

# Infections, inflammations and HIV

Kate M. Park and Catherine M. Owens

## Congenital infections

The imaging features of congenital infections (sometimes called the STORCH or TORCH infections: Syphilis, Toxoplasmosis, Other, Rubella, Cytomegalovirus and Herpes simplex) differ from those seen in older children and adults as the insult occurs while the nervous system is still developing. The manifestations largely depend on the fetal age at the time of infection and the severity of the infection. Generally, infections within the first two trimesters lead to congenital malformations, and those in the third trimester lead to destructive lesions.

Viral infections are usually transmitted transplacentally but can be acquired from the birth canal at birth. Bacterial infections usually ascend from the cervix.

### Syphilis

*Treponema pallidum* infection is acquired transplacentally, usually in the second or third trimester. Most neonates are asymptomatic in the first few weeks of life and, of these asymptomatic neonates, 20% will have metaphyseal abnormalities on plain film.

Neurological symptoms may develop within the first two years of life. The main neuropathological finding is an inflammatory infiltration of the leptomeninges, which is seen as enhancement of the affected leptomeninges on imaging studies. The infiltrate may extend into the cerebral parenchyma and appear as an enhancing parenchymal mass or cause arterial narrowing which can lead to cerebral infarction.

### Toxoplasmosis

*Toxoplasma gondii* is a protozoan usually acquired by pregnant women through ingestion of oocytes in undercooked meat. One in 1000–3500 live births are affected. The majority of neonates are asymptomatic at birth, and the infection may be generalized or purely nervous system related. The prognosis without treatment is poor. Neuropathologically, there is diffuse inflammatory infiltration of the meninges and hydrocephalus is common.

Severe infections in the second trimester can lead to hydranencephaly or porencephaly, but cortical malformations such as polymicrogyria are uncommon, unlike in cytomegalovirus infection.

The imaging features vary widely, with more severe abnormalities seen in cases of earlier insult. Cross-sectional imaging commonly demonstrates calcification, usually affecting the basal ganglia, periventricular regions and cerebral cortex, microcephaly, large ventricles and hydrocephalus. The calcification may resorb with appropriate treatment.

## Other: varicella-zoster virus, lymphocytic choriomeningitis virus, human immunodeficiency virus

### Varicella-zoster virus (VZV)

VZV is rare in pregnancy, and in the majority of cases no significant harm comes to the fetus. Infection prior to 20 weeks gestation may lead to spontaneous abortion. Reported MRI features include hydrocephalus and cerebellar aplasia or destruction of the temporal and occipital lobes with ventricular dilatation and normal cerebellum, basal ganglia and parietal lobes.

### Lymphocytic choriomeningitis virus (LCM)

LCM is an arenavirus found throughout temperate regions of Europe and North America. Infection is either through contact with affected rodents or via infected pets. The incidence is unknown and probably underrecognized. Infection in the first trimester leads to spontaneous abortion. Infection in the second and third trimesters leads to a clinical and imaging picture resembling those in toxoplasmosis and CMV.

### Human immunodeficiency virus (HIV)

In untreated HIV-positive mothers, the perinatal infection rate is 30%, compared with 2% when treated with maternal antiretrovirals and cesarean section with avoidance of breastfeeding. CNS disease is seen in 20–60% of infected children. Neurological