Toxoplasmosis, Parvovirus, and Cytomegalovirus in Pregnancy

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KEYWORDS

• Toxoplasmosis • Parvovirus • Cytomegalovirus • Diagnosis • Management

KEY POINTS

- There are several infections in adults that warrant special consideration in pregnant women given the potential fetal consequences.
- Among these are toxoplasmosis, parvovirus B19, and cytomegalovirus; these infections have an important impact on the developing fetus, depending on the timing of infection.
- Most fetal outcomes are favorable, even for those with documented infection during pregnancy.

TOXOPLASMOSIS

Toxoplasmosis is caused by the *Toxoplasma gondii* protozoan, an obligate intracellular parasite. The organism can infect any warm-blooded animal and may be found in soil, but its definitive hosts are in the cat family. The organism completes its sexual cycle in feline intestinal epithelial cells and oocysts are shed in the feces for several weeks after the reproductive cycle is completed.[1] Three routes of infection have been identified. Oocysts may be ingested from contaminated cat feces, water, or fruits and vegetables, as well as by gardening in contaminated soil. Tissue cysts are ingested in infected raw or undercooked meat. In a study of 148 patients, including 76 pregnant women with recently acquired infection, aged greater than or equal to 50 years, male sex, Midwest region, working with meat, having 3 or more kittens, and eating locally produced cured, dried, or smoked meat, rare lamb, raw ground

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beef, and unpasteurized goat's milk were associated with infection.[2] A third route of infection is via vertical transmission. Vertical transmission from a pregnant woman to her fetus can cause congenital toxoplasmosis, with consequences including stillbirth, chorioretinitis, deafness, microcephaly, and developmental delay.[3,4]

The true prevalence of toxoplasmosis is unknown because it is not a reportable disease in the United States; however, it was estimated by the fourth National Health and Nutrition Examination Survey performed from 1999 to 2000.[1] In 4234 people tested for immunoglobulin (Ig) G antibodies to *Toxoplasma*, 15.8% were positive. Of 2221 women aged 12 to 49 years, 14.9% were seropositive, leaving 85% of women of childbearing age susceptible to infection. In a more recent study of 635,000 infants in the New England Regional Newborn Screening Program, the rate was 1 per 10,000 live births.[3] With approximately 4 million live births in the United States annually, it can be estimated that between 400 and 4000 infants will be born with congenital toxoplasmosis.

Vertical transmission of infection to the fetus is most likely to occur with a primary infection during the pregnancy. However, immunocompromised women with chronic infection may also transmit the disease.[5] More than 90% of pregnant women who acquire a primary infection are asymptomatic, as are 85% of neonates born with congenital toxoplasmosis.[6] Transmission is rare in early pregnancy and increases with duration of pregnancy. Transmission frequency is approximately 15% in the first trimester, 30% in the second trimester, and 60% in the third trimester.[6] Exposure to infection acquired in the first trimester causes more severe congenital toxoplasmosis, with fetuses exposed in the third trimester most likely to be asymptomatic. However, although most infected infants are asymptomatic at birth, some studies have shown that up to 90% of affected infants show symptoms later in life, including visual impairment, hearing loss, and developmental delays.[7] These infants require treatment to prevent manifestations later in life. Transmission can be decreased by antenatal treatment, and appropriate therapy should be initiated for suspected fetal infection.

DIAGNOSIS

Diagnosis can be made by testing maternal serum for antibodies. Initial testing should measure IgG and IgM antibodies. If both are negative, infection has not occurred. A negative IgM result with a positive IgG result during the first or second trimester often indicates an infection that predated the pregnancy; this is also likely in the third trimester but the infection could have occurred early in pregnancy with the IgM level decreased to undetectable levels.[8] A positive IgM result with or without IgG to *Toxoplasma* requires further testing to determine the status of the infection. IgM antibodies may represent false-positive results or chronic or past infection, because they can persist for 1 year or more.[9] Serum antibody screening for toxoplasmosis can have high false-positive and false-negative rates with inconsistent standardization across facilities.[10,11]

Up to 60% of patients positive for IgM in the community have results inconsistent with recent infection on confirmatory testing at the reference laboratory.[12] Therefore, confirmation is important before consideration of elective termination of pregnancy. In one study, confirmatory testing decreased the rate of abortion from 17.2% to 0.4%.[12]

Confirmatory testing consists of the *Toxoplasma* serologic profile, performed at reference laboratories such as the Toxoplasma Serology Laboratory of the Palo Alto Medical Foundation. The panel of tests available includes the Sabin-Feldman test, the differential agglutination test, IgG avidity, and enzyme-linked immunosorbent assay (ELISA) for IgM, IgE, and IgA.