

It is not just the number of amniotic sacs that determines risk for twins, It is the number of placentas

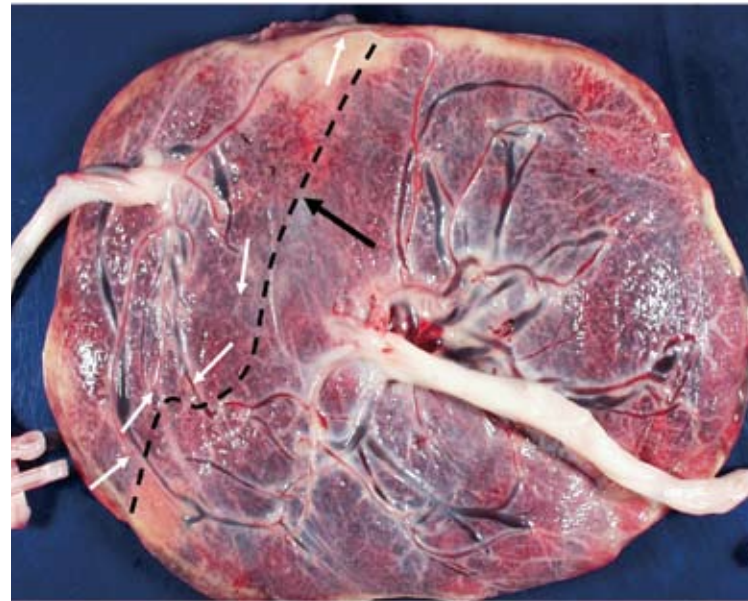
There are approximately 140,000 multiple births annually in the USA. Although general perinatal fetal risks in multiples such as prematurity, perinatal mortality and morbidity, and maternal issues such as toxemia, hemorrhage and anemia are well known to obstetricians, there appears to be less awareness of the consequences of one subset of twins – those with monochorionic (MC) placentas. This type of monozygotic (MZ) twin pregnancy is a result of a twinning event 4 or more days from fertilization. When compared to fraternal twins or MZ twins with separate placentas, MC twins are more likely to be premature, growth discordant, suffer IUGR, die, and suffer developmental and acquired birth defects that do not occur in the absence of MC placentation. It is this fetal loss and risk of cerebral palsy and intellectual disability in survivors that is most concerning to parents.

A Monochorionic Twin Gestation is High Risk

Morphologically, it is the presence of anastomotic blood vessels in the MC placenta (chorioangiopagous vessels), and the tendency for the twins to have varying degrees of chorion shares that underlie fetal risks in MC twins (Figure 1). In addition, unlike singletons, MC twins must survive blastomere allocation, implantation orientation, chorioangiopagous status, and changes in anastomotic status with loss of decidua capsularis-chorionic levae at 12 weeks. Twin to twin transfusion syndrome (TTTS), which affects 15% of MC twins, is one such risk and is considered a significant challenge in modern obstetrics. Since there is no primary prevention for these problems (IVF for that matter, is associated with a 5-15x incidence of MZ twinning over spontaneous), it is imperative that placental type be determined as early in pregnancy as possible and increased resources be directed toward fetal surveillance.

The placenta is the only biologic structure that can kill or injure more than one person at the same time

One can determine placenta type (chorionicity) as early as 7 menstrual weeks by high-resolution abdominal or transvaginal ultrasound, and fetal number and amnionicity by 6 and 8 weeks respectively. Chorionicity determination approaches 100% in the first trimester. Separate placental masses and the ‘lambda’ or ‘twin peak’ sign (see Figure 2) in the 1st trimester both indicate dichorionic placentation. In contrast, MC twins will have a single placenta, with the interfetal septum forming a ‘T’ as it meets the base. The absence of chorion in the septum makes the septum thin (only two layers) or ‘very hard to see,’ often giving the false impression of MC monoamniotic twins (see Figure 3). In the 2nd trimester, membrane septum thickness, especially at the base, and fetal gender may be used to determine chorionicity.



Monochorionic Placenta

Figure 1. There are roughly 30,000 monochorionic twin births each year in the USA. Of these, 5,000 have abnormal placental factors severe enough to cause pathologic conditions unique to MC twins such as TTTS. The white arrows point to several anastomotic blood vessels between the twins’ placental circulations. The black arrow points to a dotted line that indicates the ‘equator’ of the shared disc, which is significantly asymmetric. Both findings underlie the excess morbidity and mortality of MC twins.

The Pathophysiology of Maternal and Fetal Complications in MC Twins is Extremely Complex

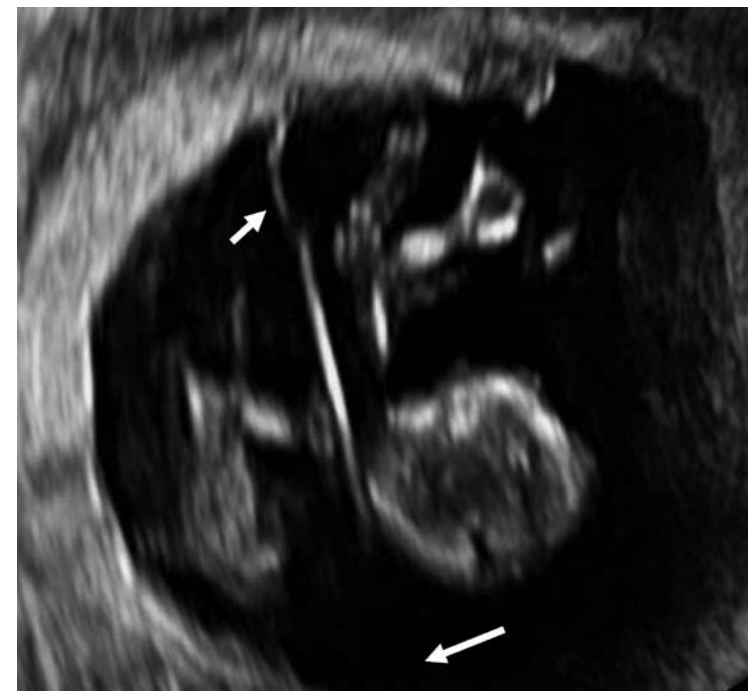
In addition to the placental factors just described, the MC twin pregnancy can be affected by two maternal factors. Studies have shown maternal protein-energy malnutrition (hypoproteinemia and anemia) in 100% of MC twin pregnancies by mid-gestation. Multiple pregnancy is also at risk for cervical shortening and funneling. Monitoring the cervix by ultrasound may allow for treatment, and prevent the associated mortality and morbidity of preterm birth.

It is having one placenta that determines identical twins and



Dichorionic Placenta - No Risk For TTTS

Figure 2. The arrows point to the interfetal membrane septum, which contains a triangular projection of chorionic villi at the septum base. This early sign ensures a dichorionic pregnancy.



Monochorionic Placenta - Risk For TTTS

Figure 3. The upper arrow points to a thin (< 1.5 mm) interfetal membrane septum in monochorionic twins, which forms a ‘T’ at the base, and is ‘hard to see’ in some areas (lower arrow). These twins are ‘at risk’ for TTTS.

If chorionicity is uncertain for whatever reason, it is crucial to manage as a MC gestation with especially targeted follow-up and monitoring

The 15 Most Important Questions and Explanations

The issues addressed in this pamphlet on multiple gestation, MC placentation and TTTS are virtually unknown to patients. There is an increased tendency for them to turn to the Internet for information, which can be both good and bad. The following questions and answers may help you educate them on the risks of monochorionicity outlined above, TTTS, TTTS symptoms, and size discordance. These questions are the most common mentioned online, so patients will likely want to receive this information. In general they cover: criteria for TTTS diagnosis; the possible involvement of a perinatologist; the why and when for treatment; and when delivery is indicated.

Confirm at First Ultrasound

- 1. Is the placenta monochorionic?**
TTTS only occurs with a single, monochorionic placenta.
- 2. Are the babies the same sex?**
Only same sex babies can have a monochorionic placenta and TTTS.
- 3. Can you see the dividing membrane?**
A thin, wispy membrane confirms monochorionic twins. Inability to see the membrane does not prove monoamniotic (same sac) twins. The membrane may be shrink wrapped around a donor baby suffering from TTTS.
- 4. Is the placenta anterior or posterior?**
Laser surgery may be performed on either location, but an anterior placement of the placenta presents more challenges.
- 5. Do the cords have 3 vessels or 2?**
One reason monochorionic twins can be more than 20% different in size is that the umbilical cord of the smaller baby has only 2 blood vessels in it.
- 6. Are the cords fully attached to the placenta?**
Another reason that babies can be more than 20% different in size is that the smaller twin has a velamentous cord insertion (cord inserts into the chorioamniotic membranes instead of the placental mass.)

Questions and Explanations Continued

Ask at Weekly Ultrasounds

7. What is the largest vertical pocket of fluid for each baby?

With twins, normal pockets of fluid are 3-8cm. When the fluid is greater than 8cm (polyhydramnios) and less than 3cm (oligohydramnios), the babies have TTTS. The fluid levels can change within a day. You cannot see the connecting anastomoses in the placenta on a sonogram unless laser surgery is performed. A pathologist can and should also test for connections in the placenta after birth.

8. Can you see the bladder of the donor baby?

The bladder is there, but if you cannot visualize it within 30 minutes, the donor baby is not urinating.

9. What are the weights of the babies in grams?

(measure every 2-3 weeks)

Subtract the weights in grams and divide by the weight of the larger baby to obtain the percentage size difference. If the discordance is 20% or more, the four possible reasons are: a two blood vessel cord, a velamentous cord, TTTS (which causes the fluid problem), and/or an unequal placental share.

10. Are the dopplers normal for both babies?

Dopplers should be performed starting at 16 weeks. Donor babies often have absent diastolic flow. Recipient babies may develop reverse flow.

11. Is the heart of the recipient baby enlarged or thickened?

Both are signs that the baby's cardiovascular system is overloaded. The next step is hydrops.

12. Does the recipient have hydrops?

Hydrops is reversible only with laser surgery. Babies can survive and be healthy after having hydrops.

13. What is the measurement of the cervix, is it long and closed, thinning or dilated?

A cervix of 2.5cm or less needs a cerclage. TTTS treatments can still be done after a cerclage, but not after a premature birth and loss of the babies.

14. Is the smaller baby growing at the same rate?

When twins become 20% or more different in size, the babies may have an unequal sharing of the placenta which can only be determined after birth by analyzing the placenta. A twin can 'run out of placenta', so monitoring the rate of growth is crucial. When the baby stops growing, the babies need to be delivered or the baby will be deprived of oxygen.

15. What is the fundal height?

Also used to determine polyhydramnios (excessive amniotic fluid in TTTS).



"It is critical to determine if the placenta is monochorionic or dichorionic. It is easier to identify earlier in pregnancy, but if the radiologist or perinatologist cannot tell conclusively, the patient should be managed as monochorionic. The number of sacs or amnions is not the key because almost all twins will have two sacs. If there is one placenta, refer to a perinatologist for frequent ultrasound exams to screen TTTS. TTTS is an emergency and needs treatment. The OB should demand to know chorionicity because it changes management."

Dr. John Elliott
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Dr. Elliott co-authored the American College of Obstetrics and Gynecology Education Bulletin on multiple gestations. He has cared for 2 sets of sextuplets, 10 sets of quintuplets, 90 sets of quads, over 500 sets of triplets and over 1000 sets of twins.



"There is great need not only to confirm chorionicity through sonogram, but also to examine the placenta of TTTS patients. This is true not only of those placentas that accompany the acute syndrome, but also of those cases in which the TTTS was treated with laser ablation of vessels, etc. To assist a local pathologist in the examination of such a placenta, it is important that the nature of blood vessels on the placenta surface is understood. The Twin to Twin Transfusion Syndrome Foundation has a Placental Protocol which I have written to help your Pathology Department complete this exam and is available upon request."

Dr. Kurt Benirschke
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Dr. Benirschke has authored 26 books and 490 scientific publications

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Shetty A, Smith AP: The sonographic diagnosis of chorionicity. Prenat Diagn. 2005; 25:735-9.



The Twin to Twin Transfusion Syndrome Foundation

Established in 1989, The Twin to Twin Transfusion Syndrome Foundation has helped over 10,000 families. It is the first and only international 501C.3. nonprofit organization *solely* dedicated to providing immediate and lifesaving educational, emotional and financial support to families, medical professionals, and other caregivers before, during, and after a diagnosis of twin to twin transfusion syndrome. We are dedicated to saving the babies, improving their future health and care, providing NICU, special needs and bereavement support, furthering medical research, and keeping families together the way twins are meant to be.

Listen to mothers when they say they 'feel big' or have pain. The first warning signs of TTTS in the mothers is the sensation of rapid growth in the womb. Take her complaints seriously and get her an ultrasound right away.

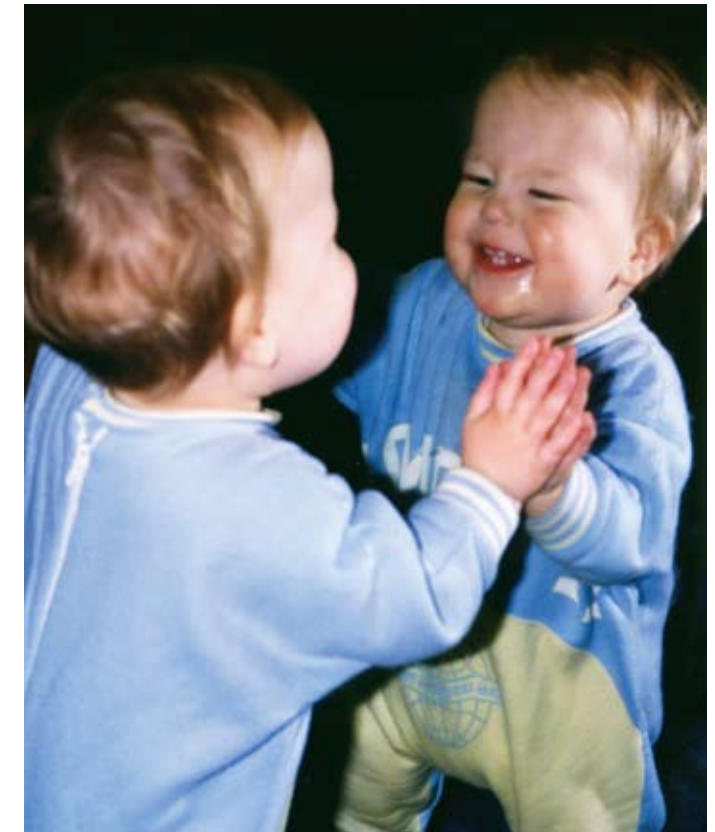
"My doctor told me that I had two sacs and the babies were not identical so I wasn't at risk for TTTS. By the time I was diagnosed, it was too late. He was mistaken and now my babies are gone"
Mother whose twins passed away from TTTS

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What Kind of Twins Are They?

Why You Must Determine Chorionicity in Multiple Gestation



Courtesy of
The Twin to Twin
Transfusion Syndrome
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Bay Village, Ohio