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Cutaneous Listeriosis

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Cutaneous infections due to *Listeria monocytogenes* are rare. Typically, infections manifest as nonpainful, nonpruritic, self-limited, localized, papulopustular or vesiculopustular eruptions in healthy persons. Most cases follow direct inoculation of the skin in veterinarians or 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 occurred following exposure to soil and vegetation.

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 the neonatal period is distinctly rare. We report here a case of primary skin infection due to *Listeria monocytogenes* and review the 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 (Fig. 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, 7 days after the onset of the rash, the patient was brought back to 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 disease specialist.

When evaluated at the infectious diseases clinic, 2 weeks after the 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 had nonpainful 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 reported that she 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 (Fig. 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 10.2×10^9/liter 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.

MATERIALS AND METHODS

We performed an English language literature search for cases of cutaneous listeriosis employing the 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 nonneonatal 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 not 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. Although 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 nonneonatal 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 years. Reflecting

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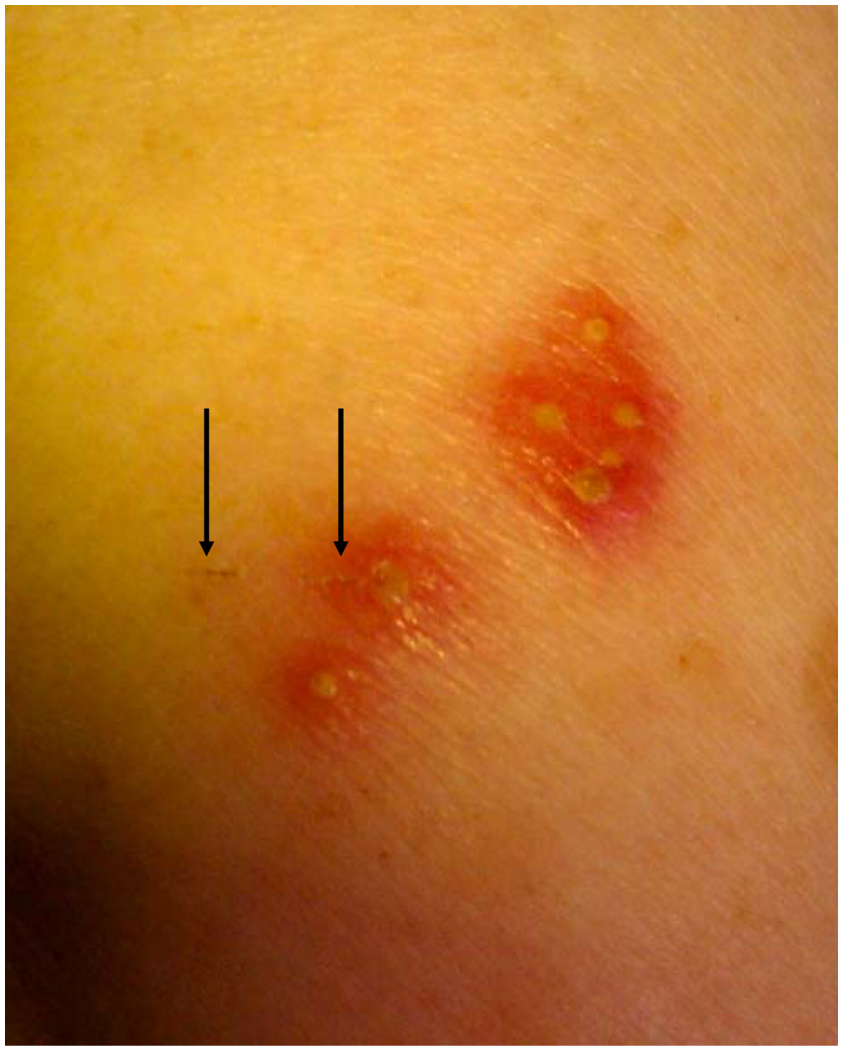

FIG 1 Rash on volar aspect of wrist 24 h after onset demonstrating two clusters of vesiculopustular lesions with surrounding erythema. Culture from an unroofed lesion grew *Listeria monocytogenes*. Although the patient reported no trauma, an interrupted, linear, healing scratch can be seen lateral to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

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 6 h to 7 days with a median of 2 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 eruptions 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 three had lymphangitis. Three individuals showed no evidence of illness other than the rash. Bacteremia was documented in only one case, a person with hairy cell leukemia and cerebritis. All three patients with invasive disease and hematogenous dissemination to the skin had a serious underlying disease (leukemia, HIV, or bone marrow transplant); all those whose skin lesions developed after direct inoculation were in good health. Antibiotic use was reported for only 5 of the 21 patients without invasive disease. Although one patient with direct inoculation cutaneous listeriosis after exposure to a bovine abortion died (the age and presence of any underlying are disease unknown), all others with direct inoculation infection for whom the outcome was recorded recovered without incident, including two patients who were clearly documented as not having received antimicrobial treatment.

DISCUSSION

Human listeriosis typically follows food-borne 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 dissemina-

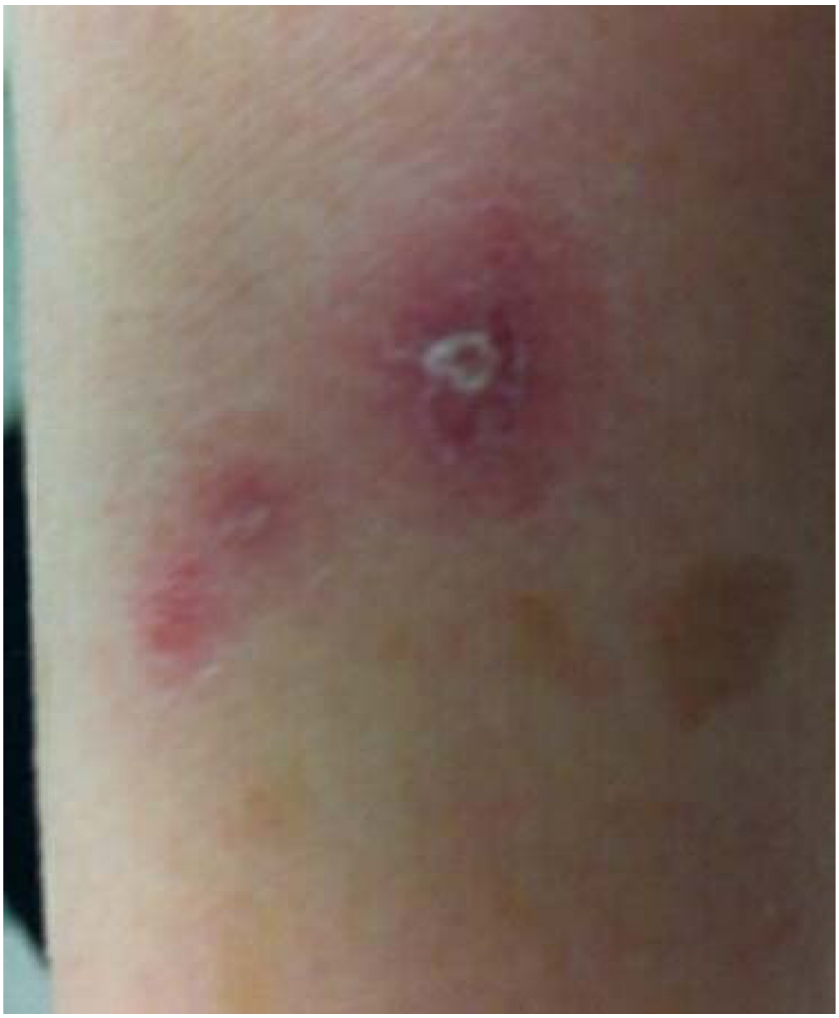

FIG 2 Resolving rash on day seven. The vesiculopustular lesions are gone, and desquamation is evident. No antimicrobial therapy had been given.

tion. 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 is most often self-limited, and full recovery without antibiotic treatment is usual.

Our present case occurred in a gardener with no underlying illness. We believe that this is the first published case of primary cutaneous listeriosis in a gardener. She developed papulovesicular skin lesions on her wrist 2 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 Fig. 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 2 weeks, and resolved completely in about 1 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 CFU/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.

TABLE 1 Features of cutaneous listeriosis cases

Yr of report (reference or first author)	Patient age (yr)/sex[c]	Exposure scenario	Incubation period	Authors' description of skin lesions	Location(s) of skin lesions	Direct inoculation or hematogenous spread	Systemic symptom(s)	Other site(s) of infection	Underlying illness(es)[d]	Treatment[e]	Outcome
1957 (Novak[a])	NA/F	Laboratory technician	NA	Papules, vesicles	Face and neck	NA	Headache, fever, swollen lymph nodes, vomiting	NA	NA	NA	Full recovery
1959 (Dijkstra[b])	NA	Bovine abortion	2 days	Papular/pustular	Arms or hands	Direct inoculation	NA	NA	NA	NA	NA
1960 (4)	NA/M	Bovine abortion	2–3 days	Papular/pustular	Right arm, left wrist	Direct inoculation	Fever, malaise, headache, dizziness	None	None	Sulfonamide, unknown duration	Full recovery
1960 (Kalkoff[b])	NA/M	Bovine abortion	1 day	Nodules, pustules, surrounding erythema	Forearms and upper arms	Direct inoculation	Chills, fever	NA	NA	NA	Full recovery
1961 (Seeliger[b])	NA	Bovine abortion	1–2 days	Papular/pustular	Arms or hands	Direct inoculation	Fever, lymphangitis, adenitis	NA	NA	NA	Died
1966 (Mouton[b])	NA	Bovine abortion	3 days	Papular/pustular	Arms or hands	Direct inoculation	Fever	NA	NA	NA	NA
1966 (Mouton[b])	NA	NA	2 days	Papular/pustular	Arms or hands	NA	Fever	NA	NA	NA	NA
1966 (Mouton[b])	NA	NA	3 days	Papular/pustular	Arms or hands	NA	Fever	NA	NA	NA	NA
1986 (5)	64/M	Bovine abortion	1–2 days	Red, vesicular/pustular	Both arms and hands	Direct inoculation	Fever, chills, aches	None	None	Erythromycin, unknown duration	Full recovery
1986 (6)	53/M	NA	NA	Nonerythematous papules	Upper extremities then lower extremities	Hematogenous spread	Fever, headache, night sweats, fatigue, weakness	Bacteremia, cerebritis	Hairy cell leukemia	Parenteral ampicillin and gentamicin for 6 wk, then oral ampicillin for 6 wk	Partial recovery
1990 (7)	NA	Handled meat carcasses	NA	Papular/pustular	Arms or hands	Direct inoculation	NA	NA	NA	NA	NA
1992 (8)	NA/M	Bovine abortion	2 days	Small pustules	Bilateral forearms	Direct inoculation	None	None	None	None	Full recovery
1994 (9)	29/M	NA	NA	Localized abscess in area of cellulitis	Pretibial	Hematogenous spread	Fever, malaise	None	HIV	Cloxacillin, then parenteral ampicillin and gentamicin for 10 days, then oral amoxicillin for 12 days	Full recovery
1994 (10)	NA	Bovine abortion	3–4 days	Papular/pustular	Arms or hands	Direct inoculation	None	NA	NA	NA	NA
1994 (10)	NA	Rectal examination of heifer	1 day	Papular/pustular	Arms or hands	Direct inoculation	NA	NA	NA	NA	NA
1994 (10)	NA	NA	NA	Papular/pustular	Arms or hands	NA	Fever	NA	NA	NA	NA
1994 (10)	NA	Bovine abortion	NA	Papular/pustular	Arms or hands	Direct inoculation	NA	NA	NA	NA	NA
1994 (10)	NA	Delivery of calf	NA	Papular/pustular	Arms or hands	Direct inoculation	Fever	NA	NA	NA	NA
1994 (10)	NA	Bovine abortion	NA	Papular/pustular	Arms or hands	Direct inoculation	Fever	NA	NA	NA	NA
2004 (11)	36/M	NA	NA	Single purple papule	Thigh	Hematogenous spread	Fever	Cerebritis, pneumonia	NHL, BMT	Ampicillin and TMP-SMX for 4 days, then ampicillin and gentamicin for 15 days, then amoxicillin for 7 days	Full recovery

2005 (12)	26/F	Bovine abortion	7 days	Pustular rash	Both arms	Direct inoculation	Fever, headache, myalgia	None	Amoxicillin-clavulanate for 10 days	Full recovery
2008 (13)	55/M	Bovine abortion	1–2 days	Pustular rash	Both hands and arms	Direct inoculation	Fever, headache, myalgia, axillary nodes	None	Amoxicillin-clavulanate for 10 days	Full recovery
2009 (14)	38/M	Bovine abortion	6 hr	Large pustules	Both hands and wrists, spreading to forearms	Direct inoculation	Fever, rigors, myalgia	None	Parenteral penicillin and gentamicin for 2 days, then amoxicillin-clavulanate for 10 days	Full recovery
Present report	66/F	Soil and plant vegetation	1 day	Vesiculopustular	Right wrist	Direct inoculation	Achiness, malaise, no fever	None	None	Full recovery

[a] Data obtained from reference 3.
[b] Data obtained from reference 10.
[c] NA, information not available; F, female; M, male.
[d] NHL, non-Hodgkin lymphoma; BMT, bone marrow transplant.
[e] TMP-SMX, trimethoprim-sulfamethoxazole.

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 cases, the skin lesions were solitary, with one of the case patients 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 and Low (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 United States 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 (5- to 7-day) course of oral amoxicillin or trimethoprim-sulfamethoxazole.

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The authors declare no conflict of interest.

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