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Case Report

Listeria Necrotizing Cellulitis: A Case Report

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Abstract

Background: *L. monocytogenes* typically affects pregnant women, neonates, or immunocompromised individuals, with a wide clinical spectrum that includes Central Nervous System (CNS) infections, endocarditis, and very rarely, localized infections such as necrotizing fasciitis . Although *L. monocytogenes* is the main pathogenic species, there are a total of 21 described species including *L. grayi. L. grayi* is not a well recognized human pathogen, despite a few case reports of infection in organ transplant patients. Listeria-associated soft tissue infections are exceedingly rare and are typically seen in immunocompromised individuals, with the usual culprit being *Listeria monocytogenes*.

Case Report: We report the case of A 33-year-old previously healthy male, presented to the Emergency Department (ED) with left leg swelling, erythema, and fever. After multiple courses of treatment, we were able to isolate the *L.grayi* from the intraoperative specimen, confirmed the diagnosis of *L.grayi* associated cellulitis in a healthy young non-immunocompromised patient.

Conclusion: This is to the best of our knowledge the first case of *Listeria Grayi* associated soft tissue infection in a previously healthy young man 3 months after recovery from COVID-19 infection.

Keywords: Listeria, Cellulitis, Necrotizing, Soft tissue infection, COVID-19, Case Report

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Introduction

Listeria is a genus of gram-positive bacteria that are the causative agents of human Listeriosis. Although *L. monocytogenes* is the main pathogenic species, there are a total of 21 described species including *L. grayi* which was previously divided into *L. grayi* and *L. murrayi* [1]. L. monocytogenes typically affects pregnant women, neonates, or immunocompromised individuals, with a wide clinical spectrum that includes Central Nervous System (CNS) infections, endocarditis, and very rarely, localized infections such as necrotizing fasciitis [2,3]. However, *L. grayi* is not a well recognized human pathogen, despite a few case reports of infection in organ transplant patients [4,5]. We report to the best of our knowledge, the first case of *L. grayi* associated cellulitis in a young, HIV-negative patient with no previously diagnosed medical conditions, 3 months after resolution of his COVID-19 infection.

Case Presentation

A 33-year-old previously healthy male, presented to the Emergency Department (ED) with left leg swelling, erythema, and fever. History goes back to three days prior to presentation, when the patient fell in his kitchen and twisted his left ankle without any bleed or penetrating injury. The following day, he noticed mild swelling, erythema, and pain at the anterior shin of the left leg along with fever, chills, nausea, and two episodes of non-bilious, non-bloody vomiting. He was subsequently started on Amoxicillin/Clavulanic acid for one day and was later switched to Clindamycin for a few days upon contacting his primary care physician. Despite antibiotics and appropriate analgesics, the swelling, erythema, and intensity of the pain increased substantially prompting the patient's ED visit. Upon presentation, he denied any other respiratory, urinary, or gastrointestinal symptoms. He reported no previous history of similar episodes. He denied any significant past medical history except for a mild COVID-19 infection three months prior to his presentation, for which he took a course of multivitamins and was managed symptomatically at home without the use of steroids or immunosuppressive medications. In addition, the patient reported a similar mild trauma three weeks earlier when he fell on his left leg in his backyard without any penetrating injury nor subsequent symptomatic changes in the leg. He has no allergies and does not take any chronic medications. He also denied drinking, smoking, and illicit drug use of any kind. He is married with no children and works as a computer engineer.

In the Emergency Department (ED), the patient had a temperature of 37.30 °C, a blood pressure of 132/85 mmHg, and a tachycardia of 128 beats per minute. On physical examination, the left leg was edematous and warm, with mild erythema starting slightly above the left knee, extending below the ankle with a black, ruptured bulla on the anterior shin of the left tibia (figure 1A). The left leg was mildly tender to palpation, not oozing pus or blood, with palpable popliteal and dorsalis pedis pulses and a normal motor and sensory examination. The rest of the physical exam including cardiovascular, pulmonary, abdominal, and right leg assessment was normal. Laboratory workup on presentation was significant for a high White Blood Cell (WBC) count of 14,000/µL, and elevated C-reactive protein (CRP) of 34.7mg/dl. X-Ray of the left leg showed extensive soft tissue swelling of the leg and ankle with no evidence of traumatic bone lesion. Ultrasound Doppler imaging revealed marked edematous thickening of the subcutaneous fat planes of the left leg with reactive external iliac lymph nodes and no evidence of deep vein thrombosis (DVT). Wound swab cultures and blood cultures were taken, and the patient was admitted on a regimen of Clindamycin and Ceftriaxone. Ceftriaxone was switched to Teicoplanin on day three and anti-fungal coverage with Itraconazole for mild onychomycosis was initiated. During the next couple of days, the left leg erythema and edema worsened significantly.

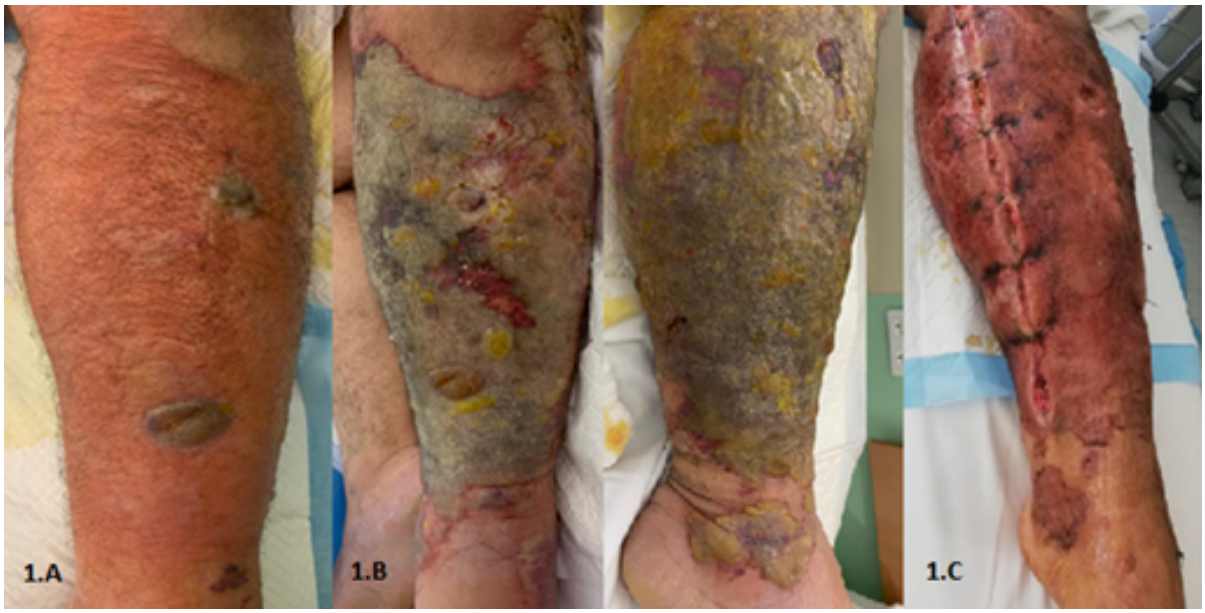

Figure 1. A: upon presentation; left leg showing mild erythema and edema with black ruptured bulla. B: Day 5 post admission; the erythema and edema worsened significantly, the skin appears necrotic, green-grey discoloration and oozing of pus and several ulcerations. C: Day 2 post fasciotomy with open wounds.

The skin started to appear necrotic, with a major change in color to green-grey and oozing of malodorous pus and several ulcerations (figure 1B) along with the development of several episodes of high-grade fever, crepitus, and exquisite tenderness over the affected area. The patient's regimen was subsequently switched to Piperacillin/Tazobactam and Ciprofloxacin for increasing suspicion of a *Pseudomonas* infection. Urgent Magnetic Resonance Imaging (MRI) of the left leg revealed diffuse subcutaneous edema with peripheral deep muscles fascia thickening suggestive of cellulitis with suspicious findings related to necrotizing fasciitis. Multiple blood and wound cultures were again obtained. An urgent fasciotomy with open wounds (figure 1C) was done with an intraoperative diagnosis of necrotizing cellulitis without significant involvement of the muscle fascia. Surgical specimen cultures were taken intra-operatively and retrieved two distinct gram-positive organisms identified as *Listeria grayi* and *Staphylococcus epidermidis.* Both organisms were sensitive to Trimethoprim/Sulfamethoxazole, and thus the patient was discharged on the oral formulation of the antibiotic continuously until secondary wound closure

Discussion

Listeria is an important foodborne pathogen that affects pregnant women, the elderly, neonates, and immunocompromised persons. In the last decade, new species have been identified from diverse sources, with recent reports indicating that the genus *Listeria* now comprises up to 21 species [1]. *Listeria monocytogenes* was originally described in 1926 as the cause of an epizootic outbreak in rabbits and guinea pigs, and later assigned its name in 1940. It remains the main pathogenic species of the genus, although rare cases of human infections with *Listeria ivanovii*, a pathogen of ruminants, and *Listeria grayi* have been reported [4,5]. *L. monocytogenes* is a facultative anaerobic gram-positive organism that occurs ubiquitously in nature [6]. It is recognized as an important foodborne pathogen that can lead to invasive diseases resulting in significant mortality [7]. Most cases of invasive disease occur in vulnerable populations, and they may be life-threatening. These typically comprise at least one of three syndromes: central nervous system infection, mainly meningoencephalitis, meningitis, and

cerebritis, maternofetal/neonatal listeriosis, and blood stream infection, all of which have a high mortality rate [8]. Apart from the traditional manifestations of Listeriosis, a *Listeria* infection can rarely cause focal manifestations in immunocompetent individuals such as skin infections known as cutaneous listeriosis, prosthetic joint infections, and others. Cutaneous listeriosis presents as non-painful, non-pruritic, localized, self-limited vesiculopustular eruptions mainly on the arms of veterinarians and farmers after direct inoculation from exposure to animal products of conception [9]. To the best of our knowledge, there are only two case reports of Listeria necrotizing fasciitis, both caused by *Listeria monocytogenes* [2,3].

On the other hand, *L. grayi* was first discovered in 1966 and has been isolated in various locations worldwide. Its identification requires specific biochemical testing such as its type of hemolysis and acid production from D-xylose, L-rhamnose, α-methyl-D-mannoside, and D-mannitol. Biochemically, *L. grayi* may be distinguished from relevant members of the *Listeria* genus through its fermentation of mannitol, its positive starch solubility test, and its negative hippurate hydrolysis test. Additionally, and in contrast to *L. monocytogenes*, it does not exhibit β-hemolysis on blood agar [6]. *L. grayi* is not well recognized as a human pathogen. Three cases *L. grayi* bacteremia in a heart transplant patient, a stem cell transplant patient, and a Hodgkin lymphoma patient have been reported. All three of these patients were immunosuppressed at the time of *L. grayi* isolation, with ages ranging from 20 to 57 years [4,5,10]. Notably, the most recent of these reports revealed that the organism was resistant to the glycopeptide vancomycin [5].

Conclusion

Our report is the third case of Listeria-associated necrotizing cellulitis/fasciitis and the first ever case of an *L. grayi* skin infection, remarkably occurring in a young patient who is not known to be immunosuppressed, and who has no significant past medical history. Although *S. epidermidis* was also isolated from the wound, its commensal and non-aggressive nature along with the lack of risk factors such as hospital stays or involvement of foreign materials makes it an unlikely solitary culprit in the severe presentation of this patient [11]. Additionally, the successful isolation of *L. grayi* from the intraoperative specimen despite multiple courses of bactericidal and bacteriostatic antibiotics further confirms the role of the bacterium in this unusual case.

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