

Pregnancy and Heart Disease

During pregnancy, the body undergoes a series of drastic changes. There is normally a 40%-50% increase in blood volume, an increase in heart rate from 10-15 beats per minute, an increase in cardiac output anywhere from 30%-50%, an increase in stroke volume for the first and second trimesters, a decrease in blood pressure of about 10 mmHg, and an overall decrease in systemic vascular resistance. The first cardiovascular change associated with pregnancy is peripheral vasodilation, which causes a decrease in systemic vascular resistance. Blood volume must increase in order to supply enough blood to the mother and growing fetus. The increase in blood volume is balanced out since the blood is spread throughout more blood vessels but the decrease in resistance will decrease blood pressure. Since the increase in blood volume is greater than the increase in the number of red blood cells, anemia may also be an issue.¹²

These normal changes can mimic heart disease signs and symptoms. Pregnant women usually experience dyspnea, fatigue, jugular vein distension, and mild peripheral edema. Increased blood flow and volume can also cause a third heart sound to be auscultated as well as audible physiologic systolic murmurs.³

Heart disease is the leading cause of maternal mortality. This may be due to recent increases in number of women who are pregnant who smoke, are obese, are older, and/or have diabetes. Also, there has been a link to previously undiagnosed ischemic heart disease. Morbidity factors of women who have heart disease and get pregnant includes cardiac arrhythmia, stroke and heart failure. There may also be adverse affects on the fetus. Women with previous heart conditions must work with a cardiologist and obstetrician to keep this condition under control to

¹ Maroo & Raymond, 2009

² Cho, 2011

³ Maroo & Raymond, 2009

ensure a safe pregnancy. Such conditions include hypertension, hyperlipidemia, transient ischemic attack or stroke, narrowing of mitral or aortic valve, or ejection fraction of less than 40%. Women should also be concerned if they have a history of heart or vascular disease such as aortic disease, arrhythmia, cardiomyopathy, heart murmur, Marfan syndrome, rheumatic fever, heart failure, or poor functional status.⁴

The age at which women are having children is increasing due to increased longevity and effectiveness of fertility enhancement regimens. Thusly, the diseases and lifestyle factors now associated with the older population in the U.S. will be affecting the aging pregnant population. Such prepregnancy cardiovascular risk factors incorporate diabetes, smoking, hypertension, thrombophilia, and hyperlipidemia, are linked to increased risks of maternal placental syndromes, spontaneous abortion, premature rupture of membranes, preterm labor and acute arterial or venous thromboses during pregnancy. Also, the presence of these risk factors also predicts future development of stroke, coronary artery disease, peripheral arterial disease, and chronic hypertension in the mother. Maternal obesity and gestational diabetes are also risk factors for forthcoming cardiovascular disease in women. Women with gestational diabetes are at risk for developing type 2 diabetes. Women with maternal obesity and morbid obesity are also more prone to gestational hypertension, gestational diabetes, preeclampsia, and fetal birth weight greater than 4 kg or 8.8 lbs. Such a large birth weight makes Cesarean section more likely.⁵

For healthy women, the effects of pregnancy on the heart are equivalent to moderate exercise and can accommodate easily. For women with previously existing heart problems, the effects upon the heart can be detrimental and possibly even fatal. Women with very high blood

⁴ Cho, 2011

⁵ Maroo & Raymond, 2009

pressure during pregnancy may develop pregnancy toxemia, which results in proteinuria and/or peripheral edema. This is known as preeclampsia. When seizures develop if it is left untreated, it is called eclampsia. After birth, bacterial endocarditis may be contracted from infection at open bleeding sites during delivery.⁶

Women with congenital heart defects must be especially careful during pregnancy because it stresses an already weakened heart. Congenital heart problems include atrial and ventricular septum defects, in which the septum or wall separating the atria and ventricles is perforated, as well as patent ductus arteriosus, wherein the ductus arteriosus which shunted blood from the fetal heart to bypass the lungs and retrieve oxygen directly from the mother's blood does not close after birth. Stroke volume and cardiac output are compromised by these defects because blood is not being pumped efficiently and can flow partially backwards, causing the heart to work harder to pump the same amount of blood. If this back-flow of blood is enough to cause pulmonary hypertension, pregnancy is especially dangerous and there is a high risk of maternal death.

Another congenital defect is aortic valve stenosis, in which the aortic valve is stiff or narrowed, usually due to a bicuspid aortic valve instead of the normal tricuspid. This stresses the heart because it is using more effort to pump the same amount of blood through a narrowed vessel. Left untreated, it will result in ventricular hypertrophy and heart failure. Mitral valve stenosis is also a problem for the pregnant women. It is usually caused by rheumatic fever and can cause atrial fibrillation, which will present with symptoms of heart failure (shortness of breath, fatigue, edema, and irregular heartbeat). This can be corrected by percutaneous valvuloplasty. In contrast, mitral valve prolapse (a leak in the mitral valve) can be tolerated

⁶ Rosenfeld, 2002

during pregnancy. However, if the leak is too severe and causes too much backward flow of blood, then it must be treated.⁷

Heart disease is the third leading cause of maternal death in western countries and complicates 1%-3% of all pregnancies. In a European study of pregnant women with heart disease, the incidence of cardiac complications in these women was approximately 13% and complications with the fetus were found at approximately 10%. Due to intensive prenatal interventions and care, however, over 90% of the pregnancies lead to healthy live births.⁸

Peripartum cardiomyopathy is another problem pregnant women face. This illness is damage to the heart around the time of birth. Basically, the heart becomes weak and cannot efficiently pump blood to the rest of the body. Women most likely to be afflicted are obese, have prior heart conditions, had multiple pregnancies, have poor nutrition, and/or are using medications that can cause this. It is more prevalent among African Americans, smokers, and alcoholics. Symptoms include edema, fatigue, shortness of breath, palpitations and nocturia. Usually, peripartum cardiomyopathy presents with crackling lung sounds, abnormal heart sounds, rapid heart-rate, swollen neck veins, enlarged liver, and a low blood pressure, or blood pressure that drops when the patient stands up. Decreased cardiac output and function, an enlarged heart, and/or congestion of lungs or pulmonary veins may be detected during cardiology screening tests.

Acute coronary syndrome can mimic the signs and symptoms of normal pregnancy so it may be easily missed. Treatment for various heart disorders during pregnancy include resting and staying in the hospital for observation until acute symptoms subside. More aggressive interventions may include immunosuppressive medication, aortic counterpulsation balloon (balloon heart pump), or heart transplant. If there is little damage to the heart or the damage

⁷ Cho, 2011

⁸ Stangl, Schad, Gossing, Borges, Baumann & Stangl, 2008

present is not life-threatening, treatment may focus upon symptom-relief.⁹ Diuretics may be prescribed to reduce excess water, which would in turn decrease inflammation, edema, and blood volume, which may help to lower blood pressure. Digitalis could be given to increase the heart's pumping capacity, as well as beta blockers, which decrease the strength with which the heart pumps and slows heart rate, to place less strain upon the heart and prevent further heart failure.¹⁰

Even though the number of females who survive to reproductive age with heart disease is increasing, heart disease complications during pregnancy are being well-managed. As long as pregnant women remain consistent and thorough with their prenatal care, and work with both the OBGYN and the cardiologist to create a personalized plan of care, cardiac complications of the mother and fetus should be minimal. Pregnancy is already a huge undertaking and causes many drastic changes in the body so preexisting health issues make it even more difficult. Most pregnancies where the mother is affected by heart disease in western Europe and the U.S. result in healthy children and mothers. The emphasis should be upon prenatal care and management specific to the mother's health issues to ensure optimal results.

⁹ Mikati & Zieve, 2011

¹⁰ Chen & Zieve, 2011

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