

Possible Infections in Pregnancy and Important Preventions to Reduce the Risk of Transmission to the Fetus

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Objectives

- Learn about possible infections in pregnancy that can cause complications to the fetus or newborn
- Learn about important preventions for infections in pregnancy
- Learn about possible risks to the fetus from infections passed by the mother
- Learn about possible treatments and strategies to reduce the risk of transmission of certain infections

Overview of Content

- Viral Infections
 - Parvovirus
 - Cytomegalovirus
 - Varicella Zoster
 - Rubella
- Bacterial Infections
 - Listeriosis
- Parasite Infections
 - Toxoplasmosis

Parvovirus B19

Parvovirus B19

- Single stranded DNA virus
- Infects only humans
 - Other strands of Parvovirus infect dogs and cats
- Most commonly causes Fifth's Disease (slapped cheek) in children
- Incubation period: 5-10 days after exposure prior to onset of rash or other symptoms
 - No longer infectious with onset of rash

Transmission of Parvovirus B19

- Respiratory secretions and hand-to-mouth contact
- Risk of transmission of virus is greater when exposed by a household member (50%) than with exposure in a child care setting or classroom (20-50%)

Transmission of Parvovirus B19 to Fetus

- Transplacental transmission as high as 33%
- Recent infection constitutes a low risk for fetal disease
- About 50% of pregnant women are already immune to the disease

Symptoms of Parvovirus B19

- Mostly asymptomatic (33%) or mild
- Rash on trunk and joint pain
- Can cause severe anemia
- In children, “slapped cheek” rash with fever, runny nose, headache



Complications of Congenital Infection with Parvovirus 19

- Miscarriage
 - 2-9%
- Severe anemia
- Swelling and fluid around fetus
 - Unlikely to develop if it has not occurred by 8 weeks after infection
- Stillbirth
 - Occurs from 1-11 weeks after maternal infection
- Long-term development appears to be normal in fetuses that do not succumb to the disease

Prevention of Parvovirus B19

- Avoidance of known infected persons if mother is not immune and not currently infected
- Remember..... 20% of infected persons are asymptomatic and those with infection are infectious before they develop symptoms. Therefore, it is not routinely recommended to exclude high risk groups from work environments during outbreaks of Parvovirus B19

Testing for Parvovirus B19

- Blood test for Antibodies
- Frequent prenatal visits to check for growth and well being
- Recommend evaluation by a Perinatologist to screen for anemia and growth with frequent ultrasounds
- Fetal specimens can be tested as well (amniotic fluid, placenta, blood, autopsy tissue)

Treatment of Parvovirus B19

- Supportive care only

Cytomegalovirus

Cytomegalovirus (CMV)

- Most common congenital infection: 0.2-2% of all neonates
- Leading cause of congenital hearing loss
- Incubation Period: 28-60 days, mean = 40 days
- In U.S., 50-80% of women are infected with CMV by 40yo
- Prevalence in pregnant women:
 - Primary infection = 0.7-4%
 - Recurrent infection = 13.5%

Transmission of CMV

- Contact with infected blood, saliva, urine, or by kissing and sexual contact (most common)
- Not highly contagious
- Some groups are at higher risk
 - Child-care workers
 - Families with young children
 - Increasing parity

Transmission of CMV to fetus

- Vertical Transmission may occur after primary or recurrent CMV infection, exposure to contaminated genital tract secretions during childbirth, or breastfeeding
 - Transmission may occur at any stage of pregnancy
 - Greatest during 3rd trimester
- More fetal sequelae occur with infection during 1st trimester
- Risk of transmission to the fetus:
 - Primary infection = 30-40%
 - Recurrent infection = 0.15-2% (risk of severe infection is also lower)
- Of those infected in utero following a primary infection, 30% of severely infected infants = fetal death
 - 80% of the survivors = severe neurologic morbidity

Symptoms of CMV Infection

- Adults are generally asymptomatic
- Mononucleosis-like syndrome, elevated WBCs and lymphocytes, abnormal liver function tests, fever, malaise, muscle pain, and chills

Signs and Symptoms of Congenital CMV Infection

- 90% of infants born with CMV infection appear healthy at birth
 - Health problems or disabilities may appear 2 or more years after birth
 - 80% never develop symptoms or disabilities
- Signs of CMV infection that may be present at birth:
 - Premature birth
 - Liver, lung, spleen problems
 - Small size at birth
 - Small head size
 - Seizure
 - Jaundice, red spots on skin, low platelets, and swelling or fluid in fetus
- Permanent health problems or disabilities due to congenital CMV infection:
 - Hearing and vision loss
 - Mental disabilities
 - Small head size
 - Lack of coordination
 - Seizures
 - Death (rare)

Prevention of CMV

- Wash your hands often with soap and water for 15-20 seconds, especially after
 - changing diapers
 - feeding a young child
 - wiping a young child's nose or drool
 - handling children's toys
- Do not share food, drinks, or eating utensils used by young children
- Do not put a child's pacifier in your mouth
- Do not share a toothbrush with a young child
- Avoid contact with saliva when kissing a child
- Clean toys, countertops, and other surfaces that come into contact with children's urine or saliva
- Avoid IV drug use and sharing of needles

Testing for CMV Infection

- Pregnancy
 - Not routinely recommended
 - A single test cannot entirely rule out primary infection
- Infants
 - Antibody testing within first 2-3 weeks of life on infected urine, saliva, blood, or other body tissues
- Babies infected *after* birth are generally not at risk for problems unless they were born very prematurely or with very low birth weight
- Ultrasound abnormalities can be detected on infected fetuses and this generally indicates a much poor prognosis

Treatment for CMV Infection

- Pregnant Women:
 - None!
- Infants born with CMV Infection:
 - Regular hearing and vision checks
 - **Ganciclovir** (antiviral drug)
 - May prevent hearing loss and developmental outcomes in infants born with symptomatic congenital CMV infection with central nervous system involvement.
 - Serious side effects so only tested in severe cases
 - Vaccine has been developed – reluctance to use

Varicella Zoster Virus

Varicella Zoster Virus (VZV)

- DNA virus
- Highly contagious
- Incubation period after infection = 10-20 days; mean = 14 days
- Period of infectivity begins 14 days before rash appears and lasts until vesicles crust over
- Remains dormant in nerves after primary infection and can be reactivated later in life
- Infection causes lifelong immunity
- Usually benign and self-limited in children

Transmission of VZV

- Respiratory droplets or close contact

Transmission of VZV to the Fetus

- Transmitted across the placenta

Symptoms of VZV Infection

- Primary infection
 - Fever, malaise, and itchy rash that becomes vesicular
 - In adults over age 20, symptoms are more severe and account for 55% of varicella-related deaths in spite of accounting for less than 5% of varicella cases overall
 - Encephalitis
 - Pneumonia
- Reactivation of infection
 - Painful, red skin rash known as herpes zoster (Shingles)

Risks to Pregnant Women

- Uncommon in pregnancy (0.4 to 0.7 per 1000 pts)
- VZV pneumonia – life threatening!
 - Risk factors
 - Smoking
 - Steroid use
 - Chronic obstructive pulmonary disease
- Susceptible pregnant women with a significant exposure should receive varicella zoster immune globulin (VZIG)

Complications of Congenital Varicella Infection

- Congenital Varicella Syndrome
 - Limited to exposure during first 20 weeks of pregnancy
 - Uncommon (2%)
 - Skin scarring, limb defects, inflammation of part of the eye, and small head
- Neonatal Chickenpox
 - High death rate when maternal disease develops from 5 days before delivery up to 48 hours after delivery
 - Administer varicella zoster immune globulin immediately after delivery

Prevention of VZV Infection

- Women should receive the chickenpox vaccine at least 30 days before becoming pregnant
- Women should not receive the chickenpox vaccine within 30 days of pregnancy or during pregnancy
- As soon as a pregnant woman who is not protected against chickenpox delivers her baby, she should be vaccinated against chickenpox. The first dose of vaccine can be given before she leaves the hospital, and the second dose at the 6-8-week post-partum visit
- Vaccine is safe when breastfeeding
- If a pregnant woman is not protected against chickenpox, people who live with her should be protected
- Pregnant women should stay away from anyone who has chickenpox. "Breakthrough" chickenpox (usually little or no fever and fewer than 50 skin lesions – "mild" chickenpox in a previously infected person) is still contagious.

Testing for VZV Infection

- Usually diagnosed clinically
- Can confirm with culture of vesicular fluid or blood test

Treatment for VZV Infection

- Oral acyclovir for uncomplicated cases
- Hospital admission and IV acyclovir for complicated cases

Rubella

Rubella

- Caused by a togavirus
- Also called “German Measles”
- Most cases of Congenital Rubella syndrome are in foreign-born mothers
- Spread by contact with an infected person, through coughing and sneezing

Rubella Symptoms

- Rubella usually causes the following symptoms in children that last 2 or 3 days:
 - Rash that starts on the face and spreads to the rest of the body
 - Low fever (less than 101 degrees)
- Older children and adults may also have swollen glands and symptoms like a cold before the rash appears. Aching joints occur in many cases, especially among young women.
- About half of the people who get rubella do not have symptoms.

Vertical Transmission of Rubella

- 90% of infants born to mothers infected during first 11 weeks of gestation will develop Congenital Rubella Syndrome (CRS)
- Rate of 20% of those born to infected women in the first 20 weeks of gestation
- Infants infected late in gestation do not have CRS but can shed the virus
- Can also cause miscarriage and fetal death

Congenital Rubella Syndrome

- Deafness
- Cataracts
- Heart defects
- Mental retardation
- Liver and spleen damage
- Pneumonia



Prevention of Rubella

- Ideally, all reproductive age women should have a test to confirm immunity to Rubella before they consider pregnancy
- Susceptible women should be vaccinated and continue contraception for 1-3 months
- If a susceptible woman is already pregnant, she can be vaccinated in postpartum period – no contraindication to breastfeeding

Listeria

Listeria

- *Listeria* is a type of bacteria found in soil, water, and sometimes on plants

Transmission of Listeria

- Eating contaminated food
 - Uncooked meats and vegetables
 - Unpasteurized (raw) milk and cheeses as well as other foods made from unpasteurized milk
 - Cooked or processed foods, including certain soft cheeses, processed (or ready-to-eat) meats, and smoked seafood

Vertical Transmission of Listeria

- Transmission through placenta
- Pregnant women are about 10 times more likely than the general population to get *Listeria* infection
- Pregnant Hispanic women are about 24 times more likely than the general population to get *Listeria* infection

Symptoms of Listeriosis

- In pregnant women, listeriosis may cause flu-like symptoms:
 - Fever
 - Chills
 - Muscle aches
 - Diarrhea
 - Upset stomach
- If the infection spreads to the nervous system, the symptoms may include:
 - Headache
 - Stiff neck
 - Confusion
 - Loss of balance
 - Convulsions

Complications of Congenital Infection to the Fetus with Listeria

- Premature delivery
- Miscarriage
- Stillbirth
- Serious health problems for the newborn

Prevention of Listeriosis

- Do not eat hot dogs, luncheon meats, or deli meats unless they are reheated until steaming hot.
- Avoid getting fluid from hot dog packages on other foods, utensils, and food preparation surfaces, and wash hands after handling hot dogs, luncheon meats, and deli meats.
- Do not eat soft cheeses such as feta, Brie, and Camembert, blue-veined cheeses, or Mexican-style cheeses such as queso blanco, queso fresco, and Panela, unless they have labels that clearly state they are made from pasteurized milk.
 - It is safe to eat hard cheeses, semi-soft cheeses such as mozzarella, pasteurized processed cheese slices and spreads, cream cheese, and cottage cheese.

Prevention of Listeriosis

- Do not eat refrigerated pâté or meat spreads.
 - It is safe to eat canned or shelf-stable pâté and meat spreads.
- Do not eat refrigerated smoked seafood unless it is an ingredient in a cooked dish such as a casserole. Examples of refrigerated smoked seafood include salmon, trout, whitefish, cod, tuna, and mackerel which are most often labeled as "nova-style," "lox," "kippered," "smoked," or "jerky."
- Do not drink raw (unpasteurized) milk or eat foods that contain unpasteurized milk.
- Use all refrigerated perishable items that are precooked or ready-to-eat as soon as possible.
- Clean your refrigerator regularly.
- Use a refrigerator thermometer to make sure that the refrigerator always stays at 40 °F or below.

Testing for Listeriosis

- Diagnosis is confirmed only after isolation of *Listeria monocytogenes* from blood, spinal fluid, or amniotic fluid/placenta cultures
- A negative culture does not rule out infection in the presence of strong clinical suspicion

Treatment of Listeriosis

- If you have eaten food contaminated with *Listeria* and *do not have any symptoms*, most experts believe you don't need any tests or treatment, even if you are pregnant
- However, if you are pregnant and have eaten the contaminated food, and within 2 months experience flu-like symptoms, antibiotics are given to treat listeriosis. In most cases, the antibiotics also prevent infection of the fetus or newborn
- Antibiotics are also given to babies who are born with listeriosis

Toxoplasma Gondii

Toxoplasma Gondii

- Single celled parasite found throughout the world
- More than 60 million people in U.S. may be infected with very few having symptoms
- Incubation period = 5-18 days

Symptoms of Toxoplasmosis

- Flu-like symptoms with swollen lymph glands or muscle aches and pains that last a month or more
- Severe symptoms may develop in individuals with weak immune systems causing damage to brain, eyes, or other organs
- Most neonates who were infected in womb have no symptoms at birth but may develop symptoms later in life
- Small percentage of newborns have serious eye or brain damage at birth

Transmission

- Eating undercooked, contaminated meat (especially pork, lamb, or venison)
- Poor hand washing after handling contaminated meat
- Eating foods that had contact with contaminated meat
- Contaminated drinking water
- Contact with contaminated cat feces or soil
- Organ transplantation or blood transfusion - rare

Vertical Transmission of Toxoplasma

- Occurs if mother develops a primary infection during pregnancy
- Approximately 1/3 of infants born to mothers with primary infection will be affected
- Frequency of fetal infection is higher when maternal infection occurs in 3rd trimester (60-65%) than in the first trimester (15-20%)
- Severity is greater with infection during 1st trimester

Complications of Congenital Infection with Toxoplasma

- Calcifications of the brain
- Inflammation of parts of the eye
- Swelling of the brain
- Anemia
- Jaundice
- Enlarged spleen
- Generalized swelling of the lymph nodes
- Seizures
- Small head
- Mental retardation
- Hearing impairment

Prevention of Toxoplasmosis

- Cook foods to safe temperatures
 - 165F poultry
 - 160F ground meat
 - 145F whole cuts of meat
- Freeze meat for several days at sub-zero temperatures before cooking
- Peel and wash fruits and veggies thoroughly
- Do not eat raw or undercooked oysters, mussels, or clams
- Do not drink unpasteurized milk
- Wash cutting boards, dishes, counters, utensils, and hands with hot soapy water after contact with raw meat, poultry, seafood, or unwashed fruits and veggies
- Wear gloves when gardening or during contact with soil or sand and wash hands afterwards
- Teach children about importance of washing hands
- Pregnant women should avoid changing cat litter if possible, keep cats indoors, and should not adopt or handle stray cats, especially kittens

Testing for Toxoplasmosis

- Blood test of mother
- PCR on amniotic fluid for congenital infection
- Ultrasound findings:
 - Small fetal head
 - Enlarged brain
 - Growth restriction
 - Enlargement of organs
 - Fluid around fetus (hydrops)

Treatment of Toxoplasmosis

- Combination of drugs such as spiramycin, pyrimethamine and sulfadiazine, plus folinic acid

References

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