



# Varicella-zoster virus infection in pregnancy

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- Varicella–zoster virus is a DNA herpesvirus acquired predominately during childhood, and 90 percent of adults have serological evidence of immunity.
- Varicella is of great importance in pregnancy because it poses risks to the mother, fetus, and neonate



- VZV infection causes two clinically distinct forms of disease: **varicella** (chickenpox) and **herpes zoster**(shingles)

## Varicella

- Primary VZV infection results in the diffuse vesicular rash of varicella, or chickenpox
- Although fewer than 2 percent of reported cases of varicella infections occur among adults older than 20 years of age, almost a quarter of all VZV-related mortality occurs among this age group. Thus, pregnant women are at risk for substantial morbidity and mortality.



- If the mother acquires varicella infection during the early gestational period (weeks 8 to 20), the fetus is at risk for developing **congenital varicella syndrome** .
- This syndrome is characterized by limb hypoplasia, skin lesions, neurologic abnormalities, and structural eye damage.
- Maternal varicella during pregnancy is also associated with the subsequent development of **herpes zoster during infancy**.
- If the mother acquires varicella **immediately before or after delivery**, the baby is at risk for **neonatal varicella**, which may present with mild rash to disseminated infection.



# Herpes zoster

- Endogenous reactivation of latent VZV typically results in a localized skin infection known as herpes zoster, or shingles. Maternal herpes zoster infection is not associated with a significant risk of congenital varicella syndrome.



# Maternal varicella

- Although the incidence of varicella is not higher in pregnant compared to nonpregnant adults, **disease severity appears to be increased.**
- Varicella pneumonia is often estimated to complicate 10 to 20 percent of maternal infections.
- Risk factors for varicella pneumonia during pregnancy include a history of smoking and having greater than 100 cutaneous vesicles.



# Congenital varicella

- The incidence of congenital abnormalities was 0.4 percent if maternal infection occurred before the 12th week of pregnancy.
- The risk increased to approximately two percent if maternal infection occurred **between weeks 13 and 20**.
- Some features include chorioretinitis, microphthalmia, cerebral cortical atrophy, growth restriction, hydronephrosis, limb hypoplasia, and cicatricial skin lesions , microcephaly, ventriculomegaly, echogenic foci in the fetal liver



# Clinical features of congenital varicella syndrome

- Cutaneous scars in a dermatomal pattern
- Neurological abnormalities (mental retardation, microcephaly, hydrocephalus, seizures)
- Ocular abnormalities (optic nerve atrophy, cataracts, chorioretinitis, microphthalmos, nystagmus)
- Limb abnormalities (hypoplasia, atrophy, paresis)
- Gastrointestinal abnormalities (gastroesophageal reflux, atretic or stenotic bowel)
- Low birth weight





# TRANSMISSION

- **Person to person**
- Patients are infectious from one to two days prior to this rash until the lesions are crusted over.
- Varicella is usually transmitted by infected secretions harbored in the nasopharyngeal mucosa by droplets onto the conjunctival or nasal/oral mucosa.
- Other mechanisms include direct contact with vesicular fluids that contain virus.
- Susceptible persons can also acquire varicella infection from exposure to persons with zoster, although the rates are considerably lower and usually require close exposure to open cutaneous lesions.



## Mother to infant

- Transmission can occur in utero, perinatally, or postnatally .
- Intrauterine or perinatal infection of the fetus is facilitated through transplacental transmission
- Postnatal varicella is transmitted through respiratory droplets or direct contact with someone with varicella.
- Passage of varicella-zoster virus to the fetus during zoster is rare due to preexisting maternal antibody to VZV and to the generally lower levels of viremia that accompany reactivation of VZV infection.



# Varicella pneumonia

- The most common clinical manifestation of complicated varicella infection in pregnancy is varicella pneumonia.
- The predominant signs and symptoms of varicella pneumonia in pregnancy are cough, dyspnea, fever, and tachypnea
- The pneumonia usually develops within one week of the rash.
- The clinical course is unpredictable and may rapidly progress to hypoxia and respiratory failure.
- The chest findings include a diffuse or miliary/nodular infiltrative pattern often in the peribronchial distribution involving both lungs.



- Varicella is not generally associated with first-trimester spontaneous abortions, premature births, or intrauterine death.

## **Neonatal VZV infection**

- Neonatal varicella infection results from VZV transmission from a mother to the fetus just prior to delivery.
- Neonates born to mothers who have clinical disease within five days before to two days after delivery are at the greatest risk for severe disease and poor outcome



# DIAGNOSIS

- **Maternal varicella**
- The diagnosis of varicella infection is clinical.
- If there is doubt about the clinical diagnosis, VZV infection may be rapidly confirmed through detection of viral DNA by PCR testing of skin scrapings from the base of the vesicle or through the detection of VZV antigen by immunofluorescence.
- Serologic testing is usually not necessary for diagnosis of maternal varicella, and may be potentially confusing since the assays vary in sensitivity and specificity.



# Prenatal diagnosis

- After maternal infection, the risk of congenital varicella syndrome can be estimated using polymerase chain reaction (**PCR**) testing of fetal blood or amniotic fluid for VZV DNA in conjunction with **ultrasonography** for detection of fetal abnormalities .
- A detailed anatomic ultrasound evaluation should occur at a minimum of five weeks after maternal infection to assess fetal abnormalities consistent with congenital varicella syndrome ( **microcephaly, limb hypoplasia, intrauterine growth retardation** )



- Normal results of imaging and laboratory testing suggest a low risk of congenital varicella syndrome.
- A normal ultrasound with detectable VZV DNA suggests potential risk
- Repeat ultrasound at 22 to 24 weeks is indicated.
- If the repeat ultrasound is normal, the risk of congenital varicella syndrome is remote.
- If the ultrasound shows evidence of congenital varicella syndrome, the woman should be counseled regarding likely fetal disease.



# Postnatal diagnosis

- The diagnosis of congenital varicella syndrome requires the following criteria :
- History of maternal varicella infection during the first or second trimester of pregnancy
- Presence of compatible fetal abnormalities consistent with congenital varicella syndrome
- Evidence of intrauterine VZV infection
- ✓ detection of VZV DNA in the newborn
- ✓ presence of VZV-specific IgM antibodies in cord blood; persistence of VZV IgG beyond seven months of age
- ✓ appearance of clinical zoster infection during early infancy





# Treatment of varicella infection

## Uncomplicated varicella infection

- We suggest oral **acyclovir** therapy (800 mg five times per day for seven days) for all pregnant women with uncomplicated varicella.
- Acyclovir treatment was associated with faster healing of skin lesions and a shorter duration of fever, if initiated within 24 hours of symptom onset.



## Varicella pneumonia

- Varicella pneumonia during pregnancy is a medical emergency
- We recommend intravenous acyclovir (10 mg/kg every eight hours) for pregnant women with varicella pneumonia.
- Although **acyclovir** crosses the placenta, it is unknown if this antiviral agent decreases the risk of congenital varicella syndrome



# POST-EXPOSURE PROPHYLAXIS

- **Evaluating susceptibility**
- Self-reported history of varicella among pregnant women is a powerful predictor of antibodies to varicella infection.
- VZV serologic test should be conducted prior to administration of immunoprophylaxis among those women who report no history of varicella.
- Rapid screening is necessary since prophylaxis should be offered within ten days of exposure.
- If results of serologic testing are not available within this time frame, then postexposure prophylaxis should be offered.



# Immunoprophylaxis for the prevention of maternal varicella infection

- Passive immunization with VZV-specific antibodies reduces the risk of varicella infection and also attenuates the severity of infection.
- Patients need careful follow-up for signs of infection despite passive immunization. Those who are infected despite postexposure prophylaxis should be treated for varicella infection.
- Varizig(**varicella-zoster immune globulin**) is a purified human immune globulin preparation made from plasma containing high levels of anti-varicella antibodies.
- Varizig should be administered intramuscularly as soon as possible within 10 days of exposure .



## Intravenous immunoglobulin

- For pregnant women who cannot receive Varizig within 10 days of exposure, clinicians may choose
  - ✓ Administer a single dose of intravenous **immune globulin** (IVIG) at 400 mg/kg or
  - ✓ An alternative is to administer oral acyclovir (800 mg, five times daily for 7 days) or oral valacyclovir (1000 mg, three times daily for 7 days).



# Immunoprophylaxis for the prevention of congenital varicella syndrome

- Due to the rarity of congenital varicella syndrome, there are no definitive data that immunoprophylaxis prevents embryopathy among women who develop varicella despite prophylaxis.
- The primary reason to offer immunoprophylaxis to all VZV-exposed pregnant females is to decrease the risk of maternal infection and maternal morbidity .
- VZIG should be administered to neonates born to mothers who have clinical evidence of varicella 5 days before and up to 2 days after delivery.



- The manifestations of neonatal varicella include disseminated mucocutaneous lesions, visceral infection, pneumonia, and encephalitis .
- Infants born during this window of time must avoid contact with vesicular lesions on the mother's skin.
- They should receive immunoprophylaxis with VariZIG or treatment with antiviral agents such as acyclovir or valacyclovir.



# Vaccination

- An attenuated live-virus vaccine is recommended for nonpregnant adolescents and adults with no history of varicella.
- The vaccine is not recommended for pregnant women or for those who may become pregnant within a month following each vaccine dose.
- The attenuated vaccine virus is not secreted in breast milk. Thus, postpartum vaccination should not be delayed because of breastfeeding.





## **Contraindications to the vaccine include :**

- pregnancy, an immunodeficiency disorder, high-dose corticosteroid therapy, untreated tuberculosis, severe systemic illness, and an allergy to neomycin, which is one component of the vaccine.

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