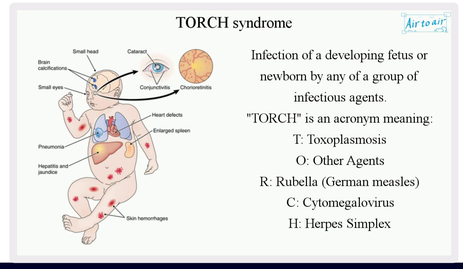


- Perinatal infections
  - The majority acquired during pregnancy are of little or no consequence to the fetus
  - Appropriate treatment can prevent morbidity and mortality
  - May result in anything from fetal demise to structural abnormalities and neuro developmental delay
  - The effect on the fetus depends on
    - The type of infection
    - The gestation acquired

Perinatal infections

Overview

Toxoplasmosis

- Pathogen — unicellular protozoan- TOXOPLASMA GONDI
- Transmission
  - Cats are the definitive host and produce oocysts and sporozoites
  - · Human acquisition of the infection occursby:
    1. Oocyst contaminated soil, salads, vegetables.
    2. Ingestion of raw or undercooked meat containing tissue cysts (Sheep, pigs and rabbits are the most common meat sources).
    3. Ingestion of oocysts and sporozoites in cat feces and contaminated surface water.

Rubella (German measles)

- Pathogen — single stranded RNA virus- Rubella virus; Rubivirus family
- Incidence — The national immunization programs in many countries have made this disease increasingly rare
- Transmission
  - aerosol via the respiratory tract
  - Incubation period on average of 14 days (12–23 days)
- Classic non-confluent maculopapular rash seen first on the face then spreading to the trunk. There is often a lymphadenopathy

Cytomegalovirus (CMV)

- Double-stranded DNA virus that belongs to the herpes virus family
- **THE MOST COMMON CONGENITAL INFECTION**
- 50–70 per cent of pregnant women show serological evidence of previous infection
- Transmission of the virus requires close contact between individuals though contaminated urine, saliva, semen, cervical secretions and breast milk
- Incidence of primary maternal infection in pregnancy is 1- 4%, with transmission to the fetus occurring in approximately one-third of cases

Herpes Simplex Virus

- HSV is transmitted through close physical contact with mucosal surfaces or abraded skin and during sexual intercourse
- HSV remains latent in sensory neurons
  - trigeminal nerve in type 1
  - sacral ganglia in type 2
- Reactivation then occurs as a result of triggers such as trauma, fever, stress, menstruation and ultraviolet light
- primary genital herpes is usually severe with lesions that start with erythema, progressing to vesicles and then ulcers and finishing with crusting involving the vulva and cervix, and lasting 2 weeks

VARICELLA (chicken pox)

- Varicella-zoster virus (VZV) is a highly contagious DNA virus of the herpes family
- It's transmitted by respiratory droplet and by direct personal contact with vesicle fluid.
- The incubation period is 7–21 days and a person is infectious 48 hours before the rash appears and continues to be infectious until the vesicles crust over, typically 5 days.
- Over 90% of the antenatal population in the UK are seropositive for VZV specific IgG antibody
- Infection is uncommon, affecting 1 in 1000 pregnancies

Hepatitis B virus

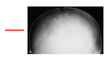
- Hepatitis B virus (HBV) is an extremely infectious double-stranded DNA virus that has three major structural antigens
  - surface antigen (HBsAg)
  - core antigen (HBcAg)
  - e antigen (HBeAg)
- This blood-borne virus is transmitted sexually, vertically or by blood contamination
- Carriage among pregnant women in the UK is estimated at 0.5-1%

Clinical features

Toxoplasmosis

- Maternal infection
  - Usually asymptomatic, although they may develop a mild malaise, lethargy and lymphadenopathy
  - Is often associated with unsafe eating habits
- Fetal infection
  - The likelihood of fetal infection and the severity are gestation dependent.
  - As pregnancy progresses the likelihood of transplacental passage increases but fetal injury is less likely.
  - In the first trimester fetal infection will often result in miscarriage
  - Chorioretinitis

  - Intracranial calcifications



  - Hydrocephalus

Rubella (German measles)

- Fetal infection
  - Feto-maternal transmission rate
    - 1st trimester = 80%
    - 2nd trimester = 25%
    - Risk is decreased after 16 weeks
  - Defects occur in
    - 1st trimester = 85%
    - 2nd trimester = 20%
    - >16 weeks = minimal risk of deafness only
    - >20 weeks = no increased risk
- Congenital rubella syndrome
  - Heart defects
    - patent ductus arteriosis
    - pulmonary stenosis
    - pulmonary arterial hypoplasia
  - Eye defects
    - cataracts
    - microphthalmos
    - retinopathy
  - CNS problems
    - mental and psychomotor delay
    - speech and language delay
  - Microcephaly and sensorineural deafness
  - Hepatosplenomegaly; Thrombocytopenic purpura (blueberry muffin rash) and haemolytic anaemia

Cytomegalovirus (CMV)

- The likelihood of CMV having an effect on the fetus is not gestation dependent, but the sequelae differ
  - In early infection fetal brain anomalies are more frequently seen and the neonate is more likely to be symptomatic in comparison to later infection where hepatitis and thrombocytopenia are more common.
- Congenital CMV infection is the most common cause of deafness and learning disabilities in the developed countries.
- Fetal infection
  - · IUGR
  - · Microcephaly
  - · Sensorineural hearing loss
  - · Cerebral atrophy
  - · Ventriculomegaly
  - · Intracranial calcification
  - · Fetal hydrops

Herpes Simplex Virus

- Fetal infection — Intrauterine infection is associated with
  - 1. Hydrops Fetalis
  - In-utero fetal demise
- Neonatal herpes
  - Clinical manifestation can arise any time during the first six weeks of life, but usually occurs within the first month of life
  - classified into three subgroups in the infant depending on the site of infection
    - Disease localised to skin, eye and/or mouth
    - Local central nervous system (CNS) disease (encephalitis alone)
    - Disseminated infection with multiple organ involvement, 30% mortality rate
  - Neonatal infection occurs as the result of an infection at the time of birth; in contrast, congenital herpes is extremely rare and occurs by transfer of infection in utero.

VARICELLA (chicken pox)

- Fetal infection
  - The effect of VZV on the fetus is gestation dependent
  - From as early as 3 weeks until 28 weeks' gestation it is possible for the fetus to develop fetal varicella syndrome (FVS), the risk 1–3% only
  - (FVS) :
    1. limb deformity
    2. microcephaly
    3. hydrocephaly
    4. soft tissue calcification
    5. IUGR

Hepatitis B virus

Maternal Diagnosis

Toxoplasmosis

- Serological
- When IgM and IgG are identified, conversion from a seronegative sample taken at booking is helpful in accurately confirming the diagnosis
- Serial IgG measurement

Rubella (German measles)

An acute infection may be diagnosed by isolation of the virus from throat swabs, but it is more common for an acute rubella specific immunoglobulin (IgM) response to be isolated using fluorescent immunoassay techniques.

Cytomegalovirus (CMV)

- CMV IgG has a high sensitivity and specificity as a sign of a past or recent infection
- CMV IgM is suggestive of a recent or ongoing infection with a high sensitivity

Herpes Simplex Virus

- primary genital herpes is usually severe with lesions that start with erythema, progressing to vesicles and then ulcers and finishing with crusting involving the vulva and cervix, and lasting 2 weeks.
- For women presenting with first episode genital herpes in the third trimester, particularly within 6 weeks of expected delivery, type specific HSV antibody testing (immunoglobulin G [IgG] antibodies to HSV-1 and HSV-2) is advisable.

VARICELLA (chicken pox)

- Maternal history
- For a woman with no previous history of chickenpox and a significant history of exposure, diagnosis is serological by looking for VZV IgG.
- The diagnosis itself is made from examination of the classic rash

Hepatitis B virus

- Is made by the detection of HBsAg. The detection of HBeAg indicates active disease and the disappearance of HBsAg and the appearance of surface antibodies indicate disease resolution and these antibodies will provide immunity. Resolution usually occurs within 3 months.
- All pregnant women are routinely offered screening for HBV

Fetal Diagnosis

Toxoplasmosis

- Fetal
  - PCR of amniotic fluid
  - Parasitic load of the amniotic fluid, poor prognosis in
    - infections acquired before 20 weeks' gestation
    - high parasitic load
    - women with fetal anomalies shown on ultrasound
- Neonate
  - Serologic testing
  - brain imaging
  - CSF analysis
  - ophthalmologic evaluation

Rubella (German measles)

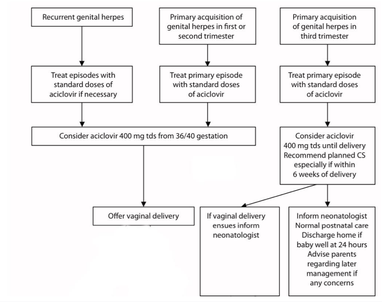
- Fetal blood sampling to measure levels of rubella specific IgM
- Rubella-specific RNA using reverse-transcriptase polymerase chain reaction (RT-PCR)

Cytomegalovirus (CMV)

- Quantitative PCR on the amniotic fluid
- The diagnostic sensitivity is high if the sample is taken after week 21 of pregnancy (once fetal diuresis is established) and 6 weeks after maternal serum is positive.

Herpes Simplex Virus

Algorithm for the management of herpes in pregnancy and care of neonate



VARICELLA (chicken pox)

- Ultrasound findings
- Amniocentesis may be performed to confirm the diagnosis with PCR identification of VZV DNA
- There is usually a time lag of at least 5 weeks after the primary infection before fetal differences are seen

Hepatitis B virus

- The risk of vertical transmission depends on the antigen status of the women. There is a 95% transmission rate in the presence of both HBsAg and HBeAg, compared with 2–15% when HBeAg negative
- 95% of cases of transmission occur at the time of delivery

Treatment

Toxoplasmosis

- Needs to be commenced within 4 weeks of infection
- **SPIRAMYCIN** — should be commenced before PCR results
- If PCR result is positive and patient is more than 18 weeks GA

pyrimethamine + sulfadiazine + folinic acid is used

Rubella (German measles)

No treatment, only supportive

Cytomegalovirus (CMV)

- There is no effective fetal therapy
- **GANCICLOVIR** — can transiently reduce viral shedding and may reduce the audiological consequences of CMV in some infected infants

Herpes Simplex Virus

Management is dependent both on gestation and on whether the episode is a primary or secondary occurrence.

Infected infants should be treated with — **I.V. ACYCLOVIR**

VARICELLA (chicken pox)

There is no intrauterine treatment currently available

Hepatitis B virus

Prevention

Toxoplasmosis

- Prenatal education
- Handling and cooking meat correctly
- Wearing gloves to handle cat litter
- Avoiding contact with objects that are potentially contaminated with cat feces

Rubella (German measles)

Prevention is by vaccination (childhood or post-natal)

- Rubella vaccine is live attenuated as part of the MMR vaccine, so 3 months contraception is advised after vaccination
- Testing of pregnant women for rubella immunity is mandatory
- Proper counseling regarding avoiding exposure

Cytomegalovirus (CMV)

There is no vaccination

Herpes Simplex Virus

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VARICELLA (chicken pox)

- For women known to be seronegative varicella vaccine can be administered before pregnancy. This is a live attenuated vaccine and hence pregnancy should be avoided for 1–3 months after administration
- If the pregnant woman is not immune to VZV and she has had a significant exposure, she should be offered varicella-zoster immunoglobulin (VZIG) as soon as possible
- If maternal infection occurs in the last 4 weeks of a woman's pregnancy, there is a significant risk of varicella infection of the newborn. A planned delivery should normally be avoided for at least 7 days after the onset of the maternal rash to allow for the passive transfer of antibodies from mother to child, provided that continuing the pregnancy does not pose any additional risks to the mother or baby.

Hepatitis B virus

- Prevention of HBV infections of the neonate is achieved by avoiding fetal invasive procedures during labour and the administration of passive immunoglobulin in the first 24 hours to neonates of highly infectious mothers.
- Hepatitis vaccination is given to those born of low-infectivity mothers
- When a baby has been immunised there is no contraindication to breastfeeding.

Follow up

- Complete HBV immunization as per schedule 3 dose schedule
- Follow up testing done at 9 to 18 months of age for Anti-HBs and HbsAg

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- **The management of the pregnancy in which an abnormal fetus is identified involves a whole multidisciplinary team of specialists. This team comprises the sonographer, fetal medicine specialist, geneticist, neonatologist and paediatric surgeon**
  - **When the diagnosis is made, clear information should be made available to the parents regarding the condition, prognosis and level of disability, should the baby be born alive**
- **The detailed fetal anomaly scan**
  - **Ultrasound scan done at 18-21 weeks' gestation**
    - **1. Transverse section through the fetal head, assessing head shape and internal structures**
    - **2. face: lips**
    - **3. Fetal spine: sagittal, coronal and transverse views**
    - **4. Fetal abdomen: longitudinal and transverse; identifying intra-abdominal organs: stomach, kidneys, bladder and ventral wall integrity and cord insertion**
    - **5. Transverse section through fetal thorax to examine four-chamber view of the heart and outflow tracts**
    - **6. Limbs: identify three long bones in each limb, hands and feet**
- **Lethal conditions**
  - **Anencephaly**
  - **Bilateral renal agenesis**
  - **• Lethal skeletal dysplasias**
  - **Some severe complex cardiac defects**
  - **Triploidy**
  - **Trisomies 18, 13 and 15**
- **Options for termination of pregnancy**
  - **Medical**
    - **The introduction of prostaglandins (PGE1) and the antiprogesterone mifepristone**
    - **preferred method in the second trimester**
    - **Advantages — allowing the opportunity for a postmortem examination**
    - **Disadvantages — can be a lengthy process and may require further surgery to remove retained tissue**
  - **Surgical — Dilatation of the cervix prior to surgery is achieved by passing graduated metal dilators or inserting vaginal prostaglandin preparations. — Cervical dilatation may be complicated by cervical tears, uterine perforation and the creation of false passages**
- **Care of women and follow up**
  - **Time for grieving must be allowed**
  - **Psychological stress is high after termination, with 40% of women showing symptoms of psychiatric morbidity**
  - **Prevent lactation by Dopamine agonists as early as 16 weeks of gestation**
  - **Postmortem results may provide additional information as to the precise diagnosis**
  - **Referral to a genetic specialist may be required in order to assess the risk of recurrence and possibly to investigate other family members**

Termination of pregnancy for fetal anomalies