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Necrotizing *Erythema Nodosum Leprosum* (ENL) Post-MDT in Multibacillary Hansen's Disease: A Case Report

Mira Nupila Rahma[1], Made Prajnana Adhi Parasikan Susana[1], Wibisono Hasanul Muhtaram[1], Ashila Sallama Nur Fadlila[1], Indri Tiffani[1], Lalu Abdul Mubarak[1], Retno Dwi Utami[1], Baiq Mayada Isqie[1], Florentcia Davina Gunawan[1], Nensy Dwi Astika[1], Pande Komang Inten Widya Iswara Oka[1], Kurniati[1], Yunita Hapsari[2]

[1]Faculty of Medicine and Health Sciences, Mataram University, Mataram, West Nusa Tenggara, Indonesia;

[2]Department of Dermatology and Venereology, Faculty of Medicine and Health Sciences, Mataram University, Mataram, West Nusa Tenggara, Indonesia;

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*Corresponding Author: **Mira Nupila Rahma**, Medical Education**,** Faculty of Medicine, University of Mataram, Mataram, Indonesia; Email: mirnupila@gmail.com

Abstract: Necrotic *erythema nodosum leprosum* (ENL) is a rare and severe type 2 leprosy reaction that mainly affects patients with multibacillary Hansen's disease and may progress to tissue necrosis. We report the case of a 26-year-old woman with *released-from-treatment* (RFT) multibacillary Hansen's disease who presented with recurrent painful erythematous nodules, cutaneous necrosis, paresthesia, numbness, and peripheral neuropathy. Clinical examination revealed enlarged and tender peripheral nerves with sensory and motor impairment, while slit-skin smear demonstrated a bacteriological index of +3. Laboratory findings showed leukocytosis, neutrophilia, and mild microcytic anemia, indicating an active inflammatory process. The patient was diagnosed with recurrent necrotic ENL after completion of multidrug therapy and was treated with systemic corticosteroids, analgesics, wound care, emollients, neurotropic supplementation, and iron therapy. Clinical improvement and a reduction in the bacteriological index were observed during follow-up, although recurrent skin lesions and residual sensory neuropathy persisted. This case emphasizes that necrotic ENL may occur after RFT and highlights the importance of early recognition, appropriate treatment, and close follow-up to reduce recurrence, prevent irreversible nerve damage, and improve long-term outcomes.

Keywords: Erythema nodosum leprosum; Hansen's disease; Multibacillary leprosy; Necrotic ENL; Peripheral neuritis.

Introduction

Leprosy (Hansen's disease) remains one of the *neglected tropical diseases* (NTDs) and continues to represent a major public health concern because of its potential to cause irreversible disability, persistent psychosocial consequences, and long-standing stigma despite the availability of effective multidrug therapy (Van Netten et al., 2021; WHO, 2021). Among the immunological complications of leprosy, *erythema nodosum leprosum* (ENL) is recognized as a systemic inflammatory reaction resulting from the host immune response to *Mycobacterium leprae*. Clinically, ENL typically presents with the abrupt appearance of painful erythematous nodules accompanied by systemic manifestations such as fever, malaise, neuritis, arthritis, and lymphadenitis. Histopathological examination commonly demonstrates prominent neutrophilic infiltration with panniculitis and, in some cases, vasculitis associated with immune complex deposition and complement activation (Al-Anbagi et al., 2025).

According to the World Health Organization, 172,717 new leprosy cases were reported globally in 2024. The South-East Asia Region (SEAR) contributed the largest proportion of cases (72%), followed by the Region of the Americas (13.7%), the African

Region (11.1%), the Western Pacific Region (1.8%), the Eastern Mediterranean Region (1.4%), and the European Region (<1%). Within the SEAR, Indonesia reported 14,698 new cases, ranking third worldwide after India and Brazil (WHO, 2025). Although leprosy primarily involves the skin and peripheral nerves, delayed diagnosis or inadequate treatment may lead to irreversible damage affecting the skin, peripheral nerves, face, hands, and feet, resulting in lifelong disability and social exclusion. Furthermore, stigma and discrimination continue to impose a substantial burden on affected individuals and remain closely associated with the disease worldwide (WHO, 2021).

ENL frequently follows a relapsing or chronic course, with episodes recurring over several months or even years. Despite the global decline in leprosy incidence, the burden of type 2 lepra reactions remains considerable. Approximately one-third to one-half of individuals with lepromatous leprosy experience ENL, whereas the condition occurs less frequently, affecting around one in ten patients with borderline lepromatous disease. Recurrent or inadequately managed ENL may lead to severe pain, progressive peripheral nerve injury, and irreversible disability, substantially increasing patient morbidity (Hingtgen et al., 2024; Polycarpou et al., 2017).

Necrotic ENL, also known as *erythema necroticans*, is an uncommon but particularly severe variant of type 2 lepra reaction. The condition is associated with the formation and deposition of antigen–antibody immune complexes that may occur during the natural course of leprosy or after treatment. Necrotic ENL can occur at any stage of disease management, including before treatment, during *multidrug therapy* (MDT), or after its completion. This severe manifestation may follow either an acute or chronic course and is associated with an increased risk of disease-related complications (Kemenkes, 2019; SL., 2020). Clinically, it is characterized by ulcerative lesions with tissue necrosis caused by an intense inflammatory response, making both diagnosis and management particularly challenging because of its rarity and severity (Alfieri et al., 2024).

Although several studies have reported the clinical features and treatment of ENL, the available literature predominantly focuses on its classical presentation, whereas reports describing necrotic ENL remain limited. Additional case reports are therefore needed to broaden current knowledge regarding its diagnosis, therapeutic management, and clinical outcomes, particularly in leprosy-endemic countries such as Indonesia. This case report presents the clinical features, diagnostic assessment, therapeutic management, complications, and clinical outcome of necrotic erythema nodosum leprosum in a patient with multibacillary Hansen's disease. Reporting this uncommon presentation is expected to enhance clinicians' awareness, facilitate earlier recognition, and support appropriate management to reduce morbidity and prevent irreversible disability.

Materials and Methods

This descriptive case report describes a 26-year-old woman with multibacillary Hansen's disease who developed necrotic erythema nodosum leprosum following release from treatment (RFT). Data were obtained from the patient’s medical records, history taking, physical examination, laboratory findings, and clinical documentation during hospitalization. In addition, relevant evidence was retrieved from PubMed, Google Scholar, and ScienceDirect to provide supporting information on Hansen's disease, erythema nodosum leprosum, its underlying pathophysiology, diagnostic approach, and therapeutic strategies. The collected data were then presented descriptively and compared with relevant literature.

Results and Discussion

A 26-year-old woman, Mrs. L, attended the Dermatology and Venereology Clinic of Universitas Mataram Hospital from January to April 2026 with fluctuating complaints involving peripheral neuropathy and skin lesions. Initially, she reported difficulty flexing her fingers upon waking, accompanied by tingling and numbness, followed by pain at subsequent follow-up visits. After hospitalization, she developed new nodules all over the body with associated pain; the tingling and numbness temporarily resolved, but

dry skin appeared. At later follow-ups, recurrent nodules with pain were noted along with the return of tingling and numbness, persistent dry skin, photosensitivity-related pain, and subsequent sleep disturbances.

Physical examinations were performed periodically from January to April 2026. Throughout this period, the patient remained in good general condition with vital signs within normal limits. Peripheral nerve examination revealed bilateral enlargement and tenderness of the greater auricular, ulnar, common peroneal, and posterior tibial nerves, accompanied by varying degrees of sensory impairment. Paresis of the left ulnar nerve was noted, manifesting as a claw hand deformity, and xerosis was present on both lower extremities. On dermatological examination following hospitalization (March 16, 2026), multiple painful erythematous and hyperpigmented nodules were observed, with several lesions exhibiting central necrosis. On March 30, 2026, slit-skin smear examination showed a *Bacterial Index* (BI) of +3 and a *Morphological Index* (MI) of 6.06%, which decreased to a BI of +2 and an MI of 4.17% on April 27, 2026.

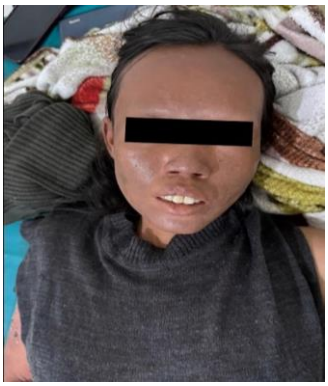

Figure 1. Facial Hyperpigmentation and Infiltration

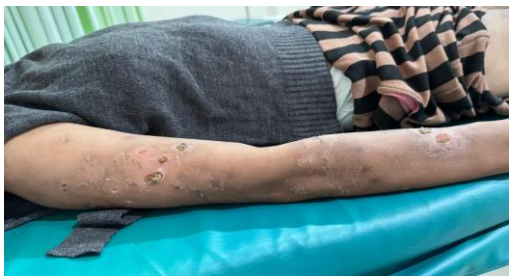

Figure 2. Hyperpigmented infiltrative macules/plaques with scale, multiple ulcers, and crusts.

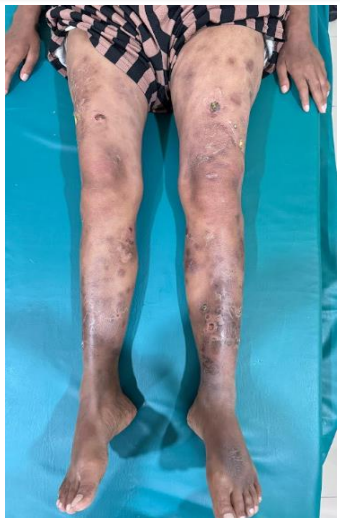

Figure 3. Hyperpigmented and Erythematous Macular/Plaque Lesions with Crust Formation

Based on hematological examination, leukocytosis (WBC 20.71 $\times 10^3/\mu L$) and neutrophilia (NEUT# 17.98 $\times 10^3/\mu L$) were observed. Erythrocyte parameters demonstrated decreased hematocrit (36.4%), low mean *corpuscular volume* (MCV; 78.3 fL), and elevated red cell distribution *width-coefficient of variation* (RDW-CV; 17.0%). These findings were consistent with mild microcytic anemia accompanied by anisocytosis. The platelet count remained within normal limits. Urinalysis revealed positive leukocyte esterase, positive nitrite, mild proteinuria, positive urinary blood, increased erythrocytes (10–20/high-power field), and bacteriuria, suggesting a *urinary tract infection* (UTI) accompanied by hematuria.

Slit-skin smear examination for Morbus Hansen demonstrated a *Bacterial Index* (BI) of 5+, indicating a very high acid-fast bacillary load and supporting the classification of *multibacillary* (MB) leprosy (Kemenkes, 2019; Luo et al., 2021). The *Morphological Index* (MI) was 1.35%, indicating the presence of a small proportion of viable or intact bacilli. This finding suggests persistent residual bacillary activity despite the patient having completed *multidrug therapy* and achieved *release from treatment* (RFT), which may contribute to recurrent episodes of *erythema nodosum leprosum* (ENL).

The diagnosis of post-RFT multibacillary Hansen's disease complicated by necrotic *erythema nodosum leprosum* (ENL) and anemia was established based on the patient's clinical history, physical examination, and laboratory

findings. Management consisted of methylprednisolone, methotrexate (MTX) with folic acid supplementation, paracetamol for symptomatic relief, and iron and vitamin D supplementation.

Discussion

Diagnostic Considerations and Clinical Manifestations

The patient was diagnosed with post-*release from treatment* (RFT) multibacillary Hansen's disease complicated by necrotic *erythema nodosum leprosum* (ENL) and anemia. Slit-skin smear examination demonstrated a *bacteriological index* (BI) of +5, indicating a high bacillary burden consistent with multibacillary leprosy. Because the patient had a previous history of Hansen's disease, had completed multidrug therapy, and had been declared *released from treatment* (RFT), the current episode was classified as post-RFT multibacillary leprosy.

Table 1. Naafs criteria to diagnose ENL

Naafs criteria	A patient is considered to have a type II reaction if he has the major criterion or at least three minor criteria
Major	A sudden eruption of tender (red) papules, nodules or plaques, which may ulcerate
Minor	Mild fever, the patient is unwell.
	Tender enlarged nerves.
	Increased loss of sensation or strength.
	Arthritis.
	Lymphadenitis.
	Epididymo-orchitis.
	Iridocyclitis or episcleritis.
	Edema of extremities or face.
	Positive Ryrie or Ellis test.

Sourcer: (Bhat, R.M. and Vaidya, 2020)

The diagnosis of *erythema nodosum leprosum* (ENL) was established based on the patient's clinical presentation. ENL is classified as a type 2 lepra reaction that occurs predominantly among individuals with the *lepromatous (LL)* or borderline *lepromatous (BL)* forms of Hansen's disease. In clinical practice, the diagnostic criteria proposed by Naafs may be applied, whereby the diagnosis is confirmed by fulfilling either one major criterion or at least three minor criteria (Bhat & Vaidya, 2020).

Laboratory abnormalities frequently observed in patients with ENL include anemia, leukocytosis, elevated hematocrit, increased *C-reactive protein* (CRP) levels, and impaired liver function tests. Although these findings are not specific to ENL, they may reflect the systemic inflammatory process underlying the reaction and can provide supportive evidence when interpreted together with the patient's clinical manifestations (Bhat & Vaidya, 2020).

Histopathological examination may further support the diagnosis by demonstrating prominent neutrophilic infiltration within granulomatous lesions. However, this characteristic finding is not consistently present in every patient. Therefore, histopathological results should be interpreted alongside the clinical presentation rather than used as an isolated diagnostic criterion (Bhat & Vaidya, 2020; Wijaya et al., 2023).

Necrotic *erythema nodosum leprosum* (necrotic ENL) is an uncommon but severe variant of ENL, accounting for approximately 8% of reported cases. Compared with classical ENL, this variant is distinguished by ulcerative and necrotic cutaneous lesions caused by an intense inflammatory response, resulting in greater morbidity and more complex clinical management (Alfieri et al., 2024).

Differential Diagnosis of Necrotic Cutaneous Nodules

The differential diagnoses in this case included Lucio phenomenon, type 1 lepra reaction (*reversal reaction*), systemic cutaneous vasculitis, and non-leprosy erythema nodosum. Lucio phenomenon is typically characterized by purpuric macules or plaques that subsequently progress to extensive ulceration and tissue necrosis (Dwiana Savitri, 2025), whereas the present case was characterized by recurrent painful erythematous nodules. Type 1 lepra reaction (*reversal reaction*) was also considered because inflammatory involvement of the peripheral nerves may manifest as paresthesia or peripheral neuropathy. However, the coexistence of multiple painful nodules, fever, and neuritis was more compatible with a type 2 lepra reaction,

making necrotic *erythema nodosum leprosum* (ENL) the most likely diagnosis (Astiningtyas et al., 2025; Hingtgen et al., 2024; Thapa et al., 2023). Systemic cutaneous vasculitis may present with painful nodules accompanied by ulceration or skin necrosis, whereas non-leprosy erythema nodosum may also present with painful nodules. However, neither condition adequately accounted for the presence of multiple enlarged peripheral nerves, characteristic sensory impairment, or bacteriological findings indicating a high bacillary load (Aprilita & Topik, 2024; Jimenez et al., 2025).

Pathophysiology of Necrotizing Erythema Nodosum Leprosum

The pathogenesis of ENL involves a type 2 lepra reaction mediated by immune complex formation, leading to the production of pro-inflammatory cytokines, especially *tumor necrosis factor-alpha* (TNF-α) (Mehta et al., 2022). Persistent *Mycobacterium leprae* bacilli may sustain recurrent inflammatory responses, leading to the development of painful erythematous nodules that can progress to ulceration and tissue necrosis in severe cases. A high bacillary burden has also been identified as an important risk factor for the development of necrotic ENL.

Therapeutic Approach and Treatment Rationale

For mild lepra reactions, including *reversal reaction* (RR) and *erythema nodosum leprosum* (ENL), symptom control can be achieved with *nonsteroidal anti-inflammatory drugs* (NSAIDs). In contrast, severe lepra reactions are primarily managed with corticosteroids as the first-line treatment according to the *World Health Organization* (WHO), while clofazimine serves as an alternative second-line agent and thalidomide may be considered as a corticosteroid-sparing therapy in selected patients (De Barros et al., 2020; Stefani et al., 2021). The anti-inflammatory effects of corticosteroids are largely mediated through suppression of pro-inflammatory cytokine production, particularly *tumor necrosis factor-alpha* (TNF-α). The WHO recommends initiating prednisolone at 40 mg/day for the first two weeks, followed by dose reduction every two weeks until a maintenance dose of 5 mg/day is reached. However, patients with ENL may require prednisolone doses exceeding 2 mg/kg/day, depending on disease severity (Stefani et al., 2021).

Complications and Long-Term Outcomes

The classical presentation of ENL is characterized by painful erythematous nodules, papules, and plaques that mainly affect the face and extremities. Without appropriate treatment, episodes generally resolve within 1–2 weeks, although some patients experience a chronic or recurrent course (Kim, J et al., 2019). Repeated episodes may result in subcutaneous scarring, tissue fibrosis, and progressive limitation of joint mobility. Prolonged corticosteroid therapy is also associated with complications such as osteoporosis. Persistent uncontrolled inflammation may further lead to secondary amyloidosis with subsequent renal dysfunction. Ongoing neuritis may likewise result in irreversible nerve damage (El-Azhary et al., 2019; Putri & Wisan, 2020).

Besides the classical clinical presentation, ENL may also manifest with less common cutaneous lesions, including bullous, ulcerative, pustular, hemorrhagic, necrotic, and erythema multiforme-like (targetoid) lesions. The disease may also involve multiple organ systems, presenting with cervical or inguinal lymphadenitis, distal neuritis, arthritis, synovitis, iritis or uveitis, orchitis, and glomerulonephritis (Kim, J et al., 2019).

Prognostic Factors in Recurrent Necrotic ENL

The prognosis of the patient in this case is quo ad vitam, ad functionam dubia, and ad sanationam.

Quo ad vitam: Dubia

The patient developed *erythema nodosum leprosum* with multiple nodules accompanied by central necrosis distributed throughout the body. This necrotic condition occurs as a result of a type II hypersensitivity reaction that triggers a pro-inflammatory cytokine storm and causes damage to the skin tissue (Hrithik et al., 2025). Extensive open necrotic wounds may increase

the risk of secondary bacterial infection and sepsis (Bhat and Vaidya, 2020).

Quo ad functionem: Dubia

The patient experienced tenderness of multiple peripheral nerves accompanied by numbness and paresthesia involving the N. ulnaris, N. peroneus, N. tibialis posterior, and N. auricularis magnus, which persisted until April 2026. Such peripheral nerve involvement carries a high risk of causing permanent neuropathy (Vangala et al., 2026).

Quo ad sanationem: Dubia

Studies by Hrithik, et al. (2025) have shown that patients with severe or necrotic ENL are highly susceptible to recurrent relapses.

Conclusion

This case reports a 26-year-old woman with post-*release from treatment* (RFT) multibacillary leprosy who developed necrotic *erythema nodosum leprosum* (ENL). The diagnosis was established based on the presence of multiple painful erythematous nodules with central necrosis, involvement of multiple peripheral nerves manifested by paresthesia, numbness, and motor weakness, as well as bacteriological findings demonstrating a high bacterial index. These findings indicate that necrotic ENL is a severe form of type 2 lepra reaction that may occur even after completion of anti-leprosy treatment. Management consisted of systemic corticosteroids and supportive therapy, resulting in clinical improvement. However, the recurrence of neuropathic symptoms and the appearance of new lesions during follow-up suggested a high risk of relapse. Improved clinical outcomes can be achieved through timely diagnosis, ongoing follow-up, and appropriate therapeutic interventions, which help reduce disease-related complications, limit irreversible disability, and support long-term quality of life.

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