

CARDIAC TESTS

General

Symptoms and signs in a normal pregnancy may mimic heart disease. In the setting of a known cardiac defect, it may be difficult to determine if complaints (such as fatigue, breathlessness, dizziness, and/or palpitations) relate to normal adaptive changes to the pregnancy or worsening of underlying pathology. For this reason, cardiac tests (such as electrocardiogram and echocardiogram) are important components for a baseline cardiac evaluation and are often repeated as the demands of the pregnancy progress or as new symptoms or signs arise. Additional cardiac tests (such as ambulatory electrocardiographic monitoring, cardiac catheterization, cardiac magnetic resonance imaging) may be added at the discretion of the consultant cardiologist when deemed appropriate.

Routine Tests

Electrocardiography (ECG): A baseline ECG is useful at the start of pregnancy and is generally repeated as the pregnancy progresses, particularly if new symptoms develop. Normal findings on ECG in pregnancy include; sinus tachycardia due to augmentation of cardiac output, which reaches a peak by the beginning of the third trimester (heart rate generally increases 10-20 bpm above baseline), shift of the frontal plane QRS axis to the left, and non-specific repolarization changes (T waves are often inverted in lead III).

Echocardiography (maternal): Echocardiography for cardiac surveillance of the mother during pregnancy is extremely valuable as a modality that is safe, readily available, relatively modest in cost, and well-suited to serial examinations. Useful time points for echocardiography are a baseline assessment early in pregnancy, a repeat study towards the end of the second trimester/early third trimester to evaluate the impact of increased cardiac work at its peak (usually at or around 28 weeks gestation), and post-partum (at 6 weeks and/or 6 months) to determine if there are persistent effects of the recent pregnancy. Additional studies should be organized for cardiac assessment in the event of new or progressive symptoms, which may be of cardiac origin.

Echocardiography (fetal): The risk of the fetus having a structural cardiac defect varies between 3% and 50%, compared with the background risk of 1% for the general population. This risk will depend on the underlying congenital cardiac lesion of the mother. Fetal echocardiography is generally performed at 18-20 weeks gestation and can diagnose most major forms of structural/functional cardiac disease. It should be noted that a fetal echocardiogram cannot reliably exclude small septal defects, minor valve abnormalites, some forms of coarctation, and certain venous anomalies.

Additional Tests

Ambulatory electrocardiographic monitoring: Holter monitoring and/or event recording can be useful for correlation of symptoms with rhythm in the context of palpitations.

Cardiac catheterization and cardiac computed tomography (CT): Exposure to ionizing radiation during pregnancy is best avoided. However, it may be necessary if information to be obtained is critical for diagnosis or ongoing management that is not available through complementary imaging modalities. In general, conventional angiography results in a dose of about 6 millisieverts (equivalent of ~ 500 chest x-rays). Fetal exposure to radiation can be lessened through shielding of the maternal abdomen and the use of the radial artery approach for angiography. Cardiac CT can be accomplished with radiation doses similar to conventional angiography as long as data acquisition is limited to a single cardiac cycle (1 R-R interval). No congenital anomaly has been identified in fetuses exposed to less than 100 milligrays of radiation (exposure to 1 milligray of radiation occurs through a dose of 1 millisievert).

Cardiac magnetic resonance imaging (MRI): Effects of the MRI environment on the fetus have not been well established. Possible fetal risks relate to impact of exposure to the static magnetic field and imposed electromagnetic gradients on fetal growth and development as well as fetal responses to heat and noise. Pregnant patients should undergo MRI only if other non-ionizing forms of diagnostic imaging are inadequate and/or MRI would provide information that would otherwise require exposure to ionizing radiation. It is known that gadolinium-based contrast media crosses the human placenta into the fetus when given in clinical dose ranges; however, adequate studies to examine teratogenic effects have not been performed to date and safety of MRI contrast media has therefore not been established. If MRI is deemed necessary during pregnancy, care should be taken to minimize time in the scanner, contrast should be avoided if possible, and the study should be performed after organogenesis is complete thus following the first trimester.

References:

- 1. Colman JM et al. Cardiac monitoring during pregnancy. In: Steer P, Gatzoulis M, Baker P, eds. Heart Disease and Pregnancy. London: RCOG Press, 2006:67-77.
- 2. Nihoyannopoulos P. Cardiovascular examination in pregnancy and the approach to diagnosis of cardiac disorder. In: Oakley C and Warnes CA, eds. Heart Disease in Pregnancy. Blackwell Publishing. Malden, Massachusetts, 2007: 18-28.
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