Original Article

Pregnancy Outcome After Selective Fetal Reduction in Dichorionic Twin Pregnancies

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Abstract

Objective: This study was conducted for determining pregnancy outcome after selective fetal reduction in twin pregnancies based on the gestational age at the time of the procedure in a referral academic center between 2017 and 2021.

Materials and methods: This retrospective cohort study included all women with twin pregnancies who were diagnosed with a genetic or structural anomaly of one fetus or a desire to reduce the number of fetuses in order to reduce pregnancy complications visited in the period of 2017-2021. Reduction was performed due to an abdominal approach at 11 to 23 weeks of pregnancy. Maternal and pregnancy information were recorded.

Results: A total of 159 cases of twin dichorionic pregnancies were included. The highest frequency of reduction was performed at the gestational age of 18-20 weeks, and the most common cause of reduction was major structural anomalies in the fetus .The results showed the average gestational age (GA) at the time of delivery to be 37.6 weeks, the average birth weight of 2,999 grams, the incidence of miscarriage (loss before 22 weeks) to be 9.4% and a rate of preterm birth (delivery before 37weeks) of 33.3%. There is not a statistically significant relationship between the gestational age at the time of reduction and preterm birth, the birth weight, the incidence of RDS and the incidence of SGA.

Conclusion: Fetal reduction of twins to singleton pregnancy is associated with lower risk of preterm birth (delivery before37 weeks reduction of twins to singleton pregnancy is associated with lower risk of preterm birth (delivery before37 weeks). It causes an increase in birth weight and perinatal outcome in remaining co-twin so we recommend fetal reduction after counselling with patients for their unique situation to improve pregnancy outcome.

Keywords: Pregnancy Outcome; Reduction; Twin; Complications

Introduction

The prevalence of multiple pregnancies are going to increase. Data from the Centers for Disease Control and Prevention (CDC) shows that the incidence is 32.2 per 1,000 live births. The factors related to these changes are increasing maternal age and use of ART for infertility treatment .twin pregnancies are

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associated with higher rate of preterm labor ,low birthweight, perinatal morbidity than singleton (1-3).

Fetal reduction is used as a method to reduce mortality rate and preterm birth and pregnancy complications without increasing pregnancy loss. In fact, it is recommended to reduce one fetus in high-risk pregnancies, genetical or structural anomalies of one fetus, maternal diseases, uterine anomalies, and a history of preterm labor (4-6).

Selective reduction is usually performed early in dichorionic pregnancy, after anatomical examination, detailed ultrasound or genetic testing. The findings of previous studies on the relationship between gestational age (GA) at the time of the procedure and pregnancy complications have been inconsistent. Some studies have shown that selective reduction in early pregnancy reduces pregnancy loss and prematurity, while other studies have found a different result (7-12).

Understanding the pathology, diagnosis and management of complications and using selective reduction treatment methods help to prevent maternal and fetal complications, and consequently, the complications of the neonatal period, fetal death can be prevented by using existing treatment methods. However, little information is available about risk factors for fetal death, including gestational age at the time of selective fetal reduction; very few studies have investigated the association between perinatal variables and fetal death after selective reduction (13, 14). Therefore, the present study aims to investigate pregnancy outcome after the selective reduction of one fetus in twin pregnancies based on the gestational age at the time of the procedure.

Materials and methods

This is a retrospective cohort study in which women with dichorionic twin pregnancies who were diagnosed with a genetic or structural anomaly of a single fetus or having the desire to reduce the number of fetus in order to reduce pregnancy complications who had visited academic referral Hospital in the period of 2017-2021 and candidates for fetal selective reduction were included in this study.

Inclusion criteria included dichorionic-diamniotic twin pregnancies who selected fetal reduction in 11 to 21 weeks and 6 days of pregnancy, information about mother, fetus and neonate records. Exclusion criteria was gestational age over 22 weeks at the time of the procedure, monochorionic twin pregnancy, and incomplete information.

The abdominal approach was performed by intracardiac injection potassium chloride using a 20-Gauge needle under ultrasound guidance until asystole fetal heart rate was obtained. The reduction procedure was performed by a perinatalogist professor from 11 weeks to 21 weeks and 6 days of pregnancy. After the procedure, the patient was under direct supervision for 60 minutes and then discharged. Follow-up ultrasound was performed during one week after the procedure, and then prenatal visits were routinely performed for the patient. Maternal and fetal information were entered in the developed checklist. Information about the maternal habitus (characteristic and demographic data), gestational age at the time of reduction, GA at the time of delivery, preterm birth and its causes, miscarriage and any neonatal complications including hospitalization in the NICU ,occurrence of RDS , SGA and sepsis recorded also Any pregnancy complications were also taken into consideration.

The investigated outcomes included: early consequences of reduction including bleeding, premature rupture of membranes, abortion (pregnancy loss at the age of less than 22 weeks) and late consequences of reduction, including gestational age at delivery in each group, preterm birth in each group, SGA (fetal weight below 10th percentile), birth weight and neonatal complications.

Data analysis was done by descriptive statistics methods such as frequency distribution tables, drawing graphs, calculating numerical indices and chi-square statistical tests using version 21 of the SPSS software. A p-value of less than 0.05 was considered significant.

The present study was approved by the ethics committee of Tehran University of Medical Sciences, Iran. (Number of ethical approval is IR.TUMS.MEDICINE.REC.1400.1448). Informed consent was obtained from the women who participated in the study and the objectives were explained to them. The participants were informed that they had the right to accept or decline participation in the study.

Results

The study group included 159 patients with dichorionic diamniotic twins who underwent reduction to singletons at 11–22 weeks of pregnancy. The average Gestational age at the time of delivery

was 37.6 weeks, the average birth weight was 2,999 grams, the incidence of miscarriage (pregnancy loss before 22 weeks) was 9.4%, the rate of premature birth (delivery before 37 weeks) was 33.3%, and the infant mortality rate was 1.3%. The rate of rupture of membrane during the first two weeks after reduction was 6.9%, and the rate of bleeding during the first two weeks was 1.8%. The maternal characteristic feature included: maternal age was 31.09 ± 5.7 years, maternal BMI was 24.75 ± 3.41 and maternal gravidity was 1.73 ± 1.1.

Reasons for reduction procedure were structural defect in 104 cases (65.8%) chromosomal anomaly in 36 cases (22.8%) maternal indication in 9 cases (5.7%) maternal request and etc. in 9 cases (5.7%). The most common cause of reduction was major structural anomalies, followed by genetic disorders, and the least cause of reduction was reduce the number of fetuses due to lower pregnancy complications and maternal medical problems .The number of pregnancy <14 weeks were 35 cases (22%), 14-16 weeks were 19 cases (11.9%), 16-18 weeks 25 cases(15.7%), 18-20 weeks 56 cases (35.2%), 20-22 weeks 24 cases (15.1%),The highest frequency of reduction was at the gestational age of 18 to 20 weeks, and the lowest was at the gestational age of 14 to 16 weeks.

The results of table 1 show that there is no statistically significant relationship between the gestational age at the time of reduction and the cause of premature birth (P=0.663).

According to the results of table 2, there is no statistically significant relationship between the birth weight and gestational age at the time of reduction (P=0.755).

The results showed that RDS occurred in 9 cases and there is no statistically significant relationship between gestational age at the time of reduction and the incidence of respiratory distress syndrome in infants (P=0.159), sepsis 6 cases (P=0.108), early neonatal death 2 cases (P=0.153), the incidence of SGA 12 cases (P=0.909), premature rupture of the amniotic membrane during the first 2 weeks after reduction 11 cases (p =0.830).

There is statistically significant relationship was found between hospitalization in the neonatal intensive care unit and gestational age at the time of reduction, P=0.039 (Table 3).

Discussion

The aim of our study was twin to singleton reduction is associated with decreased preterm birth and also increase in birthweight and perinatal outcome in remainig co-twin. The results showed that in twin pregnancies there was not a significant relationship between the gestational age at the time of reduction and premature rupture of the amniotic membrane, bleeding in the first two weeks after procedure, age at the termination of pregnancy, preterm birth and the cause of preterm birth (spontaneous or indicated), miscarriage (loss of pregnancy at the age of less than 22 weeks), the incidence of SGA, RDS and sepsis. However, there was a significant relationship between the gestational age at the time of reduction and hospitalization in the NICU.

In accordance with our findings Jigal Haas et al study showed that reduction of twin pregnancy to singleton is associated with better perinatal outcome. They showed that fetal reduction of twin to singleton lowers the risk of prematurity in compared with non-reduced twin pregnancy (9.5% vs 56.7%) (15)

In Zemet et al a total of 248 diamniotic dichorionic twin pregnancies who were candidates for selective reduction were examined, including 172 cases of early reduction in weeks 11 to 14 and 76 cases of late reduction in weeks 15 to 23. The gestational age at delivery was not significantly different between the study groups. The rate of preterm delivery was significantly higher in pregnancies with late reduction.

Table 1: Cause of preterm birth and gestational age at the time of reduction in twin pregnancies

	Cause						Total
	Cervical Dilation	PROM	Preeclampsia	Placental abruption	Gestational Fatty liver	Placenta Previa	
Gestational age at the time of reduction							
< 14	3	4	1	0	1	0	9
14-15+6	3	1	0	1	0	0	5
16-17+6	1	7	1	0	1	0	10
18-19+6	6	11	0	2	0	0	19
20-21+6	3	2	3	1	0	1	10
							53

Table 2: Birth weight and gestational age at the time of reduction

	Birth Weight				p-value
	More than 2500 gr	LBW (1500-2500gr)	*VLBW (1000-1500gr)	**ELBW (<1000gr)	
Gestational age at the time of reduction					
<14	28	4	0	1	0.755
14-15+5	15	2	0	0	
16-17+5	19	3	0	0	
18-19+5	44	4	2	0	
20-21+5	18	4	1	0	
Total	124	17	3	1	

*Very low birth weight, ** Extreme low birth weight

Table 3: NICU admission and gestational age at the time of reduction

	NICU			p-value
	Yes	NO		
Gestational age at the time of reduction				0.039
<14	3	29	32	
	9.4%	90.6%		
14-15+6	2	15	17	
	11.8%	88.2%		
16-17+6	0	21	21	
	0%	100.0%		
18-19+6	3	47	50	
	6.0%	94.0%		
20-21+6	6	17	33	
	26.1%	73.9%		
Total	14	129	143	

After adjusting for maternal age, parity, body mass index, and the location of the reduced fetal amniotic sac. The rate of primary complications related to the reduction procedure, such as infection, vaginal bleeding, and amniotic fluid leakage was not significantly different among the groups. There was no significant difference in the rate of pregnancy loss before 24 weeks, and no cases of intrauterine fetal death after 24 weeks were recorded. There was no significant difference between the two study groups in terms of the prevalence of premature rupture of membranes or SGA. The rate of RDS, need for mechanical ventilation and, sepsis in the late reduction group was higher than in the early reduction group this difference with our study can be explained by the fact that larger cohort study are needed to evaluate more about these difference (15).

Such as our finding Gal Greenberg et al performed a retrospective analysis of dichorionic twin pregnancies who underwent fetal reduction. Preterm delivery (delivery before 37 weeks of gestation) was the primary outcome of their study, and secondary outcomes included preterm before 34 weeks of gestation, birth weight, SGA and stillbirth. In this study, ninety-eight reduced twin pregnancies were compared with 222 non-reduced twins. Premature delivery in the reduction group was significantly lower than the twins group. The results of the multivariate analysis showed that fetal reduction independently and significantly reduces the risk of prematurity. Finally, in this study similar to our findings, it was concluded that reducing the fetus from twins to a single baby reduces the risk of preterm birth (less than 37 weeks of gestation) (16).

Kristensen et al in 11 years cohort study about dichorionic-diamniotic twin pregnancies that undergone fetal reduction. They reported that this procedure was safe with good outcome for remaining co-twin and they showed that best results was taken when the procedure performed before 14 weeks they reported 19.4% preterm delivery rate before 37 weeks when reduction was performed at GA >14 weeks and 6.9% when reduction was performed before 14 weeks (17).

Conclusion

It is concluded that fetal reduction of twin pregnancies to singleton decreases the risk of preterm birth with increasing birthweight and perinatal morbidity for remaining co-twin. Our results showed that there is not a statistically significant association between the gestational age at the time of reduction and procedure- related complications (bleeding, miscarriage, premature preterm rapture of membrane, premature birth, SGA and RDS).

It is recommend that in 11-14 weeks patients with twin pregnancies informed and consulted appropriately about fetal reduction procedure to be discussed and let them to choose the best decision for their unique situation.

Conflict of Interests

Authors declare no conflict of interests.

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