Medico-legal aspects of perinatal pathology

Placental infections

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Acute chorioamnionitis and funisitis: definition, pathologic features, and clinical significance
Acute chorioamnionitis (ACA)

Green-yellowish discoloration +/- malodorous
Acute chorioamnionitis (ACA)

ACA is a maternal response to microbial invasion of the amniotic sac; initially, histologic inflammation may be localized to point of rupture (POR).
Acute chorioamnionitis (ACA)
2 types/sources of PMN inflammatory response (placenta has 2 circulations)
Acute chorioamnionitis (ACA)

Green-yellow discouloration due to MATERNAL PMN infiltrate & PMN peroxidase activity
Maternal response

- Stage 1: Acute subchorionitis or chorionitis
- Stage 2: Acute chorioamnionitis (inflammation in fibrous chorion and/or amnion)
- Stage 3: Necrotising chorioamnionitis (karyorrhexis of PMN, amniocyte necrosis and/or amnion BM hypereosinophilia)

- Grade 1: not severe as defined
- Grade 2: severe confluent PMN or with subchorionic microabscesses

Rare before 14 weeks
Usually clinically silent
Inflammation: HCA is maternal response
Inflammation: HCA is maternal response

Maternal Inflammation Severe Grade 2 and Stage III worse prognosis for neurologic sequelae in term infants

Subchorionic microabscess
Fetal Inflammatory Response

### Stages

1. **Stage I**
   - Rare before 20 weeks

2. **Stage II**

3. **Stage III**

**Maternal Inflammatory Response**

**Fetal Inflammatory Response**
Fetal response

• Stage 1: Chorionic vasculitis or umbilical phlebitis
• Stage 2: Involvement of the umbilical vein and 1 or 2 umbilical arteries
• Stage 3: Necrotising funisitis

• Grade 1: not severe as defined
• Grade 2: severe near confluent intramural PMN with attenuation of vascular smooth muscle
Fetal Inflammatory Response

I - Grades 1 and 2
II - Grades 1 and 2
III - Grades 1 and 2

OMFP
ACA with FETAL response: chorionic vasculitis

Grade 2: intense vasculitis of chorionic plate vessels (or cord) and/or nonocclusive thrombosis
Some considerations

- Most histological ACA are subclinical
- ACA is a major cause of preterm delivery with subsequent problems
- Women with CA at 1\textsuperscript{st} pregnancy are at risk of CA in subsequent pregnancies
Risk factors

- Previous CA
- Bacterial vaginosis in early pregnancy
- Periodontal disease
- Bacteriuria
- Socio-economic factors
- Maternal disease (DM, immunity, etc.)
- Maternal carrier status (GBS, E coli)
Histolopathologic features linked w/ Fetal Inflammatory Response Syndrome

FIRS = sepsis-like picture in neonate but cultures NEG
...but high levels of circulating inflammatory mediators
   IL-1, IL-6, IL-8, TNF-$\alpha$, etc

In particular IL-6 is a major mediator of host response to infection and tissue damage

Babies with FIRS have higher rates of neonatal complications such as cerebral palsy
Features linked with increased risk for neurologic sequelae in term infant:

- Chorioamnionitis with intense chorionic vasculitis or funisitis
- Acute chorioamnionitis with recent non-occlusive chorionic vessel thrombi

Features linked with increased risk for adverse neonatal outcome and perinatal death:

- Phlebitis and arteritis of umbilical cord
- Subacute necrotizing funisitis
- Severe maternal response
Cerebral Palsy

• Despite advances in perinatal care, incidence of CP not fallen over recent years
• 2 / 1000 children continue to be affected
• Multifactorial aetiology including intrauterine infection, maternal/fetal coagulation problems, antenatal haemorrhage, abnormal presentation, preterm birth & developmental /chromosomal abnormalities
  – Histologic chorioamnionitis is seen in around 12% of children with CP
  – There is up to 80% increased risk of CP in babies with histological chorioamnionitis
  – In babies <32/40 the prevalence of chorioamnionitis increases to 26%
Risk factors

• Prematurity: risk decreases with increasing gestational age
• Birth weight: Increase risk in SGA & IUGR and in LGA
• Socioeconomic factors
• Multiple births
Placental pathology → Intrauterine growth retardation → Impaired anaerobic metabolism in labour → Ischaemic brain injury → Cerebral palsy
Brain damage: factors

- Prenatal intrauterine infections
  - Prolonged rupture of membranes at term
  - Intrapartum maternal fever
- Vascular lesions
  - Fetal thrombotic vasculopathy
- Intrapartum hypoxia
- Meconium
- SYNERGY
Proposed mechanisms of fetal brain injury after exposure to fetal inflammation. Clinically, fetal inflammatory response syndrome (FIRS) can result from chorioamnionitis or fetal sepsis.
Placental lesions associated with CP (single or in combination)

- Fetal thrombotic vasculopathy
- VUE with obliterative fetal vasculopathy
Placental lesions associated with CP (single or in combination)

- Chorioamnionitis with severe fetal vasculitis

- Meconium-associated vascular necrosis
CP and risk factors

- 69% of children with CP had only antepartum risk factors
- 25% had ante- and intrapartum risk factors
- 2% had no recognised risk factors
- only 4-10% of children with CP had intrapartum risk factors

Perinatal asphyxia may be a CONSEQUENCE of, rather than a CAUSE of neurological injury
Do histology & bacteriology

- Maternal fever $\geq 37.8^\circ$C
- Fetal tachycardia
- Neonatal Apgar score $<6$
- FIRS can result in NN encephalopathy with negative cultures
Acknowledgments
Thank you