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LISTERIOSIS

Revised 10/15/2004

Listeriosis, a serious infection caused by eating food contaminated with the bacterium *Listeria monocytogenes*, has recently been recognized an important public health problem in the United States.

Although a number of *Listeria* species have been recognized, almost all human and animal infections are caused by *L. monocytogenes*. The organism is a facultative, non-acid-fast, non-spore-forming, gram-positive bacillus. Morphologic confusion with coryneforms can occur, and since these latter organisms can contaminate CSF and blood cultures, *Listeria* may be dismissed as a false-positive if it is not appropriately identified.

Epidemiology

Listeria monocytogenes is found in soil and water. Vegetables can become contaminated from the soil or from manure used as fertilizer. Animals can carry the bacterium without appearing ill and can contaminate foods of animal origin such as meats and dairy products. The bacterium has been found in a variety of raw foods, such as uncooked meats and vegetables, as well as in processed foods that became contaminated after processing, such as soft cheeses and cold cuts at the deli counter. Unpasteurized (raw) milk or foods made from unpasteurized milk may contain the bacterium. Many foods are contaminated with *L. monocytogenes*, and recovery rates of 15 to 70% are common from raw vegetables, raw milk, fish, poultry, and meats, including fresh or processed chicken and beef available at supermarkets or delicatessen counters. Ingestion of *L. monocytogenes* must be an exceedingly common occurrence.

Transmission occurs by eating food contaminated with *Listeria*. Babies can be born with listeriosis if their mothers eat contaminated food during pregnancy. Although healthy persons may consume contaminated foods without becoming ill, those at increased risk for infection can probably get listeriosis after eating food contaminated with even a few bacteria. Although most human listeriosis appears to be foodborne, other modes of transmission occur including from mother to child transplacentally or through an infected birth canal, cross-infection in neonatal nurseries,¹ and rarely common-source outbreak.

L. monocytogenes has the ability to replicate at refrigerator temperatures of 4°C (39.2°F). This growth characteristic has been useful in isolating the pathogen in mixed culture and accounts for, in part, the association of *Listeria* with soft cheeses and cold cuts. *Listeria* is killed by pasteurization, and heating procedures used to prepare ready-to-eat processed meats should be sufficient to kill the bacterium; however, unless good manufacturing practices are followed, contamination can occur after processing.

Epidemiologically, it is likely that most cases of listeriosis are related to food-borne infection. A number of epidemics have been recognized related to cole slaw, milk, or soft cheese. Most cases of infection are sporadic.

Humans may carry the organism asymptotically in the intestinal tract in up to 5% of the normal population.

In the Louisiana, *L.monocytogenes* infection is estimated to cause 40 to 50 serious illnesses and 5 to 10 deaths each year.

Risk factors

- Pregnant women : They are about 20 times more likely than other healthy adults to get listeriosis. About one-third of listeriosis cases happen during pregnancy
- Newborns: Newborns rather than the pregnant women themselves suffer the serious effects of infection in pregnancy.
- Persons with weakened immune systems:
 - Persons with cancer, diabetes, or kidney disease
 - Persons with AIDS: They are almost 300 times more likely to get listeriosis than people with normal immune systems.
 - Persons who take glucocorticosteroid medications
 - The elderly
- Healthy adults and children occasionally get infected with *Listeria*, but they rarely become seriously ill.

The incubation period is variable, ranging from 3 to 70 days; the median incubation period for foodborne transmission is thought to be 3 weeks.

Clinical Description

Listeriosis has a wide variety of manifestations, including meningoenzephalitis, septicemia, influenza-like illness and congenital infection which can result in abortion or neonatal death.

Infection in Pregnancy: Pregnant women are prone to develop *Listerial* bacteremia. *Listeria* bacteria may proliferate in the placenta in areas that appear to be unreachable by usual defense mechanisms.

Bacteremia is manifested clinically as an acute febrile illness, often accompanied by myalgias, arthralgias, headache, and backache. Illness usually occurs in the third trimester, probably related to the major decline in cell-mediated immunity seen at 26 to 30 weeks of gestation. Twenty-two percent of perinatal infections result in stillbirth or neonatal death; premature labor is common. Untreated bacteremia is generally self-limited, although if there is a complicating amnionitis, fever in the mother may persist until the fetus is spontaneously or therapeutically aborted. Early diagnosis and antimicrobial treatment can result in the birth of a healthy infant.

There is no convincing evidence that listeriosis is a cause of habitual abortion in humans.

Neonatal Infection

When in utero infection occurs, it may precipitate spontaneous abortion and the fetus may be stillborn or die within hours of a disseminated form of *Listerial* infection known as *granulomatosis infantiseptica* characterized by widespread microabscesses and granulomas, particularly prevalent in the liver and spleen. In this entity, abundant bacteria are often visible on Gram stain of meconium.

More commonly, neonatal infection manifests as

- an early-onset sepsis syndrome usually associated with prematurity and probably acquired in utero,
- a late-onset meningitis occurring about 2 weeks postpartum in term babies most likely infected by organisms present in the maternal vagina at parturition. In early-onset disease, *L. monocytogenes* can be isolated from the conjunctivae, external ear, nose, throat, meconium, amniotic fluid, placenta, blood, and sometimes CSF; Gram stain of meconium may show gram-positive rods and provide early diagnosis. Purulent conjunctivitis and a disseminated papular rash rarely have been described in newborns with early-onset disease, but clinical infection is otherwise similar to that due to other bacterial pathogens.

Bacteremia:

Bacteremia is the most common manifestation of listeriosis in compromised hosts; Clinical manifestations are similar to those seen in bacteremia with other causes and typically include fever and myalgias; a prodromal illness with diarrhea and nausea may occur. Since immunocompromised patients are more likely than healthy persons to have blood cultured during febrile illnesses, transient bacteremias in healthy persons may go undetected.

Central Nervous System Infection: *L. monocytogenes* has tropism for the brain itself, particularly the brain stem, as well as for the meninges. Many patients with meningitis have altered consciousness, seizures, or movement disorders, or all of these, and truly have a meningoencephalitis.

- Meningitis
- Brain Stem Encephalitis (Rhombencephalitis): An unusual form of *Listerial* encephalitis involves the brain stem and is similar to the unique zoonotic *Listerial* infection known as circling disease of sheep.
- Brain Abscess: Macroscopic brain abscesses account for about 10% of CNS *Listerial* infections. Bacteremia is almost always present, and concomitant meningitis with isolation of *L. monocytogenes* from the CSF is found in 25%;
- Endocarditis
- Localized Infection: Rare reports of focal infections from which *L. monocytogenes* has been isolated include direct inoculation resulting in conjunctivitis, skin infection, and lymphadenitis. Bacteremia can lead to hepatitis and hepatic abscess, cholecystitis, peritonitis, splenic abscess, pleuropulmonary infection, joint infection, osteomyelitis, pericarditis, myocarditis, arteritis, and endophthalmitis.

Laboratory Tests

Diagnosis requires isolation of *L. monocytogenes* from normally sterile clinical specimens (CSF, blood, joint fluid, and so forth) and identification through standard microbiologic techniques.

Food samples that are sent in should be handled by the sanitarian. In the absence of a sanitarian, submit at least 100 grams (approx. 4-5 oz) of the suspected food item. Be sure to keep food refrigerated (not frozen).

Treatment

Ampicillin has been generally considered the drug of choice for listeriosis (usually 200-250mg/kg/day in 6 divided doses) and may be combined with gentamicin because of synergistic activity. In individuals who are significantly beta-lactam allergic, trimethoprim/sulfamethoxazole (at a dose of 10-15mg/kg/day of trimethoprim-equivalent in 3 divided doses) can be used.

Surveillance

Listeriosis is a condition reportable within 5 business days of diagnosis.

Case Definition

Clinical description

In adults, invasive disease caused by *Listeria monocytogenes* manifests most commonly as meningitis or bacteremia; infection during pregnancy may result in fetal loss through miscarriage or stillbirth, or neonatal meningitis or bacteremia. Other manifestations can also be observed.

Laboratory criteria for diagnosis

- Isolation of *L. monocytogenes* from a normally sterile site (e.g., blood or cerebrospinal fluid [CSF] or, less commonly, joint, pleural, or pericardial fluid)
- In the setting of miscarriage or stillbirth, isolation of *L. monocytogenes* from placental or fetal tissue

The usefulness of other laboratory methods such as fluorescent antibody testing or polymerase chain reaction to diagnose invasive listeriosis has not been established.

Case classification

Confirmed: A clinically compatible case that is laboratory-confirmed

Case management - Investigation

Although the majority of cases are sporadic, several large foodborne outbreaks have been reported. In the event of an outbreak, an investigation should be warranted in order to determine the source(s) of the infection, to identify the population exposed to increased risk of infection, and to institute disease control measures.

- Upon receipt of a report of a case of listeriosis, contact the physician and/or hospital to confirm the diagnosis.
- It is not necessary to follow-up on individual, isolated cases. Further evaluation is necessary only if the case is suspected to be part of a foodborne outbreak. The first concern would be to determine the source(s) of the infection. Check recent food history and recover all suspected foods for appropriate testing.

The risk for a person developing *Listeria* infection after eating a contaminated product is very small. Persons who have eaten a recalled product but do not have symptoms do not require tests or treatment even if they are in a high-risk group. However, persons in a high-risk group who have eaten contaminated product and become ill within 2 months with fever or signs of serious illness should consult a physician.

When infection occurs during pregnancy, antibiotics given promptly to the pregnant woman can often prevent infection of the fetus or newborn. Babies with listeriosis receive the same antibiotics as adults, although a combination of antibiotics is often used until physicians are certain of the diagnosis. Even with prompt treatment, some infections result in death. This is particularly likely in the elderly and in persons with other serious medical problems.

Prevention of transmission

Food hygiene

- Cook thoroughly raw food from animal sources, such as beef, pork, or poultry.
- Wash raw vegetables thoroughly before eating.
- Keep uncooked meats separate from vegetables and from cooked foods and ready-to-eat foods.
- Avoid raw (unpasteurized) milk or foods made from raw milk.
- Wash hands, knives, and cutting boards after handling uncooked foods.

Recommendations for persons at high risk, such as pregnant women and persons with weakened immune systems:

- Avoid soft cheeses such as feta, Brie, Camembert, blue-veined, and Mexican-style cheese. (Hard cheeses, processed cheeses, cream cheese, cottage cheese, or yogurt need not be avoided.)
- Cook until steaming hot left-over foods or ready-to-eat foods, such as hot dogs, before eating.

- Although the risk of listeriosis associated with foods from deli counters is relatively low, pregnant women and immunosuppressed persons may choose to avoid these foods or thoroughly reheat cold cuts before eating.

Source Reduction

Government agencies and the food industry have taken steps to reduce contamination of food by the *Listeria* bacterium. The Food and Drug Administration and the U. S. Department of Agriculture monitor food regularly. When a processed food is found to be contaminated, food monitoring and plant inspection are intensified, and if necessary, the implicated food is recalled.

Because of the health risks associated with the consumption of raw milk and raw milk products, FDA requires pasteurization of all dairy products sold across state lines except cheese made from raw milk that has to be aged a minimum of 60 days.

Hospital precaution and isolation: Standard precautions