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Case Report

Discordant twins and Selective Intrauterine Growth Restriction (sIUGR): A case report.

Yu-Hsuan Lin[1], Li-Hsin Hsia[1], Chien-Wen Yang[1], Tsung-Ho Ying[1,2*]

[1] Department of Obstetrics and Gynecology, Chung Shan Medical University Hospital, Taichung City, Taiwan
[1] Department of Obstetrics and Gynecology, School of Medicine, College of Medicine, Chung Shan Medical University, Taichung City, Taiwan

Birth weight discordance, defined as a significant weight differences between twins, has affected approximately 16% of twin pregnancies. Possible causes of discordant twins include twin to twin transfusion syndrome(TTTS), selective intrauterine growth restriction (sIUGR), placental insufficiency in one twin, different genetic growth potential in dizygotic twins, maternal problems, and infection. We presented a case of dichorionic diamniotic discordant twins after in vitro fertilization with one embryo transfer, which developed discordant twins and one selective intrauterine growth restriction (sIUGR) during third trimester. A 35-year-old woman, G3P0SA2, conceived through IVF and had single-embryo transfer, presented with twin pregnancy at 36+4/7 weeks of gestation. Estimated fetal body weight (EFBW) discordance of the twins(2600/1800 grams) was found, favored twin-to-twin transfusion syndrome. Thus, she was admitted for a scheduled cesarean section. After cesarean section delivery, the twin babies were ad–mitted to our NICU(Neonatal intensive care unit) for further survey and management. Weight discordance (Discordant weight of twin growth) occurs in about 16% of twin pairs. Factors that might cause the fetal weight discordance included use of Assisted Reproductive Technology (ART), monochorionic twins, congenital fetal infection, placenta sharing of twins. Our case was conceived through IVF, with 43% difference in the twins body weight. We concerned about serious fetal complications such as Selective intrauterine growth restriction (sIUGR) or Twin-to-twin transfusion syndrome(TTTS). Fortunately, ultrasound and follow-up examination showed no significant abnormality of the twins. Previous studies suggested that regular prenatal ultrasound evaluation may be beneficial to early detection of discordant weight of twins. However, the optimal timing of delivery had not been recommended due to limited data. The incidence of monozygotic twins had increased due to the increased use of ART, which may lead to some fetal complications such as having discordant twins. Weight discordance in twins may contribute to a higher risk of IUFD and other fetal complications. With the assistance of ultrasound, we can diagnose discordant twins at an earlier gestational age and detect its causing factors.

Keywords: Discordant twins, Selective intrauterine growth restriction (sIUGR), monochorionic diamniotic twins(MCDA)

1. Introduction

Birth weight discordance, defined as a significant weight differences between twins, has affected approximately 16% of twin pregnancies[1]. Possible causes of discordant twins include twin to twin

* Correspondence Author: Tsung-Ho Ying
Address: No. 110, Sec. 1, Jianguo N. Rd., Taichung City, 40201, Taiwan
Tel: +886-4-2473-9595 ext. 34523
E-mail: doggy0314@gmail.com

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transfusion syndrome(TTTS), selective intrauterine growth restriction (sIUGR), placental insufficiency in one twin, different genetic growth potential in dizygotic twins, maternal problems, and infection.

We presented a case of dichorionic diamniotic discordant twins after in vitro fertilization with one embryo transfer, which developed discordant twins and one selective intrauterine growth restriction (sIUGR) during third trimester.

2. Case presentation

The patient in discussion is a 35-year-old woman, G3P0SA2, presented with twin pregnancy at 36+4/7 weeks of gestation. She was conceived through IVF (in vitro fertilization) and had single-embryo transfer. Subsequently, She underwent cervical cerclage at 13 weeks of gestational due to cervical incompetence[2].

The patient had her regular prenatal care at the outpatient department of Chung Shan University Hospital, and she did not develop any significant problems. She did not receive amniocentesis for prenatal genetic testing. At gestational age (GA) of week 33, the biparietal diameter (BPD) measurements of the twins were 8.4/7.8 cm (33/31 weeks), with the estimated fetal body weight (EFBW) as 1950 and 1650 gm. Before this gestational age, there was no discordance in these measurements. On the day of prenatal examination at 36+4/7 weeks of gestation, sonography showed that two distinctively presenting fetuses (Breech/Vertex) with their BPD values measuring 9.1/ 8.3 cm (GA 36/32 weeks), abdominal circumference values measuring 30.3/25.3 cm (36/32 weeks), and femur length values measuring 6.5/5.6 cm (35/31 weeks). The EFBW of the fetuses were 2600/1800 grams (gm), and the estimated GA by ultrasound dating was 36/32 weeks. Moreover, the S/D ratios of their umbilical arteries were 2.3/2.6, which favored twin-to-twin transfusion syndrome. Thus, she was admitted for a scheduled cesarean delivery at 36+4/7 weeks of pregnancy.

Two alive female babies were delivered via cesarean delivery, both with breech presentation, weighing 2686 gm and 1515 gm. The Apgar score of the larger newborn was 7'-9' (one-minute and five-minute), and that of the smaller one was 9'-10'(Figure 1) .



Figure 1. Twin A: the larger newborn was weighted 2686 gm. Twin B the smaller one was 1515 gm.

After cesarean section delivery, the twin babies were admitted to our NICU(Neonatal intensive care unit) for further survey and management. Twin A (the larger baby) was discharged on the tenth day. As for twin B (the smaller baby), she was discharged after a month. There were no congenital infection of Toxoplasmosis, Rubella,Cytomegalovirus (CMV), or Herpes simplex virus (HSV) in both twins.

3. Discussion

Weight discordance (Discordant weight of twin growth) in twins is defined as a 15-25% difference in actual weight bewteen twins according to the American College of Obstetricians and Gynecologists (ACOG)[3]. The difference is calculated by the following equation : (larger estimated or actual weight – smaller estimated or actual weight)/ larger estimate or actual weight). In our case, The weight of twin A was appropriate for gestational age, measured 2686 gm (75th-90th percentile), while twin B was 1515 gm (<5th percentile), which was small for gestational age(SGA). According to the above equation, our twins had a 43% difference in their body weight.

Weight discordance occurs in about 16% of twin pairs. Known factors that influence the likelihood of discordant twins can be categorized as maternal, fetal, or placental (Table 1).

For maternal related factors, some studies reported that there is a relationship between parity, or use of Assisted Reproductive Technology (ART)

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Table 1. Risk Factors of discordant twins

Maternal	Maternal age >30 years
	Assisted reproduction vs spontaneous twins
	Nullparity
	Tobacco use
	No prenatal care
	Fluctuating change in body mass index
Fetal	Monochorionic
	Small for gestational age in either fetus
	Viral infection
	Sex-discorant twins
Placenta	Velamentous cord insertion
	Placenta sharing
	Placenta weight
	Pattern and size of vascular anastomoses

Miller. Discordant twins. Am J Obstet Gynecol 2012.

and discordant growth[4]. Besides, some studies showed that comparing to the natural occurrence of monozygotic twins(0.4%) [5], the use of ART may contribute to a higher prevalence rate of multiple pregnancy as it increase the rate of monozygotic twins by 2.25 times after single-embryo transfer [6]. It is known that the timing of division of the embryo results in different chorionicity and amnionicity. If the embryo splits within the first 3 days after fertilization, it may become dichorionic-diamniotic (DC-DA) twins, while splitting between 4 and 8 days post-fertilization results in monochorionic-diamniotic (MC-DA) twins, and monochorionic-monoamniotic (MC-MA) twins is considered to be a consequence of division after 9 to 12 days [7]. All of the dizygotic twins are DC-DA, while ⅓ of monozygotic twins are DC-DA, ⅔ are MC-DA, and 1% would be MC-MA [8]. However, a retrospective study reported that compared to spontaneously conceived twin pregnancies, assisted reproductive technologies do not have a higher risk of ultrasound-diagnosed FGR (fetal growth restriction)[9]. Another retrospective review compared obstetric outcomes of MCDA and DCDA twin pregnancies after ART with spontaneous conception, and found that ART does not increase perinatal morbidity outcomes in twin pregnancies of both types of chorionicity[10]. In our case, the mother had no maternal predisposing factors related to discordant twins. She had twin pregnancy after single-embryo implantation. It was probably due to the “zygotic splitting”phenomenon, which is when one embryo divides and results in monozygotic twins. Its prevalence is around 1.36 % according to the literature. [11]

Fetal risk factors of discordant twins include monochorionic twins, opposite sex, and congenital fetal infection. As for placental factors, it is thought to be associated with placental weight discordance or placental sharing. Placental sharing of twins may lead to selective intrauterine growth restriction (sIUGR) or TTTS. In DC twins, placental insufficiency in one of the placentas may be a cause of discordant twins and sIUGR. A higher incidence of placental apoptosis is also discovered in the growth restricted fetus of discordant twins[12].

sIUGR affects approximately 10-25% of twin pregnancies[13]. In MC twins, unequal sharing proportion of the placenta results in poor blood supply to one of the twins. In dichorionic twins with sIUGR, since the fetal-placenta blood circulations were separated, the larger twin is nearly unaffected. However, the smaller twin is affected by deficient uteroplacental perfusion, leading to higher morbidity and mortality[14]. Nevertheless, studies showed that

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Table 2. comparison of TTTS, sIUGR and our case

	TTTS	sIUGR	our case
Chorionicity	monochorionic or dichorionic	monochorionic or dichorionic	monochorionic
Placenta	Shared placenta with anastomosing vessels and unbalanced blood flow	Unequal placental sharing	Unequal placental sharing
Fetal Weight			
Smaller twin	<10th percentile in 50% fetuses	<10th percentile	<5th percentile
Larger twin	≥ 10th percentile	AGA (10-90th percentile)	AGA (75th-90th percentile)
discordance	>25 %	>25 %	43 %(>25 %)
Ultrasound finding			
Aminotic fluid			
smaller twin	oligohydramnios	with or without oligohydramnios	normal
larger twin	polyhydramnios	normal	normal
Fetal bladder discordance	Small donor bladder and/or enlarged recipient bladder	-	-
MCA Doppler discordance (>1.5 MoM in donor/anemic AND <0.8 MoM in recipient/ plethoric)	++ blood flow from donor to recipient	+ resistance of blood flow from placenta to SGA twin	normal

survival rate of a fetus with isolated sIUGR may be more than 90%[15].

Another cause of discordant twins we are concerned was TTTS. In TTTS, the donor twin would have decreased blood volume and urinary output, causing oligohydramnios. Moreover, lacking blood flow may lead to organ ischemia. As for the recipient twin, it will develop circulatory overload, which might eventually lead to heart failure. Its urinary output would also increase, which might result in polyhydramnios. The prenatal diagnostic criteria of TTTS included single monochorionic placenta and findings of oligohydramnios/polyhydramnios in ultrasonography. Oligohydramnios and polyhydramnios are usually defined as a maximum vertical amniotic fluid pocket <2 cm and >8 cm, respectively. Though TTTS is typically known as a complication of monochorionic twins, some studies reported that dichorionic twin pregnancies may also be complicated by TTTS. Its possible pathogenesis is thought to be arteriovenous anastomoses in the placenta [16] or superficial vessels crossing the dividing membrane[17].

Discordant twins are known to be at a higher risk of intrauterine growth restriction (IUGR) and intrauterine fetal demise (IUFD) compared to twins with concordant growth, especially when at least one fetus is small for gestational age (SGA). However, a meta-analysis pointed out that there's no significant increase in the risk of neonatal death (NND) among twins with birth-weight discordance[18] . Regular prenatal ultrasound evaluation may be beneficial for early detection of discordant twins. The sensitivity to detect growth discordant is 80% using AC and 25-55% using EFW [1]. The optimal timing of delivery had not been recommended due to limited data.

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Some studies suggest that delivery of dichorionic twins with sFGR should be delayed after 32 weeks of gestation if possible, since premature delivery may influence the development of the fetus. However, a large-scale study showed that whether the delivery was immediate or delayed resulted in no significant difference in the mortality or long-term outcome of the growth restricted fetus[19].

4. Conclusion

In our case, the amount of amniotic fluid was normal and equal for both twins even though twin B's estimated weight was under the 5th percentile of its corresponding gestational age, and the weight difference between the two babies was over 25 %, both matching the criteria of sIUGR (Table 2.).nThe incidence of monozygotic twins had increased due to the increased use of ART, which may lead to some fetal complications such as having discordant twins. Weight discordance in twins may contribute to a higher risk of IUFD and other fetal complications. With the assistance of ultrasound, we can diagnose discordant twins at an earlier gestational age and detect its causing factors.

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