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Size-discordant twins

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Definition: Twins with birth weight discordance of more than 20%, calculated from the weight of the larger twin¹. Cutoffs for discordance remain controversial between investigators, although most of them have settled on 15%, 20%, or weights^{[1] [2] [3] . [4] . [5] . [6] . 7,8} with clinical correlates to support all three^{4 , 6 ,9,10}. In our definition we use the 20% cutoff because it is the most acceptable compromise^{11,12,13,14,1} and because there is no good evidence to suggest that below 20% is associated with significant perinatal mortality and morbidity².

Two more limitations have been added in the definition of discordant twins:

- Absence of chromosome anomalies or major congenital anomalies in either one or both fetuses in the pair¹.
- Twin to twin transfusion syndrome is also excluded¹⁵.

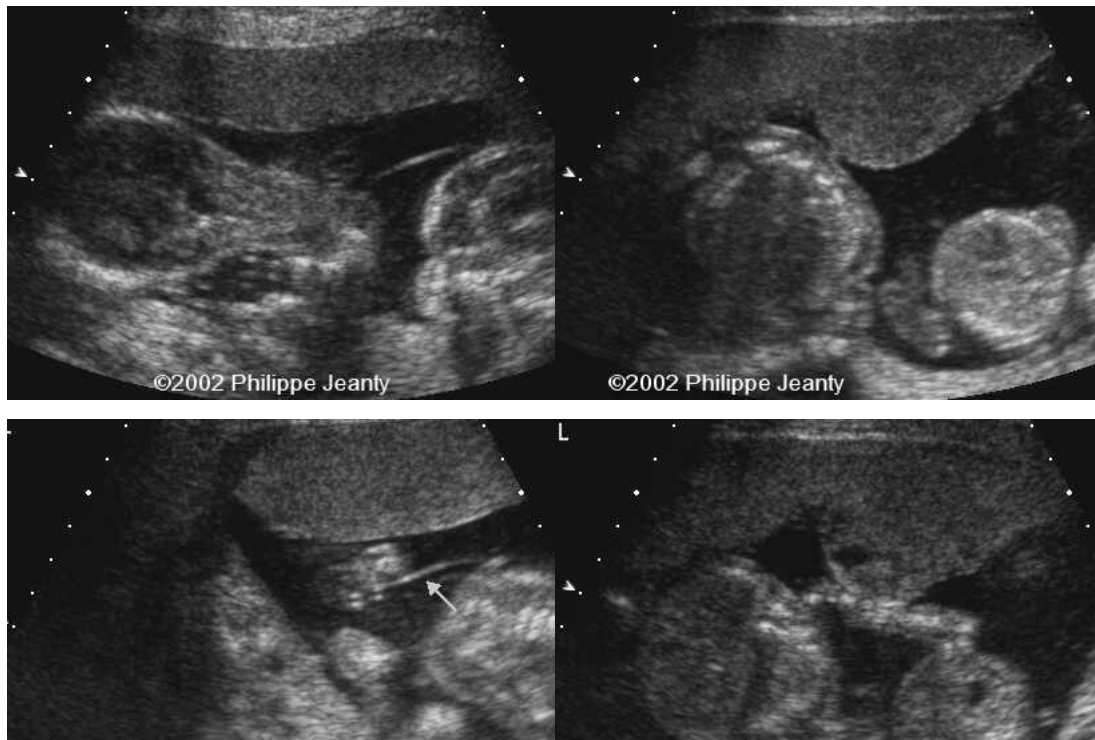
Case report: A 21-year-old G₁P₁ pregnant woman was first examined at 20 weeks and 3 days of gestation, as estimated by last menstrual period.

A twin diamniotic pregnancy was observed with a single anterior placenta. There was a discrepancy of size between the fetuses such that the estimated gestational age for the small twin was 17 weeks and for the big twin was 20 w biometry (see Table 1).

	<i>Small Twin</i>	<i>Big Twin</i>	<i>Difference</i>
Biparietal Diameter	41mm	48mm	7mm
Head circumference	146mm	177mm	31mm
Abdominal circumference	123mm	160mm	37mm
Femoral length	19mm	30mm	11mm
Humerus length	20mm	32mm	12mm
Estimated fetal weight	234gr	384gr	150gr
Gestational age by ultrasound	17w0d	20w1d	3w1d

Table 1. Biometry in 20w3d (based in last menstrual period).

The genitalia of the small twin were defined as ambiguous. The big twin had male genitalia. The amniotic fluid was normal and equal for both twins. There was no structural anomaly seen in either one of the fetuses. An amniocentesis was performed without difficulty, showing normal male chromosomes for both fetuses.

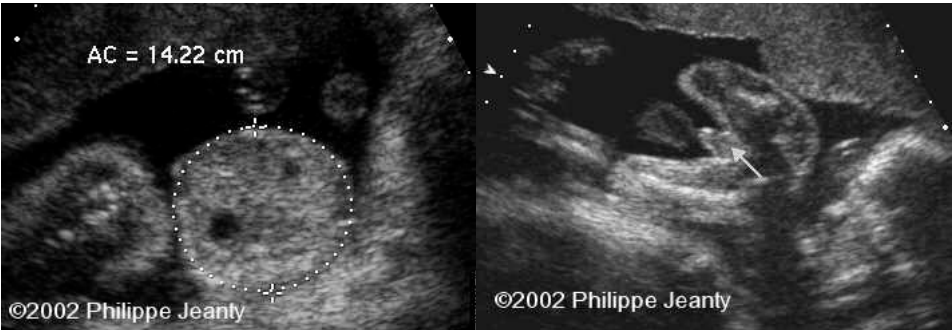
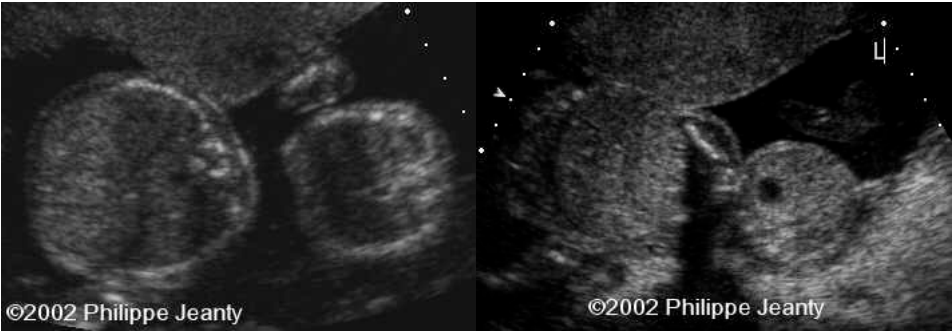




The next ultrasound was at 22 weeks 6 days (as estimated from the last menstrual period). The small twin was estimated by biometry as 18 weeks and 6 days and the big twin as 22 weeks and 3 days (see Table 2). All other paramet limits.

	<i>Small Twin</i>	<i>Big Twin</i>	<i>Difference</i>
Biparietal Diameter	48mm	56mm	8mm
Head circumference	169mm	201mm	32mm
Abdominal circumference	142mm	184mm	22mm
Femoral length	26mm	38mm	12mm
Humerus length	25mm	36mm	11mm
Estimated fetal weight	333gr	564gr	231gr
Gestational age by Ultrasound	18w6d	22w3d	3w4d

Table 2. Biometry in 22w6d (based in last menstrual period).



There is a [400kb Video-clip](#) of the hypospadias.

Repeat ultrasounds were done at 26 and 29weeks of gestation (see Table 3 and 4 respectively).

	<i>Small Twin</i>	<i>Big Twin</i>	<i>Difference</i>
Biparietal Diameter	54mm	62mm	8mm

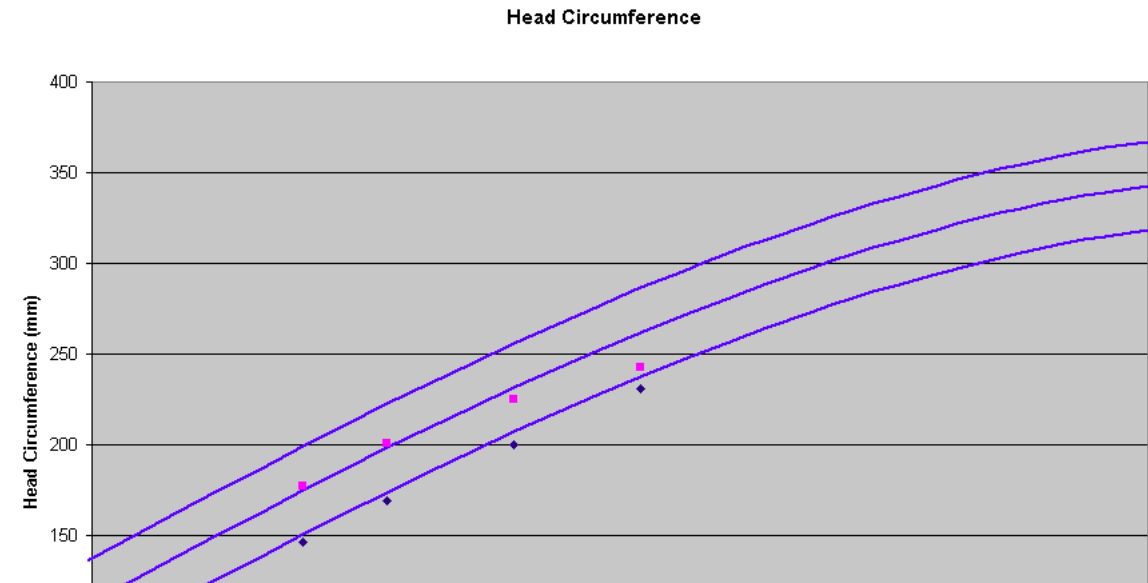
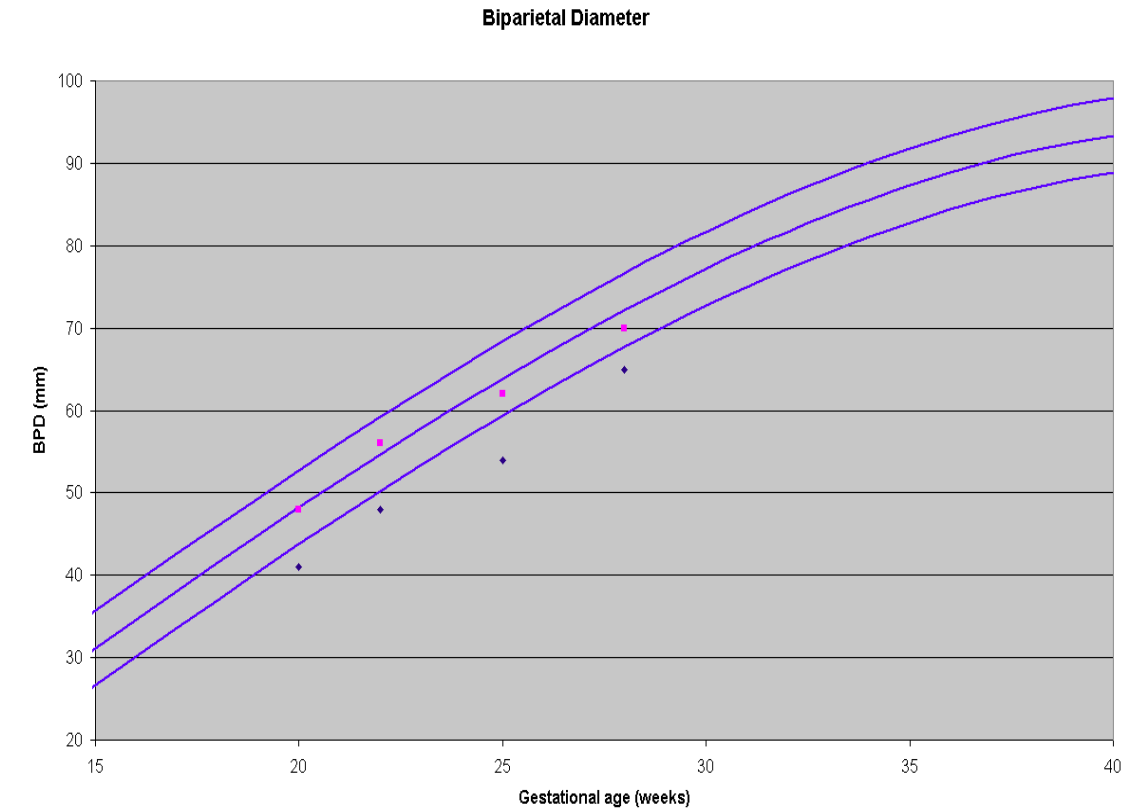
Head circumference	200mm	225mm	25mm
Abdominal circumference	162mm	231mm	69mm
Femoral length	32mm	48mm	16mm
Humerus length	30mm	43mm	13mm
Estimated fetal weight	466gr	970gr	504gr
Gestational age by ultrasound	21w0d	25w6d	4w6d

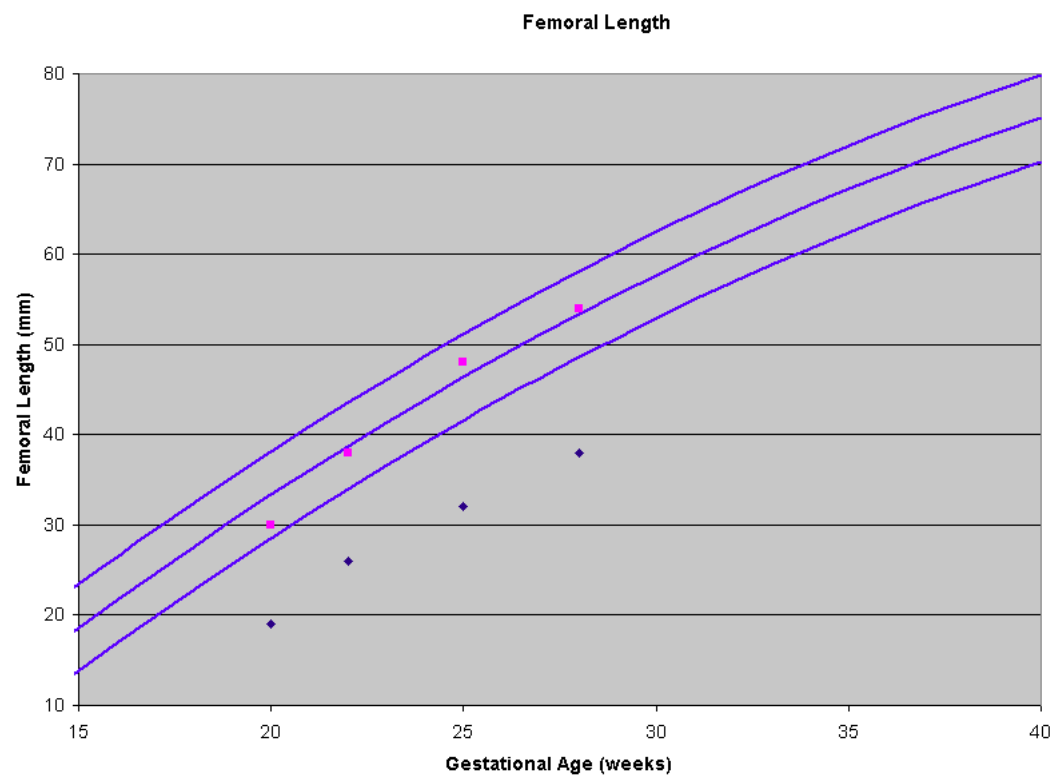
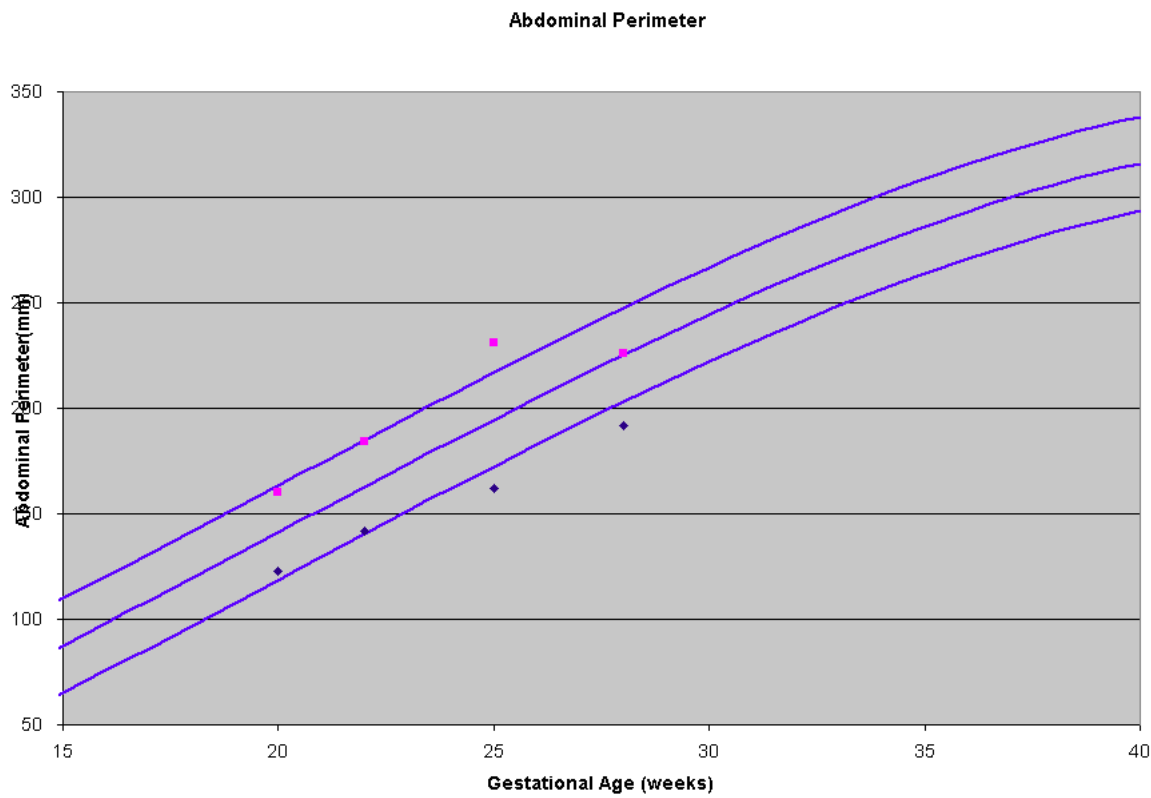
Table 3. Biometry in 25w4d (based in last menstrual period).

	<i>Small Twin</i>	<i>Big Twin</i>	<i>Difference</i>
Biparietal Diameter	65mm	70mm	5mm
Head circumference	231mm	243mm	12mm
Abdominal circumference	192mm	226mm	34mm
Femoral length	38mm	54mm	16mm
Humerus length	38mm	48mm	10mm
Estimated fetal weight	629gr	1120gr	491gr
Gestational age by ultrasound	24w2d	27w5d	3w3d

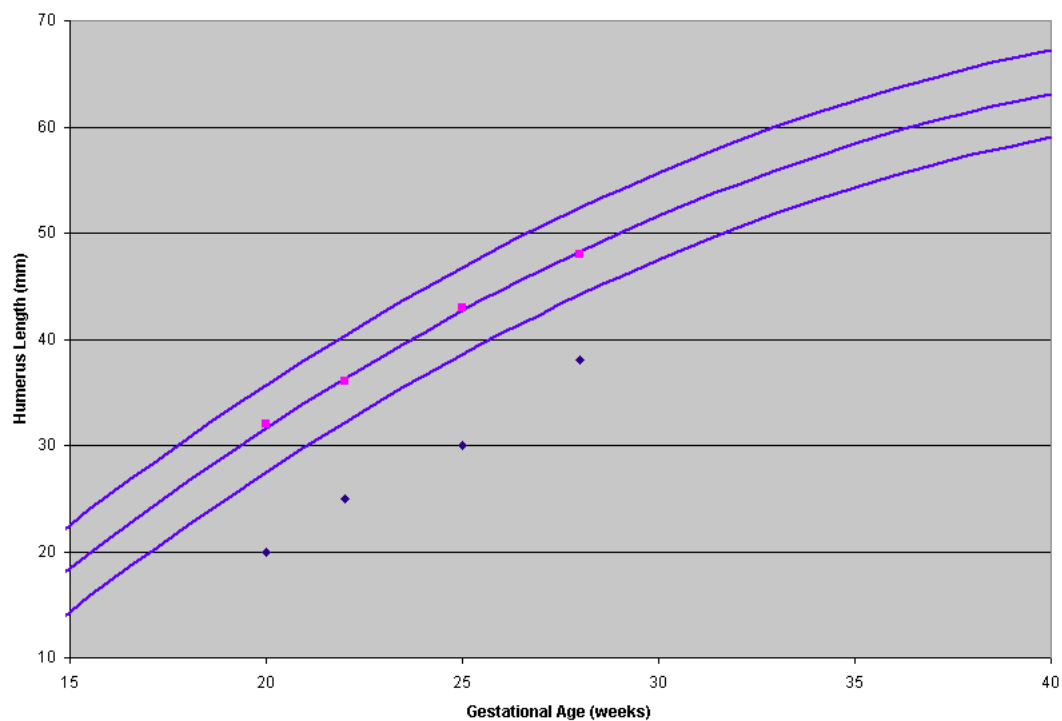
Table 4. Biometry in 28w4d (based in last menstrual period).

In the charts below, the dark blue dots represent the smaller twin and the pink dots the bigger twin. The lower line represents the 10th percentile, the middle line the 50th and the upper one the 90th percentile.

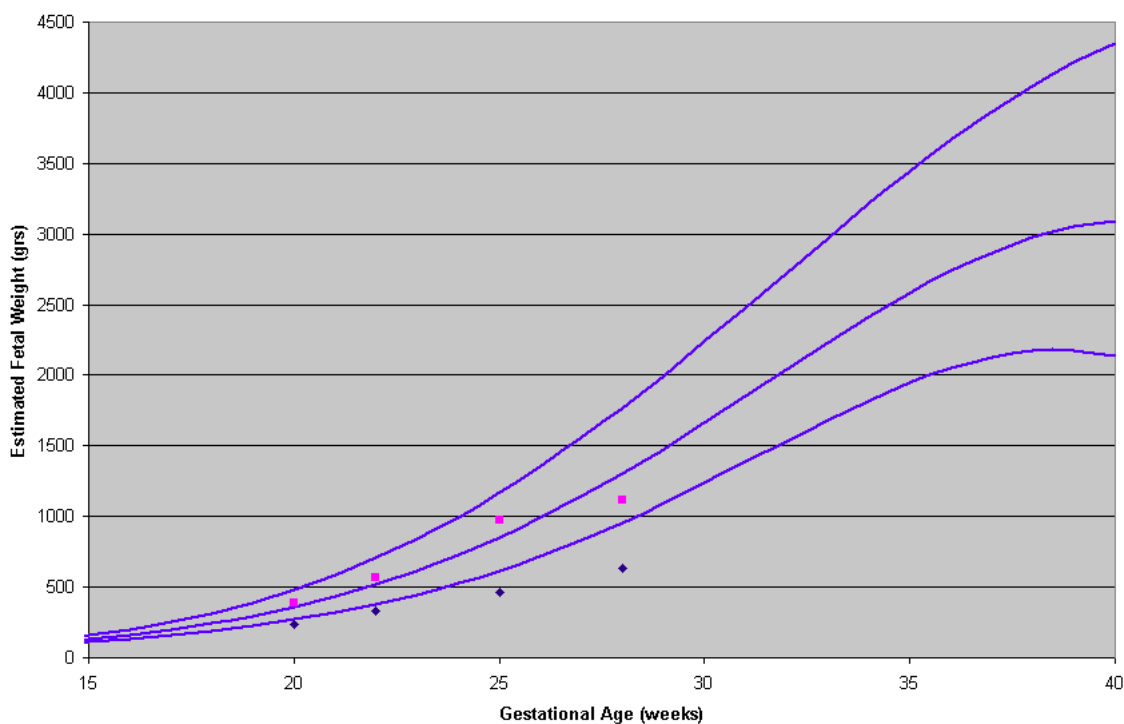




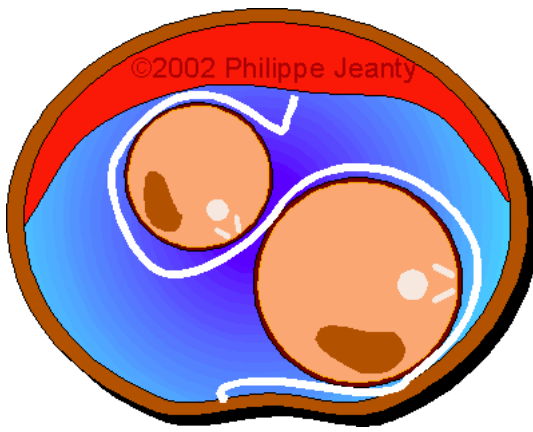
Humerus Length



Estimated Fetal Weight



The umbilical artery Doppler of the small twin demonstrated antegrade end diastolic velocity at 28 weeks. Another significant fact was that the fetuses changed position between the 20th and 28th week. The small twin was left and the big twin was right at the 20th week. In the 25th week the small twin was right/low and the big twin was left/high. In the 28th week the small twin was low/right and the big twin was top/transverse. This very unusual situation with twin changing position membranes that appeared fairly "loose". The bigger twin actually burrowed under the small twin then became locked in this position and was no longer able to return to its original left-sided position. There are 2 short video-clips [600kb](#) and [1.2mb](#) of their membrane.



A C-section was done at 31 weeks, due to pregnancy-induced hypertension and absent end-diastolic flow in the small twin's umbilical artery Doppler, and two viable babies were delivered.

The small twin was 789gr and had a length of 25cm. Its Apgar was 7,8. The big twin was 1510gr and had a length of 46,5cm. Its Apgar was 8,9. Both were intubated in the delivery room.

The weight discordance between the twins at birth was 47,7%. The small and big twins after delivery.



Repeat karyotyping showed normal 46,XY chromosomes for both babies.

The small twin developed respiratory distress, which relapsed to mild to moderate chronic lung disease in the next days. He was extubated by day of life #5. His hematocrit and complete blood count was normal at birth. He later developed and received numerous blood transfusions. The physical exam showed hypospadias and bilateral undescended testes, as well as a wide anterior fontanel. From his regular screen tests only elevated TSH was found, without clinical symptom and was treated accordingly. Since then the TSH normalized. He was finally discharged after 99 days in the Neonatal Intensive Care Unit.

The big twin was extubated by day of life #2. His hematocrit and complete blood count was within normal limits at birth. He later developed anemia of prematurity requiring two transfusions of packed red blood cells. He also developed Sepsis, with secondary thrombocytopenia. He was treated accordingly. The regular laboratory screen was within normal limits. On physical exam no structural anomalies were found. He was discharged 7 days after delivery.

The placenta was submitted to gross and microscopic evaluation and was found to be of the dichorionic diamniotic type (it was also a "fused" one). It was a single oval disk that weighted 449 gr. The umbilical cord of the small twin was at the placenta. The diameter of the two umbilical cords was the same. Although the parenchyma was disrupted in the region of the small twin, there was no obvious evidence of missing cotyledons. There was no evidence of inflammatory abnormality.

Prevalence: Discordant fetal growth (more than 20%) has been reported to complicate 15% to 29% of twin gestations^{1,6,16,17}. In a large collaborative study⁶¹⁸, birth weights differed between 500 and 999gr in 18% of the twin sets 1000gr in 3%. In another large study⁹, discordancy in birth weights more than 750gr was seen in 8,9% of the twin sets.

Etiology of growth discrepancy:⁶

- IUGR:
- Prevalence 25% (10 times greater than singletons).
- 17% of all IUGR are twins.
- Twin-to-twin transfusion syndrome.
- Anomalies.

Pathogenesis: Although the birth differences in monochorionic twins have been attributed to hemodynamic factors, the etiology of discordance in dichorionic twins remains elusive². Possible etiologies include genetic potential, fetal sex, environmental factors and congenital anomalies^{2,3,12}. It has been postulated that the smaller twin might have a genetic predisposition for a lower birth weight and become a crowded intrauterine environment and/or uteroplacental insufficiency that results in greater divergence in growth rate¹.

Sonographic findings: The standard care for twin pregnancy includes serial sonographic evaluations to assess the growth of each fetus^{20,21}. Findings suggestive of growth discrepancy include:

- Estimated fetal weights discordant by more than 20%^{7,22,23,24,25,26,27,28,29,30,31,32,33,34}. It can be classified as mild (15-25%) or severe (>25%). Cases of pre-term twin gestations with severe discordance are associated with a higher morbidity rate^{35,36,37}.
- Abdominal circumference diverging by 20 mm or more^{37,38,39,40}.
- Difference in biparietal diameter greater than 6 mm, with the smaller biparietal diameter less than 2 standard deviations below the mean⁵.
- Head perimeter diverging by more than 5%.

Umbilical artery S/D ratios discordant by more than 15% and elevated umbilical artery S/D ratio (> 0.4) in one or both twins

Differential diagnosis: Includes, in monochorionic diamniotic twin pregnancies, twin-to-twin transfusion syndrome (twin oligohydramnios-polyhydramnios sequence, stuck twin syndrome).

Prognosis⁶:

- 2.5 risk of perinatal mortality.
- 6.5 risk of stillbirth
- Small twin mortality: 20% (6 times more than in concordant twins).

Discussion: According to Erkkola et al⁶, growth discrepancy in twins can be attributed to IUGR, twin-to-twin transfusion syndrome and to anomalies. In this case-report twin-to-twin transfusion syndrome was excluded from the normal amniotic fluid in the small twin. Moreover, the small twin had the greater hematocrit (56%) of the pair at birth. In addition, major anomalies were not found in either of the twins.

In this case report the discordancy between the two fetuses was actually due to IUGR in one of the fetuses. IUGR has a prevalence of 25% in twins, which is 10 times greater than in singletons. Moreover, 17% of a Especially for the dizygotic twins, significant differences in growth rates have been attributed to selective intrauterine growth retardation of one twin².

In a study of 147 dichorionic twin pairs, birth weight discordance was attributable not to differences in placental weight but to a greater number of placental lesions in the lighter twin than in the heavy study of 382 twin pregnancies⁴⁸, the most frequent findings in the placentas of severely discordant twins were small placental weight and umbilical cord abnormalities. Vascular-thrombotic lesions, acute atherosclerosis of spiral arteries, thrombosis of fetal vessels, intraplacental hematomas and perivillous fibrin deposition are common in the placentas of growth restricted fetuses⁴⁸. In our case, h above lesions were found. The only possibly significant finding was that the umbilical cord of the smallest fetus had a marginal insertion, although its diameter was same as: Moreover, in a recent study⁴⁹, marginal placental cord insertion was not associated with increased risk of growth impairment, although it was limited in singleton pregnancies.

There were no statistically significant differences observed between discordant and nondiscordant twins with respect to length of gestation, race, education, occupation, smoking, alcohol use, hyp maternal age, gravidity, and autoimmune disease². Moreover, these factors are common to each member of a twin pair¹⁵.

The overall risk of fetal death in discordant twins (>25% weight discrepancy) is 6,5-fold greater than in concordant twins^{1,6}. However, when there is discordancy with an appropriate for gestational age for gestational age twin there is no increased morbidity or mortality.

In a large study of 15066 twin pregnancies¹⁹, like-sexed pairs experienced significant excess in pregnancy loss when discordance exceeded 20% to 30%. In the same study the pregnancy loss rate was more than twice as high as for unlike-sexed pairs. This increase in the rate of pregnancy loss was attributed to monochorionic twin pregnancies. In addition, discordancy greater than 750 gr was unlike-sexed twins and in 8,3% of like-sexed twins. In another study of 147 twin pairs, however, sex did not play a significant role in birth weight discordance².

According to Rydhstrom¹⁹, a malformed twin has a tendency to intrauterine growth retardation, leading to an increased discordance even in cases when the malformation does not prove lethal.

This was a case report of a dichorionic twin pregnancy with discordance between the pair approaching 50% that had a favorable outcome. It is important that the counseling of patients with so gre pairs will include not only the definition of the possibility of pregnancy loss, but also the possibility of malformations, prolonged stay in the Neonatal Intensive Care Unit and the possible neurological c also useful to know how many of these babies will eventually have a sufficiently normal life.

Reviewer: Antony Vintzileos, MD

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