Original Article

A Comparative Study of Perinatal Outcome in Monochorionic and Dichorionic Twin Pregnancies

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Abstract

Objective: To compare perinatal outcome in monochorionic and dichorionic twins pregnancies in our setup.

Methodology: This retrospective Cohort study was conducted in the department of Obstetrics and gynaecology, Aziz Fatima Teaching hospital, Faisalabad. All the data of twin pregnancies delivered during last two years from January 2019 to December 2020 was included. Twin fetuses delivered after 20 weeks of gestation in study period were selected. Fetal data was analyzed based on chorionicity of the placenta. Three groups were defined based upon chorionicity and amniotic sac as Diamniotic dichorionic (DADC), Diamniotic Monochorionic (DAMC), and Monoamniotic Monochorionic (MAMC). Information regarding different fetal parameters and on gross congenital malformations were recorded.

Results: There was no significant difference (p-value > 0.05) in mean age among all three groups. The rate of gestational diabetes mellitus (13.9%) was significantly (p-value < 0.05) higher in DAMC twin pregnancies. The mean gestational age was noted lowest (34.21 ± 2.8) in MAMC group followed by (34.6 ± 3.1) in DAMC and (35.2 ± 2.4) in DADC group. The mean birth weight was significantly (P-value < 0.05) lesser (1.62 ± 0.56 kg) in MAMC and (1.86 ± 0.52 kg) in DAMC as compared to (1.99 ± 0.41 kg) DADC group. The rate of discordant twins ≥ 25% was found significantly (P-value < 0.05) higher (25%) in MAMC pregnancies. Rate of live birth was highest (96.3%) in DADC and lowest (75%) in MAMC group.

Conclusions: Twin pregnancies become challenging for the obstetrician due to higher risk of morbidity and mortality and this risk further increases with monochorionic twin pregnancies. So, the chorionicity should be screened as early as possible for proper management.

Key words: Twin Pregnancy, Monochoromic, Dichorionic, High-risk pregnancy.

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Introduction

The risk of maternal and perinatal morbidity and mortality increases significantly in twin pregnancies as compared to singleton pregnancies. Prematurity is the main contributing factor to this problem. Preterm birth can increase the risk of mortality up to four fold in twin pregnancies. The rate of twin pregnancies have increased significantly in past few decades. Its main reason might be the considerable expansion in assisted reproductive technology and higher age of mother at conception.[1]

Chorionicity among twin pregnancies have a significant relationship with mortality and morbidity of both mother and fetus. Many studies have shown that monochorionicity causes an increased risk of preterm birth, perinatal mortality, stillbirth, and NICU admission compared to dichorionic twins. A shared placenta and placental vascular anastomoses make it particularly challenging among monochorionic pregnancies.[2] The

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risk of pregnancy related complications increases significantly in twin pregnancies. The rate of operative deliveries also increases in twin pregnancies as compared with singleton pregnancies.[3]

Discordant twin growth is a complication specifically associated with twin pregnancies; it is defined as a significant difference in estimated fetal mass between the twins due to differential access to the placenta. Intrauterine growth retardation and intrauterine death of one of the fetuses is another complication associated with twin pregnancies. The rate of this complication is similar in singleton pregnancies and dichorionic pregnancies but there are some specific problems, which can complicate monochorionic pregnancies. These problems include twin reversed arterial perfusion, twin-to-twin transfusion syndrome (TTTS) and twin anemia polycythemia sequence (TAPS). [4,5]

The chorionicity of twin pregnancies have a significant relationship with perinatal morbidity and mortality. Many studies revealed that the risk of preterm birth, still birth, and perinatal mortality increases significantly in monochorionic twin pregnancies as compared to dichorionic and singleton pregnancies.[6] A universal complication of monochorionic twin pregnancy is shared placenta and placental vascular anastomoses, which makes it more challenging by growing risk of maternal and fetal complications drastically.[7]

The chorionicity of the placenta in twin pregnancies is defined based on several chorionic membranes and it can be monochorionic and dichorionic. The time of the division of fertilized ova, make monozygotic twins as monochorionic or dichorionic. Cleavage within three days of fertilization results in the form of two chorionic membranes and two placenta with two amnions in both dizygotic and monozygotic twins. When cleavage of zygote occurs between fourth to eighth day of fertilization then monozygotic twins will have one chorion, one placenta and two amnions and when division occurs between 8th to 12th day after fertilization then it will result in single placenta with one chorion and one amniotic membrane.[8,9] The risk of perinatal mortality increases in monochorionic twin pregnancies who have sharing of placenta, this risk further upsurges in monoamniotic twin pregnancies. In addition to complications associated with monochorionic pregnancies, monoamniotic twin pregnancies have risk of conjoined twins and cord entanglements.[10] For better antenatal management of multiple pregnancies and planning for the delivery time, the prompt diagnosis of chorionicity and amniocity is very important. Thus this study has been planned to compare feto-maternal outcome based on chorionicity of twin pregnancies.

Methodology

This retrospective cohort study was conducted in the department of Obstetrics and gynaecology, Aziz Fatima Teaching hospital, Faisalabad. All the data of twin pregnancies delivered during last two years from January 2019 to December 2020 was included in the study. In this study period, total of 23360 women delivered in out institute, from which there were 208 twin pregnancy which were included the study. Ethical approval of the study was taken form hospital ethics committee before start of the study. All twin fetuses who delivered after 20 weeks of gestation in this study period were selected. Data of pregnant women with chronic diseases like hypertension, diabetes mellitus etc was excluded from the study. The information related to perinatal outcome were obtained from data entry register of labour room and mother's record. Fetal data was analyzed based on chorionicity of the placenta.

Chorionicity was identified on ultrasound findings in antenatal period or in postnatal period. The chorionicity was classified as monochorionic and dichorionic. Three groups were defined based upon chorionicity and amniotic sac as Diamniotic dichorionic (DADC), Diamniotic Monochorionic (DAMC) and Monoamniotic Monochorionic (MAMC).

Information regarding different fetal parameters were noted including gestational age at birth, intrauterine death, live birth, discordant twin, birth weight of twins and APGAR score at 1 and 5 minutes. Similarly, information on gross congenital malformations were recorded based on ultrasound and clinical examination of the neonate during antenatal period.

All the collected data was entered and analyzed by IBM-SPSS v. 25. Descriptive statistics like mean and standard deviation was calculated for quantitative variables and frequency and percentages were presented for qualitative variables. One way ANOVA test was used to compare quantitative variables and chi-square test for qualitative variables. P-value ≤ 0.05 was considered significant.

Results

In this retrospective cohort study a total of 208 women with twin pregnancies were included consisting of 108

twin pregnancies with Diamniotic Dichorionic (DADC), 72 Diamniotic Monochorionic (DAMC) and 28 Monoamniotic monochorionic pregnancies. There was no significant difference (p-value > 0.05) in all three groups based upon chorionicity of twin pregnancies with respect to maternal age, maternal BMI and maternal hospital stay. The rate of gestational diabetes mellitus (13.9%) was significantly (p-value < 0.05) higher in DAMC twin pregnancies as compared to MAMC and DADC with rate of gestational diabetes mellitus of (12.5%) and (10.18%) respectively. There was no any significant (p-value > 0.05) difference between all three groups based on preterm labor and emergency c-section. But the average gestational age had a significant (P-value < 0.05) difference in all three groups based on chorionicity. The mean gestational age was noted lowest (34.21 ± 2.8) in MAMC group followed by (34.6 ± 3.1) in DAMC and (35.2 ± 2.4) in DADC group as elaborated in table I.

Table I: Comparison of Maternal parameters with respect to Chorionicity in twin pregnancies.

Maternal Parameters	DADC (n=108)	DAMC (n=72)	MAMC (n=28)	P-value
Maternal Age				
Mean ± SD	31.3 ± 4.9	30.2 ± 4.6	29.7 ± 4.2	0.150
Maternal BMI				
Mean ± SD	25.8 ± 2.1	26.2 ± 1.8	25.9 ± 2.8	0.457
Maternal Hospital Stay				
Mean ± SD	5.2 ± 3.6	4.8 ± 2.8	6.2 ± 3.1	0.162
Gestational Diabetes Mellitus				
N (%)	11 (10.18%)	10 (13.9%)	9 (12.5%)	0.013*
Emergency C-Section				
N (%)	73 (67.59%)	43 (59.72%)	16 (57.14%)	0.425
Preterm Labor				
N (%)	66 (61.11%)	41 (56.94%)	19 (67.86%)	0.597
Gestational Age at delivery				
Mean ± SD	35.2 ± 2.4	34.6 ± 3.1	34.21 ± 2.8	0.040*

* Significant at 5% level of significance

The mean birth weight was significantly (P-value < 0.05) lowest (1.62 ± 0.56 kg) in MAMC twin pregnancy followed by (1.86 ± 0.52 kg) DAMC and highest mean value (1.99 ± 0.41 kg) was found in DADC pregnancy group. The rate of Fetuses with discordant twins ≥ 25% was found significantly (P-value < 0.05) higher (25%) in MAMC pregnancies, followed by (13.89%) in DAMC group and (7.41%) in DADC group. Among these women having twin pregnancies, the rate of live birth was recorded highest (96.3%) in DADC and lowest (75%) in MAMC group. The rate of liver births was found to be (91.67%) in twin pregnancies having DAMC pregnancy. The rate of intrauterine death was found to be significantly (P-value < 0.05) very high (28.57%) in women with MAMC twin pregnancy in comparison to 6.94% and 2.78% in DAMC and DADC groups respectively. The intrauterine growth retardation (IUGR) was significantly (P-value < 0.05) more common in monochorionic twins (40.27%) in DAMC and (46.43%) in MAMC as compared to (25.3%) in DADC. There was no significant (P-value > 0.05) relationship was found in all three chorionicity groups based on APGAR score at 1 and 5 minutes and rate of admission of any neonate to NICU as elaborated in table II.

Table II: Comparison of Fetal parameters with respect to Chorionicity in twin pregnancies

Fetal Parameters	DADC (n=108)	DAMC (n=72)	MAMC (n=28)	P-value
Birth Weight (kg)				
Mean ± SD	1.99 ± 0.41	1.86 ± 0.52	1.62 ± 0.56	0.001*
Fetuses with discordant twins ≥ 25%				
n (%)	8 (7.41%)	10 (13.89%)	7 (25.0%)	0.032*
Live Births				
n (%)	104 (96.3%)	66 (91.67%)	21 (75.0%)	0.001*
Intrauterine Death				
N (%)	3 (2.78%)	5 (6.94%)	8 (28.57%)	0.000*
Intrauterine Growth Retardation (IUGR)				
N (%)	28 (25.3%)	29 (40.27%)	13 (46.43%)	0.042*
APGAR Score (> 7) at 1 minutes				
N (%)	89 (82.40%)	62 (86.11%)	25 (89.29%)	0.607
APGAR Score (> 7) at 5 minutes				
N (%)	104 (96.29%)	68 (94.44%)	26 (92.86%)	0.709
Admission to NICU				
N (%)	43 (39.81%)	32 (44.44%)	16 (57.14%)	0.255

* Significant at 5% level of significance

Discussion

Twin pregnancy opens a fertile field for discussion and study of all obstetric complications that can occur in single patients. This clinical study to evaluate perinatal outcome in twin pregnancies was conducted showed incidences of diamniotic dichorionic (DADC) twins, diamniotic monochorionic (DAMC) twins and monoamniotic monochorionic (MAMC) twins were 51.92%, 34.62% and 13.46%, which indicate that monochorionic twins were 48.08% and dichorionic twins were 51.92%. These findings are comparatively

higher than literature like study by Gigi A, et al showed that the incidence of monochorionic twins was 38.70% and dichorionic twins was 61.30%.[11]

In this present study, it was noted that there was no statistically significant difference (p-value > 0.05) in all three groups based upon chorionicity of twin pregnancies with respect to maternal age. The mean age was 31.3 ± 4.9 years in DADC, 30.2 ± 4.6 years in DAMC and 29.7 ± 4.2 years in MAMC twin pregnancies, although results are showing higher mean age in dichorioinic twin pregnancies as compared to monochorionic twin pregnancies. But the literature showed a significant relationship of age and twin pregnancy, in the study of Gigi A, et al it was noted that the maximum incidence of monochorionic twin pregnancy was in the age group of 20 to 24 years. In dichorionic twins, higher incidence was in the age group of 25 to 29 years. The higher mean age of women in the dichorionic twin pregnancy may be due to prolonged period of infertility and treatment with ovulation induction.[11,12]

The results shows that average gestational age had a significant (P-value < 0.05) difference in all three groups based on chorionicity. The mean gestational age was noted lowest (34.21 ± 2.8) in MAMC group followed by (34.6 ± 3.1) in DAMC and (35.2 ± 2.4) in DADC group, indicating a higher mean age in dichorionic twin pregnancies which is consistent with the literature. The results of a study showed that the average gestational age of monochorionic twin pregnancies was (33.4 weeks) significantly lower from mean gestational age (34.2 weeks) of dichorionic twin pregnancies.[13]

The rate of gestational diabetes mellitus (13.9%) was significantly (p-value < 0.05) higher in DAMC twin pregnancies as compared to MAMC and DADC with rate of gestational diabetes mellitus of (12.5%) and (10.18%) respectively. Although results from previous study does not support this finding showing no difference in maternal complications like gestational diabetes mellitus or amniotic fluid abnormalities among monochorionic and dichorionic twin pregnancies.[13,14] Higher rate of maternal, foetal and neonatal morbidity and mortality, is not only associated with singleton or multiple pregnancies but it is also related to number of fetuses and type of chorionicity.[15]

Higher feto-maternal complication rates have been found to be associated with monochorionic twins as compared to dichorionic twins. The main cause for higher complication rate among monochorionic twins might be due to higher rate of vascular anastomoses between fetuses and presence of abnormal cord insertion as well as higher frequency of unequal placental sharing. These factors can cause twin-to-twin transfusion syndrome, intrauterine growth retardation (IUGR), intrauterine death and twin growth discordance, which might result in poor fetal outcome for birth fetuses.[16]

The results of this present study showed that the rate of intrauterine death was significantly (P-value < 0.05) higher (28.57%) in women with MAMC twin pregnancy in comparison to 6.94% and 2.78% in DAMC and DADC groups respectively. The intrauterine growth retardation (IUGR) was significantly (P-value < 0.05) more common in monochorionic twins (40.27%) in DAMC and (46.43%) in MAMC as compared to (25.3%) in DADC. These findings are parallel with previous studies showing higher rate of IUGR in twin pregnancies and a significantly higher rate in monochorionic twin pregnancies.[17,18]

The mean birth weight was significantly (P-value < 0.05) lower (1.62 ± 0.56 kg) in MAMC twin pregnancy followed by (1.86 ± 0.52 kg) DAMC and highest mean value (1.99 ± 0.41 kg) was found in DADC pregnancy group. The results are in agreement with previous studies like study by Al Riyami et al found mean birth weight of 2055 g for dichorionic pregnancies and 1799 g for monochorionic pregnancies.[19]

The risk of morbidity and mortality for both mother and fetus increases in twin pregnancies, which become challenging for the obstetrician to properly manage and handle complications associated with twin pregnancies. The complication rate further increases in monochorionic twin pregnancies. Chorionicity should be determined on ultrasound in all the twins preferably in the first trimester. Determination of chorionicity is important regarding counseling the parents in relation to their risk of prenatal morbidity and mortality, invasive testing and management of discordant abnormality, feasibility of multifetal pregnancy reduction. Every attempt should be made to detect any fetal abnormality as early as possible and make appropriate interventions if adverse outcomes are to be avoided. Early diagnosis of the twin pregnancy and proper follow up throughout the pregnancy improves the prenatal outcome. Regular ultrasound for the growth and wellbeing of twins especially in case of monochorionic twins.[20,21]

Conclusion

Twin pregnancies become challenging for the obstetrician due to higher risk of morbidity and mortality for both mother and fetus. The risk of fetomaternal complications further increases with monochorionic twin pregnancies. It is recommended that chorionicity should be screened as early as possible preferably in first trimester. This early diagnosis of twin pregnancy and chorionicity will provide a base for proper follow up and management throughout the pregnancy. Which will help in improving perinatal outcome and decrease the risk of fetomaternal morbidity and mortality.

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