Obstetric (Nonfetal) Complications

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KEYWORDS

• Obstetric emergency • Placental abruption • Uterine rupture • Postpartum complications • MDCT • MR imaging

KEY POINTS

- Ultrasonography is the investigation of choice for evaluation of obstetric complications. Both the American Congress of Obstetricians and Gynecologists and American College of Radiology guidelines indicate that computed tomography should be performed only if clinical workup indicates that it is beneficial, and the radiation dose should be as low as reasonably achievable.
- Magnetic resonance imaging, especially with a combination of T1-weighted and diffusion-weighted imaging, is 100% sensitive for establishing the diagnosis of placental abruption.
- Ultrasonography has high negative predictive value but low positive predictive value for the diagnosis of retained products of conception (RPOC). A normal appearance of the endometrium excludes the diagnosis, and false-positive diagnosis of RPOC has been reported to occur in 17% to 51% cases.
- A recent meta-analysis of 14 prospective studies (12,101 patients) in pregnant women with abdominal pain or vaginal bleeding evaluated with history, physical examination, laboratory analyses, and transvaginal ultrasonography showed that transvaginal ultrasonography is the single best modality for evaluation of suspected ectopic pregnancy.
- Most adnexal torsion in pregnancy occurs before 20 weeks of gestation, and mostly in the first trimester. Mature cystic teratoma is the most common underlying disease, followed by corpus luteal cyst and other lead points such as paraovarian cysts.

INTRODUCTION

Each year more than half a million women die worldwide as a result of complications related to pregnancy or childbirth. The burden of pregnancy-related complications is increasingly being recognized both in terms of escalating health care costs and effect of hospitalization on the women and their families. In the United States alone, pregnancy-related complications in the antepartum period alone account for an average of more than 2 million hospital days of care per year, with an annual estimated cost of more than 1 billion dollars. Pathophysiology of several of these complications is directly

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related to anatomic and physiologic changes of pregnancy. Being the primary site of these changes, the female reproductive tract is thus the system that is most frequently affected by these complications. Although select complications such as placental abruption, HELLP syndrome, molar pregnancy, and ectopic pregnancy are unique to pregnancy, others such as uterine infections, uterine rupture, hyperreactio luteinalis, ovarian torsion, and fibroid growth/degeneration are more common during pregnancy. In addition, unique pregnancy subtypes such as molar pregnancy predispose to choriocarcinoma; and ectopic pregnancy can rupture, which can be life threatening. Postpartum period complications are distinct, including hemorrhage, infection, uterine rupture, and gonadal vein thrombosis. Imaging plays a crucial role in diagnosis and management of these pregnancy-related obstetric and gynecologic complications. With the advent of interventional radiology, an armamentarium of new therapeutic options is available to treat these complications. In this article, a comprehensive update is provided on epidemiology, natural history, clinical manifestations, and imaging features of a wide spectrum of pregnancy-related obstetric and gynecologic complications, with discussion on implications on management.

IMAGING MODALITIES AND IMAGING PROTOCOL

Perhaps no issue has undergone as much recurring debate in the radiology community in the last decade as the appropriateness of imaging in pregnant patients. Increasing awareness of the risk of radiation exposure to the fetus demands an optimum imaging protocol that aims to attain maximum diagnostic benefit with minimal justifiable radiation risk. This protocol is necessary given that computed tomography (CT) is the largest source of medical radiation exposure in the United States, accounting for up to 24% of radiation exposure to the US population from all sources.[1]

Universally, it is accepted that ultrasonography should be the initial modality for evaluation of the pregnant patient, with other modalities used only in cases in which ultrasonography is nondiagnostic. Ultrasonography is fast, can be performed at the bedside, and confers no known risk to the mother or the fetus. Ultrasonography can be performed transabdominally or transvaginally, and both these approaches have advantages and disadvantages. Transvaginal ultrasonography scanning is typically performed with a tight-radius, small-footprint curvilinear probe with a frequency range of 7.0 to 10 MHz and is performed with an empty bladder. Transvaginal scanning provides superior imaging of the uterus and adnexa and is likely better tolerated by the pregnant patient than transabdominal scanning. However, transvaginal ultrasonography is not always necessary and may not provide a panoramic view of the uterus and adnexa in advanced pregnancy. The transabdominal approach is particularly useful in this setting because it is easier to perform and provides a broader view of the uterus, adnexa, and other abdominal/pelvic viscera in the immediate vicinity.[2] Transabdominal ultrasonography is performed using a curvilinear probe in the frequency range of 2.5 to 5.0 MHz and requires a full bladder as an acoustic window to better visualize the pelvic organs. Ultrasonography is the modality of choice to confirm the presence of a living intrauterine pregnancy in the first trimester, and to evaluate for placental, uterine, and cervical diseases in the second and third trimesters. Ultrasonography is fairly accurate in depicting first-trimester complications such as ectopic pregnancy and molar pregnancy as well as select second-trimester and third-trimester complications such as placenta previa and abruptio placenta. Ultrasonography is also the best initial investigation for evaluation of postpartum complications such as postpartum hemorrhage (PPH), endometritis, and retained products of conception (RPOC).

Multidetector CT (MDCT) and magnetic resonance (MR) imaging serve as problem-solving tools in difficult cases. Both the American Congress of Obstetricians and Gynecologists and American College of Radiology (ACR) guidelines indicate that CT should be performed only if clinical workup indicates that it is beneficial, and the radiation dose should be as low as reasonably achievable.[3] The mother should be counseled on the risks of radiation exposure. Adverse events related to administration of iodinated contrast agent have not been reported, and hence it is safe to use them when necessary. Some of the recommended protocol modifications to be used in pregnant women include decreasing kVp in small patients, decreasing mAs, using automated tube current modulation, limiting the field of view, avoiding multiphasic examinations, and using lead shielding or internal barium shielding with 30% of orally administered barium.[3] CT is mostly reserved for pregnant patients presenting with abdominal trauma. Routine contrast-enhanced CT can be safely used in accurate assessment of select suspected postpartum gynecologic complications such as endometritis, pelvic abscess, septic thrombophlebitis, bladder flap hematoma, uterine