MCDA twins was excluded and the causes of prematurity either iatrogenic or noniatrogenic were not analyzed separately. Both the cohorts of mothers were not comparable in our study in terms of age, method of conception, and medical morbidities like early onset preeclampsia. However, multiple linear regression analysis was done to look for the effect of chorionicity alone on the primary objective that is the gestational age at delivery after correcting for confounders.

Conclusion

The perinatal outcomes in uncomplicated MCDA twins are similar to DCDA twins. Prospective risk of stillbirth after 30 to 32 weeks is extremely low with strict surveillance and early intervention in MCDA twins. Hence, uncomplicated MCDA twins should not be delivered electively before 36 weeks. The neonatal morbidity and mortality are similar in MCDA and DCDA if they are delivered at same gestational age. One should be careful with maternal risk factors in DCDA twins as well due to assisted conceptions happening at higher maternal age in background of maternal medical disorders as reproductive medicine advances.

Conflict of Interest
None declared.

Acknowledgments
The authors wish to acknowledge the Departments of Fetal Medicine, Obstetrics and Neonatology of Fernandez

Hospital for their support. No funding was received for this study.

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