

OBSTETRICS AND GYNECOLOGY

(12) PERINATAL INFECTIONS IN PREGNANCY

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Objectives:

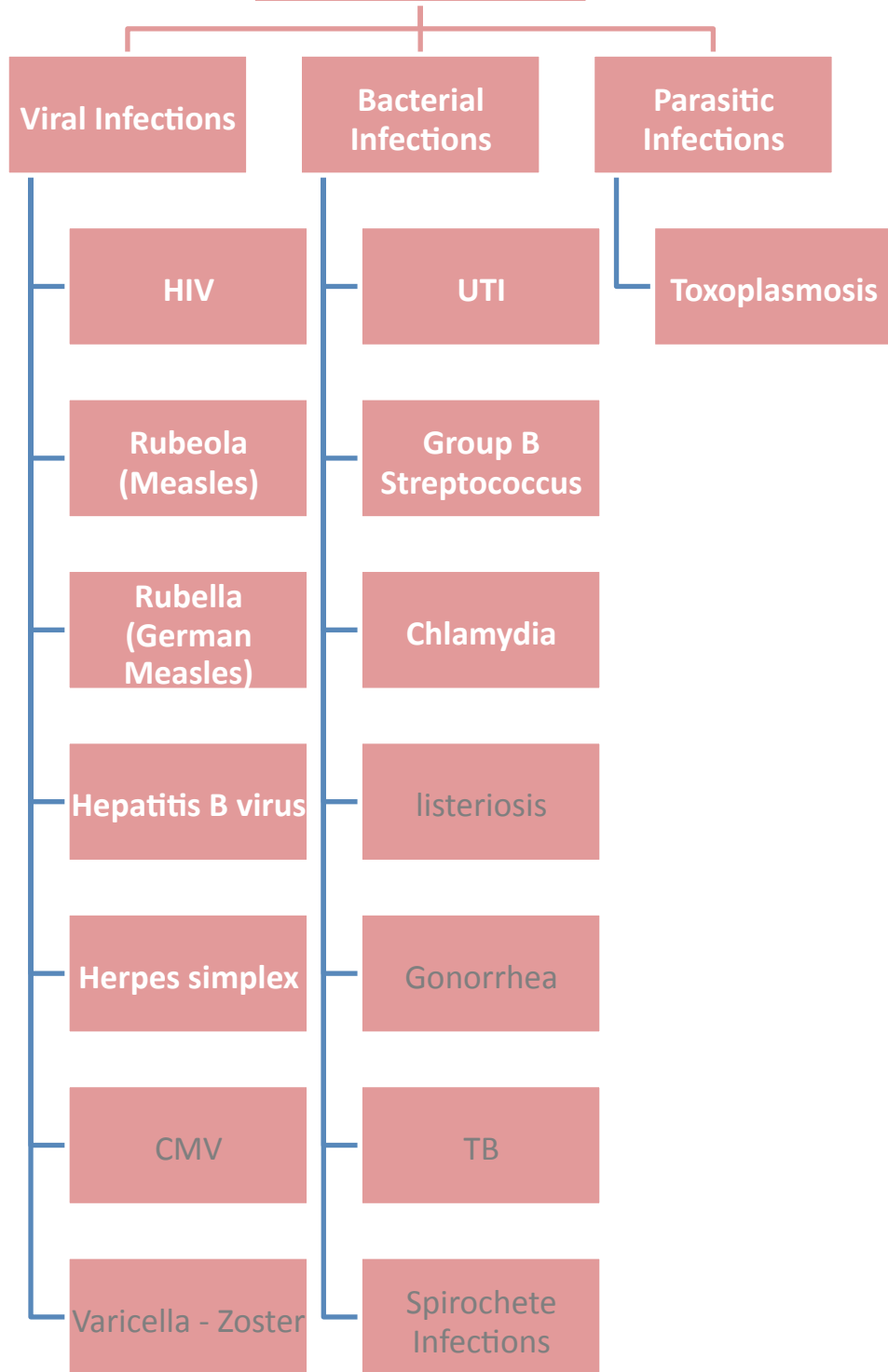
Aim:

To study of the different aspects of infectious diseases in pregnancy which can cause neonatal and maternal morbidity and mortality.

Objectives:

- **Identify different infectious diseases that can occur in pregnancy.**
- **Study their incidences, diagnosis, mode of transmission, course of the diseases, treatment and prognosis.**
- **Effect of these infectious diseases on pregnancy and impact of pregnancy on the course of the disease.**
- **Prevention.**

Perinatal Infections



Viral infections: 1) Acquired Immunodeficiency Syndrome

- HIV is an RNA **retrovirus**
- **Retrovirus**: is a virus that has an enzyme called reverse transcriptase, that transcribes their RNA into DNA (other viruses usually transcribe RNA from DNA).
- Modes of infection: (**body fluids**) Infected Blood, infected body secretions and **Maternal – infant spread**.
 - residual effect after primary infection : lifelong latency

INCIDENCE:

- In USA about 78% of newly diagnosed women acquire this virus through heterosexual intercourse, 20% via contaminated needle and the remaining cases by maternal-child transmission.
- **70%** of HIV infected women were diagnosed between 25-44 years old (**sexually active group**).

LABORATORY DIAGNOSIS OF HIV INFECTION:

Some tests detect antibodies, some detect antigens and other tests culture the virus itself. The least accurate test is the one that detects the antibodies because cross-reactions with other antibodies are possible. However, they are still used for diagnosis (Ex: ELISA).

- Enzyme linked immunosorbent assay (ELISA).
- Western blot.
- Immunofluorescent assay.
- Indirect serology with capture ELISA (p24 antigen test).
- Direct tissue culture identification.
- HIV DNA polymerase chain reaction

NEWBORN DIAGNOSIS:

- Newborns delivered by HIV-infected mothers will acquire HIV **IgG antibodies** via transplacental passage.
- They remain IgG antibodies positive for **18 months**. Therefore, **testing for IgG antibodies is not useful in diagnosing HIV in early infancy** (use culture or PCR instead).

- Diagnosing HIV in infancy is made using:
 1. Polymerase chain reaction
 2. HIV culture.
 3. P24 antigen test.
- **If 2 or more tests are positive, infection is confirmed.**
- It may need up to 4 months for the tests to be positive, depending on the timing of neonate infection (in utero VS delivery infection).

Because the incubation period can last up to 10 years -depending on the viral load-, the recently infected baby could have a false -ve test if it was done right after the infection. So, if the baby was infected during labor and was tested right after → false -ve.

Note: If the mother did ELISA and it was positive, she needs a different test to confirm the diagnosis (either PCR or culture).

COURSE OF THE DISEASE:

- **Asymptomatic period (average is 10 years)** in adults.
- **Destruction of T4** cells by HIV and reversal of T4/T8 ratio to < 1.
- **General illness symptoms** (malaise, fatigability, anorexia, fever, weight loss, nausea).
- **Secondary cancers** (Kaposi's sarcoma, non-Hodgkins lymphoma).
- **Dementia and neuropathies.**
- **Opportunistic infections:**
 - Pneumocystis carinii pneumonia PCP
 - Tuberculosis.
 - Cryptococcal meningitis.
 - Cytomegalovirus retinitis.
 - Severe herpes.

IMPACT OF PREGNANCY ON THE DISEASE:

- **Pregnancy does not accelerate the course of HIV infections**
- They are at a higher risk for **developing opportunistic infections**, postpartum infections, antepartum urinary tract infections and sexually transmitted diseases.
- **No direct effect on neonatal outcome** i.e risks of fetal growth restriction, preterm labor or premature rupture of membranes are not increased.

- No evidence that HIV infection can result in **fetal structural anomalies**.

VERTICAL TRANSMISSION: (transmission of HIV from infected mother to her infant)

- **20-30%** of infected mothers transmit the infection to their babies. However, vertical transmission accounts for **99%** of HIV infected children
- May occur in: 1. Utero i.e. transplacental.
2. Intrapartum.
3. Postpartum.
- **> 50% of transmission occurs near or during labor.**
- No evidence indicates that the **mode of delivery affects** transmission rates. (The incidence of transmitting the disease to the fetus is the same whether it was delivered vaginally or by c-section).
- **Cesarean section is done for obstetric reasons** (Ex: placenta previa, previous c-sections) and not because of the infection itself.
- However, vertical transmission increases in:
 - Mothers with recent HIV infection.
 - Preterm labor.
 - Advanced maternal HIV disease or high viral load.
 - **Breast-feeding** increases vertical transmission by 5-20%.
- Vertical transmission is decreased around 25 – 50% by giving **antiviral Zidovudine (AZI)** during pregnancy, labor and to the neonate.

CARE OF THE PREGNANT HIV-INFECTED MOTHER:

Team Work:

- Obstetrician, Pediatrician and medical physician (infectious disease).

History:

- Risk factors.
- Medical History: weight loss, T.B.

Examination:

- Oral cavity (thrush, leukoplakia).
- Fundus – Retinitis.
- LN, liver, spleen.
- Pre rectal area (herpes).
- Complete neurological exam.

Investigations:

- CBC – differential count (to detect neutropenia).
 - Platelets.
 - Liver function test.
 - T4, cell, T4/T8 ratio.
 - Screen for other infectious diseases, e.g. T.B, Rubella, syphilis, toxoplasmosis etc.
 - Pneumocystis carinii pneumonia (PCP).
 - Cervical culture for: chlamydia, gonorrhea and yeast.
- Prophylaxis against (PCP) with **trimethoprim-sulfamethoxazole (Bactrim)** is indicated if the mother's T4 ↓ below 200 cells/ μl.
- **Invasive procedures such as (amniocentesis, fetal scalp electrode etc.) should be avoided if possible → because they increase the risk of fetal infection.**

2) RUBEOLA (MEASLES):

CLINICAL MANIFESTATIONS:

- Caused by a paramyxovirus.
- Spreads by direct or indirect contact with **respiratory secretions**.
- It is communicable from **4 days before to 7 days** after the onset of the rash.

- Incubation period is 10 days.

DIAGNOSIS:

Diagnosis is made primarily by **clinical presentation**.

LAB:

- Identification of Rubella **IgM** (acute) antibodies 5-10 days after the onset of **the rash** and lasts up to 3 months.
- IgG stays for life (chronic).

IMPACT ON FETUS AND PREGNANCY:

- Most women get immune either by vaccination or solid immunity **(from the community)**.
- If the mother gets infected during pregnancy, the fetus can get infected by **transplacental** viral transmission.
- Measles vaccine is **a live attenuated virus**, therefore it is contraindicated in pregnancy **(because of possible activation of the virus)**.

MATERNAL INFECTION:

- ↑ **Rate of spontaneous abortion.**
- **Preterm labor and low birth weight**
- **Post-natal acquired measles is usually a mild disease.**

3) RUBELLA (GERMAN MEASLES):

CLINICAL MANIFESTATIONS:

- It is caused by RNA togavirus transmitted through the respiratory tract.
- Incubation period is 14-21 days.
 - **residual effect after primary infection : lifelong immunity**
 - **highest fetal infection (1st trimester)**

DIAGNOSIS:

- Best made by **serological tests**.
- **IgM appear at the onset of rash and disappears by 4-8 weeks.**
- IgG appear at the onset of rash and stays for life.
- Hemagglutination – inhibiting antibodies and culture to isolate the virus in acute phase.
- **Diagnosis of perinatal rubella infection:**
 - Detection of **IgM** in cord blood.
 - Detection of **IgG** in an infant after 6 months of age.

IMPACT OF RUBELLA ON PREGNANCY:

- **The disease course is not altered by pregnancy.**
- The gestational age at which the infection occurs has the **greatest impact on the fetus.**

FETAL INFECTION CAN RESULT IN:

- Normal baby.
- Spontaneous abortion.
- Congenital rubella syndrome (CRS).



1st trimester infection

- Carries 25% risk of (CRS).
- 50% risk in the first 4 weeks.

2nd or third trimester

- Infection carries < 1% risk of (CRS).

CONGENITAL RUBELLA:

Symmetrical intrauterine growth restriction	Central nervous system involvement: <ul style="list-style-type: none">- Microcephally- Panencephalitis- Brain calcifications- Psycomotor retardation
Congenital deafness (detected after 1 year of age)	Hepatitis
Cardiac malformation: <ul style="list-style-type: none">- Patent ductus arteriosus- Pulmonary artery hypoplasia	Thrombocytopenic purpura
Eye lesions: <ul style="list-style-type: none">- Cataracts- Retinopathy- Microphthalmia	Hepatosplenomegaly

RUBELLA SCREENING:

- Should be done in pregnancy by testing maternal serum IgG level.
- Non-immune women should be vaccinated in the immediate postnatal period. (Avoid contact with infected people during pregnancy)
- **Avoid getting pregnant in the 1st three months of the vaccination.**
- **Rubella vaccination is a live-attenuated virus, therefore contraindicated in pregnancy.**
- Antibody titers (IgG levels) should be followed up 3 months after vaccination, because 20% will fail to develop antibodies.
- Rubella is not a contraindication to breast-feeding.
- **Most imp is neonatal deafness, heart diseases, cataract.**

4) Hepatitis B:

- Caused by **DNA** virus.
- **Transmitted via blood and body secretions** (e.g: milk, vaginal secretions, semen, saliva) and across the placenta.
- The infection can be asymptomatic or expressed as acute hepatitis.

INFECTED POPULATION CAN GO ON TO EITHER:

- Chronic active.
- Persistent hepatitis.

IMPACT OF PREGNANCY:

The course of disease is not altered by pregnancy.

CHRONIC ACTIVE HEPATITIS IS ASSOCIATED WITH:

- Neonatal death.
- Low birth weight.
- Risk of prematurity.

IMPACT ON PREGNANCY:

- If the mother is positive only to HBsAg → newborn has 10% risk to develop acute infection at birth.
- If mother is +ve to both HBsAg and HBeAg the infants risk ↑ to 70-90%.

MANAGEMENT:

- Liver Function test and complete hepatitis test markers should be done.
- Vaccinate her husband and household members.
- Avoid fetal scalp electrodes during labor to avoid fetal infection.
- Fetal transmission can occur during labor and postnatally.
Therefore, hepatitis immunoglobulin and hepatitis vaccine both should be given to the fetus soon after delivery.
- Hepatitis immunoglobulin (IgG) is given along with the vaccine because the fetus still doesn't have a well-developed immune system. This helps maintain the protection against HBV until the immune system develops and responds to the vaccine.
- Vaginal delivery

5) HERPES SIMPLEX:

- DNA virus
- Sexually transmitted disease (highly contagious).
- Transmitted by **intimate mucocutaneous contact**.
- **90% is caused by Herpes Simplex virus type II and 10% by type I.**

CLINICAL MANIFESTATIONS:

- Vulvar pain and tenderness.
- Inguinal lymphadenopathy.
- Generalized malaise and low-grade fever.
- Vesicles appear on the perineal skin, vulva and vestibule.

IMPACT ON PREGNANCY:

Primary genital herpes:

- Primary Herpes in pregnancy have increased the **risk of obstetric and neonatal complications**.
- Maternal infection has been associated with increased risk of **spontaneous abortions, IUGR and preterm labor**.

Recurrent Herpes:

- **4%** of infants born to mothers with recurrent infection at the time of delivery have Herpes infection.

Neonatal herpes:

Infection acquired by the infant via:-

1. Passage through an infected birth canal.
2. Ascending infection in 90% of cases.
3. Transplacental infection.
4. Close contact with an infected individual after delivery

MANAGEMENT IN PREGNANCY:

- Women with a prior history of herpes should be allowed to deliver vaginally **if no genital lesions are present at the time of labor**.

- Patients with active lesions, either recurrent or primary at the time of labor should be delivered by caesarean section.
- Mothers may breast-feed as long as no lesions are present on the breasts.
- Most common painful genital ulcer: herpes.
- Painless ulcers: syphilis.

BACTERIAL INFECTIONS: 1) Urinary tract infections (UTI)

- Occur more frequently in pregnancy and puerperium, due to both hormonal (progesterone) and mechanical factors that ↑ urinary stasis.
- ↓ Ureteral tone and mobility, dilatation of the ureters and renal pelvis.
- UTI in pregnancy could be symptomatic or asymptomatic.
- Asymptomatic Bacteriuria: defined as the presence of $\geq 100,000$ organisms/ml in mid stream urine specimen from an asymptomatic patient.
- E-Coli is isolated in 60% of pt. with asymptomatic bacteria. Other organisms include: Proteus mirabilis, Klebsiella pneumonia, group B streptococci.
- If asymptomatic bacteria is left untreated → 20% will develop acute cystitis or pyelonephritis. → Septicemia and respiratory distress to the mother. Therefore, treating a pregnant woman with UTI –even if she was asymptomatic- is crucial.

MANAGEMENT OF UTI:

- Urinalysis (Bacteriuria, Pyuria, and/ or hematuria).
- Urine Culture and sensitivity.
- Treat patient on outpatient basis. (Unless she has pyelonephritis then she should be admitted and hydrated since dehydration and fever could lead to preterm labor).

ACUTE PYELONEPHRITIS:

- Is manifested by flank pain, fever, rigors, nausea, vomiting and dehydration.
- A rare complication is septic shock and adult respiratory syndrome.
- **Premature uterine contraction may frequently occur.**

MANAGEMENT OF ACUTE PYELONEPHRITIS:

- Hospitalization
 - o IV hydration
 - o IV antibiotics
 - o Monitoring for preterm labor

2) GROUP B STREPTOCOCCI (GBS):

GBS can be **transmitted** to the genital tract by:

1. Vaginal carriers in 15-40% of cases.
2. Fecal contamination (as GIT is the major reservoir).
3. Sexually transmitted from a colonized partner.

DIAGNOSIS:

- GBS are considered normal flora (in GIT, vaginal, cervix, throat, skin and urine of healthy individuals)
- GBS grow on routine bacteriologic media.
- Selective blood Agar or Todd-Hewitt both improves the detection rate.

IMPACT OF GBS ON PREGNANCY:

- Highest vertical transmission rates occur in women with heavy vaginal colonization.
- **Vertical transmission occurs at delivery.**
- Other risk factors for transmission include: *Pre-term labor, low birth weight, preterm rupture of membranes, prolonged rupture of membranes (greater than 12 hrs before delivery), intrapartum fever and a history of previously delivering an infected infant.*

GBS NEONATAL INFECTION IS TWO TYPES:

1) Early-onset GBS infection:

- Is characterized by its rapid onset and fulminant course, with presentation typically within the **first 48** hours of newborn life.
- Affected infant presents with respiratory distress and pneumonia, meningitis, Septicemia, shock, and death.
- The mortality rate from early onset disease **is 50%**.

2) Late-onset Neonatal GBS infection:

- Linked to a nosocomial source in the nursery, occurs after the first week of the newborn's life.
- Treating carriers in labor and nursery will reduce the rate of transmission to the infant.

3) CHLAMYDIA:

- Associated with ↑ incidence of premature labor, premature rupture of membranes and late postpartum endometritis.
- The neonates may acquire the **organism at delivery** and develop conjunctivitis, pneumonia and otitis media.
- High risk groups include: adolescents, single mothers, women of lower socioeconomic status, patients with multiple sexual partners and those with other sexually transmitted diseases.

DIAGNOSIS:

- Culture on cyclohexamide-treated McCoy cells is the most sensitive method of diagnosis, but **is costly, slow** and limited in availability.
- **Rapid antigen** detection tests such as Chlamydiazyme or MicroTrak are reliable, inexpensive and rapid.

TREATMENT:

- Erythromycin is the therapy of choice in pregnancy.
- If erythromycin cannot be tolerated, amoxicillin is alternative.
- Sexual contacts should receive empirical treatment.
- Erythromycin is also the drug of choice for the neonate if pneumonia or otitis media develops.

PARASITIC INFECTIONS: 1) TOXOPLASMOSIS:

- Toxoplasmosis is a systemic disease caused by the protozoan *Toxoplasma gondii*.
- 15% - 40% of women of reproductive age have antibodies (IgG) to toxoplasmosis, therefore they are immune.

TOXOPLASMOSIS:

- Most infections are subclinical.
- Occasionally, toxoplasmosis presents as Mononucleosis-like syndrome (flu like symptoms and lymphadenopathy).
- Infection is acquired by ingesting undercooked meat or unpasteurized goat's milk or by exposure to feces from an infected cat.

IMPACT ON PREGNANCY:

- The risk of transmission to the fetus is 15% in the first trimester, 25% in the second trimester and 65% in the third trimester.
- However, the severity of fetal infections is greatest with first trimester infection.
- The classic triad of hydrocephalus, intracranial calcifications and chorioretinitis is rarely seen.
- Approximately 75% of infected infants are asymptomatic at birth.

DIAGNOSIS:

- Diagnosis by serologic testing for both **IgG and IgM**.
- Diagnosis is confirmed by a positive finding of IgM or a fourfold rise in IgG titer in sequential samples obtained 2 to 3 weeks apart.

TREATMENT:

- Toxoplasmosis is a self-limiting disease.
- However to prevent fetal risks, **spiramycin** is used for treatment in the absence of fetal infection.
- If fetal infection is identified, therapy with pyrimethamine and Sulfadiazine plus folinic acid (**decreases the incidence of neural tube defects**) should be given to reduce the severity of fetal damage.

Summary:

- **Newborns delivered by HIV-infected mothers will acquire HIV IgG antibodies via transplacental passage. They remain IgG positive for 18 months. Therefore, testing for IgG antibodies is not useful in diagnosing HIV in early infancy (use culture or PCR instead).**
- **Pregnancy does not accelerate the course of HIV infections**
- **Prophylaxis against (PCP) with trimethoprim-sulfamethoxazole (Bactrim) is indicated if the mother's T4 ↓ below 200 cells/ μl.**
- **RUBELLA (GERMAN MEASLES): neonatal deafness, heart diseases, and cataract.**
- **Hepatitis B is transmitted via blood and body secretions.**
- **GBS: Bacterial transmission occurs at delivery.**
- **Testing for Chlamydia is done using Rapid antigen detection tests such as Chlamydiazyme or MicroTrak are reliable, inexpensive and rapid.**
- **TOXOPLASMOSIS: The classic triad of hydrocephalus, intracranial calcifications and chorioretinitis is rarely seen.**

MCQ's:

1 - A pregnant woman with Active vulval herpes infection. How would you manage her?

- A. Give acyclovir & then deliver
- B. Deliver & give the baby prophylactic acyclovir
- C. C/S.

2 - Rubella's eye manifestation on the newborn is mainly:

- A. Cataract.
- B. Microcephaly
- C. Retinopathy

3 - Regarding Rubella immunization:

- A. Rubella negative patients should be vaccinated during pregnancy
- B. Rubella vaccine is a Toxoid
- C. The majority of pregnant patients are rubella non immune
- D. Breast feeding should be inhibited if vaccine is given postnatally
- E. Pregnancy should be avoided for 3 months after vaccination

4 - The following can be associated with toxoplasmosis infection during pregnancy EXCEPT:

- A. Rhinitis
- B. Brain calcification
- C. Hepatic Splenomegaly
- D. Hydrocephalus
- E. Spina bifida

C
A
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For mistakes or feedback

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