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Fetal and Maternal Medicine Review / Volume 10 / Issue 04 / November 1998, pp 213 - 227
DOI: null, Published online: 08 September 2000

Link to this article: http://journals.cambridge.org/abstract_S0965539598000448

How to cite this article:
Ana Monteagudo and Ilan E Timor-Tritsch (1998). Ultrasound assessment of chorionicity and amnionicity in twin pregnancies. Fetal and Maternal Medicine Review, 10, pp 213-227

Fetal and Maternal Medicine Review 1998; **10**: 213–227 Printed in the United Kingdom

Ultrasound assessment of chorionicity and amnionicity in twin pregnancies

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Introduction

Sonography during the first trimester of pregnancy is essential in twin pregnancies. This is due to the fact that a short two minute scan can reliably determine chorionicity and amnionicity. However, if the scan is not performed until the second or third trimester, the determination of chorionicity and amnionicity may be tedious and time consuming at the end of which many competent sonographers will frequently misassign chorionicity and amnionicity. A first trimester scan can therefore determine the appropriate management of the patient for the entire duration of the pregnancy.

The main objectives of this chapter are to

1 stress the importance of a routine first trimester scan especially in patients at risk for twin pregnancies
2 highlight the sonographic appearance of monochorionic and dichorionic twins in the first and early second trimester using transvaginal sonography (TVS) and beyond 14 weeks of gestation using transabdominal sonography
3 apply the information learned in twins to higher order multiples.

Essential embryology

Multiple ovulation and fertilization usually results in dizygotic twins. The zygotes arrive in the uterus and implants at around day 6–7 post-conception and development progresses in a similar fashion to that of a singleton pregnancy. In contrast, monozygotic twins arise at different times post-conception resulting in a variety of clinical presentations. The major difference between these two types of twins involves the placenta.

In twin pregnancies there are two types of placentas encountered: the dichorionic and the monochorionic. *All dizygotic twin pregnancies have dichorionic placentas, but monozygotic twins may have either a dichorionic or monochorionic placenta.* All twins with dichorionic placentas are diamniotic, but the monochorionic twins can either be diamniotic or monoamniotic depending upon when during development the zygote divides (Table 1).

In approximately 30% of monozygotic twins a pre-implantation division occurs within the first three days after fertilization. This division results in the formation of two blastocysts, which results in a *dichorionic-diamniotic placenta*. In 70% of monozygotic twins division of the zygote occurs post-implantation, usually between days 4 to 8, but before the development of the amniotic cavity. This post-implantation division results in the development of a *monochorionic-diamniotic placenta*. Post-implantation division of the zygote between days 8 to 13, after the amniotic cavity has developed, results in a *monochorionic-monoamniotic placenta*. If the zygote divides between day 13 and 16, this late division will result in conjoined twins.[1]

Diagnosis of chorionicity and amnionicity in the first trimester

Ideally the pregnancy should be scanned during the first trimester using high frequency TVS.[2]

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Table 1 Summary of the Embryology of Monozygotic Twining

Timing of Cleavage (days from ovulation)	Type of Placenta	Number of Amniotic Sacs	Number of Fetuses	Number of Yolk Sacs
Pre-implantation 1–3 days	dichorionic	two	two	two
Post-implantation	monochorionic			
4–8 days*		two	two	two
8–10 days		one	two	two
13–16 days		one	conjoined	one

* Note: implantation occurs between day 6–7.

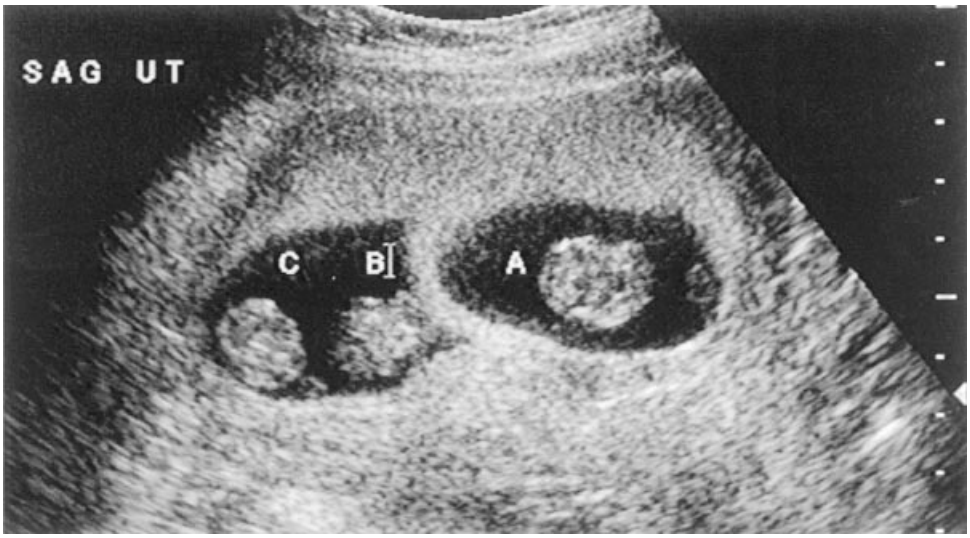

Figure 1 Transabdominal scan of a dichorionic-triamniotic triplet pregnancy at 9 postmenstrual weeks. Fetuses C and B are monochorionic.

However, transabdominal sonography (TAS) has been and continues to be an integral part of obstetric ultrasound. When examining a pregnant woman during the first trimester the resolution and detail provided by TVS is far superior to that of TAS. This is especially true when dealing with either an obese patient or a very early pregnancy. (Figure 1 and 2)

Transabdominal sonography

Several studies[3–6] have evaluated the use of TAS to determine chorionicity and amnionicity in the first trimester. One of the largest studies was that of Kurtz et al[4] who evaluated 166 pregnant women with twin gestations at 9 to 12 weeks from the last menstrual period. The purpose of their study was to determine the type of twining present. They used the following ultrasound criteria:

1 Membrane thickness. The thickness of the membrane was categorized as *thick,* (measuring 2 mm or greater) *thin,* (appearing faint and measuring less than 1 mm) *intermediate* (somewhere between the two) and *none* if no membrane was identified
2 Number of placental sites
3 The ''lambda sign'', which was defined as a triangular filled space between the uterine wall or the abutting sacs.

Their results (Table 2) concluded that of the 166 cases 105 had enough information to ensure correct assessment. Of the 85 dichorionic diamniotic pregnancies 78 (92%) were correctly diagnosed by detecting a thick membrane. By using both membrane thickness and placental number their accuracy improved to 96%. Using the placental site alone only 22 of the 85 cases (26%), were correctly diagnosed while use of

Figure 2 Transvaginal scan of a trichorionic-triamniotic triplet pregnancy at 9 weeks and 4 days. The black arrow points to the triangular ''twin peak'' sign separating two neighbouring chorionic sacs. The small arrows mark the amnion in one of the three sacs.

Table 2 Results of prediction of chorionicity and amnionicity by using membranes thickness in twin pregnancies.

Twinning Group	Number Patients	Membrane Thickness (mm)			
		Thick	Intermediate	Thin	None
Dichorionic Diamniotic	85	78	4 (three of four cases had two placentas)	3 (one of three cases had two placentas)	0
Monochorionic Diamniotic	16	0	1	14	1
Monochorionic Monoamniotic	4	0	0	0	4

Modified after Kurtz et al (4)

the lambda sign alone correctly predicted 6 of the 85 cases (7%). The presence of a thin membrane correctly identified 14 of the 16 cases (88%) of monochorionic diamniotic twins. Monochorionic-monoamniotic twins were correctly identified in all of their four cases. In their conclusions they suggested that TVS should allow better evaluation of the membranes and placental sites than TAS.

Transvaginal sonography

Determination of chorionicity

The chorionic sacs can be imaged and their number counted as early as 4 to 5 postmenstrual weeks of gestation using TVS.[2,7,8] However, Doubilet and Benson[9] reported that transvaginal sonography at 5.0–5.9 weeks frequently undercounted multiple gestations.

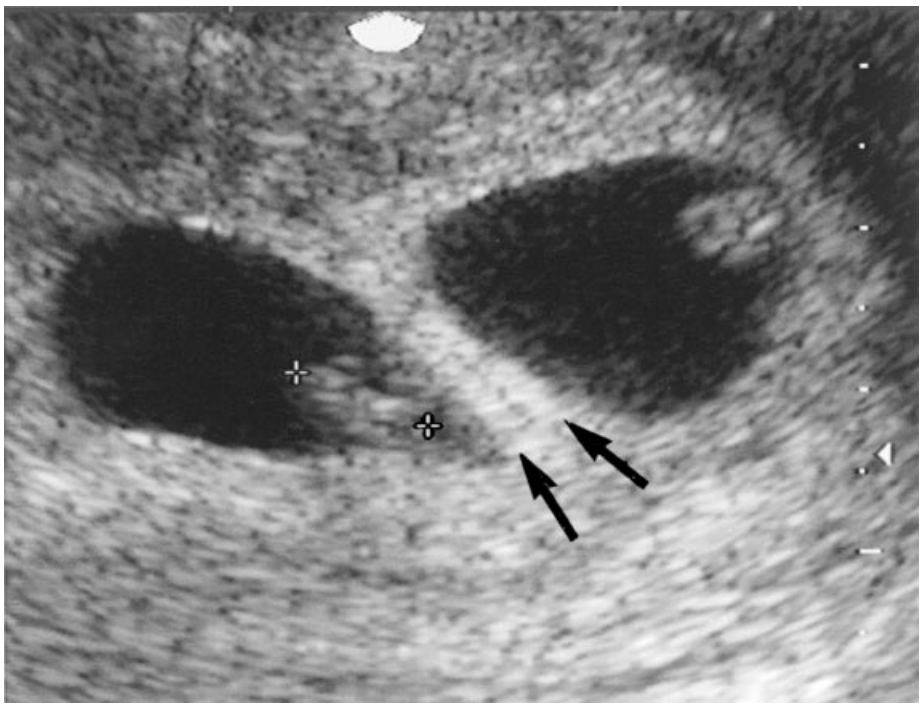

Figure 3 Using a high frequency transvaginal transducer the opposing two layers of chorionic sac walls are seen and marked with arrows.

Therefore, it is always good practice in cases where twins or higher order multifetal pregnancy is suspected very early in the first trimester to repeat the scan later in the first trimester, ideally around the 9th week (see below).

The chorionic sacs are implanted and embedded in one side of the cavity line within the thick endometrium. Sonographically the chorionic sacs appear as round sonolucent structures surrounded by a bright echogenic rim *(the chorion)*. The size of the sacs at this gestational age ranges between 2 and 5 mm in diameter. By counting the number of chorionic sacs one can determine whether the pregnancy will be dichorionic, trichorionic, etc.

In summary the chorionicity of a twin (or a higher order multiple) pregnancy can be established by the 5th postmenstrual week. (Figure 3 and 4)

Determination of the number of embryos

In a well dated pregnancy the number of chorionic sacs can usually be assessed by the 5th week, and by $5\frac{1}{2}$ weeks the *yolk sacs* can also be imaged and counted. However, using the number of chorionic and yolk sacs alone to determine the number of embryos can be misleading. By the sixth postmenstrual week of gestation, when the chorionic sacs enlarge, the yolk sacs become more evident and the embryos can now be imaged within the gestational sac.

In summary determining the number of embryos present relies on the number of heartbeats detected, hence the final determination must wait at least until the 6th week of gestation for the onset of ultrasonically detected cardiac activity.

Determination of amnionicity

The number of amniotic sacs (amnionicity), can be accurately seen and determined, at or around the 8th postmenstrual week. However, in certain twin pregnancies one can make an assumption of the number of amnions even earlier. For example, if only two chorionic sacs are imaged and each sac contains one yolk sac and only one embryo with cardiac activity, then in spite of not yet imaging the amniotic sacs,

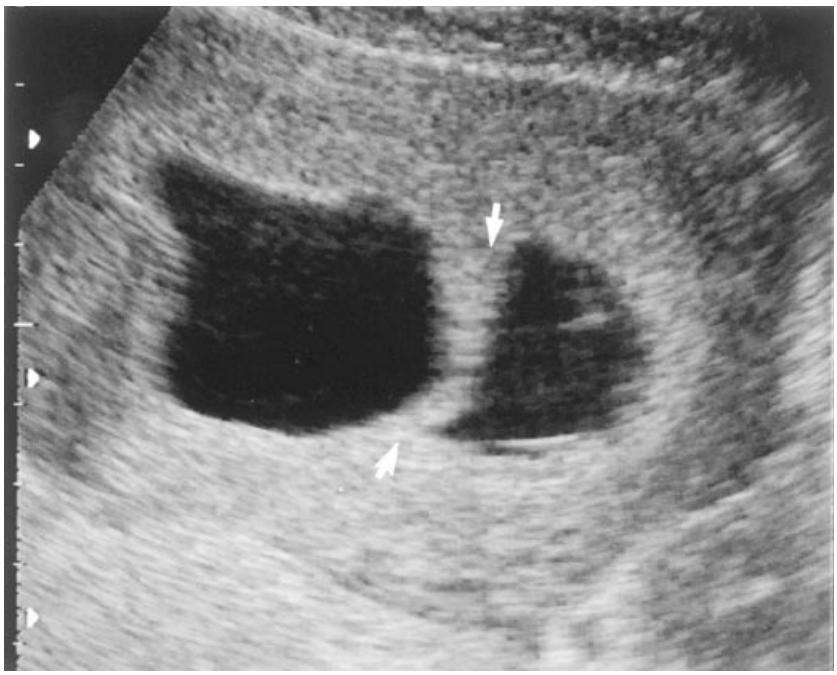

Figure 4 The two arrows point to the wedge shaped ''twin peak'' sign separating two chorionic sacs. This is a 6 weeks old dichorionic diamniotic twin pregnancy.

this twin pregnancy must be dichorionic-diamniotic (Figure 3). Thus a dichorionic-diamniotic pregnancy or higher multiples can be reliably diagnosed by the 7th week of gestation if one yolk sac and one live embryo is seen within each gestational sac.

In monochorionic pregnancies, as with dichorionic pregnancies, the chorionic sac can be imaged and counted by the 5th week of gestation. However, unlike the situation with dichorionic-diamniotic twins, in monochorionic gestations two yolk sacs and two live embryos may be seen by the 6th week of gestation within the single chorionic sac. At this point a dilemma arises: what is the amnionicity of the pregnancy? To reliably determine the amnionicity of a monochorionic pregnancy with more than one embryo within the sac, one has to wait at least until the 8th week of gestation when the amnion and amniotic cavity become sonographically visible. Despite the use of high frequency TVS probes, the amnion can only be imaged at $7–7\frac{1}{2}$ weeks gestation. At this early gestational age the amnion snugly surrounds the fetus and the amniotic cavity contains only a small amount of fluid making the clear identification of the amniotic sac quite difficult. After the seventh and up to the 8th postmenstrual week, with the increasing amount of amniotic fluid, the amnion separates from the embryonic body and becomes quite easy to image.[7,10,11] (Figure 5)

By the 6th week of gestation a single gestational sac containing two embryos with cardiac activity can be imaged in monochorionic-monoamniotic twins[7]. The number of yolk sacs present in monochorionic-monoamniotic twins determined between day 8 to 10 after conception may differ (Table 1).[12] A single yolk sac, a partially divided yolk sac or two yolk sacs may be present depending upon when the twins were ''determined'' (personal communication Kurt Benirschke). If the cell division of the twins was late, just before conjoined twins would occur, a single yolk sac would be apparent on the sonogram.

In conjoined twins, a single chorionic sac, yolk sac and a single triangularly shaped embryonic pole may be imaged at 6 weeks of gestation. An extremely late and incomplete

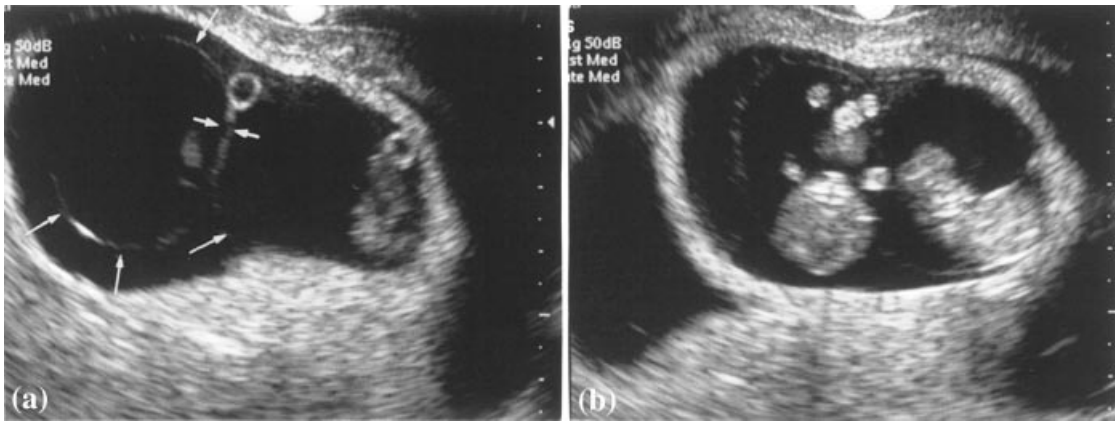

Figure 5 This is a dichorionic-triamniotic triplet pregnancy at 9 weeks.
A In the monochorionic sac there are two amniotic sacs (arrows) containing two embryos. The two extraamniotic yolk sacs are also seen.
B On this section the pair of monochorionic embryos are clearly seen.

division at approximately day 13 post-conception will result in partially joined twin fetuses.

Once the pregnancy reaches the 9th to the 10th week of gestation the extra embryonic space is progressively obliterated due to the growth of the amniotic cavity. The growth of the amniotic cavity is the result of the increasing amounts of amniotic fluid. In the dichorionic-diamniotic twin pregnancy each sac contains a single fetus, and the junction between two adjacent sacs is thick containing some chorionic tissue that sonographically appears to be wedge shaped. This has been referred to as the *''lambda sign''* or the *''twin peak sign''*[4,13,14] (Figure 4). In monochorionic-diamniotic twin pregnancies, as the single gestational or chorionic sac grows, the amniotic sacs obliterate the extra embryonic space and touch each other forming a relatively thin ''intertwin'' membrane. The junction of these two sacs in respect to the uterine wall is approximately at a 90° angle and creates a *''T-shaped*'' junction or ''take-off ''.(Figure 5)

In 1994 Monteagudo et al[8] reported on the early and simple determination of chorionic and amniotic type in multifetal gestations in the first fourteen weeks of gestation using high-frequency TVS. The study included 212 pregnancies of which ultrasound evaluation revealed 64 twins, 87 triplets, 41 quadruplets, 18 quintuplets, 1 sextuplet and 1 septuplet. Nine of the twin pregnancies were monochorionic-diamniotic, two of the triplets were dichorionic-triamniotic and four of the quadruplets were trichorionic-quadra amniotic. In all 15 monochorionic pregnancies the number of yolk sacs matched the number of fetuses. No monochorionic-monoamniotic pregnancies were encountered in the study. Pathology was available in 43 of the 54 patients delivered at the author's institution and in all cases TVS correctly predicted the pathologic chorionic and amniotic findings. The conclusion of the study was that first or early second trimester TVS allows for a quick (usually within 1 to 2 minutes) and accurate determination of the chorionic and amniotic type. (Figure 6)

Cooperman et al[15] undertook a study to determine whether chorionicity could be accurately predicted using first-trimester TVS. They studied 47 twins conceived with in-vitro-fertilization and embryo-transfer (IVF-ET) using TVS at 41 days (8 weeks post-menstrual age) following the embryo transfer. Sonographic findings were compared with placental pathology and 44 dichorionic-diamniotic and 3 monochorionic-diamniotic twins diagnosed by sonography were confirmed. They concluded that the 100% accuracy was due to the fact that the scans were performed at an early gestational age using TVS.

In a retrospective study Bromley et al.[16] identified 22 monochorionic twins (20 monochorionic-diamniotic and 2 monochorionic-monoamniotic) which had been scanned between 6 and $9\frac{1}{2}$ weeks of gestation. In each

Table 3 Sequential, Gestational Age Dependent Sonographic Appearance of Embryonic Structures in Twin Pregnancies

Timing of Transvaginal Scan	Number of Gestational Sacs	Number of Yolk sacs	Number of Fetuses	Number of Amniotic sacs	Chorionicity & Amnionicity
4 to 5 wks	two				Dichorionic
	one				Monochorionic
5 to 6 wks	two	two			Dichorionic
	one	two/one ①			Monochorionic
6 to 7 wks	two	two	two		Dichorionic
	one	two/one ①	two/one ②		Monochorionic
7 to 8 wks	two	two	two	two	Dichorionic/ Diamniotic
	one	two/one ①	two	two	Monochorionic/ Dichorionic
	one	two/one ①	two/one ②	one	Monochorionic/ Monoamniotic

① a single, a double or partially divided yolk sacs may be seen
② conjoined twins may be seen at this time

case the number of yolk sacs present and the first visualization of the amniotic membrane was noted. Their results showed that in the 20 monochorionic-diamniotic twins, when ultrasound was performed at less than 8 weeks, the yolk sacs were identified in all the pregnancies but the amniotic sac were not detected in any. In all but one case of monochorionic-diamniotic pregnancy, two yolk sacs were identified at 6 weeks. At 8 weeks only in half of the monochorionic-diamniotic twin pregnancies was the amniotic membrane identified. In the two monochorionic-monoamniotic twins a single yolk sac and amniotic cavity was seen at 9 weeks. They concluded that the number of yolk sacs imaged correlated with the number of amnions and that the number of yolk sacs could be identified at least two weeks before the number of amnions. This in fact corroborates the findings described in singleton pregnancies by other authors.

Levi et al[17] recently published on the characteristics of the yolk sac in monochorionic-monoamniotic twin pregnancies. They reviewed the data from four sets of monochorionic monoamniotic twins detected by first trimester ultrasonography. Data analyzed included the yolk sac number, size and morphologic features, as well as the outcome of the pregnancy. In all four sets, only one yolk sac was identified. In one case the yolk sac was irregular in contour, and in two it was abnormally large ($\geq$ 5.6 mm). Two of the four mothers delivered healthy twins at 34 weeks gestational age, one had conjoined twins (and underwent elective termination of the pregnancy), and one had a twin ectopic pregnancy (and underwent salpingectomy). They concluded that a single yolk sac in cases of monochorionic monoamniotic twins may be a normal finding.

Both studies by Cooperman et al[15] and Bromley et al[16] reinforce our published observations that an early, first trimester scan is an accurate and quick method of reliably assessing chorionicity and amnionicity in multifetal gestation. This information will be invaluable in the subsequent management of the pregnancy.

In summary, when scanning a twin pregnancy in the first trimester (Table 3)

- Chorionicity can be assessed by the 5th week
- The number of embryos can be assessed by the 6th week (with the onset of cardiac activity)
- Amnionicity can be reliably assessed by the 8th week.

  If each chorionic or gestational sac has a single yolk sac and an embryo with cardiac activity then the amnionicity equals the chorionicity (dichorionic-diamniotic or trichorionic-triamniotic).

  If a chorionic or gestational sac contains

Table 4 Sonographic clues to the diagnosis of chorionicity and amnionicity during the second and third trimesters of pregnancy.

Parameter	Placentation			
	Dichorionic Diamniotic		Monochorionic	
			Diamniotic	Monoamniotic
Fetal gender	Opposite/same gender		Same	Same
Placental site	Two	Single fused	Single	Single
Membrane origin		Twin peak	T-shape	No membrane
Membrane thickness		$\geq$ 2 mm	< 2 mm	
Membrane layers		4	2	

two yolks sacs, and two embryos with cardiac activity then the amnionicity may
1 be greater than the chorionicity (monochorionic-diamniotic) or
2 the amnionicity and chorionicity may be equal (monochorionic-monoamniotic).

In this case we have to wait until at least the 8th postmenstrual week when the amnions are clearly visible.

If a chorionic or gestational sac contains one yolk sac and two fetuses with cardiac activity, then the amnionicity and the chorionicity are equal (e.g. monochorionic-monoamniotic).

Diagnosis of chorionicity and amnionicity in the 2nd and 3rd trimesters

Accurate determination of chorionicity and amnionicity during the second and third trimester of pregnancy is possible, but as gestation advances it becomes quite a challenge. In the first trimester the chorionic sacs and the amnionitic sacs can be easily scrutinized in great detail, however during the second and third trimester we have to rely on indirect signs. (Table 4) At times it may be impossible to determine the placental type *in utero*.

Fetal gender

In dichorionic-diamniotic pregnancies about half the twin pairs will have the same gender and half will be different. If the fetuses are of different gender dizygotic twinning can be assured. If the fetuses are of the same gender zygosity may not be determined until after birth and around 25% may be monozygotic. In contrast, all monochorionic twins will have the same fetal gender and are monozygotic. Scardo et al[18] in 1995 reported on the predictive accuracy of a composite ultrasonographic evaluation to determine chorionicity, amnionicity, and zygosity in a consecutive series of 100 twins pairs. When using fetal gender to determine dichorionicity, opposite gender had a sensitivity of 51%, specificity of 100%, positive predictive value of 100% and a negative predictive of 39%. In contrast, like gender had a sensitivity of 100%, specificity of 51%, a positive predictive value of 39% and a negative predictive value of 100% for the prediction of monochorionicity.

Number of placental sites

Careful evaluation of the uterus may show one or two placentas, but commonly two separate placentas may be fused giving the false impression of only a single placenta.[19] If two separate placentas are located in opposite sides of the uterus then the pregnancy is dichorionic-diamniotic. Mahoney et al[19] found a sensitivity of 32% in assessing two placental sites with a predictive value of 100%. The presence of two placental sites confirms the presence of dichorionicity and, therefore, a diamniotic twin pregnancy. However, if a single placenta is present the accuracy of prediction for a monochorionic pregnancy was 49%. In the study of Scardo et al[18] the presence of a single placenta had a sensitivity of 95.8%, specificity of 57.9%, positive predictive value of 51.8% and a negative predictive value of 97.7% for the prediction of monochorionicity. (Figure 7).

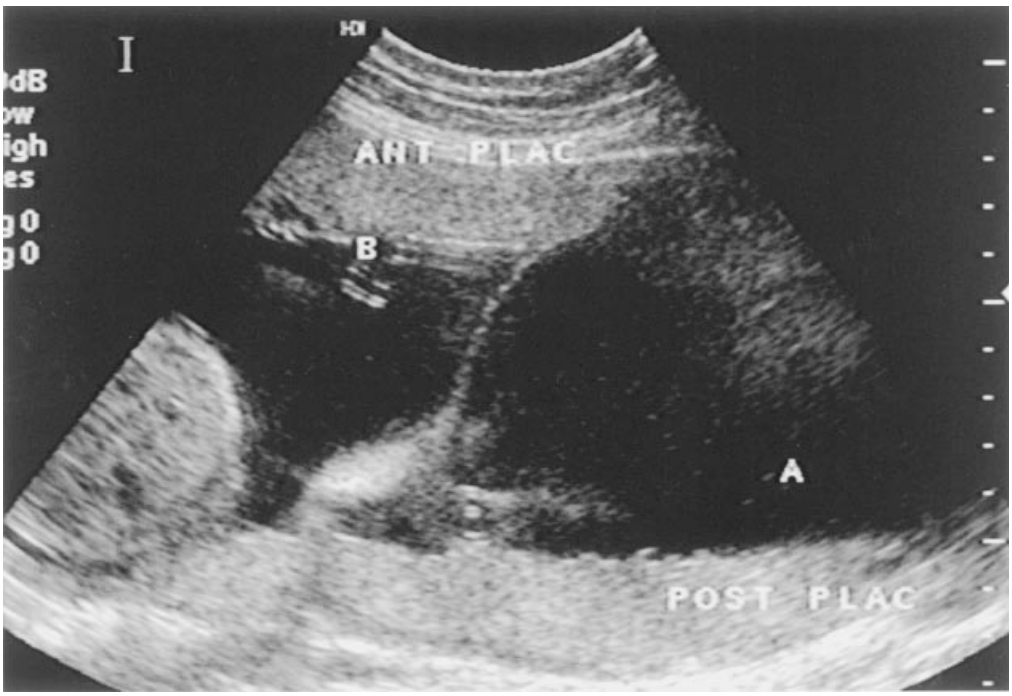

Figure 7 Dichorionic diamniotic twin pregnancy at 19 weeks. Regardless of the appearance of the membrane this is a dichorionic gestation since there are separate placentae on opposing uterine walls.

Interfetal Membranes: membrane origin, thickness and number of layers

Before the intertwin membranes can be scrutinized it is important to establish that each fetus is located within its own amniotic sac. Clinically, this is extremely important, since classically monochorionic-monoamniotic twins have an associated perinatal mortality as high as 50% for both twins. More recently, Tessen et al[20] reported on a overall survival rate for monochorionic-monoamniotic twins of 70% and a survival rate for both twins of 65%.

Once the presence of an intertwin membrane is determined then its sonographic appearance can be described. If two separate placental sites have been identified it is not important to further scrutinize the membranes. In cases with a single placental site three methods can be used to assess chorionicity and amnionicity. First, is to identify the origin of the membranes, second is to determine the number of layers present in the intertwin membrane, and lastly to assess the thickness of the membrane (Table 4).

Dichorionic placentas may be totally separate, or may be fused with only one placenta apparent. When two dichorionic placentas are fused the area of fusion creates a wedge shaped structure which has been termed the *''lambda sign''* (when imaged in the first trimester) or the *''twin peak sign''*[4,13,14] (Figure 8). The lambda and the twin peak signs when seen can be used as reliable markers of dichorionicity. Bessis and Papiernik[13] were able to correctly predict 20 out of 24 dichorionic pregnancies using the *''lambda sign''*. Kurtz et al[4] found the ''lambda sign'' to be present in only 6 of 85 dichorionic-diamniotic twin pregnancies. More recently, Finberg[14] made a similar observation and referred to it as the *''twin peak sign''*. Using this sign the author was able to predict multi-chorionicity in 15 twins and 5 triplet pregnancies scanned between 14 and 35 weeks gestation. He concluded that the ''lambda or twin peak sign'' was a reliable indicator of a dichorionic pregnancy but the absence did not rule out the presence of dichorionicity[14].

In monochorionic-diamniotic twin pregnancies as the amniotic sacs grow within the chori-

Figure 8 In a late second trimester pregnancy one has to heavily rely on the ''twin peak'' sign to diagnose a dichorionic twin gestation. The arrow points to this wedge shaped structure.

onic sac the extra embryonic space is obliterated. The growing amniotic sacs eventually touch each other forming a relatively thin intertwin membrane. The junction of these two sacs in respect to the uterine wall is *''T-shaped''* or approximately at a 90° angle. This ''*T-shaped*'' take-off of the membranes can be used as a reliable sign of monochorionicity.

Counting the layers of the intertwin membrane

The intertwin membranes need to be imaged parallel to the transducer to maximize the image resolution (Figure 9 A and B). In addition, the image needs to be enlarged to allow for accurate visualization and measurement. A thick membrane is made up of four layers, two chorions and two amnions consistent with a dichorionic pregnancy (Figure 10). A thin membrane is made up of only two amnion layers, consistent with a monochorionic-diamniotic twin pregnancy (Figure 11). D'Alton and Dudley[21] prospectively counted the number of layers in 69 twin pregnancies to determine chorionicity. Using this technique they correctly identified 94.4% of monochorionic pregnancies and 100% of dichorionic pregnancies.

Thick versus thin membrane

In dizygotic twins the opposing membranes are always thick because each membrane is composed of four layers. These thick membranes are formed by each twin's chorion in addition to the amnion. Thick membranes of 2 mm or more have a predictive value between 89 to 95% for dichorionicity.[5,22] A thin membrane measuring less than 2 mm may have a predictive value of up to 82% for monochorionicity.[22] In addition, this thin membrane may be difficult to measure and usually is described as ''hairlike'' or ''too thin to measure''.[3,5,6] (Figure 12 and 13)

Mapping the twin pregnancy

Mapping of the twin pregnancy is important, but it becomes crucial when more than three fetuses are present. The description of the exact location of each fetus is indispensable in cases in which a multifetal pregnancy reduction or a diagnostic procedure such as chorionic villus sampling (CVS) or amniocentesis is planned. For example, if CVS or amniocentesis has been performed and one fetus is abnormal, it is crucial the exact location of the affected fetus is known if selective reduction of the affected fetus is contemplated.

Ideally, to map the twin pregnancy (or higher order multiple) the uterus should be scanned in all three scanning planes. Recently, three dimensional (3-D) ultrasound machines allow a volume of the uterus to be obtained and automatically multiplanar imaging of the pregnancy is possible (Figure 14). Hata et al[23] used 3-D sonography to describe the interrelationships and contacts between twins in utero. They concluded that 3-D ultrasonography provides a novel means of visualizing multiple pregnancies and that this scanning modality may be useful in evaluating the contacts and crowdings of twin and triplet fetuses in utero.

In the sagittal plane, as per obstetrical convention, the fetus contained within the sac closest to the internal os of the cervix is usually labeled as fetus A, and the next closest as fetus B, etc. The gestational sacs can be further described as anterior or posterior depending upon which wall of the uterus they are closest to.

In the coronal plane, the gestational sacs can be further described as being located towards the right or left. Therefore, each fetus, contained within its gestational sac, has a very specific set of coordinates which then can be used to consistently locate that particular fetus.

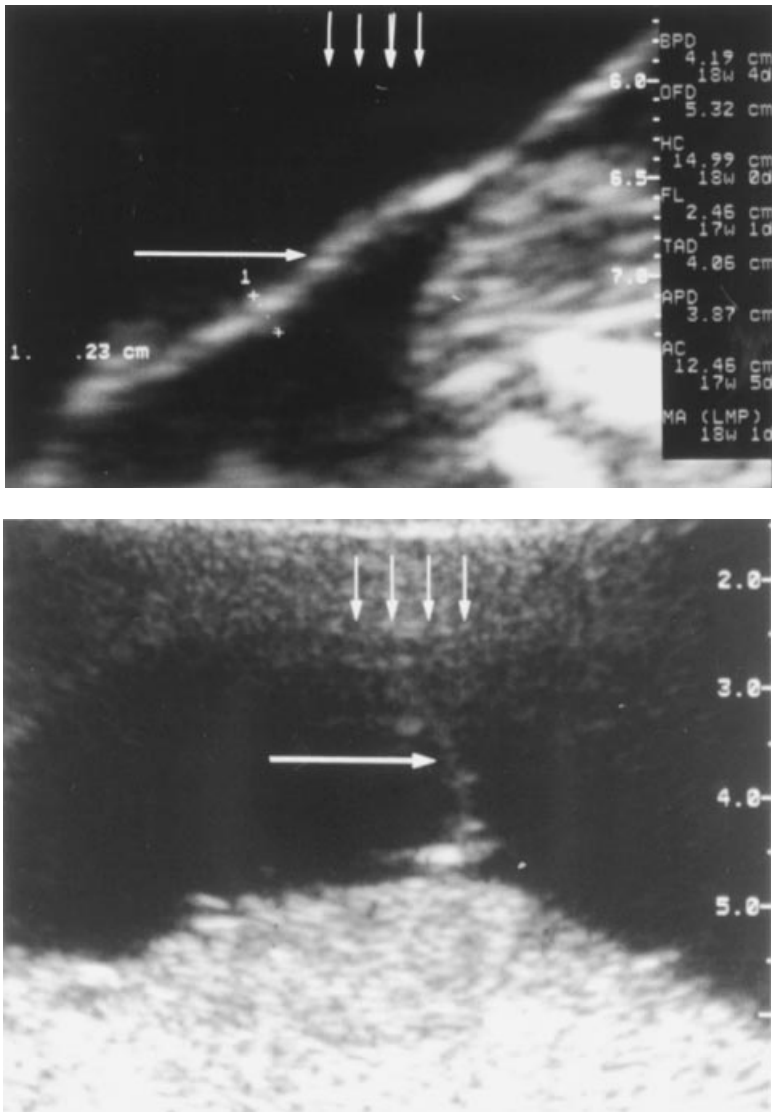

Figure 9 Determination of membrane thickness. These two pictures were obtained from the same dichorionic diamniotic twin pregnancy.
A the membranes (arrow) should be as close as possible to a 90° angle to the ultrasound beam (multiple arrows) to take advantage of the axial resolution of the probe to better image the thickness of the membrane.
B If the same membrane (arrow) is parallel to the ultrasound beam (multiple arrows) the lateral resolution of the transducer is unable to resolve the membrane thickness.

Summary and conclusions

The chorionicity of a twin pregnancy can be assessed by the 5th week of gestation. The number of embryos can be determined by the 6th week of gestation with the onset of cardiac activity. Determination of amnionicity has to wait until the 8th week of gestation when enough amniotic fluid is present in the amniotic sac to separate the amnion from the embryonic body.

Determination of chorionicity and amnioni-

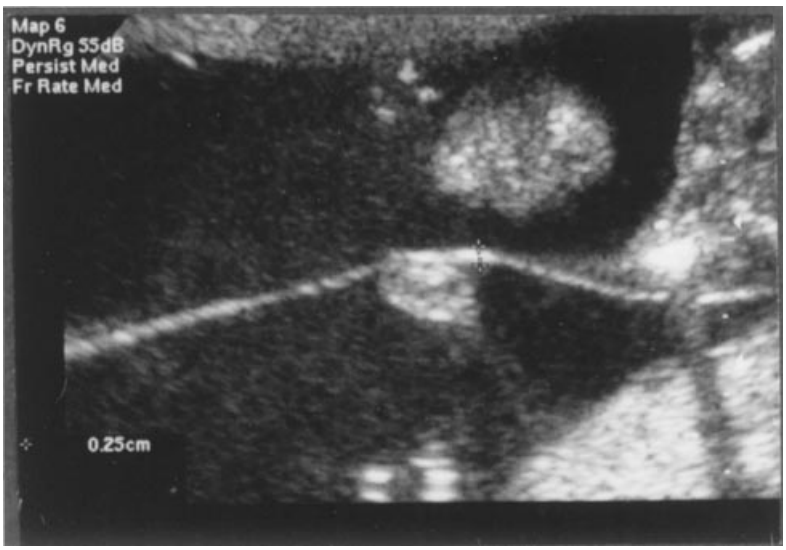

Figure 10 This is a ''thick'' (0.25 cm) membrane consisting of two opposing amnion/chorion and chorion/amnion membranes in a diamniotic dichorionic twin pregnancy at 23 weeks.

Figure 11 This is a ''thin'' (0.18 cm) membrane consisting of two opposing amnions in a diamniotic monochorionic twin pregnancy at 16 weeks.

city during the second and third trimester may be accomplished by
a counting the number of placental sites
b imaging the gender of the fetuses
c evaluating the intertwin membranes for the presence of the ''lambda'' or ''twin-peak'' sign or ''T-shape'' take-off, the thickness of the intertwin membrane and the number of layers present.

In the ideal world all patients should have a

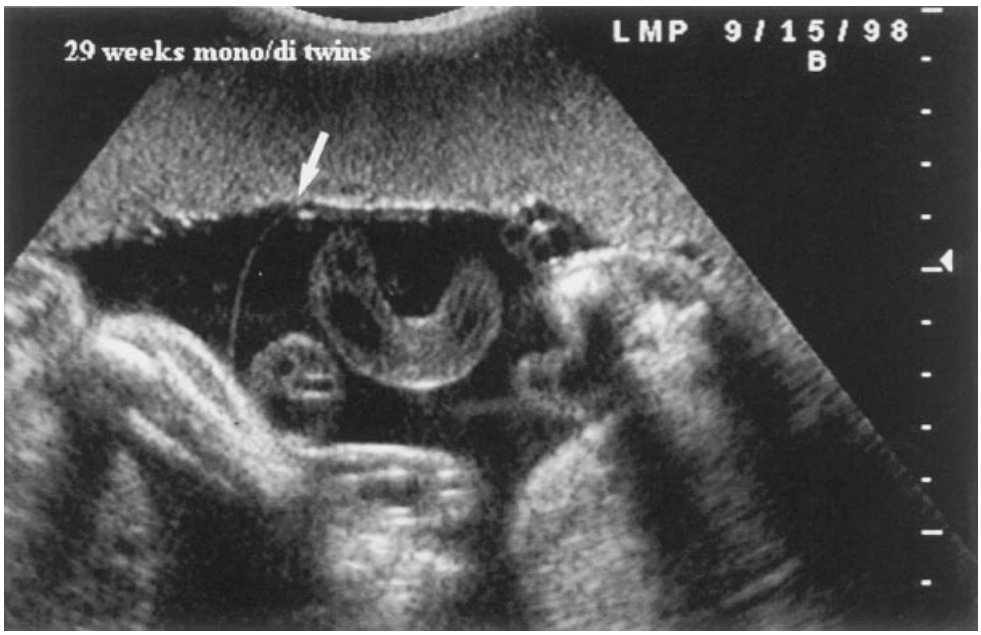

Figure 12 This image demonstrates the T-shaped junction of the thin amnions approaching the placenta (or uterine wall) in a 29 week monochorionic diamniotic twin pregnancy.

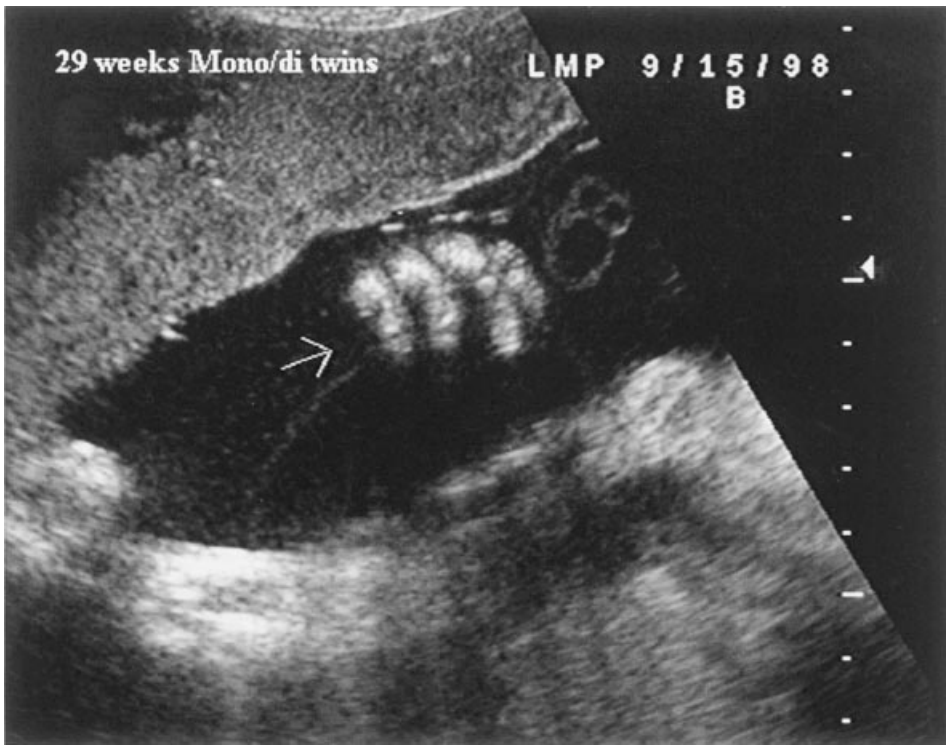

Figure 13 The ''hair-thin'' membrane (arrow) separates two amniotic sacs in this 29 weeks monochorionic twin pregnancy.

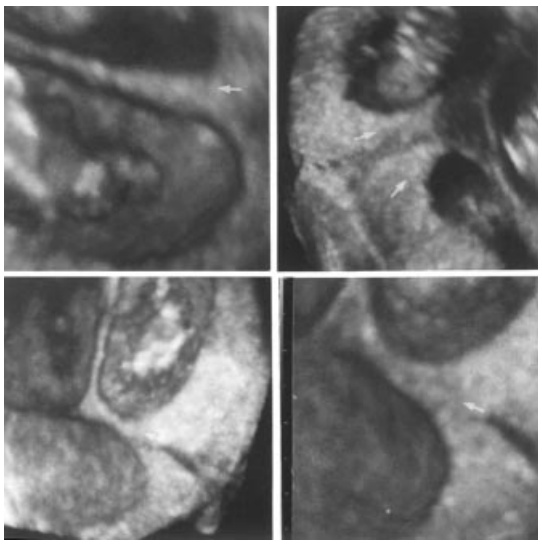

Figure 14 Four segments of a quint chorionic-quint amniotic quintuplet pregnancy rendered by a 3 dimensional ultrasound scan. The arrows point to some of the triangular ''twin peak'' signs separating neighboring chorions. In a quintuplet pregnancy there should be five of these ''twin peak''signs.

first trimester transvaginal scan since TVS can provide an accurate and quick diagnosis of the chorionicity and amnionicity of a twin pregnancy. During the second and third trimesters determining the chorionicity and amnionicity may be possible, but it will take time and effort and not all cases will be correctly classified.

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