

Twin pregnancy: Labor and delivery

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INTRODUCTION — Twin pregnancies are at increased risk of intrapartum complications, such as fetal heart rate abnormalities and complications related to malpresentation. This topic will review issues related to the delivery of twins, such as timing and route of delivery, fetal monitoring, maternal analgesia/anesthesia, and management of delivery. Antepartum assessment and neonatal management of these pregnancies, and monoamniotic twin pregnancy, are discussed separately. (See ["Twin pregnancy: Prenatal issues"](#) and ["Monoamniotic twin pregnancy"](#) and ["Neonatal complications, outcome, and management of multiple births"](#).)

TIMING — Spontaneous or medically indicated preterm birth complicates over 50 percent of twin pregnancies, thus scheduling the timing of delivery is not subject to the discretion of the obstetrician in most cases [1]. In the absence of a spontaneous or medically indicated preterm delivery, the optimum time to deliver ongoing twin pregnancies depends on chorionicity and amnionicity.

Dichorionic twin pregnancy — For normal uncomplicated dichorionic/diamniotic twin pregnancies, we suggest elective delivery at 38^{0/7} to 38^{6/7} weeks of gestation, in agreement with recommendations from the American College of Obstetricians and Gynecologists (ACOG) [2]. Twin pregnancies complicated by fetal growth restriction are delivered earlier than 38 weeks, with the timing dependent on the clinical scenario.

There are no high-quality data from randomized trials on which to base a recommendation for the optimum timing of delivery of dichorionic/diamniotic twins. The optimal length of gestation appears to be shorter in twin than in singleton pregnancies. Epidemiological evidence suggests that the lowest rate of perinatal mortality (PNM) occurs at 37 to 39 weeks in twin pregnancies versus 39 to 41 weeks in singleton pregnancies [3-7]. Within this 37 to 39 week range, neonatal morbidity can be minimized by intervention at 38 to 39 weeks versus 37 to 38 weeks [7].

Although the authors of a 2016 systematic review of timing of delivery in uncomplicated dichorionic twin pregnancies recommended delivery at 37^{0/7} to 37^{6/7} weeks, we do not believe their data warrant a firm conclusion. The authors found that in dichorionic twins, the prospective risk of stillbirth was equivalent to the rate of neonatal death between 37^{0/7} and 37^{6/7} weeks, and the risk of stillbirth significantly exceeded the risk of neonatal death at 38^{0/7} to 38^{6/7} weeks and later [8]. Rates of neonatal morbidity, including respiratory distress syndrome, septicemia, and neonatal intensive care unit admission were all lower at later gestational ages. These data, however, are limited by the absence of data about quality of ultrasound examination, antepartum fetal monitoring, mode of delivery, and level of neonatal care. Without such data, it is difficult to assess the impact of a policy

of delivering all dichorionic twins prior to 38 weeks of gestation. Therefore, we continue to recommend delivery of uncomplicated dichorionic twin pregnancies at 38^{0/7ths} to 38^{6/7ths} weeks.

Assessment of pulmonary maturity — There is widespread belief that fetuses of twin gestations experience more rapid pulmonary maturation than singleton fetuses [9]; however, this assertion has been challenged by conflicting data [10-12]. The potential for neonatal respiratory problems is particularly important when considering the optimal timing of delivery of twins since many of these pregnancies are delivered by cesarean birth prior to the onset of labor [13,14].

As with singletons, there appears to be a significant risk of respiratory problems in late preterm twins:

- One study evaluated the prevalence of neonatal respiratory disorders in the infants of 126 women with twins who underwent elective cesarean delivery before labor (at 36 to 40 weeks of gestation) [15]. The majority (65 percent) of cesarean deliveries were performed due to malpresentation in one or both fetuses; there were no maternal or fetal complications (eg, severe preeclampsia, fetal growth restriction) requiring medically indicated delivery. Neonatal respiratory disorders occurred frequently, and more often among infants born at 36 to 37 compared to 38 or more weeks of gestation (13 versus 2 percent).
- In another series of twins delivered by the vaginal or abdominal route, the prevalence of respiratory morbidity at 36 to 37 weeks was 23 percent, compared to 7 percent at 37 to 38 weeks [16].

Therefore, fetal pulmonary maturity should be evaluated if elective early delivery is planned before 38^{0/7ths} weeks of gestation. Some authors, including ourselves, feel that amniocentesis of only one twin is adequate if the gestation is ≥ 36 weeks [9,17], but others test both twins in all cases because pulmonary maturity can be asynchronous [18].

The American College of Obstetricians and Gynecologists suggested amniocentesis before elective delivery of twins less than 38^{0/7ths} weeks of gestation [19]. They state that amniocentesis of only one twin is generally sufficient at a gestational age ≥ 33 ^{0/7ths} weeks since discordancy is uncommon at this time [17,18], but they suggest amniocentesis of both twins when the procedure is performed earlier in pregnancy. When only one sac is sampled, it would be reasonable to sample the sac of the fetus less likely to be mature. As an example, a non-presenting, larger, male fetus would be less likely to have achieved lung maturity than a smaller, presenting female fetus. (See "[Assessment of fetal lung maturity](#)".)

Monochorionic twin pregnancy

Diamniotic — There are no randomized trials that have evaluated the optimum time for delivery of monochorionic/diamniotic twin gestations. While it is not clear that elective delivery prior to 37 weeks of gestation is warranted in every apparently uncomplicated monochorionic/diamniotic twin pregnancies [20,21], it is our practice, and that of other experts [7,22-27], to discuss the increased risk of intrauterine demise and offer early delivery of monochorionic/diamniotic twins. It is our practice to suggest delivery at approximately 36^{0/7ths} weeks of gestation. Delivery at about this time provides a reasonable trade-off between the morbidity of preterm birth, which falls with advancing gestational age, and the risk of unanticipated subsequent fetal demise. We do not perform amniocentesis to document lung maturity prior to delivery.

A 2016 systematic review of timing of delivery in uncomplicated monochorionic diamniotic twin pregnancies recommended delivery at 36^{0/7} to 36^{6/7} weeks because of a trend toward higher risks

of stillbirths than neonatal deaths beyond this gestational age; however, the analysis was limited by the absence of data about quality of ultrasound examination, antepartum fetal monitoring, mode of delivery, and level of neonatal care [8]. In a small prospective cohort study of closely monitored monochorionic twin pregnancies, the perinatal morbidity rate/neonate and the prospective risk of fetal death/pregnancy at 36^{0/7} to 36^{6/7} weeks were 9 and 1 percent, respectively [7].

The American College of Obstetricians and Gynecologists suggests delivery of monochorionic twins at 34^{0/7} to 37^{6/7} weeks of gestation [2] and the North American Fetal Therapy Network suggests delivery at 36^{0/7} to 37^{6/7} weeks of gestation [27]. However, some experts have argued for delivery as early as 32 weeks of gestation [22,28-31].

Monochorionic/diamniotic twin pregnancies with twin-twin transfusion syndrome are delivered earlier. (See ["Twin-twin transfusion syndrome: Management and outcome"](#).)

Monoamniotic — Additional issues must be addressed in timing the delivery of a monoamniotic twin pregnancy. Delivery earlier in the third trimester may be indicated because of the high rate of perinatal mortality described in these pregnancies despite intensive fetal surveillance, (30 to 70 percent, which is likely due to cord entanglement) [32,33]. Management of monoamniotic twin pregnancy is discussed in detail separately. (See ["Monoamniotic twin pregnancy"](#).)

DELIVERY ROUTE

Dichorionic twin pregnancy — Whether route of delivery affects morbidity and mortality is controversial. The presentation and, in some situations, the gestational age of twins can influence the selection of vaginal versus cesarean delivery. However, in most cases, women with twin pregnancies with the presenting twin in cephalic presentation should be counseled to attempt vaginal delivery [34].

Should routine cesarean delivery be offered? — Cesarean delivery is common in twin pregnancies: over 60 percent of twin births are by cesarean [35]. Some investigators have proposed that neonatal outcome could be improved by a policy of routine cesarean delivery for all twin pregnancies. The basis for this proposal is concern that the relative risk of anoxic death of the second twin is increased as a result of mechanical problems (eg, compound presentation, cord prolapse, abruptio placentae) after vaginal birth of the first twin [36]; this is most significant in gestations ≥ 36 weeks [37]. However, others have pointed out that even though the relative risk of neonatal mortality may be increased, the absolute risk remains low and, therefore, a large number of cesareans would have to be done to prevent one death of a second twin [38]. Cesarean delivery also poses short-term and long-term risks to the mother, although maternal outcomes are similar at three months postpartum for both planned cesarean and planned vaginal birth [39]. (See ["Cesarean delivery: Postoperative issues"](#), section on 'Complications' and ["Cesarean delivery: Postoperative issues"](#), section on 'Long-term risks'.)

We do not favor a policy of planned cesarean delivery of all twin pregnancies. With appropriate intrapartum monitoring and management (see below), the second twin is not at high risk of neonatal mortality or morbidity with trial of labor, even when remote from term [40-45]. (See ["Should VLBW fetuses be delivered by cesarean?"](#) below.)

We choose a delivery route based upon presentation and amnionicity (see below), as well as the presence/absence of standard obstetrical indications for cesarean delivery (eg, placenta previa). We favor a trial of labor for concordant diamniotic twins with the first twin in vertex presentation.

The following evidence supports this approach:

- In a 2011 systematic review, for twins with vertex/vertex presentation, vaginal delivery was safer than cesarean for the first twin, and was as safe as cesarean for the second twin [41]. In pregnancies with vertex/nonvertex presentation, a trial of labor was a safe option in the absence of risk factors that increased the risk of a cesarean delivery of the second twin after vaginal delivery of the first twin, although predicting combined delivery was essentially impossible antepartum. The morbidity rates for planned vaginal and planned cesarean delivery were 15.1 and 7.4 percent, respectively (OR 1.11, 95% CI 0.65-1.88); mortality rates were 0.7 and 0.1 percent, respectively (OR 3.04; 95% CI 0.37-25.2). Given the wide confidence intervals, this analysis is inadequate for conclusively determining which route of delivery should be offered.
- Subsequently, the Twin Birth Study randomly assigned 1398 women between 32^{0/7}th and 38^{6/7}th weeks of gestation with twin pregnancy with the first twin in cephalic presentation to planned cesarean or planned vaginal delivery (cesarean only if indicated) [46]. Elective delivery was planned between 37^{5/7}th and 38^{6/7}th weeks of gestation. The rate of cesarean delivery was 90.7 percent in the planned cesarean delivery group and 43.8 percent in the planned vaginal delivery group, illustrating the high frequency of cesarean even when vaginal delivery is planned.

The study found no significant difference in the composite outcome (fetal or neonatal death or serious neonatal morbidity) between the planned cesarean and the planned vaginal delivery groups (2.2 versus 1.9 percent, respectively; odds ratio 1.16; 95% CI 0.77-1.74). At two years of age, both groups had similar rates of death or neurodevelopmental delay [47]. This trial represents the best available evidence that planned cesarean delivery does not significantly improve neonatal or early childhood outcome as compared with planned vaginal delivery.

Should VLBW fetuses be delivered by cesarean? — Some investigators have suggested that cesarean delivery may decrease the risk of intracranial hemorrhage in very low birth weight (VLBW) preterm twin fetuses, regardless of presentation [48,49]. We and others have not found adequate evidence to recommend a policy of elective cesarean delivery of VLBW babies [44,50]. (See "[Delivery of the preterm low birth weight singleton fetus](#)".)

Effect of fetal presentation — Fetal presentation impacts the choice of delivery route. After 34 weeks, cephalic presentation of the presenting twin tends to remain stable, but nonpresenting twins often undergo spontaneous version [51].

Vertex-vertex twins — This presentation accounts for approximately 42 percent of twins [52]. The general consensus is that a trial of labor with the goal of a vaginal delivery of vertex-vertex twins is appropriate at any gestational age [53,54].

Nonvertex presenting twin — A nonvertex first twin comprises approximately 20 percent of twin presentations. Breech presenting twins are paired with vertex twins (7 percent), breech twins (6 percent), and transverse twins (5 percent); breech-oblique, transverse-vertex, and transverse–transverse presentations each comprise fewer than 1 percent of twins. A unique, potential complication of breech-vertex twin delivery, as opposed to breech singleton delivery, is the possibility of interlocking chins (ie, locked twins), but this is rare.

A retrospective case-control analysis of data from 13 centers that allowed vaginal birth for breech first twins reported no difference in Apgar scores and neonatal mortality related to route of delivery

among infants weighing more than 1500 grams [55]. However, nonvertex presenting fetuses weighing less than 1500 grams that were delivered vaginally had significantly higher rates of low Apgar scores and neonatal mortality compared to those delivered by cesarean (37 versus 20 percent and 45 versus 8 percent, respectively).

In contrast to this report, we and others suggest cesarean delivery when the first twin is not in the vertex presentation because the safety of vaginal delivery in these cases has not been confirmed by randomized trials and the general consensus in the obstetric community is against vaginal delivery of the breech presenting fetus, even in singleton pregnancies [54,56]. (See "[Delivery of the fetus in breech presentation](#)".) An exception is the breech presenting second twin (see below).

Vertex-nonvertex twins — Vertex-nonvertex twins comprise 38 percent of twins; the nonvertex twin may be breech (26 percent), transverse (11 percent), or oblique (1 percent). Options for delivery include cesarean delivery of both twins, vaginal delivery with breech extraction of the second twin, or vaginal delivery with cephalic version of the second twin. We suggest a trial of labor, offering the patient an attempt at breech extraction of the second twin and proceeding to cesarean delivery if unsuccessful.

The only randomized trial of planned vaginal versus abdominal birth was performed in 60 women with vertex-nonvertex twins at 35 to 42 weeks of gestation and otherwise uncomplicated pregnancies [57]. Maternal morbidity was higher with planned cesarean delivery, with no difference in neonatal outcome. However, this trial was too small to detect clinically important differences in outcome between the two groups.

Most observational studies have reported successful vaginal delivery of both twins using internal or external version or breech extraction of the second twin [58-75]. The second twins of vertex-nonvertex and vertex-vertex pairs generally had similar neonatal outcomes irrespective of mode of delivery or procedures performed during delivery. Successful vaginal delivery appeared to be less likely when external version was attempted than when breech extraction was performed immediately after delivery of the presenting twin [60,61,68,72]; external version was completed in 40 to 50 percent of cases (the remainder were delivered by cesarean delivery), while breech extraction followed by vaginal birth succeeded in 96 to 100 percent of patients [60,61]. Of note, the mean gestational age was 34 to 37 weeks and the mean birthweight was 2100 to 2500 grams in these studies.

In the absence of high quality data favoring one approach over another, we suggest offering the patient an attempt at breech extraction of the second twin and proceeding to cesarean delivery if unsuccessful. If the patient does not wish to attempt breech extraction of the second twin, we give her the option of attempting external cephalic version of the second twin or undergoing cesarean delivery of both twins. When discussing the options of breech extraction or external cephalic version with patients, the obstetrician should include information about his or her experience and comfort with these procedures. Many obstetricians, based on training and experience, may feel more comfortable performing cesarean delivery. Under these circumstances, cesarean delivery of both twins is recommended.

In diamniotic twin pregnancies at >32 weeks of gestation with a presenting fetus that is vertex, ACOG considers vaginal delivery a reasonable option regardless of the presentation of the second fetus, provided that an obstetrician with experience in internal podalic version and vaginal breech delivery is available [2].

Contraindications to breech extraction — We generally do not offer the option of breech extraction when:

- The estimated fetal weight of the second twin is ≥ 20 percent more than that of the presenting twin.
- The delivery of the presenting twin suggests that the pelvis may not be adequate for a breech delivery, such as when there is a prolonged second stage or marked molding of the head.
- The gestational age is less than 28 weeks or the estimated fetal weight of the second twin is less than 1500 grams. Under these circumstances, we recommend performing cesarean delivery of both twins, rather than attempting cephalic version of the nonvertex second twin.

Trial of labor after previous cesarean delivery — There are insufficient data to establish the safety of attempting vaginal birth of twins after a previous low transverse cesarean delivery. Available data are reassuring that outcomes are similar to those in women with singletons undergoing a trial of labor. One of the largest series reported uterine rupture in 16 of 1850 women with twins (0.9 percent) undergoing a trial of labor after previous cesarean delivery; this rate was comparable to that in singleton pregnancies undergoing trial of labor (0.8 percent) [76]. Successful vaginal delivery was achieved in 45 percent of the twin gestations and 62 percent of the singletons. Smaller series have reported similar findings [77-83]. (See "[Choosing the route of delivery after cesarean birth](#)".)

It is our practice to offer a trial of labor to women with twin pregnancies and one prior cesarean delivery, provided they go into spontaneous labor. Because the most common initial sign of uterine rupture is fetal heart rate changes, we continually monitor both fetuses. If this is not technically possible, then cesarean delivery is performed.

Monochorionic twin pregnancy

Diamniotic — Monochorionic placentation is not a contraindication to a trial of labor and vaginal birth [24,84-86]. Decision-making about route of delivery is the same as that described above for dichorionic twins: Cesarean delivery is performed when the presenting twin is not in vertex presentation and for standard obstetric indications.

Acute peripartum twin-twin transfusion syndrome has been reported in 1.8 to 5.5 percent of monochorionic twin deliveries [87,88]. Although labor and vaginal delivery may be risk factors, we believe this observation should not influence choice of delivery route until more data are available.

Monoamniotic — Monoamniotic twins are usually delivered by cesarean. The rationale for this approach and other aspects of monoamniotic twin pregnancy are reviewed separately. (See "[Monoamniotic twin pregnancy](#)".)

MANAGEMENT — Management of labor and delivery is the same for dichorionic and monochorionic diamniotic twins.

Labor — It is not clear whether multiple gestation has an effect on the progress of labor; studies have reported conflicting results (ie, both faster and slower progression than singleton labor) [89-91]. [Oxytocin](#) for augmentation or induction of labor appears to be effective; there are inadequate data to allow evaluation of safety [92-95].

Electronic fetal heart rate monitoring — Multiple gestations are at increased risk of intrapartum complications; therefore, we monitor both twins continuously during labor. Intermittent auscultation is not practical and may not reliably distinguish one twin from the other.

The fetal heart rate of each twin can be monitored using a single machine ([waveform 1](#)). These rates are often synchronous, thus requiring frequent careful review of the tracing to make sure each fetus' heart rate is being monitored. Ultrasound can assist in ensuring that both fetal heart rates are traced. If separate monitors are used, internal clocks must be synchronized, paper speeds must be identical, and contractions must be displayed on both tracings.

Electronic fetal heart rate monitoring is particularly useful for assessing the well-being of the second twin during the high risk period after delivery of the first twin (see ['Interval between delivery of the two twins'](#) below).

Analgesia and anesthesia — Epidural analgesia/anesthesia is generally recommended because it provides good pain relief, does not cause neonatal depression, and is a suitable anesthetic if uterine manipulation (eg, version) or operative delivery (eg, forceps, cesarean) becomes necessary.

First twin — For a variety of reasons, morbidity and mortality tend to be lower in first born than second born twins, regardless of route of delivery. A systematic review of observational studies reported the overall neonatal morbidity of first and second twins was 3.0 and 4.6 percent, respectively (OR 0.53, 95% CI 0.39-0.70), and overall neonatal mortality was 0.3 and 0.6 percent, respectively (OR 0.55, 95% CI 0.38-0.81) [\[41\]](#).

When vaginal birth is attempted, the capacity for immediate cesarean delivery is important in the event that complications necessitating urgent delivery arise (eg, prolapsed umbilical cord, nonreassuring fetal heart rate, or failed breech extraction/cephalic version). Emergency cesarean delivery has been reported in 10 to 30 percent of pregnancies in which vaginal births of twins had been planned, and may be necessary for delivery of the second twin after vaginal birth of the first twin (see below). It is our practice to deliver all twin pregnancies in an operating room where cesarean delivery can be performed. In our hospital, patients are moved to the operating room in the second stage of labor. However, if a patient can be transported to an operating room rapidly, delivery of vertex-vertex twins in a labor room is not unreasonable.

Delivery of the first twin of a diamniotic pair is similar to delivery of a singleton except the umbilical cords should be marked with progressive numbers of clamps (eg, one for the first twin birth, two for the second twin birth). If surgical clamps are used initially, they should be replaced with a like number of plastic umbilical cord clamps prior to sending the placenta for formal examination. Recall that 'twin A' on ultrasound may not be first born at delivery (especially if the delivery is by cesarean), and this infant is typically called 'baby A' by delivery room and nursery personnel [\[96-99\]](#).

In monochorionic twins, signs of acute peripartum twin-twin transfusion syndrome include bradycardia or a sinusoidal fetal heart rate pattern, and may necessitate urgent delivery.

In all monochorionic twins, it is important to promptly clamp the umbilical cord after delivery of the first twin as the in utero co-twin could develop hypovolemic shock from exsanguinating into the placenta and out the unclamped cord of the first twin [\[27\]](#). Monochorionic twins are not good candidates for delayed cord clamping.

Second twin — Second born twins have been reported to have a higher incidence of adverse outcome (morbidity and mortality) due to lower birth weight; higher frequency of malpresentation, cord prolapse, and abruptio placentae; and more deliveries involving internal podalic version [36,100-103].

After delivery of the first twin, the heart rate and position of the second twin should be evaluated using ultrasound and electronic fetal monitoring. If the second twin is in a nonvertex presentation, ultrasound can be used to assist external cephalic version, breech extraction, or internal podalic version of the second twin, if necessary.

As discussed above, our preference is breech extraction if the second twin is not in a vertex presentation and there are no contraindications to breech extraction (see '[Vertex-nonvertex twins](#)' above). Intrauterine manipulation is aided by ultrasonographic visualization of the orientation between the physician's hands and fetal parts ([figure 1A-B](#)) [104] and can be facilitated by administering intravenous [nitroglycerin](#) or inhalational anesthesia, which relax uterine muscle [105]. Effective maternal analgesia is also crucial. When the fetus is in the desired presentation for delivery, [oxytocin](#) is given if labor has not resumed. Amniotomy is avoided until after the presenting part is engaged [42,106].

Others have taken a somewhat different approach. One historic cohort study of 130 planned vaginal twin deliveries reported no patient who had a vaginal delivery of the first twin required cesarean delivery of the second twin [74]. In this group's practice, all patients who were undelivered at 38 weeks of gestation underwent induction if they met strict criteria (estimated weight of the second twin ≥ 1500 g and no more than 20 percent greater than the weight of the presenting twin, absence of usual contraindications to vaginal delivery). After vaginal birth of the first twin, the second twin was delivered as a vertex presentation if the vertex was engaged immediately after delivery of the first twin, by breech extraction if in breech presentation after delivery of the first twin, and by breech extraction after internal podalic version if in vertex presentation but unengaged after delivery of the first twin. The authors attributed their success to active management of the second stage of labor by obstetricians experienced in breech delivery and internal podalic version, and to their criteria for selecting candidates for vaginal delivery.

Interval between delivery of the two twins — Historically, a prolonged interval between delivery of the first and second twins was thought to be associated with poorer outcomes. Intervals of less than 25 to 30 minutes have been advocated, and maneuvers such as internal podalic version or breech extraction of the second twin were often recommended to hasten delivery [107-109].

Subsequent studies undertaken after the universal routine use of electronic fetal monitoring during labor suggest that there does not have to be a finite interval between delivery of the first and second twin, as long as the fetal heart rate tracing is reassuring [110-112]. Electronic fetal monitoring and the availability of real-time ultrasound have enabled obstetricians to identify those second twins who would benefit from expedited delivery, while allowing most cases to be managed expectantly [111]. Thus, spontaneous delivery of both twins is more likely to be achieved.

[Oxytocin](#) augmentation of labor after delivery of the first twin is reasonable and sometimes necessary due to a temporary reduction in contraction frequency after the first birth [53].

Delayed-interval delivery in previable gestations is discussed separately. (See "[Delayed-interval delivery in multifetal pregnancy](#)".)

Unplanned cesarean delivery — An unplanned cesarean for delivery of the second twin is not uncommon, occurring in about 4 to 10 percent of planned vaginal births [113-115]. As an example, a population based cohort study of twin deliveries in the United States reported 9.5 percent of second twins were delivered by cesarean after vaginal birth of the first twin [113]. This rate fell to 6.3 percent if the second twin was vertex [116], but increased to 24.8 percent if only vertex-nonvertex live births were considered [117].

A systematic review and meta-analysis including over 39,000 twins sets found that for the second twin, morbidity following combined delivery (19.8 percent) was higher than after vaginal delivery (9.5 percent; OR 0.55, 95% CI 0.41-0.74) or cesarean delivery (9.8 percent; OR 0.47, 95% CI 0.43-0.53) [41]. Factors related to unplanned cesarean for delivery of the second twin likely account for the increased morbidity. In combined deliveries, there may be an increased risk of maternal or neonatal infection due to exposure to labor and ruptured membranes.

EXAMINATION OF THE PLACENTA — Examination of the placenta can help to determine zygosity and the pathogenesis of neonatal findings (eg, discordant growth, structural anomalies, or infection). (See "[Gross examination of the placenta](#)" and "[The placental pathology report](#)".)

Monozygotic or dizygotic? — Approximately two-thirds of naturally-conceived twins are dizygotic. It is of importance to parents and twins to know whether same sex twins are monozygotic (in lay terms, "identical"). Based upon a genotype and placental study of 668 consecutive twin pairs in Birmingham, England, parents of naturally-conceived twins can be informed in the delivery room that 37 percent of all same sex twins are "identical" [118]. Same sex twins are virtually always "identical" if monochorionic, while 18 percent of same sex twins with dichorionic membranes are "identical" ([figure 2](#)).

These proportions do not apply to pregnancies conceived by in vitro fertilization. Interestingly, in these pregnancies the rate of monozygotic twinning appears to be higher than in spontaneously conceived pregnancies (2.3 versus 0.4 percent of pregnancies) [119]. In addition, there are several reported cases of dizygotic twins with monochorionic placentation [120-125]. Blood studies in these twins demonstrate chimerism. The pathogenesis of monochorionic dizygotic twinning has not been explained, but may be related to assisted reproductive technology, although the occurrence has also been reported in naturally-conceived pregnancies [124]. Many cases of monochorionic dizygous twins are probably unrecognized because the newborns have the same sex. When counseling parents of monochorionic twins of discordant sex, both the possibility of dizygosity and a disorder of sexual differentiation in one of the twins should be addressed.

Zygosity can be determined conclusively using blood type or DNA markers [126].

Vascular anastomoses — In monochorionic twins, vascular anastomoses are evaluated by placental injection. This study takes about an hour to perform and involves catheterizing the arteries and vein of each umbilical cord and injecting the vessels with a substance, such as dyed undiluted [barium](#) sulfate, until the peripheral branches are filled and backpressure prevents further injection [127]. The amniotic membranes are then removed from the chorionic surface and the placenta is rinsed with cold tap water to improve visualization of the number and type of anastomoses. Several arteriovenous and venoarterial anastomoses in combination with an arterioarterial and/or venovenous anastomosis are seen in 90 percent of placentas. The remaining 10 percent are equally divided between those with only arteriovenous anastomoses and those with no anastomoses [128,129]. (See "[Twin-twin transfusion syndrome and twin anemia polycythemia sequence: Pathogenesis and diagnosis](#)", section on 'Pathophysiology'.)

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- Basics topics (see ["Patient education: Having twins \(The Basics\)"](#))

SUMMARY AND RECOMMENDATIONS

- We suggest elective delivery of dichorionic/diamniotic twins at 38^{0/7ths} to 38^{6/7ths} weeks of gestation ([Grade 2C](#)). We suggest delivery of monochorionic/diamniotic twins at 36^{0/7} weeks of gestation ([Grade 2C](#)), in accordance with the American College of Obstetricians and Gynecologists' recommendation for delivery at 34^{0/7} to 37^{6/7} weeks of gestation. (See ["Timing"](#) above.)
- For vertex-vertex twins, we suggest vaginal delivery in the absence of standard indications for cesarean delivery ([Grade 2B](#)). (See ["Vertex-vertex twins"](#) above.)
- When the first twin is not in vertex presentation, we suggest cesarean delivery ([Grade 2C](#)). (See ["Nonvertex presenting twin"](#) above.)
- For vertex-nonvertex twins, we suggest breech extraction of the second twin only if the obstetrician has the requisite experience and if the patient provides informed consent ([Grade 2C](#)). (See ["Vertex-nonvertex twins"](#) above.)
- Available data are reassuring that outcomes in women with twins attempting vaginal birth after a previous cesarean delivery are similar to those with singletons undergoing a trial of labor. However, these data are insufficient to definitively establish that uterine rupture rates are comparable. (See ["Trial of labor after previous cesarean delivery"](#) above.)
- [Oxytocin](#) for augmentation or induction of labor appears to be effective in twin gestations; there are inadequate data to establish the safety of this intervention. (See ["Labor"](#) above.)
- We perform continuous electronic fetal monitoring of both fetuses during labor (See ["Electronic fetal heart rate monitoring"](#) above.)
- We suggest epidural analgesia/anesthesia during labor ([Grade 2C](#)). (See ["Analgesia and anesthesia"](#) above.)
- After delivery of the first twin, the heart rate and position of the second twin should be evaluated using ultrasound and electronic fetal monitoring. As long as the fetal heart rate tracing is reassuring, there is no duration of elapsed time from delivery of the first twin that necessitates intervention to deliver the second twin. Six to 25 percent of second twins will be delivered by cesarean after vaginal delivery of the first twin. (See ["Second twin"](#) above.)

- Approximately 18 percent of naturally-conceived same sex twins with dichorionic membranes are "identical." (See ['Monozygotic or dizygotic?'](#) above.)

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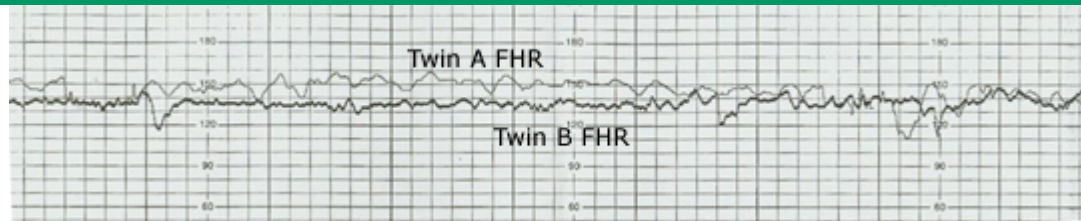
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GRAPHICS

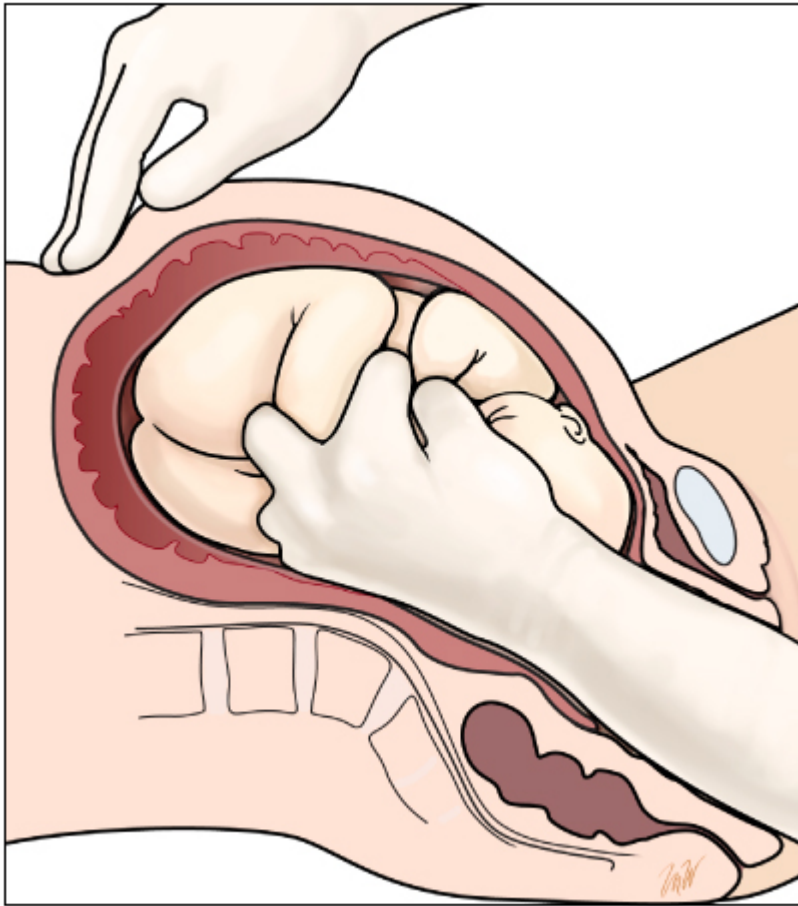
Twins



The fetal monitors are picking up two (dark tracing, light tracing) easily discernable fetal heart rate patterns.

Graphic 68893 Version 2.0

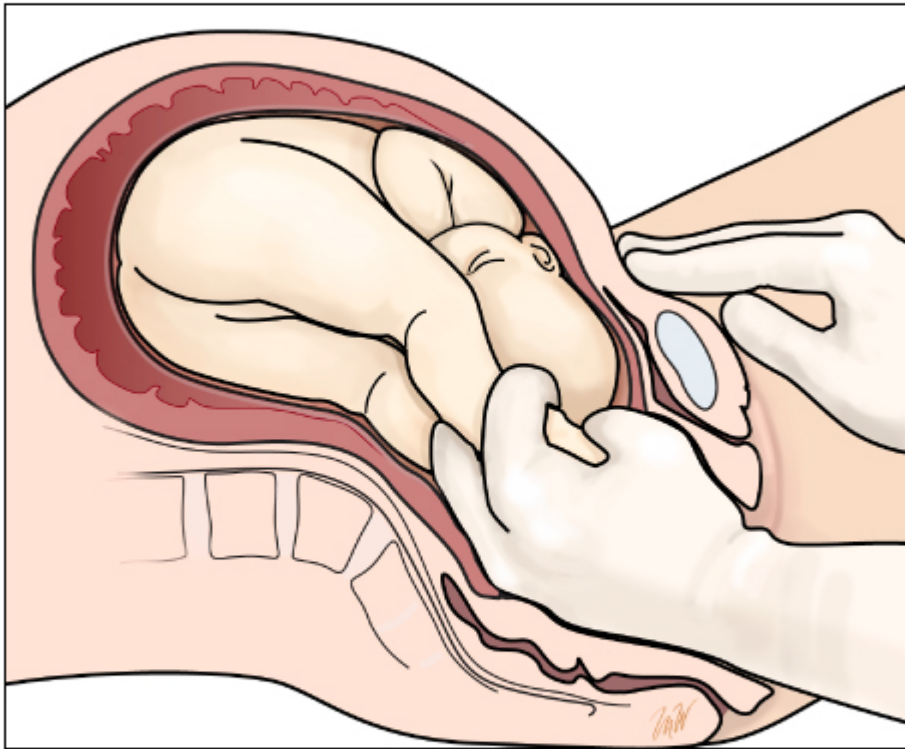
Internal podalic version



Modified from: Pritchard JA, MacDonald PC. Williams Obstetrics, 16th Edition, Appleton-Century-Crofts, New York 1980.

Graphic 58961 Version 2.0

Internal podalic version

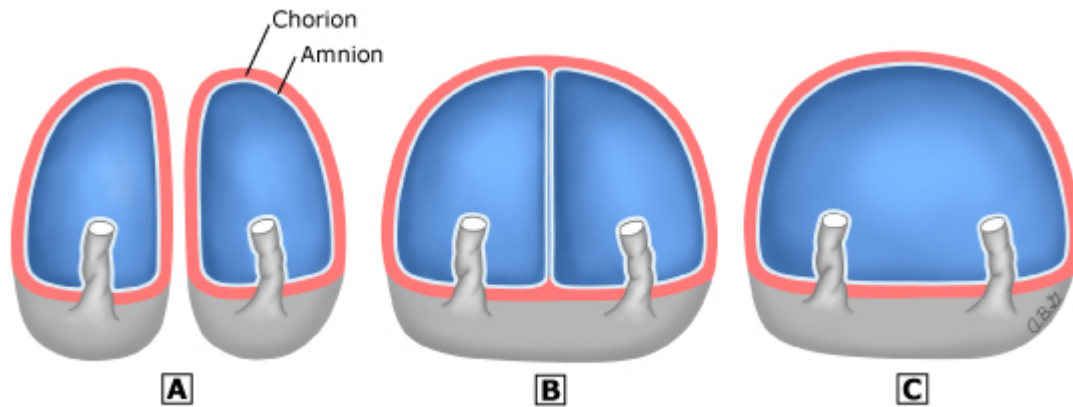


Upward pressure on head is applied as downward traction is exerted on feet.

Modified from: Pritchard JA, MacDonald PC. Williams Obstetrics, 16th Edition, Appleton-Century-Crofts, New York 1980.

Graphic 71779 Version 2.0

Placenta and membranes in twin pregnancies



(A) Two placentas, two amnions, two chorions (from either dizygotic twins or monozygotic twins with cleavage of zygote during first three days after fertilization).

(B) One placenta, one chorion, two amnions (monozygotic twins with cleavage of zygote from the fourth to the eighth day after fertilization).

(C) One placenta, one chorion, one amnion (monozygotic twins with cleavage of zygote from the 8th to the 12th day after fertilization).

Graphic 53594 Version 6.0

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Stephen T Chasen, MD Nothing to disclose **Frank A Chervenak, MD** Nothing to disclose **Charles J Lockwood, MD, MHCM** Consultant/Advisory Boards: Celula [Aneuploidy screening (No current products or drugs in the US)]. **Vanessa A Barss, MD, FACOG** Nothing to disclose

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