Evaluating for Sepsis in the Newborn

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Objectives
- Review current trends in the epidemiology of neonatal sepsis
- Examine new approaches to sepsis evaluation (provider’s point of view)
- Review what a client may expect from a “sepsis workup” (parent/patient point of view)

Case 1
- Boy infant born at 39 weeks
- Mom G1P1, GBS negative
- Precipitous vaginal delivery
- Infant initially with respiratory rate in the 70s
- By 20 mins of age resp rate drops to 50s.
- REFER?

GBS context
- Historical Incidence (prior to GBS prophylaxis in 2002): 1 to 5 cases per 1000 live births; 1 per 100-200 colonized women, 75% were early onset
- Current Incidence: 0.35 cases per 1000 live births in 2005 for Early Onset Sepsis (EOS) = Late Onset Sepsis (LOS)
- Recurrent infection in 1-3% of appropriately treated infants

Dilemma of Sepsis Evaluation in the Newborn (< 72 hours of age)

- Early onset bacterial sepsis rare
- Mortality of bacterial sepsis is high
- Goal is to use current evidence to guide work-up and therapy
  - Miss no (as few as possible) cases of bacterial sepsis.
  - For infants without bacterial infection, minimize duration of therapy.

Risk factors for sepsis

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Incidence of sepsis</th>
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</thead>
<tbody>
<tr>
<td>PROM &gt; 18 hours</td>
<td>1 %</td>
</tr>
<tr>
<td>Maternal + GBS (prophylaxis era)</td>
<td>0.2 - 0.4%</td>
</tr>
<tr>
<td>+ GBS + PROM, fever, preterm</td>
<td>4 - 7%</td>
</tr>
<tr>
<td>Chorioamnionitis</td>
<td>3 - 8%</td>
</tr>
<tr>
<td>+ GBS + chorioamnionitis</td>
<td>6 - 20%</td>
</tr>
<tr>
<td>PROM + preterm</td>
<td>4 - 6%</td>
</tr>
<tr>
<td>PROM + 5 min Apgar &lt; 6</td>
<td>3 - 4%</td>
</tr>
</tbody>
</table>

Prevention Strategies

Intrapartum prophylaxis to prevent perinatal GBS with universal screening at 35-37 weeks gestation

- Intrapartum prophylaxis indicated
  - Previous infant with invasive GBS disease
  - GBS bacteruria during pregnancy
  - Positive GBS screening culture (except in planned C-section without labor or ROM)
  - Unknown GBS status AND
    - Delivery at < 37 weeks gestation
    - ROM > 18 hours before delivery
    - Intrapartum temperature > 100.4°F (> 38°C)

Current AAP/CDC Guideline

If a woman receives intrapartum antibiotics for treatment of suspected chorioamnionitis, her newborn should have a full diagnostic evaluation and empiric therapy pending culture results, regardless of clinical condition at birth, duration of maternal antibiotic therapy before delivery, or gestational age at delivery. Empiric therapy for the infant should include antimicrobial agents active against GBS as well as other organisms that might cause neonatal sepsis (e.g., ampicillin and gentamicin).

Screening Tests for Neonatal Sepsis

CBC with differential, C-reactive protein, IL-6, mini-ESR, IL-8, Tumor necrosis factor, etc...

<table>
<thead>
<tr>
<th>Normal range of WBC indices at 4 hours of age at term</th>
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<tbody>
<tr>
<td>Mean</td>
</tr>
<tr>
<td>Total WBC (x10^9/L)</td>
</tr>
<tr>
<td>ANC (x10^9/L)</td>
</tr>
<tr>
<td>I/T ratio</td>
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</tbody>
</table>

Case 2

- 36 week infant born in a birth center
- Mom GBS positive, pen-allergic got treated with Clindamycin
- Mom had a temp of 38.2 and 38.1 in 4 hours prior to delivery
- Infant well appearing but not latching well at 2 hours of age
- REFER?

**Definition of chorioamnionitis**: Fever (maternal T >100.4 °F (>37.8 °C)) + 2 or more criteria below:

- Maternal tachycardia (>120 beats per minute [bpm])
- Fetal tachycardia (>160-180 bpm)
- Purulent or foul-smelling amniotic fluid/vaginal discharge
- Uterine tenderness
- Maternal leukocytosis (total >15,000 cells/µL)

*Risk factors for sepsis* (chorioamnionitis OR maternal GBS prophylaxis indicated but not complete):

- CBC with diff & Blood culture (if not already done)
- LP, or CXR

**Antibiotic therapy**

- Appropriate course of antibiotics.
- Treat with 36 hours antibiotics
- 3 doses of Ampicillin and 2 doses of Gentamicin (q 24hr).
- D/C home at ~48 hours.

**Culture negative & "well"**

- Treat with 72 hours antibiotics
- 3 doses of Ampicillin and 2 doses of Gentamicin (q 24hr)
- D/C home at ~48 hours.

**Culture positive, LP abnormal, or "clinical" sepsis**

- Management of Newborns < 6 hours Old

**LP or not to LP**

- Incidence of bacterial meningitis is < 0.25%
- ~30% have a negative blood culture
- > 99% of infants with meningitis have symptoms of meningitis

- Need 1000-2000 LPs to find 1 case meningitis with neg blood culture & no symptoms of meningitis
- Recommend LP in newborns with symptoms of meningitis (abnormal tone, seizures, bulging fontanel, lethargy, inconsolable, septic shock)

**How can you advocate for your patient?**

- Rapid referral for infant who is worsening quickly
- If possible, accompany the family to the referral facility to help with details of the history
- Consider suggesting a CRP (may help rule out sepsis in a conservative provider)
- Perform a home visit and remind the provider that is your plan

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**Pediatric Clinics of North America** 51:939-959, 2004
Thank You!

Acknowledgements:
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