

Perinatal Management of Twin Pregnancies

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Abstract

Introduction: Multiple pregnancy is associated with higher rates of almost all complications that could occur with pregnancy. The most serious risk for the fetus is preterm delivery which increase the perinatal mortality and morbidity. The incidence of twin pregnancy is about 1 per 80 pregnancy and has been increasing in the developed countries due to older maternal age and the increased use of fertility measures.

Aim of the Work: In this review, we will discuss the perinatal management of twin pregnancy as it is the most common form of multiple pregnancies.

Methodology: We conducted comprehensive search of medical literature databases using PubMed and google scholar search engine. All articles were screened and included when relevant.

Conclusion: Chorionicity and amnionicity influence the decision of best time to deliver uncomplicated twin pregnancies. The ACOG and the SMFM recommend a scheduled delivery for uncomplicated dichorionic twin pregnancies at 38+0 to 38+6 weeks of gestation. Uncomplicated monochorionic/diamniotic twins pregnancy better to be planned for earlier delivery than dichorionic at 36+0 and 36+6 weeks of gestation. The choice of delivery route in twin pregnancies greatly depends on amnionicity and fetal presentation at labor onset. All twin pregnancies with monoamniotic twins and diamniotic twins with a presenting twin being noncephalic are preferably managed by cesarean section.

Keywords: Multiple Pregnancies; Twins; Twin Pregnancies; Labor; Delivery; Peripartum; Perinatal

Introduction

It is no exaggeration to say that multiple pregnancy is associated with higher rates of almost all complications that could occur with pregnancy; the only exception are post-term pregnancy and macrosomia. Women carrying more than one fetus are at greater risk of hemodynamic changes, physiological anemia, gestational hypertension, preeclampsia, HELLP syndrome and acute fatty liver of pregnancy

[1]. The most serious risk for the fetus is preterm delivery which increase the perinatal mortality and morbidity. Twin-twin transfusion syndrome in monochorionic twins, higher rates of fetal growth restriction, and congenital anomalies contribute to adverse outcomes.

The majority of multiple pregnancies occur in the form of twin pregnancy [2]. In the United State, the incidence of twin pregnancy is about 1 per 80 pregnancy while Triplet occurs less frequently in approximately 1 per 8000 [3]. The incidence of multiple pregnancy has been increasing in the developed countries due to older maternal age and the increased use of fertility measures [4].

Twins can be dizygotic (DZ) or monozygotic (MZ). DZ twins are resulting from the fertilization of two separate ova while MZ are resulting from a single fertilized ovum. Higher order (three or more) pregnancy can result from either or both processes. Chorionicity in multiple pregnancy is determined by the number of chorionic (outer) membranes around the fetuses. The presence of one membrane is described as monochorionic while the presence of two membrane is described as dichorionic. Monochorionic twin pregnancies and dichorionic triplet pregnancies are at higher risks of specific complication such as discordant growth and twin-twin transfusion. Amnionicity is the number of inner membranes (amnions) that surround fetuses in a multiple pregnancy. This could be monoamniotic, diamniotic, or triamniotic. Monoamniotic pregnancies are especially prone to higher rate of complication.

In this review, we will discuss the perinatal management of twin pregnancy as it is the most common form of multiple pregnancies.

Methods

We conducted comprehensive search of medical literature databases using PubMed and google scholar search engine. On PubMed, we used Medical Subject Heading (MeSH) terms for proper identification of relevant studies. All articles were screened and included when relevant. We have excluded studies concerned about prenatal assessment and management, ultrasound diagnosis, and long term outcomes. The main concern of this paper is perinatal management of twin pregnancies which include the three stages of labor. The term used in search process include multiple pregnancies, twins, twin pregnancies, labor, delivery, peripartum, intrapartum and perinatal management.

Management: scheduling delivery

Chorionicity and amnionicity influence the decision of best time to deliver uncomplicated twin pregnancies. However, more than 50 percent of twin pregnancies are complicated by spontaneous or medically indicated preterm birth, hence attempt for scheduling the delivery is not practical in most cases [5]. The American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal Medicine (SMFM) recommend a scheduled delivery for uncomplicated dichorionic twin pregnancies at 38+0 to 38+6 weeks of gestation [6]. Watchful waiting at this gestational age could be associated with the risks of stillbirth and the risks of neonatal mortality and morbidity. One meta-analysis on cohort studies evaluating the prospective risk of stillbirth and neonatal complications in uncomplicated dichorionic pregnancy recommended earlier delivery at 37+0 to 37+6 weeks [7]. According to this analysis, they found that the prospective risks for stillbirth and neonatal death were lower for pregnancies between 37+0 and 37+6 weeks compared with the prospective risk for stillbirth and neonatal death at 38+0 to 38+6 weeks. However, the evidence is not strong enough to warrant change in recommendation and there is no high quality data from randomized trials, although planned delivery at 37+0 to 37+6 weeks could be considered a reasonable alternative based on this limited data. Limitation of this meta-analysis include lack of data about ultrasound examination quality, antepartum fetal monitoring, method of delivery, and level of neonatal care. The risk of respiratory distress syndrome, septicemia, assisted ventilation, and neonatal intensive care unit admission was lower at planned delivery at 38+0 to 38+6 weeks.

Uncomplicated monochorionic/diamniotic twins pregnancy better to be planned for earlier delivery than dichorionic. The ACOG and the SMFM guidelines recommend scheduling delivery at 34+0 to 37+6 weeks of gestation while the North American Fetal Therapy Network suggests delivery at 36+0 to 37+6 weeks [6,8]. However, some experts tend to narrower scheduling period between 36+0 and 36+6

weeks of gestation. It is worth mentioning that some authorities have even argued for earlier delivery as 32 weeks of gestation [9]. These suggestions are based on data from observational studies as no randomized trial have evaluate the optimal time for delivery of monochorionic/diamniotic twin gestations. According to the previously mentioned meta-analysis, uncomplicated monochorionic/diamniotic planned for delivery at 36+0 to 36+6 weeks were at lower prospective risk for stillbirth than neonatal death beyond this gestational age. Precise risk estimation is precluded by the small number of deaths at each gestational age. In addition, the analysis has many limitations that affect its quality of evidence as discussed above.

Women with Monochorionic/monoamniotic twin pregnancies should be counseled for delivery between 32 and 34 weeks of gestation because of the high prospective risk for stillbirth compared with neonatal death even with intensive fetal surveillance. These pregnancies should be managed in specialized maternal-fetal facilities when possible.

Management: Choosing the route of delivery

The choice of delivery route in twin pregnancies greatly depends on amnionicity and fetal presentation at labor onset. Approximately, 80 percent of presenting twin (first twin) are cephalic and 20 percent are noncephalic at the onset of labor. Of these 80 percent, more than half are cephalic/cephalic twins [10]. With adequate experience in internal and external version and/or vaginal breech delivery, vaginal route is preferred for diamniotic twins with cephalic presenting twin at the onset of labor [6]. Vaginal delivery was successfully achieved in 70 percent of pregnancies with cephalic second twins and 85 percent of noncephalic second twins at admission, according to one series of twin pregnancies > 32 weeks gestation with the first twin cephalic [11]. Of note, 11 percent of second twins changed from cephalic on admission to noncephalic at delivery, and 30 percent of noncephalic second twins on admission were cephalic at delivery.

All twin pregnancies with monoamniotic twins and diamniotic twins with a presenting twin being noncephalic are preferably managed by cesarean section. Twin pregnancies with the presence of standard obstetric indications of cesarean delivery such as placenta previa are managed accordingly.

In the presence of experienced obstetrician, or obstetric provider, in internal and external version or breech extraction, a trial of labor for diamniotic twins with cephalic-presenting twin is optimum [6]. With planned trial of vaginal delivery, the second twin is not at higher risk neonatal morbidity nor mortality compared with planned cesarean section if appropriate intrapartum monitoring and management are ensured, even when remote from term and in a noncephalic presentation [12]. The best evidence regarding planned vaginal delivery for diamniotic twins with presenting cephalic twin comes from the Twin Birth trial [12]. According to the study, planned cesarean delivery does not significantly improve neonatal or early childhood outcome as compared with planned vaginal delivery. The trial compared fetal or neonatal death or serious neonatal morbidity in 1398 women with diamniotic twin and the first twin in cephalic presentation, randomly assigned to planned cesarean or vaginal. The composite outcomes was similar for both groups. Similar finding were evidenced when the analysis was restricted to monochorionic-diamniotic twin according to recent analysis in 2020 [13]. At two years follow up, both groups continued to have similar rates of death or neurodevelopmental delay [14]. It is worth mentioning that the rate of cesarean delivery was 43.8 percent in the planned vaginal delivery group, which is considered very high.

When the presenting twin is noncephalic, as seen in 20 percent of twin pregnancies, planned cesarean delivery is suggested. Attempt of vaginal delivery for breech-presenting first twin and cephalic second twin could rarely complicated by the unique interlocking chins (locked twins). There is a general consensus in the obstetric community against vaginal delivery of the breech-presenting fetus [15]. On the other hand, some obstetricians argue the possibility of vaginal delivery in carefully selected patients by experienced staff in breech vaginal delivery and no association with a higher risk of mortality and morbidity in comparison with planned cesarean delivery for either first or second twins. Data from randomized trials evaluating the safety of vaginal delivery in this setting are lacked, and the available data are limited to observational studies. In 2020 secondary analysis of data from JUMODA cohort that included 298 planned vaginal births of breech-presenting first twins, 62 percent of women delivered both twins vaginally [16]. The gestational age was \geq 32 weeks, no

significant abnormalities were seen, and birth weights between 1500 and 4000 grams, and the second twin was not significantly larger than the first twin in all pregnancies. Similar composite rate of neonatal mortality or severe morbidity for the first twin were evidenced in the planned vaginal and planned cesarean delivery groups. The result remained statistically nonsignificant even after propensity score matching analysis. While these results can be encouraging for women who wish to have a vaginal birth and meet the inclusion criteria, the study have important limitations. Only 20.3 percent of breech presentation where planned for vaginal delivery, which considered a small proportion. In addition, the confidence intervals around the primary outcome are wide, denoting less precise result and details on the outcomes for cephalic versus noncephalic second twins and the incidence of locked twins was not given. Importantly, these results can be applied only in facilities with experienced personnel in vaginal delivery and breech presentation.

Management: The labor

Labor management for twin pregnancies is generally similar to singleton gestations, few differences, however, are present. Initially, twin pregnancies, as all multiple pregnancies, are associated with higher risk of blood loss, hence prerequisite includes adequate preparation for possible transfusion such as adequate intravenous access and blood product availability. Similar to singleton pregnancies, no restriction of oral intake should be taken until active labor when restriction to clear liquids is recommended. Bedside portable ultrasound machine can be kept readily available for rapid check of fetal positions, heart rates, and to visualize the fetus during internal or external version or breech extraction, when needed. Twin pregnancy is not a contraindication to use of cervical ripening agents such as prostaglandins by itself. Cervical ripening measures appear to be safe in these pregnancies and following the same approach as in singleton pregnancies [17]. Oxytocin could be used for induction or augmentation of labor in the same regimen used in singleton pregnancies and it appears to be effective and safe [18]. However, data are conflicting regarding the increased likelihood for cesarean delivery following induction of labor in twin pregnancies compared with induction in singleton pregnancies [19]. There is no consensus about the effects of multiple gestation on the progress of labor due to conflicting results are being reported. Data have shown that it may faster or slower the progression compared with singleton labor [20,21]. Possible reasons for conflicting results include differences in cervical dilation and effacement at onset of labor and differences in birth weight. In the largest series, twin gestations in nulliparous women had a significantly shorter first stage but a similar duration of second stage compared with singleton gestations [21].

The risk of intrapartum complications is also higher with multiple gestations; therefore, both twins should be continuously monitored during labor. Intermittent auscultation is not practical and may not reliably distinguish one twin from the other. 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. Single machine with dual-channel capability is available and could be used for monitoring both twins heart rate. The rates are often synchronous and require frequent careful review to make sure both fetuses' heart rate is being monitored. Ultrasound can be used to assist monitoring process. If two separate machines are used for monitoring, their internal clocks must be synchronized, paper speeds must be identical, and contractions must be displayed on both.

Neuraxial analgesia and/or anesthesia is greatly helpful and recommended as it provides good pain relief, does not cause neonatal depression, and is a suitable anesthetic if external or internal version, breech extraction, or operative delivery such as using forceps becomes necessary.

Even when vaginal delivery is planned and attempted, it is important to ensure that the location has available capacity for immediate cesarean delivery in case of complications necessitating urgent delivery arise. Examples of these complications include prolapsed umbilical cord, concerning fetal heart rate, failed breech extraction, or failed internal or external version. Intrapartum switching to cesarean delivery has been reported in high percentage of pregnancies that been planned vaginal delivery and it may be, nevertheless, necessary for delivery of the second twin after vaginal birth of the first twin. Some experts choose to deliver all twin pregnancies in operating room where cesarean delivery can be readily performed. Sometimes, exception is reasonably made for delivery of cephalic/cephalic twins in a

labor room if the patient can be transported to an operating room rapidly when needs for cesarean delivery arise. Additional advantage of delivering in operative room is the larger size of these rooms compared with labor rooms; allowing for better accommodation of the extra obstetric, pediatric, and nursing personnel who are present for delivery of two infants, as well as anesthesia personnel.

During the labor, episiotomy, operative vaginal delivery, and the procedure for delivery of the cephalic infant, follow the same rule and indications of singleton deliveries. Cord clamping should not be delayed in monochorionic twins because acute and large inter-twin blood transfusion may occur during labor rendering the delivery and the direction of transfusion not predictable. Signs of acute peripartum twin-twin transfusion syndrome include bradycardia or a sinusoidal fetal heart rate pattern. The presence of these signs may warrant switching to urgent delivery. About 2.5 percent of vaginally-delivered first-born monochorionic twins have been reported to have acute anemia [22]. The Second-born monochorionic twins are also at risk of anemia if the cord of the first twin is not clamped promptly after its delivery. In addition, the second twin could suffer hypovolemic shock from exsanguinating into the placenta and/or out of the unclamped cord of the first twin [8]. The suggestion is to promptly clamp the cords of both monochorionic twins.

The recommendation of American College of Obstetricians and Gynecologists regarding a short delay (30 - 60 seconds) in umbilical cord clamping after vaginal delivery of term and preterm infants could be applied on dichorionic twins [23]. Clamping and cutting a tight nuchal cord on the first twin is contraindicated in monochorionic/monoamniotic twins since it may be the umbilical cord of the undelivered twin. For diamniotic twins, the umbilical cords should be marked with consecutive numbers of clamps for labeling. The delivery staff should note that "twin A" on ultrasound may not be the first born at delivery especially with cesarean delivery; this infant is typically called "baby A" at delivery room [24].

For adequate assessment of the second twin, the heart rate and position should be evaluated using physical examination, ultrasound, and electronic fetal monitoring. Delivery personnel should be aware that the second twin in cephalic/cephalic twins undergoing a trial of labor may change to noncephalic presentation after delivery of the first twin. About 12 percent of second twins changed from cephalic to noncephalic presentation after delivery of the first twin in one large study [25].

Regarding the best interval between first and second twin, studies performed after the routine use of electronic fetal monitoring during labor suggest no specific finite interval as long as the fetal heart rate tracing is reassuring [26]. With the development of electronic fetal monitoring and the availability of real-time ultrasound, the obstetricians have been enabled to identify second twins in need of expedited delivery, while managing most cases expectantly [27]. Oxytocin may be necessary for augmentation of labor in second cephalic-presenting twin due to a temporary reduction in contraction frequency after the first birth [28]. To facilitate delivery, artificial rupture of membrane is performed when the head of second twin is engaged. Another method of artificial rupture of membrane is done before head engagement by a controlled needle puncture of the amniotic sac between contractions. This method allows slow leaking of amniotic fluid and facilitate fetus descent while preventing the umbilical cord prolapse. If the second twin is cephalic but unengaged, experienced personnel could tempt internal version and breech extraction [29]. The rationale of breech extraction is that active measures reduce the chance of complications, such as prolapse of the cord or a hand, or abruption, which would require emergency cesarean delivery. However, there is no high quality data suggesting better neonatal outcome with internal version versus pushing [30]. According to this observational study, the composite neonatal morbidity were higher in internal version/breech extraction group compared with the pushing group, but the cesarean delivery was lower. Although the quality of evidence is not robust, many experts do not support a policy of routine internal podalic version and breech extraction for the unengaged cephalic-presenting second twin. Internal podalic version and breech extraction should not be considered a safer option compared with pushing and should be limited to experience at performing these maneuvers, when needed. Unexperienced attempt of internal podalic version carries the risk for fetal and maternal trauma.

Breech extraction is better used for noncephalic second twin if there are no contraindications to this procedure. Intrauterine manipulation procedure is best aided by US visualization. To relax uterine muscles, the procedure can be facilitated by administering 50 mcg of

nitroglycerin (could be repeated in 60 seconds to a maximum 5 times) or inhalational anesthesia [31]. Effective maternal analgesia is also crucial for successful extraction. Extraction should be performed rapidly to reduce the risk of cervix contraction, potentially entrapping the head. Similar to internal podalic version, the membranes are left intact until the feet are at the vaginal introitus, though rupture during these maneuvers is common. If the choice is made for external version to cephalic presentation, the procedure is performed as standard. Membranes should be left intact during attempted external cephalic version. The safety of version attempt with ruptured membranes is not well examined, however, with fetal monitoring and the capability to perform breech extraction or cesarean delivery immediately, it remains possible option. After successful version to cephalic presentation, oxytocin is administered if labor has not resumed and amniotomy could only be performed after head engagement [32].

Switching to unplanned cesarean for delivery of the second twin is not uncommon. About 4 to 10 percent of planned vaginal birth for second twin end up by cesarean delivery [33,34], even with cephalic-presenting second twin [35]. This is associated with high risk of fetal or neonatal mortality and morbidity [34]. Unplanned cesarean deliveries occur due to maternal complications, malpresentation, cord prolapse, failure to progress, and abnormal fetal heart rate pattern. One cohort study has reported successful vaginal delivery of second twin in all twins pregnancies included in the cohort [29]. The authors attributed their success to the active management of the second stage of labor by obstetricians experienced in breech delivery and internal podalic version, and to their selection criteria for vaginal delivery candidates. Measures have been taken include labor induction for all twin pregnancies undelivered at 38 weeks of gestation in the absence of contraindication for vaginal delivery and the presence of specific criteria as an estimated weight of the second twin \geq 1500 grams and no more than 20 percent of the presenting twin's weight. In addition, the second twin was delivered as a cephalic presentation if the head was engaged immediately, by breech extraction with noncephalic presentation and by breech extraction after internal podalic version in unengaged cephalic presentation.

Management: Third stage

Multiple pregnancies are prone to higher risk of atony and postpartum hemorrhage because of increased uterine distention compared with singletons. Accordingly, they should be managed with medication that lower the risk of hemorrhage similar to singleton pregnancies but with lower threshold to intervene with a second uterotonic medication.

Conclusion

Chorionicity and amnionicity influence the decision of best time to deliver uncomplicated twin pregnancies. The ACOG and the SMFM recommend a scheduled delivery for uncomplicated dichorionic twin pregnancies at 38+0 to 38+6 weeks of gestation. Uncomplicated monochorionic/diamniotic twins pregnancy better to be planned for earlier delivery than dichorionic at 36+0 and 36+6 weeks of gestation.

The choice of delivery route in twin pregnancies greatly depends on amnionicity and fetal presentation at labor onset. All twin pregnancies with monoamniotic twins and diamniotic twins with a presenting twin being noncephalic are preferably managed by cesarean section.

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