Prenatal listeriosis: Risk factors, education, and prevention

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Outline

- Background
  - Symptoms
  - Transmission
  - Diagnosis, Management, and Treatment
- Modifiable Risk Factors
- Education and Prevention

What is *Listeria monocytogenes* (Listeria)?

- Bacterium found in soil, wood, and decaying matter in the environment (rod shaped, gram +)
- Thick cell wall, biofilm-producing
  - Allows it to better survive sanitation measures
- Many animals carry without appearing ill
- Most commonly transmitted to humans through contaminated foods
- Causes severe disease in select human populations (20-30% mortality rate)
Epidemiology

- According to CDC estimates for the US:
  - Of 1,600 Listeria-related illnesses per year, ~14% in pregnant women
  - 260 deaths annually
  - Based on 2008-2016 data from the Foodborne Diseases Active Surveillance Network (FoodNet), invasive listeriosis annual incidence rate per 100,000 was 0.28 cases among the general population but 3.73 cases among pregnant women
  - Hispanic women 24 times more likely to become infected with Listeria than other women, likely attributable to cultural food preferences

Contributing Physiological Factors

- Pregnant women more at risk for infection with *Listeria*
  - Downregulation of the cellular immune system during pregnancy, especially in the third trimester
    - Changes in T-helper and cytotoxic T-cell function in the recognition of foreign antigens, as well as a natural decrease in the amount of natural killer cells found during pregnancy
    - Bacterium’s affinity for placental cell receptors

Symptoms: Non-Invasive Listeriosis

- Gastrointestinal (diarrhea)
- Fever
- Muscle aches
  - Usually resolve in 1-3 days but can occur up to 21 days post-infection
- Non-invasive listeriosis is often undiagnosed
- However, this presentation will focus on invasive listeriosis
Symptoms: Invasive Listeriosis

- Invasive infection, defined as isolation of *Listeria* from a normally sterile site (typically blood or cerebrospinal fluid), is uncommon
- Usually occurs in pregnant women, elderly, young children, or immunocompromised populations
- Infection may be asymptomatic
- Symptoms can take days or weeks to appear
  - Nonspecific, flu-like illness with fever, chills, myalgia, backache, muscle and/or joint pain, headache, stiff neck, confusion, and loss of balance, often preceded by diarrhea or other gastrointestinal symptoms

Perinatal Outcomes: Invasive Listeriosis

- Outcomes if not treated early enough
  - Miscarriages in first trimester of pregnancy
  - Premature labor, delivery of low birth weight infant, or infant death
  - Fetuses with late infection: seizures, blindness, paralysis, cognitive disability, or impairments of the brain, heart, or kidney
  - Newborns: sepsis, meningitis

Transmission: Contaminated Food

- Outbreaks have been linked to a wide variety of foods, including contaminated produce, ready-to-eat meats, poultry, seafood, dairy products
- *Listeria* characteristics of particular concern to food industry
  - Faculative anaerobe
  - Psychrotrophic
  - Ubiquitous in the environment
  - Motile
  - Can be an intracellular pathogen
Select Outbreaks of Listeriosis

- Cantaloupes – 28 states in 2011
  - 147 ill (143 hospitalized), 33 deaths
- Ricotta salata cheese – 14 states in 2012
  - 22 ill (20 hospitalized), 4 deaths
- Caramel apples – 12 states in 2014
  - 35 ill (34 hospitalized), 7 deaths
- Ice cream – 4 states in 2015
  - 10 ill (all hospitalized), 3 deaths

Transmission:

Other Routes

- Nosocomial/hospital-acquired
  - Rare, but found to occur among healthy newborns
- Vertical/mother to child
  - Listeria can colonize the vagina of some women and infect babies, but this is rare
  - Infection of the mother can lead to infection of the baby
- Breast milk?
  - At this time, the CDC reports that there have been no documented cases of transmission of Listeria to infants directly from breast milk
  - There is evidence of bacterial shedding of Listeria in the breast milk of mice
  - However, research on human transmission of Listeria via breast milk is lacking

Diagnosis, Management, and Treatment

- Committee on Obstetric Practice, American College of Obstetricians and Gynecologists (ACOG), published "Management of Pregnant Women With Presumptive Exposure to Listeria monocytogenes" in 2014 and reaffirmed in 2016 to provide guidance for three categories of patients:
  - Asymptomatic
  - Mildly symptomatic but afebrile
  - Febrile with or without other symptoms of listeriosis
ACOG Recommendations for
Asymptomatic

- No testing, including blood and stool cultures, or treatment indicated for asymptomatic pregnant woman who reports consumption of a product recalled or implicated during an outbreak of Listeria contamination.
- An asymptomatic patient should be instructed to return if she develops symptoms of listeriosis within 2 months of eating the recalled or implicated product.
- There is no reason to alter or begin fetal surveillance in asymptomatic women with known or presumptive exposure to Listeria.

ACOG Recommendations for
Mildly Symptomatic But Afebrile

- A pregnant woman who ate a product that was recalled because of Listeria contamination and who is afebrile but has signs and symptoms consistent with a minor gastrointestinal or flu-like illness (such as mild myalgia, mild nausea, vomiting, or diarrhea) can be managed expectantly (i.e., the same as for an exposed, asymptomatic pregnant woman). This is a reasonable approach that limits low-yield testing.
- Alternatively, such a patient could be tested with blood culture for Listeria, but if such a course is elected, specific instruction should be given to the microbiology laboratory.
- Because the morphology of Listeria resembles that of diphtheroids, it may be mistaken for a contaminant. Therefore, the laboratory should be alerted to the clinical suspicion of listeriosis.

ACOG Recommendations for
Mildly Symptomatic But Afebrile (continued)

- If such diagnostic testing is performed, some experts would withhold antibiotic therapy unless the culture yielded Listeria.
- Others would initiate antibiotic therapy, although no effectiveness data exist to help clinicians and patients evaluate the risks and benefits of such a treatment choice.
- If testing is undertaken and the blood culture yields Listeria, standard antimicrobial treatment for listeriosis would be indicated (covered in slides to come).
- Assessments of fetal well-being should be addressed on an individualized basis with consideration given to the degree of concern for infection and the patient’s clinical status.
ACOG Recommendations for Febrile with or without other symptoms of listeriosis

- An exposed pregnant woman with a fever higher than 38.1°C (100.6°F) and signs and symptoms consistent with listeriosis for whom no other cause of illness is known should be simultaneously tested and treated for presumptive listeriosis.

ACOG Committee on Obstetric Practice Opinion

Diagnosis

- Work up indicated by high risk food consumption
- Blood, lumbar puncture, placental cultures diagnostic
- Care must be taken to distinguish this organism from other Gram-positive rods, particularly diphtheroids.
- Upon confirming diagnosis, health care providers should contact their state public health departments to comply with reporting requirements
Treatment

- For nonallergic
  - High-dose intravenous penicillin or ampicillin (at least 6 g/day) for at least 14 days
  - Note: gentamicin frequently added because of synergism with ampicillin, but disagreement on whether this adds to the effectiveness of the regimen, especially given the toxicity of gentamicin
- For those allergic to penicillin, ampicillin, or both
  - Trimethoprim with sulfamethoxazole or erythromycin preferred
- Gram-stain smear of meconium from clinically suspected newborns should be examined for short Gram-positive rods; if positive, prophylactic antibiotics should be administered as precaution
- If blood cultures negative after completion of recommended antibiotic regimen, decision on continuing or stopping antibiotics recommended to be made using clinical judgment in consultation with an infectious disease specialist, a maternal–fetal medicine specialist, or both

Challenges

- Symptoms of infection may not occur until 2 months after ingestion of contaminated food, making the diagnosis of listeriosis in pregnancy even more difficult
- This also makes cases difficult to attribute to a specific food source and challenging for FDA to develop appropriate regulatory or preventive policy

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Modifiable Risk Factors:
Exposures To Contaminated Foods

- Listeria can survive and grow at refrigerator temperatures, unlike most other foodborne bacteria
- Most frequently linked to Listeria contamination:
  - unpasteurized or “raw” dairy products
  - soft cheeses
    - blue-veined cheese
    - feta
    - brie
    - camembert
    - queso fresco/queso blanco
  - deli meats
  - hot dogs
  - unwashed raw vegetables, including lettuce
  - refrigerated smoked seafood

Modifiable Risk Factors:
Food Handling and Storage

- CLEAN: Wash hands and surfaces often
  - Proper handwashing before preparing/eating food
  - Proper washing and drying of produce
- SEPARATE: Separate raw meats from other foods
  - Separating cooked from raw foods
- COOK: Cook to the right temperature
  - Thorough cooking
- CHILL: Refrigerate foods promptly
  - Use an appliance thermometer to be sure the temperature is consistently 40°F or below and the freezer temperature is 0°F or below.
  - Refrigerate or freeze meat, poultry, eggs, seafood, and other perishables within 2 hours of cooking or purchasing. Refrigerate within 1 hour if the temperature outside is above 90°F.
- USE/DISPOSE
  - Prompt use of perishables, prepared foods, and leftovers
  - Disposal of foods left at room temperature after 2 hours
  - Disposal if temperatures exceed 90°F (32°C) after 1 hour
  - Weekly checks of food supplies and disposal of those past expiration dates or recommended storage times

Modifiable Risk Factors:
Hand Hygiene and Cleaning

- To prevent hospital-acquired Listeria infections in healthy newborns
  - Proper handwashing in the hospital environment
  - Sufficient facility surface cleaning
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Education and Prevention

• While good agricultural and manufacturing practices are key to reducing burden, physicians and other healthcare providers play a major role in prevention of prenatal listeriosis by providing information on risk factors and healthy behaviors
• Share FDA recommendations for safe washing and handling of foods
• Provide advice to avoid high risk foods

FDA’s Advice: To Eat or Not to Eat?

Don’t eat:
• Ready-to-eat meats: Hot dogs, deli meats, and luncheon meats - unless they’re reheated until steaming hot.
• Soft cheeses like Feta, Brie, and Camembert, “blue-veined cheeses,” or “queso blanco.” “queso fresco,” or Parme – unless they’re made with pasteurized milk. Make sure the label says, “made with pasteurized milk.”
• Refrigerated pâtés or meat spreads.
• Refrigerated smoked seafood - unless it’s in a cooked dish, such as a casserole.
  – Refrigerated smoked seafood, such as salmon, trout, whitefish, cod, tuna, or mackerel is most often labeled as “nova-style,” “lox,” “bapped,” “smoked,” or “anyak.” These types of fish are found in the refrigerator section or sold at deli counters of grocery stores and delicatessens.
• Raw (unpasteurized) milk or foods that contain unpasteurized milk.

It’s okay to eat:
• Canned or shelf-stable (able to be stored unrefrigerated on the shelf) pâtés and meat spreads.
• Canned or shelf-stable smoked seafood.
• Pasteurized milk or foods that contain pasteurized milk.

https://www.fda.gov/Food/ResourcesForYou/HealthEducators/Asset083320.htm
References


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Questions & Answers?
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