Susceptibility of Pregnant Women to Toxoplasma Infection – Potential Benefits for Newborn Screening

INTRODUCTION

Primary infection with Toxoplasma gondii, toxoplasmosis, in an immunocompetent individual is usually asymptomatic. However, if acquired during pregnancy, transmission to the foetus can occur with potentially adverse outcome. Only 10% of infants infected in-utero are symptomatic at birth and infection often remains undetected in infancy. The most common clinical sequel of CT, chorioretinitis, eventually manifests in >80% of those infected. Information on the frequency and distribution of T. gondii infection in a population is a necessary prerequisite to evaluate the benefits of screening and preventative measures. The true prevalence of Toxoplasma antibody in women of childbearing age in Ireland is unknown.

METHODS

A systematic sample of blood spots was taken from cards referred to the National Newborn Screening Laboratory over a 1 year period. Sampling was anonymous and unlinked. Blood spot discs were stratified by county of maternal residence only. Blood was eluted from each spot and a modified latex agglutination test was used to detect all classes of Toxoplasma antibody. Positive and negative blood spots were used as controls. The prevalence of Toxoplasma antibody was estimated for all of Ireland and for each county. Ninety-five per cent confidence intervals were calculated for the national rate and for each county.

RESULTS

A total of 20,252 cards were tested which represented 40.2% of registered live births in 1 year. 4,991 (24.6%) cards tested positive for Toxoplasma antibody. The mean seroprevalence in Ireland was 25%, ranging by county from 19.9% to 41.3% indicating that a significant majority of women of childbearing age remain susceptible to Toxoplasma infection in pregnancy. Toxoplasma antibody prevalence was found to be above the mean in 6 counties and below the mean in county Dublin. Percentages of antibody screens for each county were similar and average maternal age was similar throughout the country. (Data not shown).

DISCUSSION

Primary T. gondii infection during pregnancy exposes the foetus to the possibility of congenital infection. Transmission risk to the foetus varies with gestational age. First trimester infection is associated with >25% transmission with neurologic and ocular sequelae in 75%. Third trimester infection is associated with >60% transmission but adverse sequelae in <9.3% Most infants in the latter group will be asymptomatic at birth; some may display sub-clinical disease on further evaluation. Without treatment, CT is a recurrent disease that may reactivate and progress at any time. By age 20, up to 85% of CT infants have had unilateral or bilateral chorioretinitis. The morbidity and mortality burden that accompanies confirmation of congenital toxoplasmosis is substantial. Diagnosis and treatment of CT in the first year of life has been documented and may reduce the incidence of late retinochoroidalitis and progression of intracranial calcification.

Figure 1: Counties in the Republic of Ireland with Toxoplasma seroprevalence significantly above or below the national average.

This study demonstrates that in Ireland 75% of pregnant women are Toxoplasma non-immune and potentially at risk of acute toxoplasmosis. The geographical variation in seroprevalence suggests that the risk of exposure to Toxoplasma may vary in different parts of Ireland and is in part explained by urban-rural differences. The true rate of CT in Ireland can only be determined by nationwide newborn screening. The utility of screening programs for toxoplasmosis, either during pregnancy or postnatally remains controversial due to absence of standardized management protocols and limited long term monitoring studies of congenitally infected infants. In a metaanalysis of individual patient data, Thiebaut et al found no convincing evidence of benefit of prenatal screening programs in preventing CT. Postnatal diagnosis and treatment has been associated with improved long term infant outcome, and newborn CT screening programs have been successfully employed in various countries with encouraging results.

A newborn screening program based on detection of Toxoplasma specific IgM antibody in serum eluted from newborn screening cards will identify 85% of cases of CT. Screen positive infants require serologic confirmation in parallel with maternal serology. Screening in the newborn period facilitates early diagnosis of both asymptomatic and symptomatic infants. Treatment is confined to the initiation of specific anti-toxoplasmosis treatment, but importantly identifies this vulnerable group of infants who require detailed clinical evaluation and newborn CT screening programmes have been successful in many countries with encouraging results.
References


