Infections in Pregnancy and puerperium
Clinical aspects

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Objectives

- Why infections are problematic in pregnancy?
- What are the common infections which pose problems in pregnancy and pueperium?
- How do you investigate and manage these infections?

What are the problems with pregnancy?

- Low immune status in mother
  - To prevent rejection of semi-allogeneic foetus
  - Adaptive immune responses are weakened
  - Boosted innate response
  - Some infections are more severe in pregnancy (ex. Malaria, influenza, etc)
  - Some infections are reactivated in pregnancy (HSV, CMV)
- Foetus has poorly developed immune system
  - IgM and IgA - Very low
  - No IgG
  - Low CMI

Problematic infections

- Infections which cause congenital infections
  - Varicella
  - Rubella
  - CMV
  - Syphilis
  - Toxoplamsma
- UTI
- PROM/ intra-amniotic infections
  - GBS
- STI (Hep B, HIV, Chlamydia, Candida etc)
- Infections which can be severe in pregnancy
  - Chickenpox
  - Influenza
  - Malaria
  - Hep E
- Post partum
  - Endometritis/ puerperal sepsis
  - Mastitis/ Breast abscess
  - Episiotomy infections
  - Septic abortion

Case 1

- POA 20 weeks, uneventful
- P2C1
- No significant past history
- Urinary culture report
  - Coliform> 10^5 C.F.U
- No symptoms

UTI

- The most common medical complications during pregnancy
  - asymptomatic bacteriuria - 2–10 %
  - acute cystitis- 1–4 %
  - Pyelonephritis – 0.5-2%
- Risk begins in week 6 and peaks during weeks 22 to 24
- Asymptomatic bacteriuria → 20-40% develop symptomatic pyelonephritis later if untreated
  - Also lead to premature delivery/IUGR/ LBW

UTI in Pregnancy - Pathogenesis

- Relaxation of muscles in ureters and bladder → dilatation→ stasis and reflux
- Dilatation of renal pelvis
- physiologic increase in plasma volume during pregnancy decreases urine concentration
- Up to 70 % of pregnant women develop glycosuria, which encourages bacterial growth in the urine

UTI pathogens

- Similar to a non pregnant female
  - E. coli – 80-90%
  - Other coliforms
  - GPC
    - *S. saprophyticus*, enterococci, Grp. B Streptococci

Management

- Screening urine culture in first visit
- Repeat culture in T3
- Treat with a sensitive antibiotic
  - Cephalexin, Nitrofurantoin, Co-amoxiclav
  - 5 days for asymptomatic bacteriuria
  - 5-7 days for cystitis
  - Pyelonephritis - Admit and IV (Amp/ Gent/ Cefotaxime) x at least 3ds → oral 10 days
- Repeat UC 48 hours after stopping AB

Case 2

- POA 32 weeks
- Dribbling for ~ 24 hrs
- Back pain
- Fever

PPROM

- ROP before 37 weeks of gestation without labour contractions
- Prolonged ROM – ROM for greater than 24 hours
- Associated with an increased risk of ascending infection
  → infection complications in foetus
  → infection complications in mother

Intra-amniotic Infection (Chorioamnionitis)

- Infection of the membranes and chorion of the placenta
- Typically due to ascending polymicrobial bacterial infection in the setting of membrane rupture
  - Few cases from transplacental spread and bacteremia e.g *Listeria monocytogenous*
  - Rare cases after diagnostic amniocentesis
- Risk factors: PROM, young age, nullparity and bacterial vaginosis

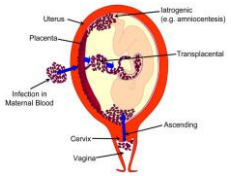
Presentation

Maternal
- Fever
- Tachycardia
- Uterine tenderness
- Foul smelling or grossly purulent amniotic fluid

Foetal
- Foetal Heart rate abnormalities
- Preterm labour
- Arrest of progress of labour
- Neonatal sepsis
- Neonatal death/ stillbirth

Organisms isolated
Polymicrobial vaginal flora

- *E.coli*
- *Mycoplasma hominis*
- *anaerobes*
- *Gardnerella vaginalis*
- *Group B Streptococci*
- *Coliforms*
- *Enterococci*



Diagnosis and Management

Clinical parameters	Result suggesting chorioamnionitis
Fever	Temperature >100.4 twice or >101 once
Maternal tachycardia	> 100/min
Fetal tachycardia	>160/min
Fundal tenderness	tenderness on palpation
Vaginal discharge	Foul-smelling discharge
Amniotic fluid parameters	
Culture	Microbial growth
Gram stain	Bacteria or white blood cells (>6/HPF)

- Broad spectrum antibiotics started as soon as suspected (not postpartum)
- Antibiotic administration reduces frequency of neonatal pneumonia, bacteremia and cures maternal infection

Ampicillin+ Gentamicin + metronidazole
or
Ceftriaxone + metronidazole

Group B streptococcus

Pregnant mother

Ethnicity, young age, IUD, diabetes

26% in US
25% in UK
19% Asia

Vaginal colonization with GBS

1-2% transmission rate

Colonize neonate

3-12% develop bacteraemia

Preterm labour, Prolong PROM, LBW

Neonatal sepsis

5-10% mortality

Group B streptococcus

- Important pathogen in early and late onset neonatal sepsis
- Management

- Screening-based strategy
  - Universal screening vaginal and rectal swab specimens at 35–37 weeks POA
  - Screening in high risk mothers

Group B streptococcus

Risk based strategy

- Intrapartum penicillin/ ampicillin to women risk factors
  - Amniotic membrane rupture ≥18 hours
  - Intrapartum temperature ≥100.4°F (≥38.0° C)
  - Having a previous infant with invasive GBS disease
  - GBS bacteriuria during any trimester of the current pregnancy
  - GBS detected in vaginal/ rectal swabs in current pregnancy after 35 weeks of POA/at the time of delivery.
  - Preterm labour with pre-labour rupture of membranes

Case 3

- POA 12 weeks
- Exposed to chicken pox ~ 1 day
- Uncertain past history of chicken pox

Chicken pox

- ~ 10% of women in childbearing age are susceptible
- Transplacental infection in T1< 3%
- Can affect the foetus if it occurs in early (foetal varicella syndrome) or very late pregnancy (neonatal varicella)

Chicken pox in pregnancy

- Effects in Foetus
  - No damage
  - Still birth
  - Foetal Varicella Syndrome (2-3% if within 20 weeks of POA)
    - skin scarring, limb hypoplasia, visceral, neurological and eye lesions
- Effects in mother
  - Severe chicken pox

Chicken pox significant exposure

- Check IgG Abs
  - Seropositive – No action required
  - Seronegative/ Serology not available
    - Give VZIG as soon as possible
    - preferably within 48 hours of contact (maximum, 96 hours)
    - Advice to seek medical attention immediately if chickenpox develops
  - VZIG is indicated after significant exposure to VZV upto 20 weeks of POA

Case 4

- POA 20 weeks
- Fever, chickenpox like rash ~ 2 days
- No history of childhood chickenpox

Management of Chickenpox in pregnancy

- Medical review is essential
- <24 hrs since onset of rash → oral aciclovir
- > 24 hrs since onset of rash → No aciclovir
- No benefit from VZIG once the rash develops

- If low risk of complications → manage at home
- High risk group → monitor in hospital
  - Isolate from other pregnant mothers, babies and nonimmuned staff
  - If complications – IV aciclovir

Chickenpox just before delivery

- Rash develops 6 days or less before delivery or upto 7 days after delivery
  - Neonates should receive prophylactic VZIG soon after delivery
    - Virus cross placenta
    - No protective Abs to foetus
    - Baby develops severe disseminated varicella with pneumonia and encephalitis
- Rash develops 7 days before delivery
    - Abs cross placenta
    - Foetus cope remarkable well
    - Baby does not develop severe disease

STI

1. Syphilis
   - pregnant women with untreated early syphilis,
     - 70% chance of transmitting the infection to her fetus
     - 25% of pregnancies result in stillbirth
     - 14% in neonatal death
     - overall perinatal mortality of about 40%
   - Routine screening
   - Treatment with single IM benzathine penicillin for primary, secondary, and early latent syphilis in pregnancy, and three doses one week apart for late latent syphilis

STI

2. HIV
   - Transmitted to foetus/ neonate through placenta, birth canal, breastfeeding
   - Increased risk with high viral load, young maternal age, low CD4 count, Prolonged PROM, vaginal delivery, other STIs
   - Maternal anti retroviral therapy significantly reduce the mother-child transmission
   - zidovudine, nevirapine, or a combination of the two, are recommended during pregnancy to reduce mother-to-child transmission of HIV
   - Other interventions
     - Screening
     - Counseling
     - EL-LSCS before onset off labour
     - Neonatal post exposure prophylaxis with ARV

STI

3. HBV infection
   - Transplacental and perinatal transmission
   - Acute HBV infection during pregnancy usually is mild and not associated with teratogenicity or mortality
   - Unless the patient has acute liver failure, antiviral therapy is usually unnecessary
   - Treatment is mainly supportive, with monitoring of liver biochemical tests
   - To reduce transmission to baby:
     - Screening and monitoring of viral load
     - All babies born to positive mothers should receive Hep B Immunoglobulin and Hep B vaccine within 12 hours of delivery

STI

4. Gonorrhoea/ Chlamydia infection
   - Pre-term labour, PPROM, Chorioamnionitis, Endometritis
   - opthalmia neonatorum (40-50%), Pneumonia (18%)
   - Most are asymptomatic
   - Screening in high risk population and treatment

Other severe infections

1. *Influenza*
   - Pregnant women are at high risk for severe complications of influenza during seasonal influenza periods and pandemics
   - some studies suggest an increased risk for adverse outcomes among infants born to mothers infected with influenza during pregnancy
   - CDC Recommendations:
     - influenza vaccine for all pregnant women in any trimester during flu season.
     - Pregnant women with symptoms of influenza should be tested and treated immediately with oseltamivir

Other Infections

3. Zika virus
   - Febrile illness ~ dengue - Transmitted by Aedes mosquitoes
   - Zika virus is a cause of microcephaly and other congenital anomalies
   - Risk higher with infection in T1
   - Outbreak in Brazil started in 2015 → spread to Americas, Caribbean, Pacific, and SE Asia
   - Diagnosis – Pregnant mothers with recent travel + symptoms
     - Serum for PCR (within 2 weeks of travel)
     - 4 weekly USS
   - Treatment - supportive

Case 5

- EM-LSCS performed in a 36 weeker with prolonged ROM, and lack of progress.
- Developed fever following LSCS with high WBC and CRP

Post-partum Endometritis

- Postpartum infection of the uterus
- Most common cause of puerperal fever → puerperal sepsis
- Predominant predictor: Caesearan section particularly after labour or premature rupture of membranes
  - Rates vaginal delivery 0.9-3.9%
  - Caesearan section rate: 10-50%
- Secondary risk factor - BV
- Presents with
  - Fever on 1st or 2nd day postpartum
  - Lower abdominal pain
  - Uterine tenderness
  - Leucocytosis

PP Endometritis

- It is a polymicrobial Infection
- Pathogens
  - *Group B Streptococci*
  - *G.vaginalis*
  - *Enterococci*
  - *E.coli, Bacteroides spp*
- Diagnosis: Blood culture, Culture of high vaginal swab
- **Treatment: intravenous antibiotics**

  (Ampicillin/ Co-amoxiclav/ Ceftriaxone + gentamycin + metronidazole)

Case 6

- 2 weeks post delivery
- Breast feeding
- Fever
- Pain and swelling in L/ breast
- Localized inflammed area

Mastitis/ Breast abscess

- Present with Inflammation+/- infection +/- abscess (3%)
- Management
  - Physiological – correct breastfeeding, expressing, massage, apply warmth
  - Treatment – analgesics
    - **Antibiotics** - If symptoms are not resolving within 12 to 24 hours with physiological methods or if presenting symptoms are moderate or severe
    - Most common organisms- *S. aureus* (less commonly Streptococcus or Escherichia coli)
    - Oral flucloxacillin/ cephalexin x 5 days
    - If not responding to first line AB/ severe mastitis – hand expressed mid stream breast milk culture and ABST

Episiotomy infections

- Rare- 0.1%
- Presents with significant pain and a delay in healing of episiotomy, oedema, redness, ecchymosis, and wound discharge, dehiscence, +/- fever, +/- abscess, +/- myonecrosis, +/- sepsis
- Causative agents – *Streptococcus pyogenes, Staphylococcus aureus (MRSA), Clostridium perfringens*
- Treatment - surgical debridement + antibiotics (depends on superficial/ deep infection)

Septic abortion

- Usually result from induced abortions done by untrained practitioners using nonsterile techniques → high mortality
- Infection of the placenta and fetus, or products of conception, of a pre-viable pregnancy
- Polymicrobial – vaginal flora, bacteria from contaminated equipment, toxin producing bacteria
- Diagnosis – Blood, evacuation products/ curettings, high vaginal swab for culture
- Management – Broad spectrum IV antibiotics to cover all possible organisms + prompt evacuation of retained products and devitalized tissue

Summary

- Infections in pregnancy
  - Risk to baby
  - Risk to mother
- Clinical suspicion
- Adequate investigations/ screening
- Adequate treatment
  - Antibiotics/ antivirals should be safe to use in pregnancy