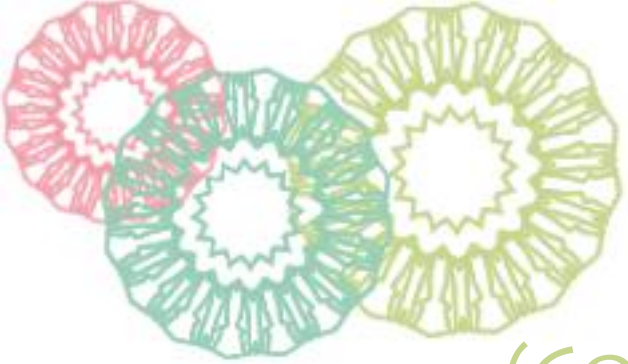


Lecture (2)
Transplacental (Congenital) Infection

Objectives:

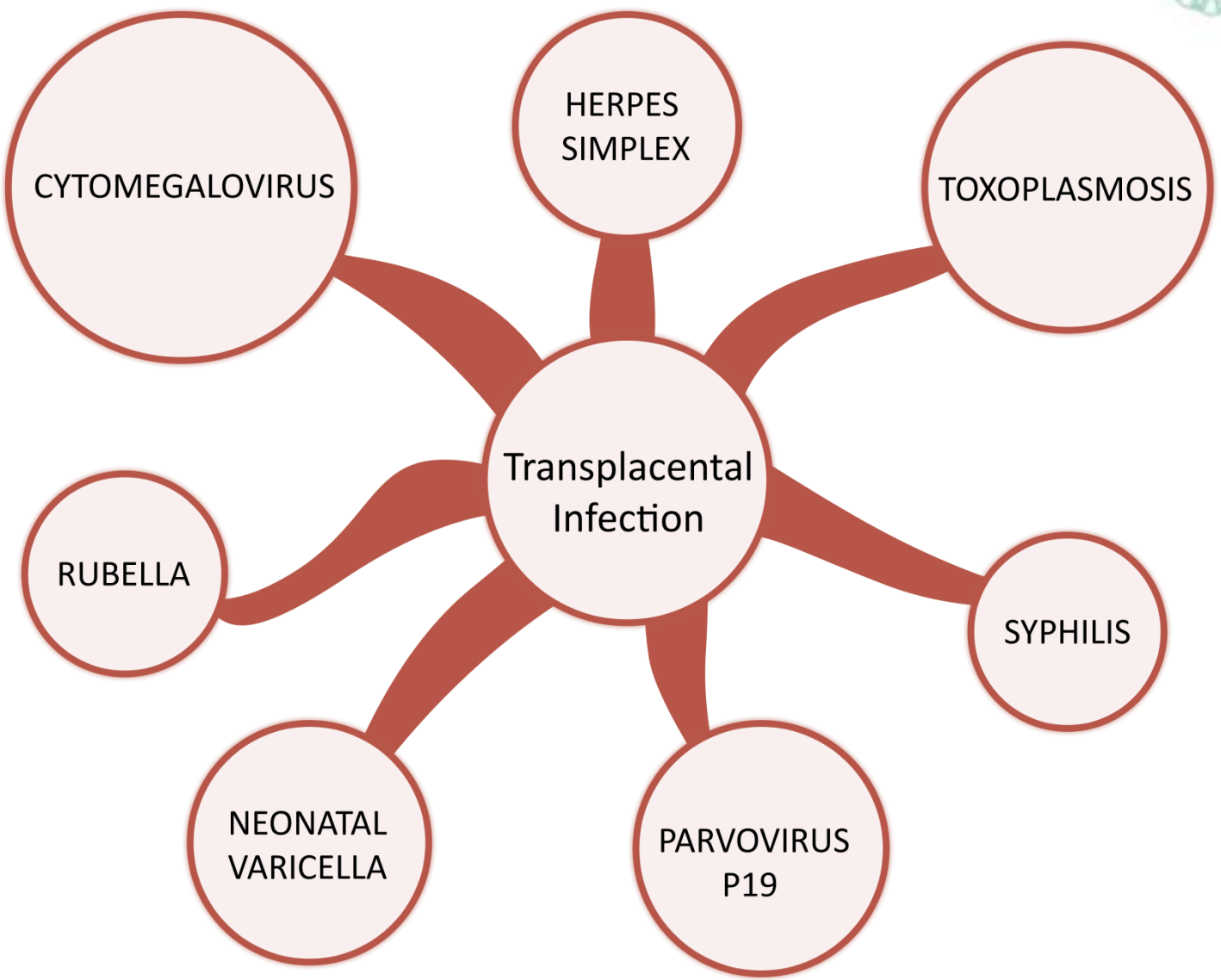
- To understand the epidemiology and clinical presentation of trans-plancental infections
- To identify the most appropriate methods for the diagnosis of these infections
- To be familiar with the management and prevention of these infection.

Done by: Ahmad Al-Sayegh

Reviewed by: Albara' Sabbagh, Hessah aljadeed & Joharah Almubrad

MIND MAP

MICROBIOLOGY TEAM 432



Transplacental (Congenital) Infection

Classification	Occurrence	Mechanisms
Congenital	In utero	Trans placental
Perinatal	During labor and delivery	Exposure to genital secretions and blood
Neonatal	After birth	Direct contact, breast feeding or nosocomial exposure

Types of Congenital Infections

mostly viruses

(TORCH) infections:

- Toxoplasmosis
- Other (syphilis, parvovirus &VZV)
- Rubella
- CMV "Cytomegalovirus"
- Herpes(Hepatitis & HIV)

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Risk of congenital infection

1.Organism (Teratogenicity)

Strong in Parvovirus and Rubella

Mild in CMV and Syphilis

2.Type of maternal

infection(Primary "1°" ,recurrent)

*primary infection in the mother will cause sever infection in the baby

3.Time during pregnancy

(1^{st},2^{nd},3^{rd} Trimester)

Infections in early pregnancy are more dangerous.

Features of congenital infection

Most of them look like each other most of them will cause skin and soft tissue lesion, they will cause hepatosplenomegaly, hydrpcephalis, microcephaly, and other hematological abnormality.

1.Intrauterine growth retardation(IUGR)

2.Microcephaly

3.Thrombocytopenia

4.Skin rash

5.Hepatosplenomegaly(HSM)

6.IgM, Persistent IgG >12 ms of age

Majority of CI ("asymptomatic") at birth

Absence of fetal IgM at birth does not exclude infection

TOXOPLASMOSIS

Organism	It is parasitic, Toxoplasma gondii (Definitive host is the domestic cat)
Transmission	1. Aerosolization of stool (stool of the cat) and inhalation. 2. Ingestion of cysts (meats, garden products). 3. Ingestion of oocyst: Contaminated fingers ,soil ,water. Blood transfusion &organ transplant
Epidemiology	• Mostly in European countries (i.e. France, Turkey). • Usually asymptomatic. • Infection (Transmission) rate higher with infection in 3rd trimester**. • Fetal death higher with infection in 1st trimester**.
Clinical presentation	**• Mostly asymptomatic at birth but are still at high risk of developing abnormalities, especially eye (chorioretinitis)/neurologic disease(MR) later.** **• Classic triad of symptoms:** **1. Chorioretinitis. (Inflammation of the choroid and retina of the eye).** **2. Hydrocephalus. (obstruction of the ventricles, causing ↑ accumilation of the CSF)** **3. Intracranial calcifications (Calcification anywhere in the Skull).**
Diagnosis	**1.Maternal serology IgM/IgA IgG,(IgM will give the diagnosis but it will take very long period up to 1 year, IgG if it is chronic infection.)** **2.Fetal ultrasound (if the mother still pregnant) / tissue culture +PCR (incase of abortion).** **3.Newborn: Serology, Culture, PCR**
Treatment	1. Spiramycin.(very dangerous just if the fetus gonna die) 2. Pyrimethamine & sulfadiazinea
Prevention	1. Avoid exposure to cats, contaminated food or water and undercooked meat(raw meat). 2. Hand washing.

**This means that it is more likely for the fetus to get infected during the 3rd trimester; which is safer than getting infected in the 1st trimester.

Dr.Ali said he will not ask about the treatment neither the prevention,the most important thing is the clinical presentation and the diagnosis

SYPHILIS

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Organism	Treponema pallidum (spirochete).
Transmission	Transmitted via sexual contact to the mother. • Mother with primary or secondary syphilis. • Typically occurs during second half of pregnancy Syphilis have 3 stages: Primary: will present with genitalial ulcer and will disappear completely after few weeks. Secondary: after 3 months will present with rash and the bacteria will be in the blood. Tertiary: if not treated after few months, and this stage is irreversible.
Clinical features	- Fetal: Stillbirth,Neonatal death, Hydropsfetalis - Early congenital(infantile): Rash and destruction of face tissue and Funisitis (Umbilical Cord Vasculitis),Osteochondritis, Periostitis (nflammation of the periosteum), Liver and Lung fibrosis -Late congenital (Childhood): Frontal bossing,High palatal arch, Hutchinson teeth (Screwdriver teeth), Short maxilla, 8th nerve deafness, Saddle nose, Perioral fissures.
Diagnosis	-RPR/VDRL: non treponemal test (RPR) Rapid plasma regain, (for prevention too) -Confirmed if T. pallidum identified in skin lesions, placenta, umbilical cord, or at autopsy
Treatment	-Penicillin G (because RPR non-specific we give Penicillin directly sometime without do the test)

PARVOVIRUS P 19

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Organism	-Viral infection. (very dangerous in pregnancy and mild in adult) - Parvovirus P 19. non developed V. Icosahedral capsid & s.s DNA genome
Transmission	Causative agent of Fifth disease (erythema infectiosum). Spread by the respiratory route, blood & transplacental.
Epidemiology	-Most of the population is eventually infected. (become immune) -Half of women of childbearing age are susceptible to infection. -Risk of fetal death highest when infection occurs duringthe second trimester of pregnancy (1st 20 weeks of pregnancy) ➢ Infection in the 1st trimester ➔ IUD (Intrauterine death) ➢ Infection in the 2nd trimester ➔HF (Hydrops fetalis) ➢ Infection in the 3rd trimester ➔Lowest risk -Minimal risk to the fetus if infection occurred during the third trimesters of pregnancy. **-it is sever in early pregnancy and if the mother is not immune and infected in early pregnancy the chance is high for the child to get the infection.**
Clinical Feature	**1. Hydrops fetalis. 2.Severe anaemia 3.Congestive heart failure. 4.Generalized oedema.(No evidence of teratogenicity the abnormality in the blood not in tissue)**
Diagnosis	**Pregnant mother: Specific IgM , IgG seroconversion** **Prenatal: Not grow in c/c. , PCR , US to see if there is any fluid (hydrops)**
Treatment	**intrauterine transfusions & administration of digoxin (increase the contraction of the heart) to the fetus.**
Prevention	**Hygiene practice - No vaccine (TRIAL**

Varicella Zoster Virus VZV

- Varicella Zoster Virus VZV its (d.s DNA , Enveloped , cosahedral Virus)

Transmission: 1.Respiratory droplets 2.Direct & Indirect contact 3.Transplacental

VZV can cause:

1. Acquired infection:1. Varicella " Chickenpox" primary illness 2.Zoster"Shingles"Recurrent form
2. **Congenital infection: NEONATAL VARICELLA**

Neonatal Varicella

- 90% of pregnant women already immune.
- Primary infection during pregnancy carries a greater risk of severe disease.

Clinical Features

- First 20 weeks of Pregnancy.
- Up to 3% chance of transmission to the fetus, recognised congenital varicella syndrome; Scarring of skin, Hypoplasia of limbs, CNS and eye defects.
- Evidence of teratogenecity

Diagnosis

vesicles	Serology	US and MRI
Culture + DFA + PCR +	IgM + Rising IgG +	for Pregnant mother & Fetus

Treatment

Acyclovir at first signs of varicella pneumonia

Prevention Very important

- **Pre-exposure; live-attenuated vaccines** before or after pregnancy but not during pregnancy.
- **Post exposure Zoster immunoglobulin** to:
  - ✓ susceptible pregnant women
  - ✓ infants whose mothers develop varicella during the last 5 days of pregnancy or the first 2 days after delivery
  - ✓ premature baby <28 wks of gestation.

RUBELLA

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- SS RNA enveloped virus, Icosahedral capsid, member of the togaviridae family.
- Spread by respiratory droplets and transplacentally.

Epidemiology	**Vaccine-preventable disease.** • No longer considered endemic. • Mild, self-limiting illness. • Infection earlier in pregnancy has a higher probability of affecting infant.
Clinical Features	• **Sensorineural hearing loss (most common)** • **Cataracts, glaucoma (the only one cause this)** • **Cardiac malformations** • **Neurologic (less common)** • **Others to include growth retardation, bone disease, HSM, thrombocytopenia, "blueberry muffin" lesions**
Diagnosis	Maternal IgG is useless! Viral isolation virus from nasal secretions, throat, blood, urine, CSF. Serologic testing. IgM = recent postnatal or congenital infection. Rising monthly IgG titers suggest congenital infection.
Prevention	**by immunization (the only one of vaccine-preventable disease)**

CYTOMEGALOVIRUS

- Herpesviridae dsDNA , Enveloped , Icosahedral Virus.
- Transmission(tn)

1- Horizontal tn: A. Young children: saliva B.Later in life: sexual contact Blood transfusion &organ transplant

2- Vertical tn primaryCMV inf . (~40%) Recurrent CMV inf (~1%)

- It **is the most common congenital viral infection**~40,000 infants per year.
- Mild, self limiting illness

Epidemiology	-Transmission can occur with primary infection or reactivation of virus but 40% risk of transmission in primary infection. **-Increased risk of transmission later in pregnancy but more severe complications associated with earlier acquisition. Same as Toxoplasmosis**
Clinical Features	• 90% are asymptomatic at birth • Up to 15% develop symptoms later • **Microcephaly, periventricular calcifications (Toxoplasmosis cause Intracranial calcifications), neurological deficits, HSM, petechiae, jaundice, chorioretinitis** • **>80% develop long term complications: Hearing loss, vision impairment, developmental delay.** • **The most common cause of neurosensory defect**
Diagnosis	• **Maternal IgG shows only past infection** • **Viral isolation from urine or saliva in 1st 3 weeks of life other viruses we do IgG and IgM** • **Viral load and DNA copies can be assessed by PCR** • **Detection of Cytomegalic Inclusion bodies in affected tissue** • **Serologies not helpful given high antibody in population**
Treatment	**Ganciclovir x6wks in symptomatic infants**

HERPES SIMPLEX

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Epidemiology	• HSV1 or HSV2 • Primarily transmitted through infected maternal genital tract. • Primary infection with greater transmission risk than reactivation. • **management of pregnant women with primary herpes simplex is to do C-section delivery prior to membrane rupture.(very important)**
Clinical presentation	**patterns of equal frequency with symptoms between birth and 4wks: Skin, eyes, mouth, CNS disease, disseminated disease (present earliest).**
Diagnosis	• **Culture of maternal lesions if present at delivery** • **Cultures in infant** • **CSF PCR** • **Serologies is useless**
Treatment	**High dose of acyclovir.**

SUMMERY

MICROBIOLOGY TEAM 432

- The clinical features of congenital infections are mostly the following; Intrauterine growth retardation, skin rash, Microcephaly and Hepatosplenomegaly.
- Toxoplasmosis is caused by Toxoplasma gondii and the Definitive host is the domestic cat.
- Toxoplasmosis infection is acquired by the ingestion of cysts (meats, garden products).
- Syphilis is caused by Treponema Pallidum and transmitted by sexual contact and Hutchinson teeth (Screwdriver) is clinical feature in late conigental (childhood)
- Parvovirus P 19 is the causative agent of Fifth disease [Erythema Infectiosum],and CF Hydrops fetalis ,Severe anaemia ,Congestive heart failure ,Generalized oedema. (so if the fetus come with hemolytic anemia you now the causes ☺)
- Rubella is an RNA virus and it spreads by respiratory droplets and transplacentally, it can be prevented by vaccination (the only one of vaccine-preventable disease).
- Cytomegalovirus is the most common congenital viral infection , and CF are periventricular calcifications , neurological deficits .
- Remember that Cytomegalovirus is periventricular calcifications while Toxoplasmosis is Generalized calcifications .
- In HERPES SIMPLEX we do C-section delivery prior to membrane rupture.
- The rate of transmission of the infection from the mother to the baby is high during the 3rd trimester.
- If the infection occurred in the 1st trimester it will lead to fetal death.

From 431

Summery				
	Presentation	**Diagnosis**	**Treatment**	**Prevention**
Toxoplasmosis	1. Chorioretinitis 2. Hydrocephalus 3. Intracranial calcifications	1. Serology 2. Fetal tissue culture 3. PCR	1. Spiramycin 2.*Pyrimethamine* and *sulfadiazine*	-
Syphilis	**Fetal:** Stillbirth, Neonatal death, Hydrops fetalis **Early congenital (infantile):** Rash and Funisitis (Umbilical Cord Vasculitis), Osteochondritis, Periostitis, Liver and Lung fibrosis **Late congenital (Childhood):** Frontal bossing, Short maxilla, High palatal arch, **Hutchinson teeth (Screwdriver),** 8th nerve deafness, Saddle nose, Perioral fissures.	1. **RPR/VDRL:** Non-Treponemal test	*Penicillin G*	
Parvovirus P19	*1. hydrops fetalis* 2. congestive heart failure 3. generalized oedema	- Serology - PCR - US - There is **NO** culture	*Intrauterine digoxin*	
Neonatal Varicella	1. Scarring of skin 2. Hypoplasia of limbs 3. CNS and eye defects	1. Culture 2. PCR 3. Serology 4. US	*Acyclovir* at first signs of *varicella pneumonia*	-**Pre-expoure:** *live-attenuated vaccines* -**Post-exposure:** *Zoster immunoglobulin*
Rubella	1. Sensorineural hearing loss 2. Cataracts, glaucoma and cardiac malformations 3. *"blueberrymuffin" lesions*	1. Viral *culture*from nasal secretions 2. Serologic testing: IgM 3. PCR	*Supportive care*	immunization
Cytomegalo virus	1. Microcephaly *2. periventriculr calcifications* 3. Hearing loss	**1. Urine and Saliva Culture** **2. Urine PCR** **3. Serology**	*Ganciclovir*	
Herpes simplex	Skin, eyes, mouth , CNS disease	1. Culture of maternal lesions 2. CSF PCR	*acyclovir*	

Questions

Microbiology Team 432

1- a pregnant women was exposed to a cat feces in her 1st trimester, her baby had chorioenteritis, hydrocephalus, and intracranial calcification, what is the diagnosis?

A. Parvovirus B. Rubella C. Toxoplasmosis

2- which one of the following treatment is recommended in case of genital herpes infection:

A. Acyclovir B. Penicillin G C. Spiramycin

3- The rate of transmission of the infection from the mother to the baby is high during the:

A. 1st trimester. B. 2nd trimester. C. 3rd trimester.

Answers: C, A, C

For any suggestions or problems please contact
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Thank you