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Effects of Twin Gestation on Maternal Morbidity

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As the incidence of twin gestation increases, it is important to consider the maternal risks associated with carrying multiples. Compared with singleton gestation, there are increased risks to the mother during the antepartum, intrapartum, and postpartum periods. Certain pregnancy complications are more likely to occur during a twin gestation, including preeclampsia and other hypertensive disorders, antepartum hospitalization for preterm labor or abnormal bleeding, nutritional deficiencies, cesarean delivery, and postpartum hemorrhage. Women carrying twins may benefit from early education regarding these issues, close maternal monitoring as well as physical therapy sessions, and nutrition counseling during their pregnancies.
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The incidence of twin pregnancies is increasing; this higher incidence is attributed to the frequent use of assisted reproductive technologies as well as the older average age of women at the time of conception, the time in which a twin gestation is more likely to occur spontaneously. Twin gestations have higher rates of complications for the fetus and neonate as well as the woman carrying the pregnancy. This review article focuses on the maternal morbidity associated with a twin gestation.

Women carrying twin pregnancies have higher rates of medical and obstetrical complications throughout pregnancy and the puerperium compared with women carrying singleton pregnancies. This manuscript is divided into 3 sections namely antepartum, intrapartum, and postpartum. Maternal risks include preeclampsia and hypertensive disorders,[1-7] anemia,[1,4] nutritional depletions,[8,9] cesarean delivery,[1,10] postpartum hemorrhage,[1,11] and musculoskeletal concerns correlating with the larger gravid uterus.[12] Additionally, the potential emotional impact from adverse maternal or neonatal outcomes will be considered.

Maternal Physiological Adaptation to Twin Pregnancy

Women with multifetal gestations undergo significant physiological adaptations beyond the expected cardiovascular, hematologic, and metabolic changes for a singleton pregnancy.[8] These exaggerated responses in twin pregnancies may put women with certain preexisting cardiovascular or pulmonary conditions at higher risk for earlier and severe complications of pregnancy as well as place additional strain on a woman with normal baseline physiology.

Differences in cardiovascular physiological adaptations between a singleton and twin gestation appear as early as the first trimester.[13] In a study of 119 pregnant women with twin pregnancies compared with 128 singleton controls, maternal left ventricular function was assessed by echocardiography. Twin gestation was characterized by higher cardiac output secondary to both a higher stroke volume and faster heart rate.[13] Additionally, the authors found an increase in left atrial diameter and left ventricular end-diastolic diameter, reflecting an increase in preload for twin gestations. Additional studies have found similar increases in cardiac output for twin gestations.[14-16] Although these cardiac adaptations are not significant for women with intact baseline cardiovascular function, women with cardiovascular or congenital heart disease may reach the limit of their adaptive capabilities earlier with a twin gestation.

There are a variety of hematologic adaptations that occur to support a twin gestation. The blood volume in a twin gestation increases 50%-70% by 20 weeks of pregnancy[8] compared with only 20% with a singleton pregnancy.[17] There is only a 25% increase in erythrocytes in women carrying a twin pregnancy, and, therefore, a hemodilutional anemia occurs resulting in decreased concentrations of hemoglobin, albumin, and water-soluble vitamins.[8] Twin pregnancies have lower maternal hemoglobin levels in the first and sec-

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ond trimesters and higher rates of iron-deficiency anemia compared with singleton gestations.[8]

Twin gestations have higher metabolic rates than a singleton pregnancy, with maternal resting energy expenditure increased by 10%.[8] This increase in metabolic rate results in a 40% increase in caloric requirements.[8]

Antepartum Morbidity

Hypertensive Disorders/Preeclampsia

Hypertensive disorders occurs in 5%-10%[18] of singleton pregnancies and affect up to 10%-20% of twin gestations.[2,4,6,7,19] Preeclampsia is defined as gestation-related hypertension combined with proteinuria.[20] This heterogenous condition has a wide spectrum of clinical presentations and may cause the following maternal morbidities: hypertensive urgency, stroke, seizure, need for obstetrical intervention, cesarean delivery, thrombocytopenia, and hemorrhage.[21,22] A large retrospective analysis of severe obstetrical indicators during hospitalizations from 1998 to 2006 for hypertension during pregnancy revealed significantly higher rates of acute renal failure, pulmonary edema, Acute Respiratory Distress Syndrome (ARDS), puerperal cerebrovascular disorders, disseminated intravascular coagulation syndrome, and the need for assisted ventilation compared with pregnant women hospitalized without hypertension.[22] There was an increased rate of maternal mortality for women diagnosed with either severe preeclampsia or chronic hypertension.[22] Recent estimates reveal that preeclampsia remains a leading cause of maternal mortality[21,23] and a leading cause of antepartum hospitalizations. However, these studies have not analyzed whether there is a difference between the mortality rate for twin versus singleton pregnancies.

It is well established through large population studies that there is a higher rate of preeclampsia among twin gestations, even when adjusting for confounding variables, such as maternal age and parity.[2,4,6,7,19] The risk may be directly correlated with the number of fetuses, as higher order multiples have increasing risks of developing preeclampsia,[10,24,25] perhaps, in part, secondary to the larger placental volume. Additionally, women who become pregnant with multiple gestations through assisted reproductive technologies have a 2-fold risk of preeclampsia compared with spontaneous twin conceptions.[26]

In addition to the increased incidence of preeclampsia among twin pregnancies, severe preeclampsia develops earlier,[27] and women are more likely to be delivered for this diagnosis at <35 and <37 weeks compared with singleton counterparts.[3] Another analysis revealed a 4-fold increase rate of development of hemolysis, elevated liver enzymes, low platelet (HELLP) syndrome for women carrying a twin pregnancy compared with a singleton[10]; however, this association was not confirmed in another study.[7] The chorionicity of a twin pregnancy has implications for the development of preeclampsia. One retrospective analysis indicated that dichorionic twins were nearly twice as likely to develop preeclampsia compared with monochorionic twins, but the preeclampsia was more likely to be considered mild disease.[28]

In summary, women carrying twins have a higher incidence of preeclampsia and its associated risks of antepartum hospitalization and maternal and obstetrical complications compared with their singleton counterparts. For women who develop preeclampsia, the condition is more likely to manifest earlier in gestation and in a more severe form.

Gestational Diabetes

Although the larger placental mass in twin gestation results in an increase in placental-derived steroid hormones that may predispose to glucose intolerance, studies have not consistently found an increase in gestational diabetes.[29-31] Studies evaluating the risk of gestational diabetes in women carrying multiple pregnancies are conflicting, with some demonstrating an increase in the incidence of gestational diabetes[32-34] and others finding no difference when compared with singleton rates.[29-31] Perhaps, the risk is offset by increase in caloric expenditure associated with the higher metabolic rate necessary to maintain a twin gestation.[8] Of note, although 1 study found a higher incidence of gestational diabetes in twin pregnancies, compared with singletons, these pregnancies required similar insulin regimens for adequate control of hyperglycemia.[32] This study indicates that although the incidence of gestational diabetes was more common in twin pregnancies, the condition was not more severe than gestational diabetes in a singleton pregnancy based on insulin requirements.

Other Third-Trimester Complications

Pregnant women with twins have increased risk of third-trimester bleeding from placenta previa[35] or placental abruption[4] and an increased incidence of preterm labor.[1] These complications may require inpatient management with close maternal and fetal management, tocolysis, and early delivery. The rate of placenta previa was 40% higher in twin gestations compared with singletons in a large cohort study.[35] Placenta previa necessitates a cesarean delivery and increases the likelihood of blood loss anemia and blood transfusion.[35] Tocolysis with agents such as nifedipine and magnesium have maternal risks, including hypotension, shortness of breath, and pulmonary edema, with these adverse outcomes occurring in up to 22% of all mothers treated.[36] Women with twin gestations may have higher rates of these side effects compared with singleton gestations, although limited information is available addressing this question.

Weight Gain

Given the increased metabolic rate of twin gestation and higher caloric needs, separate nutritional and weight guidelines have been established for twin pregnancies.[37] Recent Institute of Medicine guidelines suggest women carrying twin pregnancies gain a varying range of weight depending on their prepregnancy body mass index (BMI).[37,38] Women with a twin gestation and a normal BMI are recommended to