DISEASES TRANSMITTED THROUGH PLACENTA
(BACTERIAL & VIRAL)

prepared by: Esraa Al-Taweel
Supervised by: Dr. Manal Badoor
**Introduction:**

Infection in pregnancy carries a risk to the mother, but even more to her fetus or newborn infant. The fetus and the neonate are especially vulnerable to infection, probably because of the immaturity of the immune system and other defense mechanisms. Viruses pose the greatest risk but bacterial infections, especially in the neonatal period, can be life threatening and require prompt diagnosis and treatment.

**Transmission:**

1- **In utero:**
   - many viruses and bacteria cross the placenta, possibly through infecting it, and invade the tissues and organs of the fetus.

2- **Intrapartum:**
   - during the passage of the infant through the birth canal, organisms can be acquired from infected or colonized maternal genital tissues.

3- **Postpartum:**
   - infection can be acquired in the neonatal period from mother via(e.g. breastfeeding)

**Note:** both intrapartum & postpartum transmission cause **Neonatal infection**.
### Virus infection in pregnancy

<table>
<thead>
<tr>
<th>Virus</th>
<th>In utero</th>
<th>Neonatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rubella</td>
<td>Congenital rubella</td>
<td>No</td>
</tr>
<tr>
<td>Varicella/zoster</td>
<td>Congenital varicella</td>
<td>Severe varicella</td>
</tr>
<tr>
<td>Herpes simplex</td>
<td>Rare</td>
<td>Severe generalized infection</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td>Cytomegalovirus inclusion disease</td>
<td>No</td>
</tr>
<tr>
<td>Parvovirus B19</td>
<td>Non-immune hydrops fetalis</td>
<td>No</td>
</tr>
<tr>
<td>HIV</td>
<td>Fetal infection</td>
<td>Neonatal infection</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Rare</td>
<td>Carrier state</td>
</tr>
<tr>
<td>Enterovirus</td>
<td>No</td>
<td>Generalized infection</td>
</tr>
</tbody>
</table>

**Congenital infection:**

**1- Rubella:**
The congenital rubella syndrome consists of generalized infection with a triad of congenital anomalies- cataracts, heart defects & deafness; mental retardation. Babies asymptomatic at birth may develop a significant degree of deafness in later childhood.
2- Parvovirus B19

Has strong tropism for dividing erythrocyte progenitor cells in the bone marrow, causing aplastic crisis, e.g. in sickle cell disease. Infection in utero does not give rise to congenital defects. But can cause severely anaemic fetus, with gross oedema & congestive cardiac failure (non-immune hydrops fetalis).

**Note:**
Rubella & B19 infection especially in early pregnancy cause an increased incidence of spontaneous abortion.

3- Cytomegalovirus:

Maternal infection with Cytomegalovirus is not uncommon in pregnancy, but much more dangerous to the fetus if infection is primary. The majority of affected babies are asymptomatic at birth, but around 7% have severe generalized infection (also known as cytomegalic inclusion disease).

**Note:**
Congenital cytomegalovirus infection also differs from rubella in that the virus has a destructive effect on fetal tissue, rather than the teratogenicity of rubella virus.
4-Varicella

Congenital varicella can be a complication of maternal varicella: affected infants have signs of generalized infection, including limb hypoplasia, cicatrices (skin scars) & cerebral & psychomotor retardation. Varicella is occasionally unusually severe in pregnant women.

5-HIV:
Can be transmitted in utero, although perinatal infection is more common.

Rare:
Hepatitis B & herpes simplex virus type 1&2 can cross placenta & infect in utero, causing severe generalized infection infection with visceral & CNS involvement in the case of herpes simplex, or the carrier state in the case of hepatitis B.

Neonatal infection:

The neonate can acquire infection either intrapartum during passage through the infected birth canal, or perinatally from its mother's breast milk or through close contact.
1-Varicella:
Infection may be acquired either in utero or postpartum from the mother with varicella, or postpartum from another person with varicella or zoster.

2-Herpes simplex:
Especially type 2 (but also type 1) can also cause severe generalized infection, with severe neurological damage in the neonate & often large, vesicular skin lesions. Usually transmitted from mother genital tissue during delivery.

3- HIV:
The virus can be also transmitted intrapartum perinatally by close contact with the mother; affected infants are asymptomatic at birth, but are chronically infected and have a high risk of disease later on in childhood.

4-Hepatitis B:
The child does not develop acute hepatitis B but becomes a carrier. Transmission is mainly intrapartum, but perinatal infection may also play a part.
5-Enteroviruses:
Spread to the infant may be intrapartum, but infection is usually acquired perinatally from the mother.

6-Papillomaviruses:
Are commonly transmitted during delivery: types 16 & 18 are usually symptomless in the child, but types 6 & 11 (rarely) cause juvenile laryngeal papillomas.

Management

CONGENITAL INFECTION

1- Antiviral therapy & passive immunization cannot generally be used to treat the fetus in utero. But passive administration of virus-specific immunoglobulin to the newborn child at birth can prevent or modify infection from a mother with primary varicella near the time of delivery, or prevent transmission of hepatitis B from an e-antigen positive carrier mother.
2- Mothers infected with HIV should be treated with appropriate antiretroviral therapy during & after pregnancy.

NEONATAL INFECTION:
Should be treated with the appropriate antiviral drug- such as acyclovir, which is well tolerated by infants.
Bacterial infection in pregnancy

In contrast to viruses, few bacteria are capable of crossing the placenta to infect the fetus in utero.

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Congenital</th>
<th>Neonatal</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>T. pallidum</em></td>
<td>Congenital syphilis</td>
<td>No</td>
</tr>
<tr>
<td><em>Listeria monocytogenes</em></td>
<td>Fetal death, severe disease</td>
<td>Meningitis, septicaemia</td>
</tr>
<tr>
<td><em>N. gonorrheae</em></td>
<td>No</td>
<td>Ophthalmia neonatorum</td>
</tr>
<tr>
<td><em>C. trachomatis</em></td>
<td>No</td>
<td>Conjunctivitis, pneumonia</td>
</tr>
</tbody>
</table>

1- **SYPHILIS**:  

Transmission of syphilis (*Treponema pallidum*) from mother to fetus is more likely if the women becomes pregnant during the first year of her infection.  

**Clinical Features:**  
Abortion or stillbirth if the congenital syphilis is acquired very early in mother's disease.
1-Latent infection:

more than half of the infants have no symptoms—but they are serologically positive.

2-Early:

up to the end of second year of life.

3-Late:

manifestation appear after the second year of life.

**PREVENTION & TREATMENT:**

Fetal infection is unlikely to occur if the mother’s infection is detected and treated before the fourth month of pregnancy. Follow-up of the infant is essential in case the infection has become latent.

A single treatment with penicillin is curative for primary secondary syphilis, and no antibiotic resistance has been reported. In cases of patient sensitivity to penicillin, alternate therapy with erythromycin or tetracycline may also be effective.

2-Listeriosis:

The causative organism, *Listeria monocytogenes*, is widely distributed in nature: in soil, silage, water and a wide range of animals.
CLINICAL FEATURES:

Listeriosis contracted in early Pregnancy results in maternal bacteraemia, which can cross the placenta to result in abortion or stillbirth.

PREVENTION & TREATMENT:

Ampicillin with gentamicin are effective drugs to treat bacteraemia. Recognition of risk in pregnancy and advice given to avoid soft cheeses and cook-chilled foods has significantly reduced the incidence of listeriosis in pregnancy.

SEXUALLY TRANSMITTED DISEASES

1- Neisseria gonorrhoeae

cause ophthalmia neonatorum, a rare conjunctival infection of the neonate acquired from the maternal genital tract during birth.

Prevention:

Instillation of 1% silver nitrate solution in to the eyes at birth.

2- Chlamydia trachomatis:

an obligate intracellular bacterium and the cause of the most common sexually transmitted disease. Intrapartum infection of the infant occurs from maternal infection of the cervix; the main infection seen is neonatal ophthalmia- apurulent conjunctivitis which responds to treatment with erythromycin.
**TREATMENT:**
Azithromycin & Tetracyclines are currently the drugs of choice.

References:

1-Notes on Medical Microbiology. (Morag C.Tumbury, A.Christine McCrtney, Bishan Thakker, Katherine N.Ward)

2-Lippincotts Illustrated Reviews on Microbiology.

3-Internet sites.