Perinatal infections

Mike Starr

Congenital Infections

- **T**oxoplasmosis
- **O**ther (syphilis)
- **R**ubella
- **C**MV
- **H**erpesviridae
  - Herpes simplex
  - Varicella zoster
- Parvovirus
- Hepatitis B virus

Neonatal Infections

- *Streptococcus agalactiae* (GBS)
- *Escherichia coli*
- *Listeria monocytogenes*

TORCH

Useful acronym but not a name for a test

Serology

- IgG can be maternal
- IgM often insensitive

- Despite reported incidence, in practice very unusual to see full blown disease

Clinical features of congenital infection

- **General** - SGA
- **CVS** - myocarditis; congenital heart disease
- **Resp** - pneumonitis
- **GIT** - hepatosplenomegaly; conjugated jaundice
- **Haematological** - haemolytic anaemia
- **Skin** - petechiae; purpura
- **CNS** - microcephaly; hydrocephaly; intracranial calcification; meningoencephalitis
- **Eye** - chorioretinitis; keratoconjunctivitis; cataracts; glaucoma

Skin lesions

- Petechiae
- Intradermal erythropoeisis (blueberry muffin) - toxoplasmosis
- Granuloma

Utility of TORCH screening

- Rarely diagnostic
- Routine TORCH screening of all SGA infants (mostly preterm)
  - 71 infants investigated
  - 1 case of ‘CMV-uria’

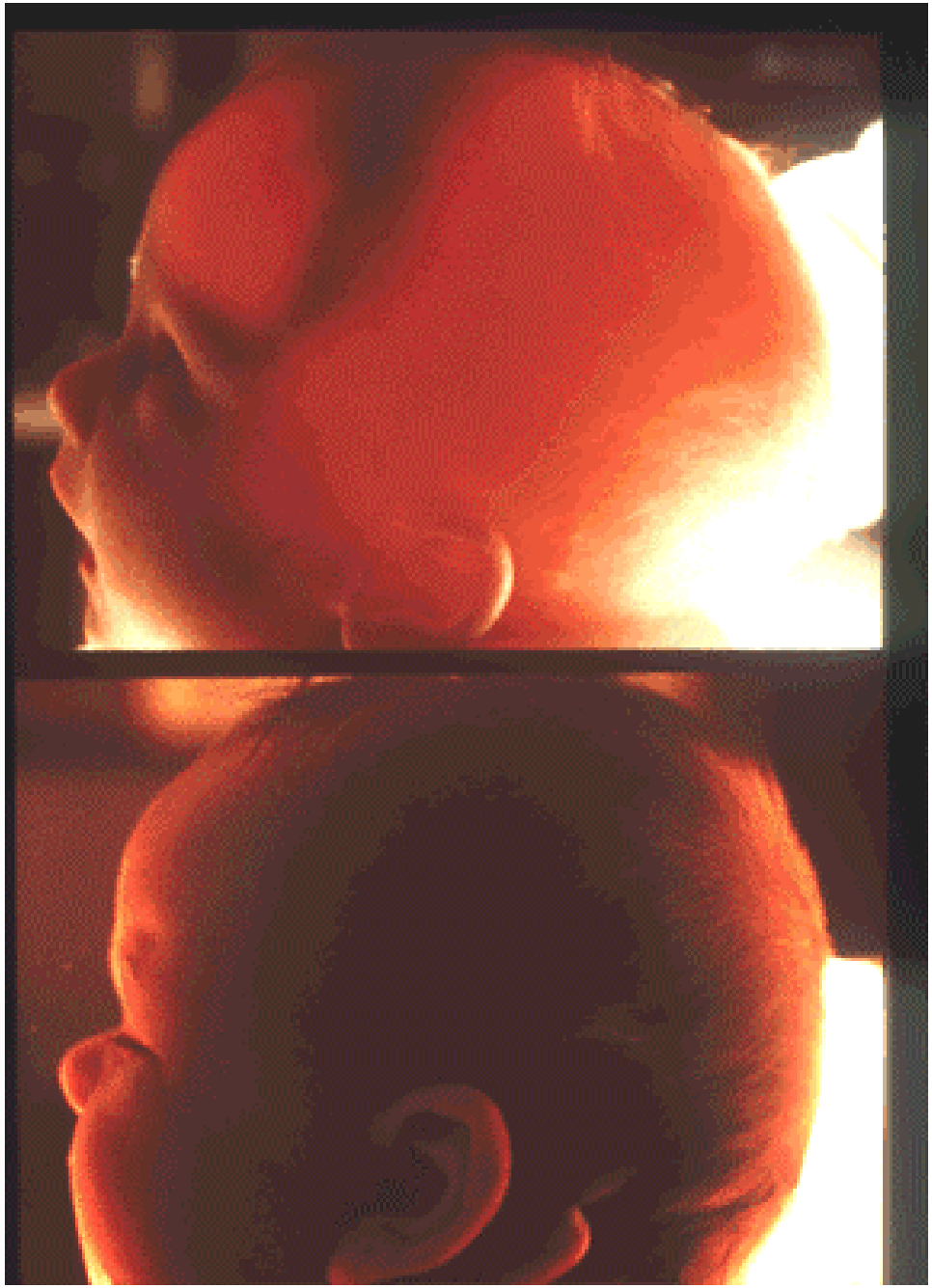
  📖 *J Peds 1979;94:779-86*
- TORCH screen requested in 603 patients
  - No evidence of infection with toxoplasmosis, rubella, CMV, herpes

  📖 *Pediatrics 1983;72:41-3*

Utility of TORCH screening

- Audit of screening of SGA babies for TORCH infection
  - Standard practice was to investigate all infants <3rd centile for weight
  - 66 of 1347 infants admitted were <3rd centile
  - 2 had congenital rubella (both had clinical signs)

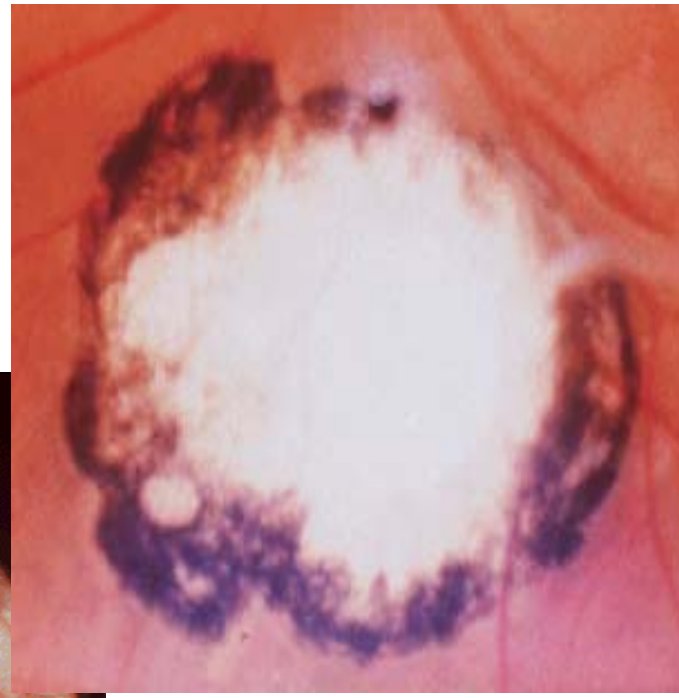
  📖 *Clin Peds 1982;7:417-20*

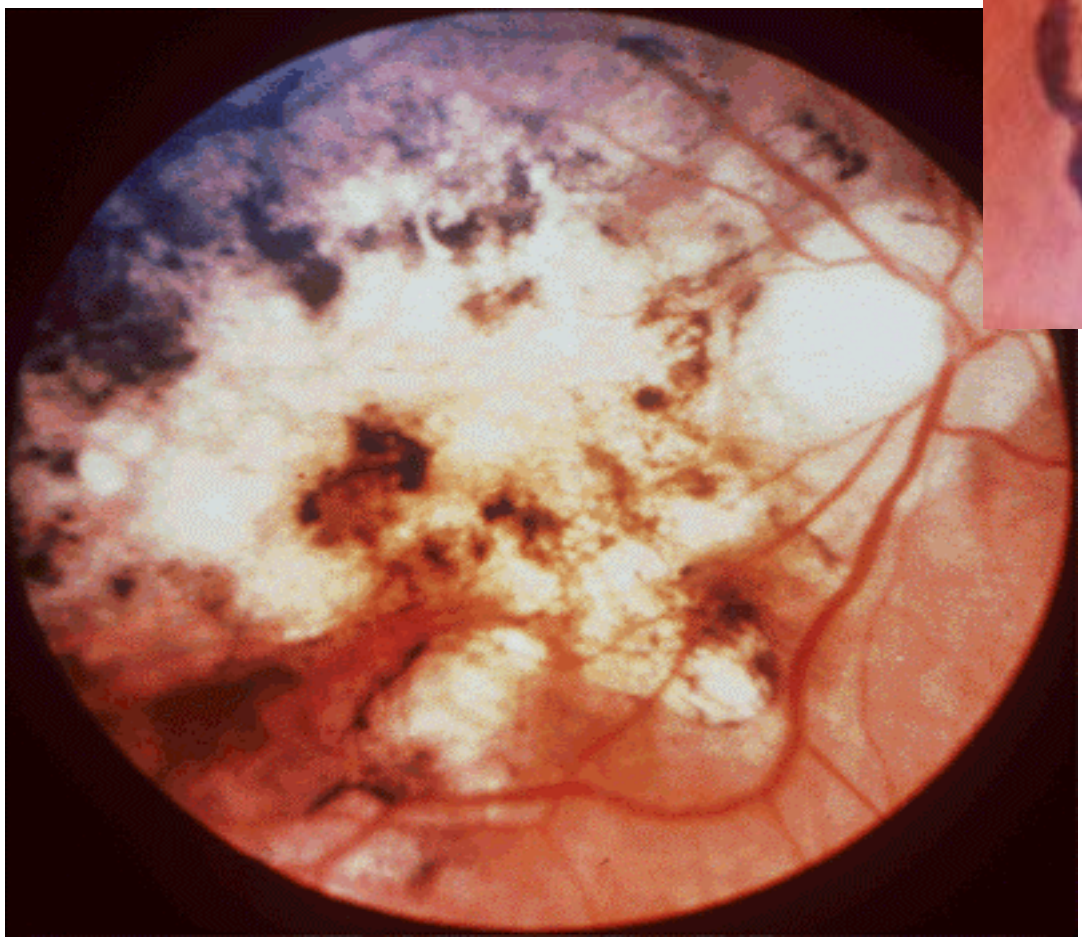


Case 1

- 7 day old girl
- normal pregnancy
- NVD
- jaundice day 1
- increased head circumference
- chorioretinitis

Chorioretinitis





Toxoplasmosis

Toxoplasma gondii – a protozoan parasite

- Zoonosis: domestic animals esp. cats.
  - Eat oocysts in cat faeces or infected meat
- Incidence: ~1:200 pregnancies
  - Usually not recognised
- Most women asymptomatic
  - Can have flu-like illness or lymphadenopathy
- Risk of fetal damage greatest in 1st trimester

Toxoplasmosis

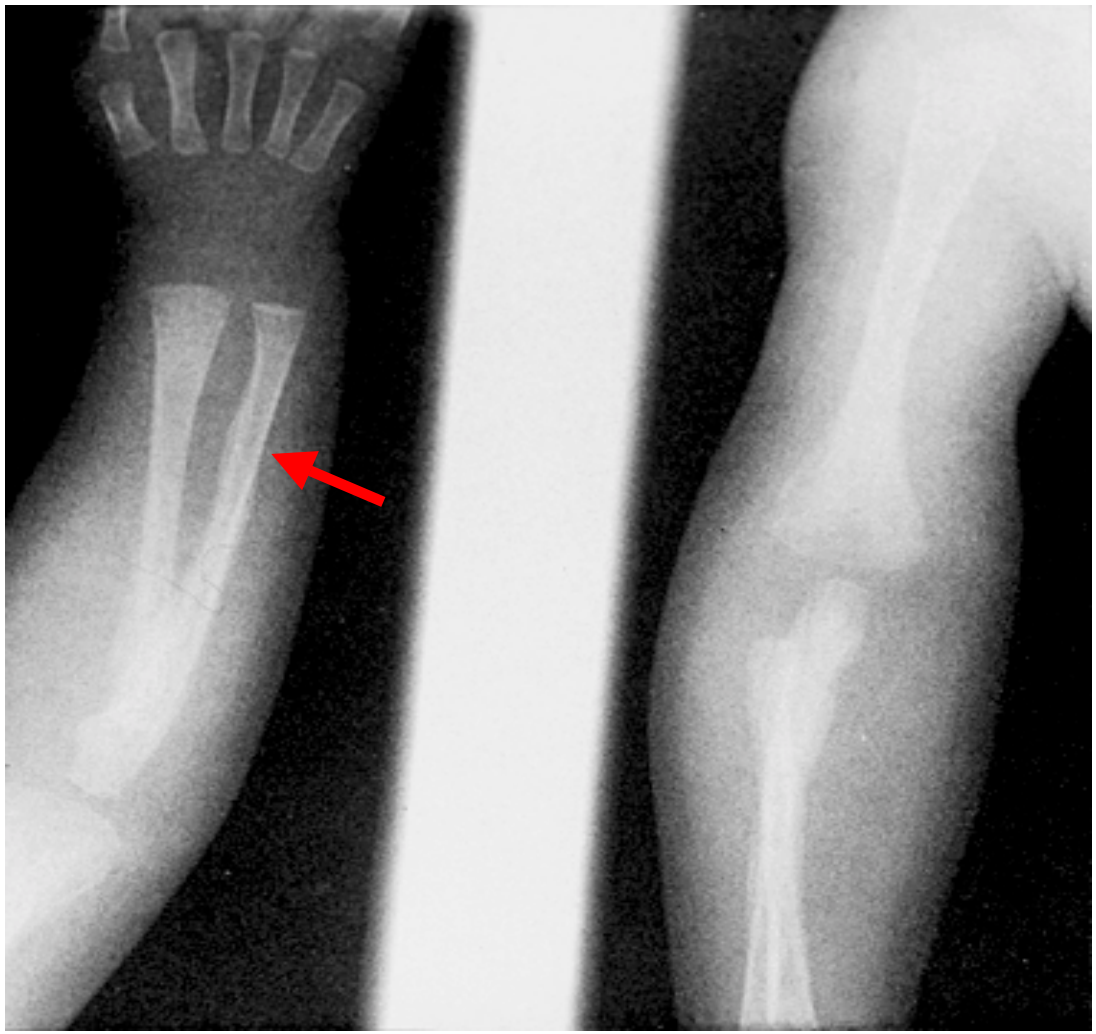
	Risks	
	Fetal infection	Fetal damage
1st trimester	5-15%	60-80%
2nd trimester	25-40%	15-25%
3rd trimester	30-75%	2-10%

Toxoplasmosis

- Classic tetrad
  - Chorioretinitis, hydrocephalus or microcephaly, convulsions, intracranial calcification
  - ‘Blueberry muffin’ – cutaneous erythropoeisis
- Main presentation
  - Hydrocephalus or vision abnormalities at birth or later
- Diagnosis - serology
  - IgM +ve, or IgG rise (or IgA +ve or low IgG avidity)
- Treatment
  - pyrimethamine + sulfadoxine +/- spiramycin

Case 2

- 9 day old boy
- Snuffles
- Peeling skin
- Rash on soles



Xray showing periostitis

Syphilis

Treponema pallidum - spirochaete

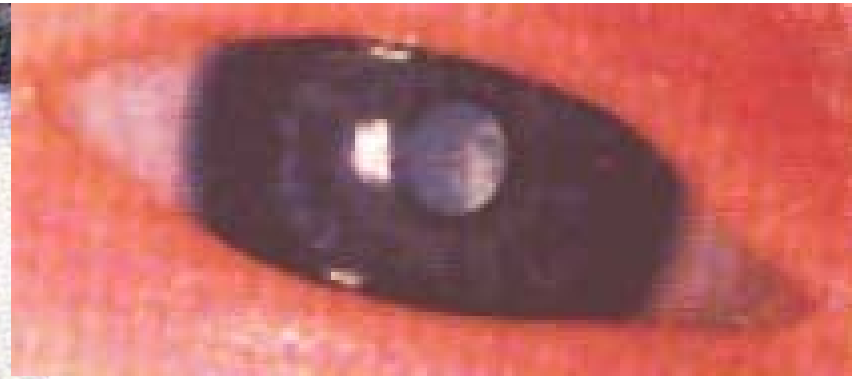
- Incidence: rare in Australia, though incidence increasing in gay men + outbreaks in Kimberley
- Untreated maternal infection in 1st trimester more likely to produce fetal damage

Syphilis

- Transplacental spread
  - Abortion/fetal death, hydrops fetalis, preterm labour, IUGR
- Extrauterine manifestations
  - Wide spectrum, including fulminant sepsis
  - Maculopapular rash on back, legs, palms, soles
  - Bullous/desquamating rash
  - Rhinitis - ‘snuffles’ - 1/52 - 3/12
  - HSM, jaundice, osteitis, pancytopenia, oedema, keratitis, deafness, Hutchinsons teeth, neurosyphilis with handicap

Syphilis

- Diagnosis: antenatal
  - Non-treponemal tests for screening (VDRL, RPR)
    - high titre suggests active infection
    - low titre suggests false +ve or previously treated syphilis
  - Specific treponemal tests for confirmation (TPHA, FTA-Abs)
    - positive TPHA indicates current or past syphilis
- Diagnosis: neonatal
  - clinical picture
  - IgM, IgG (RPR)
  - CSF
- Treatment: Penicillin



Case 3

- Baby girl, day 1
- ‘Bluish’ palpable rash
- No red reflex
- HSM
- Slight jaundice

Rubella

- Incidence
  - less since MMR - up to 10% of women susceptible
- Fever, rash, lymphadenopathy in mother
  - hard to diagnose clinically; 50% asymptomatic
- Screen for IgG in pregnant women
- Congenital Rubella
  - Deafness, heart defects, mental retardation, cataracts / retinopathy
  - Main risk is in 1st trimester (~ 90%)

Rubella - management

- Prevent by immunisation!
- Test maternal IgG and IgM
  - even if previously IgG positive
  - reinfection can occur without detectable IgM - rare - ↓ risk of fetal damage ~ 5%

CMV

- Most common cause of congenital infection and non-hereditary deafness
  - 0.3 - 2% live births
- Primary CMV infection occurs in 6/1000 pregnancies
- 50% risk of transmission to fetus

CMV - sequelae

- Symptomatic congenital CMV (10%)
  - risk of sequelae 90%
    - mortality 10-30%
    - microcephaly 35-50%
    - mental retardation up to 70%
    - SNHL 25-50%
- Asymptomatic congenital CMV (90%)
  - risk of sequelae 10%
    - SNHL 5%

CMV

- Features
  - thrombocytopenia
  - microcephaly and intracranial calcification
    - periventricular
  - jaundice
  - deafness - can be progressive
- Diagnosis
  - culture/PCR of urine in first week of life
  - IgM (IgG reflects maternal antibody)
- Management
  - ?role for ganciclovir

Case 4

- 5 day old baby girl
- low grade fever
- tachypnoea
- lethargic
- blistering lesions noted from day 2

Herpes Simplex Virus

- Incidence: 2/100 000 live births
  - most HSV-2
- Risk to baby
  - if mother seropositive
    = 0.04% risk of transmission to baby
  - if shedding from reactivation during delivery
    = 3% transmission
  - if maternal primary infection
    = 30-50% transmission

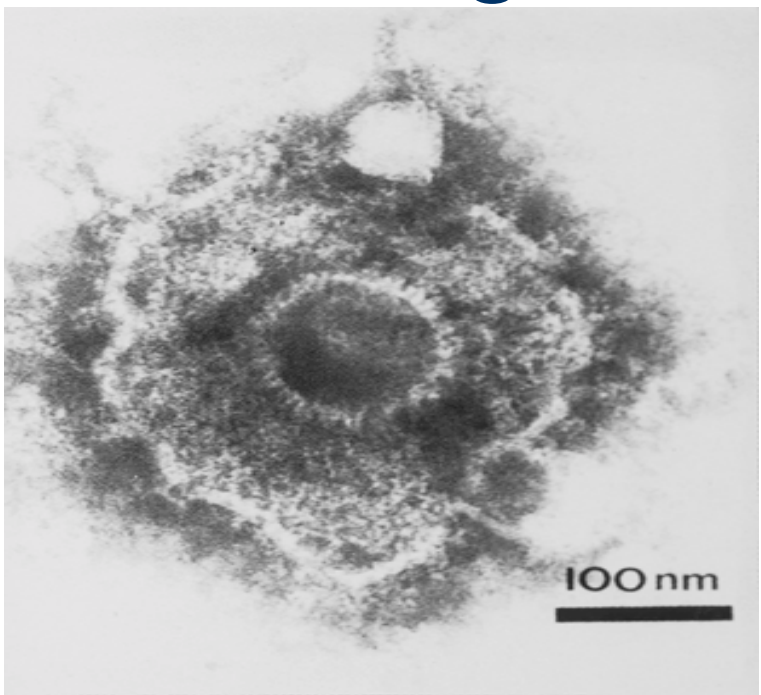
Herpes simplex virus

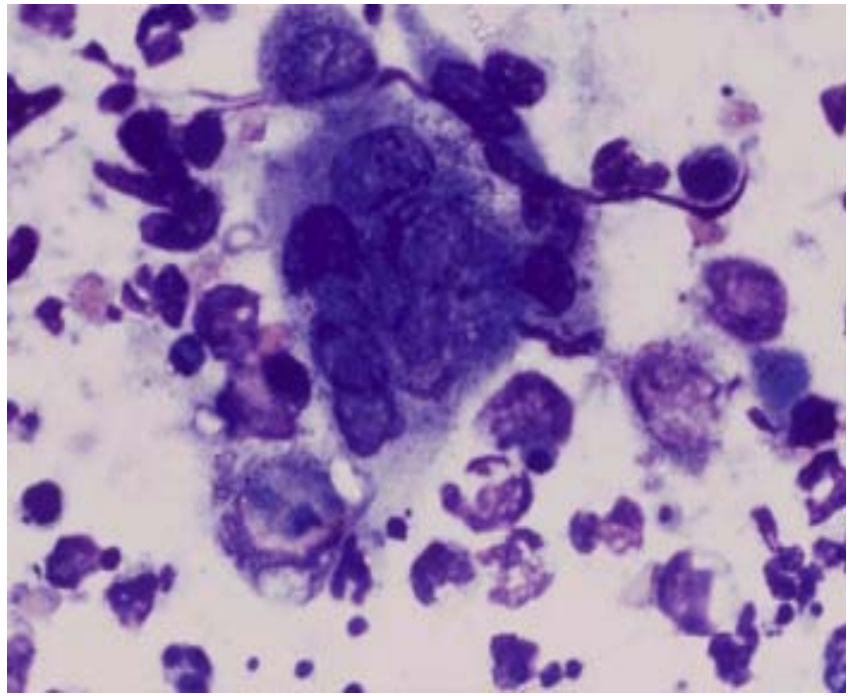
- Increased risk
  - prems
  - fetal scalp monitoring

Perinatal herpes infection

- Congenital - rare
- Postnatal - 3 clinical categories
  - Localised skin, eye, mouth (SEM): D5-6
  - CNS: D9-12
  - Disseminated

HSV diagnosis





- EM, PCR, IF, culture of vesicular fluid or tissue scraping microscopy (multinucleate giant cells and intranuclear inclusions)
- Serology: babies get IgG from mum!

Herpes simplex virus

- Treatment
  - prompt treatment is essential
  - hi-dose aciclovir (20 mg/kg iv 8H)
- Outcome
  - even with early treatment of meningoencephalitis, 85% major handicap

Case 5

- 7 day old male infant
- NVD at term
- 2 year old sibling has chickenpox

Perinatal VZV infection

- Congenital varicella syndrome
  - 2% if maternal infection at 13-20/40
  - 0.4% if <13/40
- Neonatal chickenpox
  - high risk if perinatal exposure (5 days before to 2 days after delivery)

    → full IV dose virus with no maternal Ab

Perinatal VZV infection

- Outcome
  - Congenital - cicatricial skin lesions and hypoplastic limbs; CNS; eyes
  - Neonatal - up to 30% mortality from pneumonitis

Perinatal VZV infection

- Maternal chickenpox
  - >5 (7) d before delivery: no Rx to infant
  - 5 (7) d before – 2 (28) d after delivery: ZIG
- If baby develops chickenpox, give aciclovir if:
  - prem
  - severe disease
  - ZIG given late

Case 6

- 25 yo school teacher is pregnant
- Child in class has slapped cheek disease

Parvovirus B19 infection in pregnancy

- 60% of adults are immune
- Risk of infection if susceptible:
  - Exposure at home: 50%
  - Exposure at school/child care: 20-30%
  - Exposure in community: <20%
- Exclusion of teachers/child care workers NOT recommended

Parvovirus B19 infection in pregnancy - risks

- 50% risk of transmission from infected mother to fetus
- 10 excess fetal loss in 1st 20/40 i.e.15%)
- 3% risk of hydrops
- <1% congenital anomalies (no excess)

Parvovirus B19 infection in pregnancy – overall risks

	Any pregnant woman exposed to parvovirus	Pregnant woman with proven recent infection
Excess fetal loss in 1st 20/40	0.4 – 1%	5%
Death from hydrops or its treatment	0.05 – 0.1%	0.6%

Hepatitis B in infants

- Risk of chronic infection and subsequent liver disease is inversely proportional to age at time of infection
  - 90-95% of hep B infections <1yo result in chronic liver disease
  - 25 - 50% of infections in 1 - 5 yo
  - 6 - 10% in adults

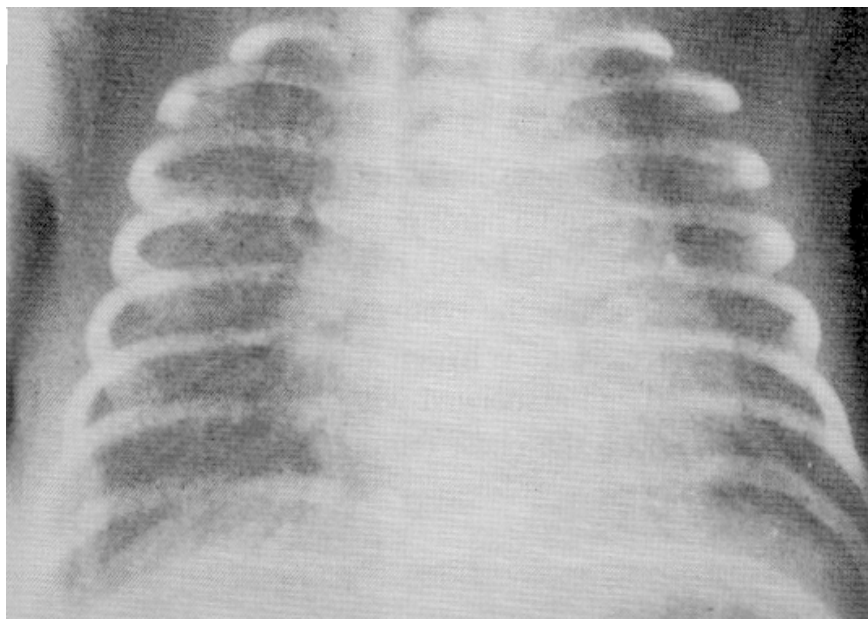
Hepatitis B - vertical transmission

- Risk depends on maternal status
  - sAg +ve = carrier (5-20% vertical transmission)
  - eAg +ve = high risk carrier (90% transmission)
- Hepatitis B vaccine prevents ~ 85% infection
- Hepatitis B immunoglobulin and vaccine prevents ~95% - given if mother eAg +ve
- If vertical transmission doesn't occur, there's still a high risk of horizontal transmission till ~ 5yo if unimmunised

Neonatal Infections: Early Onset Sepsis

Case 7

- 28 week gestation baby
- Premature rupture of membranes 60 hours previously
- Maternal fever
- Baby born in immediate respiratory distress requiring ventilation



Group B Streptococcus

Streptococcus agalactiae/GBS

- Incidence
  - ~20% women colonised in pregnancy
  - 40 - 70% babies colonised
  - 1% of these get disease
  - approximately 1-2/1000 live births in Australia
- Features
  - serotypes Ia, Ib, and II-VIII cause EOS (2/3)
    - pneumonia and septicaemia
  - serotype III predominantly causes LOS (1/3)
    - bacteraemia and meningitis

GBS infection

Early onset disease

- < 7 days
- Obstet Cx common
- 30% prems
- Bacteraemia, pneumonia
- Fulminant
- Mortality 5-20%

Late onset disease

- 7 days – 3 months
- Obstet Cx uncommon
- Term babies
- Bacteraemia, meningitis
- Slowly progressive
- Mortality 2-6%

Management of pregnancy

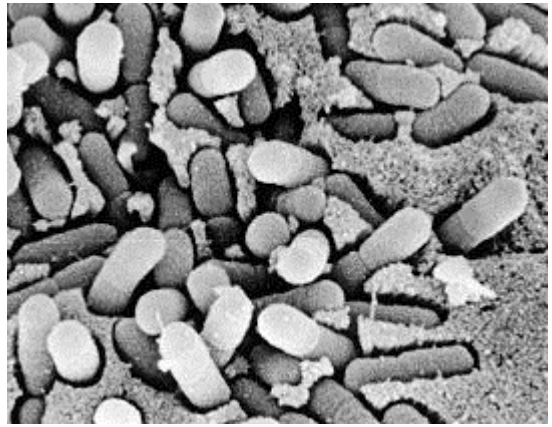
- Screening
  - low vaginal + anorectal swabs
  - 35-37/40
- Obstetric risk factors
  - Previous infant with GBS
  - GBS bacteriuria
  - Labour < 37/40
  - ROM > 18/24
  - Intrapartum fever

Intrapartum penicillin

Management of neonate

- Surface swabs unhelpful
- FBE; blood, urine and CSF cultures; CXR
- Penicillin + gentamicin
- Outcome
  - Mortality <10% overall
  - Neurological sequelae in survivors of meningitis

Escherichia coli



- Early onset sepsis, but continued risk up to 3 mths of age
- Risk factors same as for GBS
  - PROM, chorioamnionitis, maternal fever
- UTI, bacteraemia, meningitis
- Gentamicin for sepsis, cefotaxime if meningitis

Neonatal Infections: Late Onset Sepsis

Late Onset Sepsis (LOS)

- LOS >48 hours
  - EOS bugs (GBS, *E coli*, Listeria)
  - Plus nosocomial
  - +/- Coagulase negative staphylococci
- Other nosocomial pathogens
  - Enterococci, Candida, Pseudomonas….

Antibiotics for neonatal sepsis

- EOS - **benzylpenicillin + gentamicin**
- LOS - **flucloxacillin + gentamicin**
  - vancomycin and gentamicin where CONS suspected
- Meningitis: add **cefotaxime**

Acknowledgements

- Jim Buttery
- Australasian Society for Infectious Diseases (ASID)