Case Report

Purpuric lesion in a patient with leprosy: Was it a Lucio’s phenomenon or an epiphenomenon?

Sri Linuwih Menaldi¹, Melani Marissa¹, Inadia Putri Chairista¹, Henry W. Lim², Rahadi Rihatmadja¹

1. Department of Dermatology and Venereology, Universitas Indonesia/Dr. Cipto Mangunkusumo Hospital, Jakarta, Indonesia
2. Department of Dermatology, Henry Ford Hospital, Detroit, Michigan, USA

Email: susetyo_mr@yahoo.com

Abstract

Background: Lucio’s phenomenon (LP) is a severe necrotizing cutaneous reaction that occurs in patients with Lucio’s leprosy. The exact pathomechanism is not fully understood, but typically abundant acid-fast bacilli in the walls of blood vessels point to direct perturbation of blood supply to the epidermis. We report a case of LP where epidermal necrosis occurred in the absence of vascular invasion by mycobacteria, raising the question whether this was an epiphenomenon or a true LP.

Case Illustration: A 34-year-old male was referred for an episodic swelling of his hands and feet that persisted for two years. There were signs of leprosy (diffuse shiny skin lesions, anesthesia, and anhidrosis of the extremities) with purpuric patches on lower extremities. The slit-skin smear test revealed a high index of acid-fast bacilli. Histopathological examination revealed epidermal necrosis and leukocytoclastic vasculitis without demonstrable bacillus. WHO multidrug regimen for leprosy and corticosteroids successfully cured the patient and prevented ulcer development.

Discussion: Despite the presence of classical LP characteristics clinically and histologically, mycobacterium was absent in the vessels’ walls. We hypothesized that, in LP, vascular impairment might also be secondary due to antigen–antibody reaction and hypercoagulable state.

Conclusion: Purpuric patches in Lucio’s leprosy might be the first sign of skin necrosis or vascular damage (purpura and ulceration). Besides the antimycobacterial drugs, anti-inflammatory drugs should be administered. Laboratory test for hemostasis might be advised.

Keywords: Lucio’s phenomenon, mycobacteria, histopathology, vasculitis

Background

Leprosy is an infectious disease that mainly involves the skin and nerves. The clinical features are divided into polar tuberculoid (paucibacillary) and polar lepromatous types (multibacillary), depending on the host’s immune response.¹ There are two main clinical forms in the polar lepromatous type: nodular lepromatous leprosy and diffuse lepromatous leprosy, known as Lucio’s leprosy.² Some authors considered the latter a distinct form, further attributing it to a recently discovered species, Mycobacterium lepromatosis.²⁻⁴

Lucio and Alvarado (1852) were the first to describe a necrotizing skin reaction related to diffuse lepromatous leprosy. Later in 1948, Latapi and Zamora coined the term Lucio’s phenomenon (LP) after the identification of necrotizing cutaneous vasculitis in the histopathology.⁵

Lucio’s leprosy patients often presented with subtle clinical signs that were easily missed. Therefore, they were often diagnosed only when LP had manifested.⁶ Typically, the acute symptoms, for example, fever and pain, were lacking, in contrast to the presence of multiple skin ulcerations.
Abundant acid-fast bacilli in the vascular walls were the pathological hallmark, suggesting some compromise in the blood flow resulting in cutaneous necrosis.\textsuperscript{2,6}

Herein, we describe this rare reaction in a patient who has not been previously diagnosed with leprosy. The case highlighted the insidious nature of LP and, interestingly, vascular damage even in the paucity of micro-organisms.

**Case Illustration**

A 34-year-old male was referred to our outpatient clinic. He had suffered from swollen hands and feet for two weeks, although several episodes of similar symptoms had occurred in the past two years. He was once diagnosed with lupus erythematosus and treated with methylprednisolone, regularly taken whenever the swelling recurred. The swelling was never painful; instead, numbness was noted. Indeed, there were wounds on the soles that had been present for the past two months, but their painless nature did not prompt the patient to seek medical attention. His medical history was unremarkable. Contact with a patient diagnosed with leprosy could not be ascertained, but visiting endemic areas was denied.

Physical examination was unremarkable, except for cutaneous lesions. His facial skin was smooth and shiny, with nodules on the ears. (Fig. 1 (a-b)). Purpuric patches of varying sizes on slightly edematous palms, legs, and feet were observed. (Fig. 1 (c-f)). Several ulcers on the soles were also observed. (Fig. 1 (g)). Sensory impairment with stocking-glove pattern accompanied by anhidrosis was present. The ulnar, posterior tibial, and common peroneal nerves were moderately enlarged and painless. Dermoscopic examination showed telangiectasias in both ears and purpuric dots on the palm. (Fig. 2 (a-b))

**Figure 1.** (a) slightly alopecic eyebrows; (b) diffuse nodules on the ear; (c-d) slightly edematous palms and legs; (e-f) purpuric macules and patches on both hands; (g) superficial ulcers on both feet.
Figure 2. Dermoscopic findings consisting of (a) telangiectasias on the left ear (arrow); (b) purpuric dots on the palm (arrow).

Figure 3. Histopathology of a purpuric lesion showing (a) epidermal necrosis (arrow) (H&E, 400×); (b) granuloma with foam cells (red arrow) and leukocytoclastic vasculitis (black arrow) (H&E, 1000×); (c) vascular obliteration and occlusion (arrow) (H&E, 1000×)

The slit-skin smear examination showed bacterial index (BI) of 5+ and morphological index of 1.6%. The histopathology of the purpuric lesion on the leg showed epidermal necrosis, vascular obliteration, and granulomas around adnexal structures. Leukocytoclastic vasculitis features of LP, such as luminal occlusion, were seen in the dermis (Fig. 3 (a–c)). However, Fite-Faraco staining failed to detect acid-fast bacillus. Laboratory findings showed hemoglobin 10.2 g/dL, leukocyte 10,290/µL, thrombocyte 204,000 µ/L, AST 45 U/L, ALT 72 U/L, creatinine 0.18 mg/dL, and urea 25.7 mg/dL. The patient was finally diagnosed with LP, which has developed due to not receiving treatment for Lucio’s leprosy.

Multidrug therapy (MDT) regimen, according to the World Health Organization (WHO), for leprosy consisted of rifampicin (600 mg/month), dapsone (100 mg/day), and clofazimine (100 mg/month and 50 mg/day), should be started immediately. Methylprednisolone was tapered to 8 mg once daily from 24 mg given previously by the internist. Daily dressings with normal saline and sodium fusidate ointment were applied to the ulcers twice a day. After three weeks, a reduction in the size of some skin lesions was noticed (Fig. 4 (a–d)). The purpuric macules resolved leaving black crusts, and the ulcers on both soles healed. There was no sign of erythema nodosum leprosum, which sometimes appears following treatment of multibacillary leprosy. MDT was continued for twelve months, methylprednisolone was gradually tapered off, and petrolatum was given for the dry skin.
Discussion

LP cases reported outside Mexico and Costa Rica were rare.\textsuperscript{2,5,6} However, in other areas such as Africa, South Pacific Polynesian Islands, Middle East, South Asia, and Southeast Asia, LP cases had been discovered.\textsuperscript{2,7,8} Although South East Asia had the second highest prevalence of leprosy in 2011, such findings were rare in Indonesia.\textsuperscript{9} At the Dermatology and Venereology Outpatient Clinic Dr. Cipto Mangunkusumo Hospital, Indonesia, only four cases were registered between 2017 and 2019.

The fundamental clinical characteristic of Lucio’s leprosy is diffuse infiltration that begins with a myxedematous appearance, therefore called “lepra-bonita” or “pretty leprosy.” Such extensive granuloma in the dermis was considered responsible for the edematous impression of the extremities. Hair loss involving the scalp and face may occur. Peripheral neuropathy is also a common finding.\textsuperscript{2} As seen in our patient, even these peculiar clues are easily overlooked, leading to a misdiagnosed case of Lucio’s leprosy.

LP presents as painless erythematous patches in variable shapes and sizes that normally begin in the feet and goes upward affecting the thighs, arms, trunk, and face. The patches become slightly infiltrated after 24 to 48 h and then become darker with a purpuric appearance and central necrosis after 72 to 96 h. A few days later, a red dark eschar is formed and falls off leaving a pearly white atrophic scar. This whole process takes approximately 15 days. Constitutional symptoms may occur. Bacterial and morphological indices show high positivity.\textsuperscript{10,11} Our patient exhibited almost all of Lucio’s leprosy characteristics.

Histopathologically, epidermal necrosis and leukocytoclastic vasculitis with thrombosis supported the clinical suspicion of LP. Paradoxically, however, the absence of acid-fast bacillus from the biopsied lesion in our patient seemed to disprove it, even when found in high numbers elsewhere. Fite-Faraco staining has a good sensitivity rate to detect weak acid-fast bacilli of \textit{M. leprae} and should be able to demonstrate them in multibacillary cases, particularly with BI more than +3.\textsuperscript{12,13} To our knowledge, all publications on LP reported positivity in histopathology. Therefore, we suspect that the vascular damage and resulting necrosis in our patient might be an epiphenomenon, resulting from at least two indirect mechanisms.

First, an antigen–antibody complex originating from other sites might be deposited in the skin of the extremities, especially the lower legs.\textsuperscript{13} Another possibility was blood hypercoagulation, as was reported in leprosy. DaSilva et al.\textsuperscript{14} demonstrated that high levels of plasmatic fibrinogen, anti-cardiolipin antibodies, von Willebrand factor, and soluble tissue factor increased in small percentages in multibacillary leprosy. Unfortunately, we could not investigate further due to financial constraints, but those evaluations were warranted because we had observed intractable LP cases that did not respond to antimycobacterial and anti-inflammatory drugs, where necrosis became severe enough and required amputation (unpublished).

Besides our hypothesis, fluorescence microscopy can be used as a supplementary tool when tissue sections stained by the Fite-Faraco method failed to detect the bacillus.\textsuperscript{12}

Early diagnosis and treatment in LP will be beneficial for the outcome.\textsuperscript{15} However, there is no known agreement or consensus for the best treatment option. This might be due to limited cases of LP described in the literature. The most
commonly approved treatment is multibacillary WHO-MDT for leprosy. Antibiotics have been reported as beneficial for secondary infections. The role of corticosteroids in LP is controversial, and thus some authors suggested to only use them in severe reactions. Regardless of the initial good response to MDT, many of these patients may develop the classical erythema nodosum leprosum.\textsuperscript{16}-\textsuperscript{18} In Indonesia, we treated multibacillary leprosy with WHO-MDT recommended therapy.\textsuperscript{19} Our patient responded well to the treatment, and therefore MDT was continued for twelve months.

**Conclusion**

LP, despite being very rare, should be suspected when even slight signs of vascular damage or skin necrosis (purpura and ulceration) appeared in a nonnodular leprosy patient. Histologically, they correspond to necrotizing vasculitis and vascular occlusion. Contrary to previous reports, perhaps in some cases like ours, mycobacteria might not directly invade the blood vessels; rather, the blood flow disturbance could be caused by a reaction to antigen–antibody complexes originating from other sites, or by hypercoagulable state. Prompt treatment with both WHO-MDT regimen and corticosteroids prevented worsening of the condition.

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