**Intra-uterine infections -2018**

*Prof. N.P. Sunil-Chandra*, *Dept. of Medical Microbiology*, *Faculty of Medicine,* *University of Kelaniya*

**What is fetus?**

* **An unborn human baby, from the embryo stage from 9th week until birth.**
  + **End of the eighth week after conception,**
  + **when the major structures have formed**
  + **This is the longest stage of prenatal, human development**

**Fetus has poor immune defenses**

* IgM and IgA not produce enough until 2nd half of pregnancy.
* No IgG synthesis.
* Poorly developed or absent CMI
* Inadequate production necessary cytokines.

**Immune & non-immune mother**

* Antibodies in the maternal blood prevent most infections from being transmitted to the fetus.
* Maternal IgG can cross the placenta and protect fetus from infection
* However some maternal-to-fetal infections, particularly in the first trimester of pregnancy can cause miscarriage or severe birth defects

**Intra-uterine infections:**

* Infection by microbial agent(s) while in the uterus [**pre-partum**])
* Antibodies in the maternal blood prevent most infections from being transmitted to the fetus.
* However some maternal-to-fetal infections, particularly in the first trimester of pregnancy can cause
  + Miscarriage/death of fetus or
  + severe birth defects/congenital malformations

**Effects of intra-uterine /congenital infection**

* Most microorganisms once infected can kill the fetus leading to
  + Spontaneous abortion
  + stillbirth
* Few microorganisms are capable of more subtle, non-lethal effects
  + They overcome placental barrier to spread in fetus
  + Interfere with fetal development
  + Cause lesions
* So live but damage baby is born

**Important Points to Remember Concerning intra-uterine/congenital Infections**

* The time to provide information to mothers - before pregnancy begins
* The first trimester is usually the most dangerous time to acquire these infections-a greater risk.
* Infection in the mother - often very trivial symptoms, or even none at all -usually undiagnosed.

Infection in the mother does not always mean the baby will be affected.

* + i.e., the baby is more at risk at particular stages of pregnancy - first trimester for Rubella,
  + at delivery for HSV.
* Some infections can be avoided by the mother through simple measures,
  + such as immunization (Rubella, VZV) during childhood and before pregnancy.
  + Some infections are treatable (ex. syphilis is treated effectively with penicillin).

**Routes of intra-uterine /congenital infection:**

1. The most common means of infection of the fetus is via the blood stream.

2. Less common means of infections include:

* + (a). extension of infection in adjacent tissues and/or organs, or
  + (b). as a result of invasive procedures for diagnosis and therapy of fetal disorders (ex. monitors, sampling fetal blood, intrauterine transfusions).

**Efficiency of Transmission of Some of the Microorganisms from Mother to Fetus**

* The efficiency of transmission varies depending on
  + (a). the organism and (b). the trimester of pregnancy.
* i.e**., *In utero* transmission of the** 
  + Rubella virus and *Toxoplasma gondii* occurs only as a result of a primary infection,
  + CMV and HIV infections have occurred for multiple pregnancies.

**Etiological agents of intrauterine /congenital infections**

***Viruses***

* Rubella
* CMV
* HSV
* VZV
* Enteroviruses
* Hepatitis B
* HIV
* Erythrovirus B19 (Parvovirus B19)
* Zika virus
* Etiological agents of intra-uterine / congenital infections

***Bacteria***

* *Treponema pallidum*
* *Mycobacterium tuberculosis*

***Fungi***

* *Candida albicans*

**Clinical Syndromes in the neonate caused by congenital /fetal infections**

* Rubella virus: 🡪 Congenital rubella syndrome
  + Cardiac defects, sensorineural hearing loss, cataracts
* Cytomegalovirus: 🡪 congenital CMV
  + Microcephalus, periventricular calcification
* Herpes Simplex Virus
  + Vesicular lesions, keratoconjunctivitis
* Varicella-zoster virus
  + Limb abnormalities, scarring of the skin
* Erythrovirus B19 (Parvovirus B19)
  + Diffuse edema (*in utero* hydrops fetalis)
* Human Immunodeficiency virus
  + Severe thrush, failure to thrive, recurrent bacterial infections, calcification of the basalganglia
* Zika virus
  + Zika virus discovered in infant brains link to microcephaly
* *Treponema pallidum*
  + Bullous, macular, and eczematous skin lesions involving the palms and the soles;rhinorrhea, dactylitis and other signs of osteochrondritis and periostitis
* *Toxoplasma gondii*
  + Hydrocephalus, diffuse intracranial calcification, chorioretinitis

**Prevention and treatment of fetal infections**

* *M. tuberculosis* 🡪 Therapy
* Hepatitis B 🡪 HBIG for neonate
* *Chlamydia* 🡪 Therapy
* Syphilis 🡪Therapy
* Rubella 🡪childhood vaccination, Postpartum vaccine
* Group B *Streptococcus 🡪* Intra-partum therapy
* Herpes Simplex 🡪 Cesarean section, Therapy