Cutaneous Listeriosis

Casey E. Godshall, MD,1 Gina Suh, MD,2 and Bennett Lorber, MD3

Section of Infectious Diseases and Department of Medicine, Temple University School of Medicine1,3 and Division of Infectious Diseases and Geographic Medicine, Department of Medicine, Stanford University School of Medicine2

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Corresponding author:
Bennett Lorber, MD
Section of Infectious Diseases
Temple University Hospital
Broad and Ontario Streets
Philadelphia, PA 19140

Phone: 215-707-3536
FAX: 215-707-4414
Email: bennett.lorber@temple.edu
Abstract

Cutaneous infection due to *Listeria monocytogenes* is rare. Typically, it manifests as a non-painful, non-pruritic, self-limited, localized, papulopustular or vesiculopustular eruption in healthy persons. Most cases follow direct inoculation of the skin in veterinarians and farmers who have exposure to animal products of conception. Less commonly, skin lesions may arise from hematogenous dissemination in compromised hosts with invasive disease. Here we report the first case in a gardener that followed exposure to soil and vegetation.

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Human listeriosis most frequently is recognized as a foodborne invasive illness leading to bacteremia or central nervous system infection [1]. In utero transmission from mother to fetus may result in disseminated neonatal infection that sometimes is associated with diffuse skin lesions [1,2], but cutaneous listeriosis outside of the neonatal period is distinctly rare. We report a case of primary skin infection due to *Listeria monocytogenes* and review available literature concerning cutaneous listeriosis.

**Case Report**

A 66-year-old woman was referred to an infectious diseases clinic for a rash on her right wrist. Two weeks earlier, the patient spent time digging out plants and bushes in her California garden. She has a large estate and described the area in which she worked as “more wild” than her usual gardening locations. She did not recall specific trauma to her skin. The day after gardening, she experienced generalized achiness and noticed she was sleeping more than usual. She had no fever, chills, nausea, vomiting, diarrhea, headache, or neck stiffness. One day later, she developed a rash on her right wrist (Figure 1.) without associated joint pain. The rash was neither painful nor pruritic. Three days after gardening, she saw her primary care physician who unroofed and swabbed a skin lesion for culture. Blood cultures were not obtained. *Listeria monocytogenes* susceptible to
ampicillin and penicillin was isolated from the swab culture; a single colony of coagulase-negative Staphylococcus was also isolated.

When the culture result became known, seven days after the onset of the rash, the patient was brought back into her primary care physician’s office. At that time the rash was thought to appear more prominent, but because the patient was well she was not given any antibiotic therapy and was referred to an infectious diseases specialist.

When evaluated at the infectious diseases clinic, two weeks after onset of her rash, she felt well; her energy level was back to normal. She reported a diagnosis of osteoporosis and a history of herpes labialis for which she occasionally took acyclovir. She had non-painful zoster of the abdomen in the 1990s and had not received the zoster vaccine. She was taking no medications; ciprofloxacin caused a rash.

The patient lives with her husband on the San Francisco peninsula in California. She volunteers at a Ronald McDonald House and at a local hospital. Her last travel was to Europe in 2010. She occasionally eats artisanal cheese but does not eat queso fresco. She ate cantaloupe and deli-style pastrami prior to the rash. She had no animal exposure. She had no family history of unusual or recurrent infections.

In the infectious diseases clinic, her vital signs and examination were normal except for a resolving rash on the volar surface of her wrist (Figure 2.). There were no remaining pustules or vesicles from which to obtain a culture, and no other skin lesions were present. The white blood cell count was 10.2 x 10^9/L.
with 55.5% neutrophils, 34% lymphocytes, 6% monocytes, and 3.5% eosinophils. A swab from the surface of the resolving skin lesions and two blood cultures yielded no growth. No treatment was given.

She was seen again several weeks later at which time she was asymptomatic, and the rash had resolved completely.

Methods

We performed an English language literature search for cases of cutaneous listeriosis employing PubMed and Ovid databases and using the search terms "listeriosis" and "Listeria monocytogenes," combined with the terms "cutaneous," "rash," or "skin." We selected for review all non-neonatal cases of skin lesions attributable to Listeria monocytogenes whether they were primary (limited to the skin) or secondary to systemic infection. References cited in the articles found through these searches were evaluated for potential additional cases. Cases from references unable to be located by a traditional literature search, along with those originally reported in languages other than English, were included if they were summarized in previous English language reviews. Even though several cases were detail deficient in terms of patient age and sex, type of skin lesion, occurrence of systemic symptoms, need for treatment, and outcome, we included them in order to have as complete a review as possible.

Results

Cases of non-neonatal listeriosis with cutaneous manifestations are summarized in Table 1. Twenty-three instances of cutaneous listeriosis occurring after the neonatal period were reported in the literature between 1957
and 2009 [3-14]; our report represents the 24th case. Patients ranged in age from 26 to 66. Reflecting occupational exposure as veterinarians and farmers, most cases were in men, with only 3 cases in women. Contact with an aborted bovine fetus was the most common exposure. The time from exposure to development of a rash ranged from six hours to seven days with a median of two days. Seventeen of the 24 cases occurred as the result of direct skin inoculation. In three instances, the skin was secondarily involved in patients with invasive disease through hematogenous spread, and in four, the mechanism of cutaneous infection was unknown.

Most episodes of cutaneous listeriosis manifested as papules or pustules; there was one instance of cellulitis with abscess formation. Again reflecting occupational exposure, skin eruption most often occurred on the arms and/or hands, with only 3 cases of skin lesions noted on the lower extremities. Most patients experienced systemic symptoms with fever being the most common, occurring in 17 of 24 cases. Three patients had regional adenopathy, and one of these had lymphangitis. Three individuals had no evidence of illness other than the rash. Bacteremia was only documented in one case, a person with hairy cell leukemia and cerebritis. All three patients with invasive disease and hematogenous dissemination to the skin had serious underlying diseases (leukemia, HIV, bone marrow transplant); all those whose skin lesions developed after direct inoculation were in good health. Antibiotic use was reported for only five of the 21 patients without invasive disease. Although one patient with direct inoculation cutaneous listeriosis after exposure to a bovine abortion died (age
and presence of any underlying disease unknown), all others with direct inoculation infection, for whom outcome was recorded, recovered without incident, including two patients who were clearly documented as not having received antimicrobial treatment.

**Discussion**

Human listeriosis typically follows foodborne transmission and manifests as bacteremia and/or central nervous system infection in persons at risk due to impaired cell-mediated immunity from underlying disease or medical therapy, pregnancy, or advanced age [1]. Less often, focal infections of joints, liver, spleen, pericardium, and other body sites may follow hematogenous dissemination. When fetal infection occurs, the newborn may exhibit skin lesions as part of widely disseminated disease (*granulomatosis infantiseptica*). Cutaneous listeriosis outside the neonatal period is quite rare. Our literature review yielded just 23 cases.

Cutaneous listeriosis after the neonatal period is mostly an occupational infection, with the majority of episodes representing primary cutaneous involvement in veterinarians or farmers who were exposed to bovine products of conception. In these cases, *L. monocytogenes* infection caused the intrauterine demise of the bovine fetus and was then transmitted via direct inoculation to the person who assisted at the delivery. In many of these cases, the farmer or veterinarian did not wear birthing gloves. Unlike most cases of human listeriosis, primary cutaneous infection happens in otherwise healthy individuals, or those
who are presumed to be healthy. Although infection appears confined to the skin, fever and other systemic symptoms are common.

The papulopustular or papulovesicular rash that occurs most often is self-limited, and full recovery without antibiotic treatment is usual.

Our present case occurred in a gardener with no underlying illness. We believe this is the first case of primary cutaneous listeriosis in a gardener. She developed papulovesicular skin lesions on her wrist two days after digging out plants and bushes in an overgrown area of her property. _Listeria monocytogenes_ is prevalent in soil and on vegetation [15]. As illustrated in Figure 1., her lesions cropped up adjacent to a scratch that may have been the inoculation site. Her lesions were neither pruritic nor tender, were well-healed in less than two weeks, and resolved completely in about a month. Given the widespread presence of _L. monocytogenes_ in soil and on plants, and the common occurrence of skin trauma during gardening, it is somewhat surprising that there have been no previous reports of cutaneous infection in gardeners. It is possible that some cases may have been misdiagnosed as folliculitis, contact dermatitis, or localized herpetic infection; but a more likely explanation is that it takes a large inoculum of _Listeria_ to produce infection. The occurrence of cutaneous listeriosis in veterinarians and farmers having contact with bovine products of conception may be related to the very high concentrations of bacteria found in infected amniotic fluid (estimated to be $10^8$ colony forming units/ml [10]). In this regard, cutaneous listeriosis is reminiscent of febrile gastroenteritis due to _L. monocytogenes_. It also occurs in healthy persons, but requires a very large inoculum to produce illness [16].
Skin involvement after hematogenous dissemination of *L. monocytogenes* infection has been documented in three instances. Each patient had an underlying condition that severely impaired cell-mediated immunity (hairy cell leukemia, AIDS, and bone marrow transplant for non-Hodgkin lymphoma) along with evidence of severe systemic illness. In these three cases, *L. monocytogenes* was grown from culture of skin lesions. In two, the skin lesions were solitary; one of them having an abscess within an area of cellulitis. In the third case, there was a widespread eruption of papules similar to the cutaneous lesions seen in neonatal cases of listeriosis.

Cutaneous listeriosis is rare, and its frequency is hard to determine. McLauchlin [10] reported the incidence of skin involvement in human listeriosis in Great Britain to be between 0.1 and 1.1%. There were 1,651 cases of listeriosis in the US from 2009 through 2011 [17]; we are unaware of any reports of cutaneous infection during that time period.

Direct inoculation listeriosis should be considered whenever a veterinarian or farmer presents with a rash within days of assisting at the delivery of a calf. Such persons should wear protective gloves when attending deliveries. Primary cutaneous listeriosis also should be considered when a gardener presents with a papulopustular or papulovesicular rash within several days of being exposed to soil and/or vegetation.

Primary cutaneous listeriosis appears to be self-limited in almost all instances, and the role for antibiotics is unclear. Our patient was not treated with antibiotics, because at the time she was seen by the infectious diseases
consultant she was totally well, and the rash was almost gone. However, since
most patients experience systemic symptoms including fever, we believe it would
be prudent to treat those having documented infection with a brief course (five to
seven days) of oral amoxicillin or trimethoprim-sulfamethoxazole.
References


Table 1. Features of cutaneous listeriosis cases

<table>
<thead>
<tr>
<th>Year of Report/ First Author</th>
<th>Age/ Sex</th>
<th>Exposure</th>
<th>Incubation Period</th>
<th>Description of Skin Lesion (authors’ terms)</th>
<th>Location of Skin Lesion</th>
<th>Direct Inoculation or Hematogenous spread</th>
<th>Systemic Symptoms</th>
<th>Other Sites of Infection</th>
<th>Underlying Illness</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957 Novak*</td>
<td>NA/F</td>
<td>Laboratory technician</td>
<td>NA</td>
<td>Papules, vesicles</td>
<td>Face and neck</td>
<td>NA</td>
<td>Headache, fever, swollen lymph nodes, sweating</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Full recovery</td>
</tr>
<tr>
<td>1959 Dijkstra**</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>2 days</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct Inoculation</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Full recovery</td>
<td></td>
</tr>
<tr>
<td>1960 Owen</td>
<td>NA/M</td>
<td>Bovine abortion</td>
<td>2-3 days</td>
<td>Papular/pustular</td>
<td>Right arm, left arm</td>
<td>Direct Inoculation</td>
<td>Fever, malaise, headache, dizziness</td>
<td>None</td>
<td>None</td>
<td>Sulfonamide, unknown duration</td>
<td>Full recovery</td>
</tr>
<tr>
<td>1960 Kalkoff**</td>
<td>NA/M</td>
<td>Bovine abortion</td>
<td>1 day</td>
<td>Nodules, pustules, surrounding erythema</td>
<td>Forearms and upper arms</td>
<td>Direct Inoculation</td>
<td>Chills, fever</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Full recovery</td>
</tr>
<tr>
<td>1961 Seelig**</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>1-2 days</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct Inoculation</td>
<td>Fever, lymphangitis, arthritis</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Died</td>
</tr>
<tr>
<td>1966 Mouton**</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>3 days</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct Inoculation</td>
<td>Fever</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1966 Mouton**</td>
<td>NA</td>
<td>NA</td>
<td>2 days</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct Inoculation</td>
<td>Fever</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1986 Cain</td>
<td>64/M</td>
<td>Bovine abortion</td>
<td>1-2 days</td>
<td>Red, vesicular/ pustular</td>
<td>Both arms and hands</td>
<td>Direct Inoculation</td>
<td>Fever, chills, aches</td>
<td>None</td>
<td>None</td>
<td>Erythromycin, unknown duration</td>
<td>Full recovery</td>
</tr>
<tr>
<td>1986 Salata</td>
<td>S3/M</td>
<td>NA</td>
<td>NA</td>
<td>Non-erythematous papules</td>
<td>Upper extremities than lower extremities</td>
<td>Hematogenous spread</td>
<td>Fever, headache, night sweats, fatigue, weakness, Bacteremia, Cerebritis, Many cell leukemias, Parenteral ampicillin and gentamycin for 6 weeks, then oral ampicillin for 6 wks, Parental</td>
<td>Parenteral</td>
<td>Parenteral</td>
<td>Parenteral</td>
<td>Full recovery</td>
</tr>
<tr>
<td>1990 McLachlin</td>
<td>NA</td>
<td>Handled meat carcasses</td>
<td>NA</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct Inoculation</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>Full recovery</td>
</tr>
<tr>
<td>1992 Allcock</td>
<td>NA/M</td>
<td>Bovine abortion</td>
<td>2 days</td>
<td>Small pustules</td>
<td>Bilateral forearms</td>
<td>Direct Inoculation</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Full recovery</td>
<td></td>
</tr>
<tr>
<td>1994 Vazquez</td>
<td>28/M</td>
<td>NA</td>
<td>NA</td>
<td>Localized abscess in area of abscessus</td>
<td>Pretibial</td>
<td>Hematogenous spread</td>
<td>Fever, malaise</td>
<td>None</td>
<td>None</td>
<td>HIV</td>
<td>Clofazimine, then parenteral ampicillin and gentamycin for 10 d, then oral ampicillin for 12 d</td>
</tr>
<tr>
<td>Year</td>
<td>Author</td>
<td>Gender</td>
<td>Age</td>
<td>Disease Type</td>
<td>Duration</td>
<td>Initial Symptom(s)</td>
<td>Site</td>
<td>Mode of Infection</td>
<td>Clinical Symptoms</td>
<td>Treatment</td>
<td>Outcome</td>
</tr>
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<tr>
<td>1994</td>
<td>McLauchlin</td>
<td>NA</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>3-4 days</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct inoculation</td>
<td>None</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1994</td>
<td>McLauchlin</td>
<td>NA</td>
<td>NA</td>
<td>Rectal examination of heifer</td>
<td>1 day</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct inoculation</td>
<td>Fever</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1994</td>
<td>McLauchlin</td>
<td>NA</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>3-4 days</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct inoculation</td>
<td>None</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1994</td>
<td>McLauchlin</td>
<td>NA</td>
<td>NA</td>
<td>Delivery of calf</td>
<td>1 day</td>
<td>Papular/pustular</td>
<td>Arms or hands</td>
<td>Direct inoculation</td>
<td>Fever</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>2004</td>
<td>Lambotte</td>
<td>36/M</td>
<td>NA</td>
<td>NA</td>
<td>Single purple papule</td>
<td>Thigh</td>
<td>Hematogenous spread</td>
<td>Fever</td>
<td>Cerebrovascular disease, pneumonia, NHL, BMT</td>
<td>Ampicillin and TMP-SMX for 4d, then ampicillin and gentamicin for 15d, then amoxicillin for 7d</td>
<td>Full recovery</td>
</tr>
<tr>
<td>2005</td>
<td>Regan</td>
<td>26/F</td>
<td>NA</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>7 days</td>
<td>Pustular rash</td>
<td>Both arms</td>
<td>Direct inoculation</td>
<td>Fever, headache, myalgia</td>
<td>None</td>
</tr>
<tr>
<td>2008</td>
<td>Laureyns</td>
<td>55/M</td>
<td>NA</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>1-2 days</td>
<td>Pustular rash</td>
<td>Both hands and arms</td>
<td>Direct inoculation</td>
<td>Fever, headache, myalgia, edematous nodes</td>
<td>None</td>
</tr>
<tr>
<td>2009</td>
<td>Gilchrist</td>
<td>38/M</td>
<td>NA</td>
<td>NA</td>
<td>Bovine abortion</td>
<td>6 hours</td>
<td>Large pustules</td>
<td>Both hands and wrists, spreading to forearms</td>
<td>Direct inoculation</td>
<td>Fever, rigors, myalgia</td>
<td>None</td>
</tr>
<tr>
<td>2009</td>
<td>Present report</td>
<td>66/F</td>
<td>Soil and plant vegetation</td>
<td>1 day</td>
<td>Vesiculo-pustular</td>
<td>Right wrist</td>
<td>Direct inoculation</td>
<td>Achrinosis, malaise, no fever</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

* Data obtained from reference 3, **data obtained from reference 10. NA = information not available; wks = weeks; d = days; NHL = non-Hodgkin lymphoma; BMT = bone marrow transplant; TMP-SX = trimethoprim-sulfamethoxazole.
Figure 1.
Figure 2.
Legends

Figure 1. Rash on volar aspect of wrist 24 hours after onset demonstrating two clusters of vesiculopustular lesions with surrounding erythema. Culture from an unroofed lesion grew *Listeria monocytogenes*. Although the patient reported no trauma, an interrupted, linear, healing scratch can be seen lateral to and extending into one of the lesions (see arrows).

Figure 2. Resolving rash on day seven. The vesiculopustular lesions have gone and desquamation is evident. No antimicrobial therapy had been given.