

Dermatopathic Lymphadenopathy with *Talaromyces marneffe*i Infection Mediated by Anti-Interferon γ Autoantibodies: A Case Report with a Literature Review

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Background: Dermatopathic lymphadenitis (DL) is a rare reactive lymphoproliferative disorder often secondary to chronic dermatological conditions, which can be clinically misdiagnosed as lymphoma and other malignant diseases. Anti-IFN- γ autoantibodies can predispose adults to rare opportunistic infections, but reports of DL combined with *Talaromyces marneffe*i (TM) infection are limited.

Case Description: A 56-year-old male patient presented with recurrent rashes, significant itching, desquamation, and multiple lymph node enlargements, accompanied by fever, night sweats, and weight loss. Lymph node biopsy revealed dermatopathic changes and reactive lymphoid hyperplasia. TCR and IGH gene rearrangements demonstrated negative results, and no abnormal phenotypes were detected by peripheral blood flow cytometry. Hematological and immunological tests revealed elevated white blood cells, neutrophils, and IgE levels, along with positive anti-IFN- γ autoantibodies (29.22 ng/mL). NGS testing of secretions from the ulcerated skin area of the parotid gland confirmed TM infection. The diagnosis was determined as anti-IFN- γ autoantibody-mediated TM infection, complicated by DL and reactive lymphoid hyperplasia. Antifungal therapy with amphotericin B combined with voriconazole was administered, along with symptomatic and immunomodulatory treatments. Lymph node enlargement and systemic symptoms significantly improved, and the rash completely resolved.

Conclusion: This case suggests that in adult patients with diffuse skin lesions and systemic inflammatory reactions, if accompanied by multiple lymph node enlargements and pathological findings of cutaneous lymphadenitis, potential immune deficiencies related to anti-IFN- γ autoantibodies should be considered. For adults with unexplained lymphadenopathy accompanied by fungal infection, testing for anti-interferon- γ autoantibodies is recommended to identify potential underlying immune abnormalities and to inform subsequent individualized immunological assessment and therapeutic decision-making.

Keywords: dermatopathic lymphadenopathy, *Talaromyces marneffe*i, anti-interferon gamma autoantibody, pathologic diagnosis

Introduction

Dermatological lymphadenopathy (DL) is a rare disease caused by reactive lymphoid tissue hyperplasia, usually secondary to extensive desquamation of the skin. Its clinical manifestations include lymphadenopathy, systemic erythroderma, skin pigmentation, and paroxysmal itching.¹ Its pathological characteristics include foam cells containing lipid vacuoles and macrophages containing melanin particles, which are considered to be the excessive immune response of lymph nodes to the continuous stimulation of skin antigens, and can occur in people of all ages.²⁻⁴ Previous studies have shown that the detection rate of DL in 190 lymph node biopsy specimens is about 2.6%, indicating that DL is

relatively rare in lymph node lesions.⁵ DL has been reported to be associated with various viral diseases, particularly the human immunodeficiency virus (HIV)⁶ and human papillomavirus (HPV).⁷ DL diagnosis is mainly based on lymph node pathology, but it can be misdiagnosed and underdiagnosed due to its complex and non-specific clinical manifestations.

Anti-interferon (IFN)- γ autoantibody syndrome is an acquired immunodeficiency disease, with approximately 80% of case reports coming from the Asian population, particularly concentrated in Southeast Asia.^{8–10} In recent years, *Talaromyces marneffi* (TM) and non-tuberculous mycobacterial infection have become important clinical markers for this syndrome.⁹ TM is a rare conditionally pathogenic fungus, most commonly found in immunosuppressed or deficient individuals, especially HIV patients.¹¹ TM infection is relatively rare in non-HIV-infected populations, indicating potential immune regulatory abnormalities. In this context, this study conducted a systematic clinical, imaging, immunological, and pathological evaluation of a case of DL with anti-IFN- γ autoantibody syndrome and TM infection that occurred in a non-HIV state. Combined with previous literature reports, this study aims to further elucidate the characteristics of rare lymph node lesions in this immunodeficient state and provide a reference for DL early identification, standardized diagnosis and treatment.

Case Report

A 56-year-old male presented with recurrent rashes of unknown cause, accompanied by intense pruritus and partial desquamation. He developed multiple enlarged masses in the preauricular and cervical regions, which progressively increased in size and number. Additionally, he experienced recurrent fevers reaching 39–40°C, preceded by chills, along with profuse night sweats and a weight loss of over 15 kg. At the time of admission, the patient presented with multiple pale red rashes all over the body, which fused into plaques that did not subside upon compression, and some were accompanied by desquamation and hypopigmentation. Multiple lymph nodes were palpated in front of the ears, behind the ears, neck, armpits, and groin on both sides. The larger lymph node was located in front of the left ear and merged into a cluster, about 3 cm × 4 cm, soft in texture, locally undulating, with exudation and pus discharge on the surface, poor mobility, and no tenderness (Figure S1A and B). The clinical process, diagnostic examination, and treatment timeline of the patient are summarized in Figure 1. Institutional approval was required to publish the case details. The study involving humans was approved by the Ethics Committee of Sanming First Hospital Affiliated to Fujian Medical University.

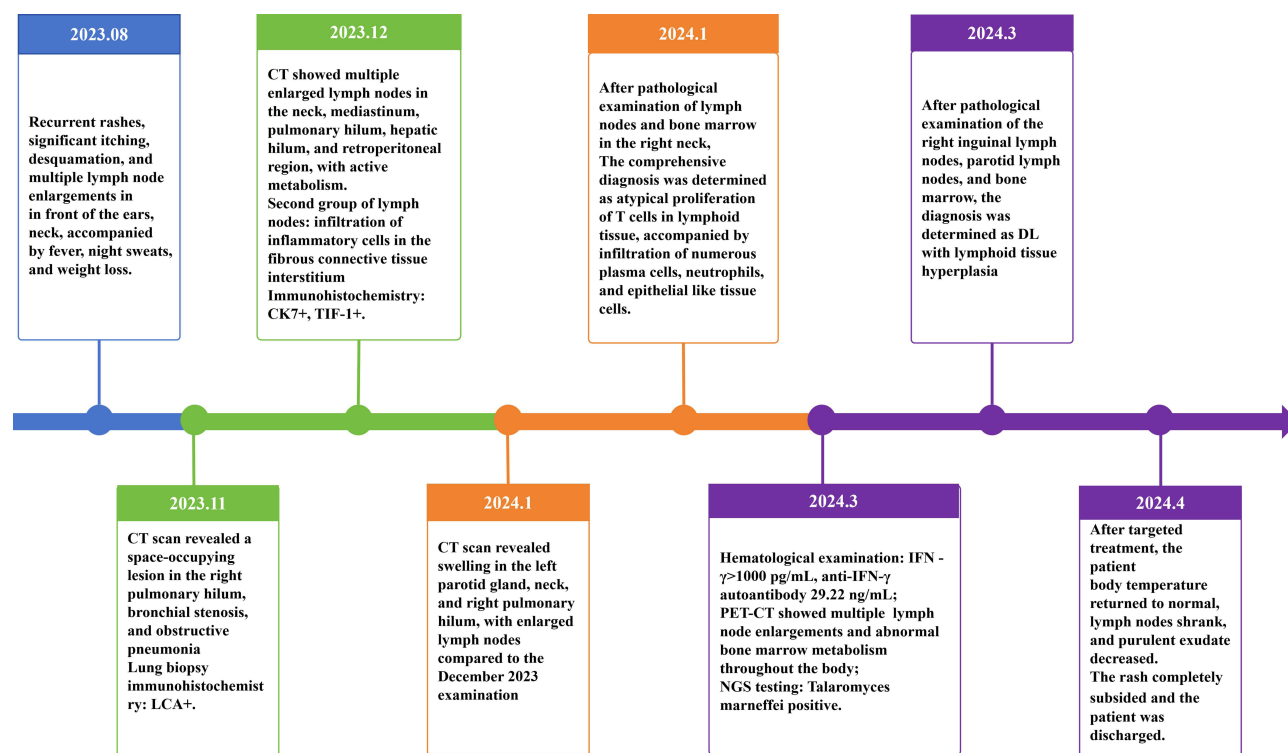


Figure 1 Timeline of key clinical events, diagnostic procedures, and treatments.

Imaging Examination

On November 23, 2023, a CT scan from an external hospital showed a space-occupying lesion in the right pulmonary hilum, accompanied by ipsilateral hilar and mediastinal lymph node enlargement, suggesting the possibility of a malignant tumor. Secondary local bronchial stenosis was observed in the right lung, accompanied by a small amount of obstructive pneumonia ([Figure S2](#)). On January 17, 2024, the head and neck mass recurred again. CT examination revealed swelling in the left parotid gland, neck, and right pulmonary hilum, and lymph nodes had progressed compared to the December 2023 imaging ([Figure 2](#)).

For a comprehensive evaluation, the patient underwent a whole-body PET-CT examination upon admission, which showed multiple lymph node enlargements with increased glucose metabolism throughout the body, involving the neck region, mediastinum, bilateral pulmonary hilum, hepatic hilum, and retroperitoneum. Multiple abnormal increases in bone marrow metabolism were also observed. The above imaging findings suggested systemic lesions throughout the body, and malignant tumors cannot be ruled out ([Figure 3](#)).

Hematological Testing

The hematological examination results showed an increase in white blood cell count ($21.7 \times 10^9/L$), neutrophil count ($13.86 \times 10^9/L$), platelet count ($463 \times 10^9/L$), and C-reactive protein (43.90 mg/L), while hemoglobin (98 g/L) decreased. Eosinophils (8%) and monocytes (9%) were elevated in the classification of white blood cells, while other indicators were normal. Further laboratory testing showed a significant increase in IgE levels (2370 IU/mL). EBV-DNA was 6.77×10^4 copies/mL, and CMV-DNA was 7.44×10^3 copies/mL. The level of IFN- γ significantly increased (>1000 pg/mL). Test for anti-IFN- γ autoantibodies showed a positive result (29.22 ng/mL). Autoimmune-related indicators (ASO, RF, IgG4) showed no abnormalities. HIV, TPPA, RPR, T-SPOT, and anti-tuberculosis antibody tests were all negative.

Blood Culture and Microbiology

The patient underwent aerobic and anaerobic blood cultures during multiple episodes of fever, and the results were negative. The NGS detection of secretions from the left parotid gland rupture site clearly detected TM ([Figure S1](#) and [S2](#)). The skin biopsy of the right forearm showed hyperkeratosis with incomplete keratinization, thickening of the spinous layer, and a small amount of lymphocyte infiltration in the superficial dermis.

Pathology and Immunohistochemistry

External lung biopsy and lymph node biopsy did not show any malignant tumors, indicating the lymphatic system as the main source of cells. Some lymph nodes showed reactive inflammatory hyperplasia and epithelioid cell aggregation. Bone marrow biopsy showed mild proliferative abnormalities, increased proportion of plasma cells and T cells, and no clonal abnormalities or morphological malignant features were observed ([Table 1](#)). The patient was comprehensively diagnosed as having atypical proliferation of T cells in lymphoid tissue, accompanied by infiltration of numerous plasma cells, neutrophils, and epithelial-like tissue cells.

After admission, lymph node biopsy of the right inguinal and parotid glands showed structural disorder of the lymph nodes, significant widening of the subcortical area, and the presence of lightly stained nodules and dendritic cell-like cell aggregation. There was a small number of activated lymphocytes in some areas. Immunohistochemistry showed that CD21 was scattered in the FDC network, with CD1a and S-100 being mostly positive, Langerin being slightly positive, Ki-67 being approximately 30–40%, and some cells being in an activated state ([Figure 4](#)). The parotid lymph nodes exhibited multifocal Langerhans cell proliferation, BRAF negative, indicating reactive lesions rather than LCH. Bone marrow biopsy showed an increase of about 20% in plasma cells and an increase of about 40% in the proportion of T cells. Immunohistochemistry and flow cytometry analysis did not reveal abnormal clonal proliferation. Molecular testing (TCR, IGH rearrangement) demonstrated negative results, indicating reactive changes related to lymphoid tissue proliferation. The results of the external pathological consultation report support that multifocal Langerhans cell and lymphoid tissue hyperplasia were reactive lesions, with no clear evidence of lymphoma. [Table 1](#) provides detailed information.

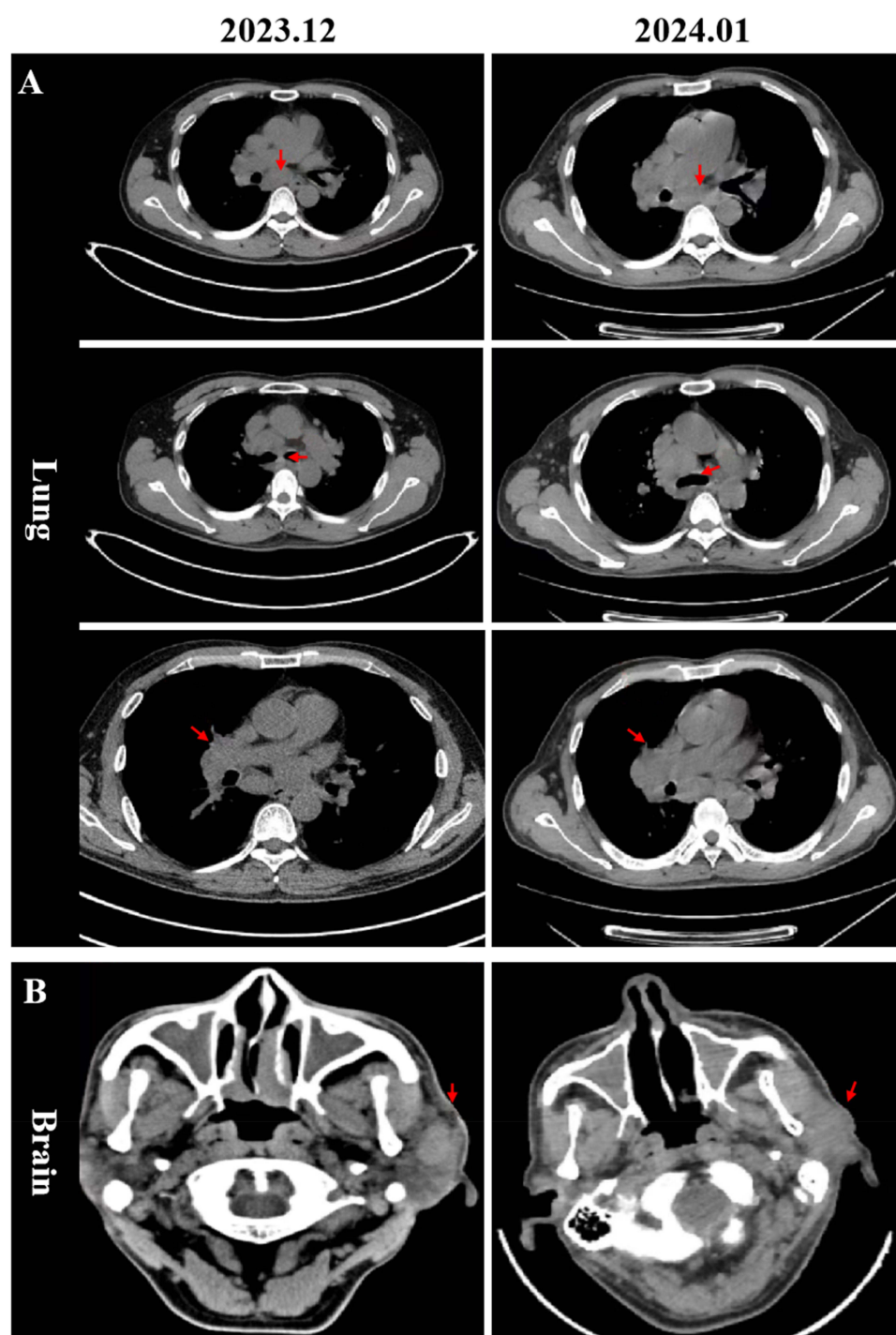


Figure 2 CT scans from 12–2023 and 01–2024. **(A)** CT plain scan of both lungs shows enlargement of mediastinum 7, 4R area, and right pulmonary hilum lymph nodes; **(B)** Head CT plain scan shows multiple enlarged lymph nodes in the left parotid gland area.

Diagnosis

Based on the patient's repeated skin lesions, extensive lymph node enlargement, significantly elevated levels of anti-IFN- γ autoantibodies, clear evidence of TM infection, and reactive lymphoid tissue hyperplasia, the final diagnosis was determined as the TM infection mediated by anti-IFN- γ autoantibodies, accompanied by DL and lymphoid tissue hyperplasia.

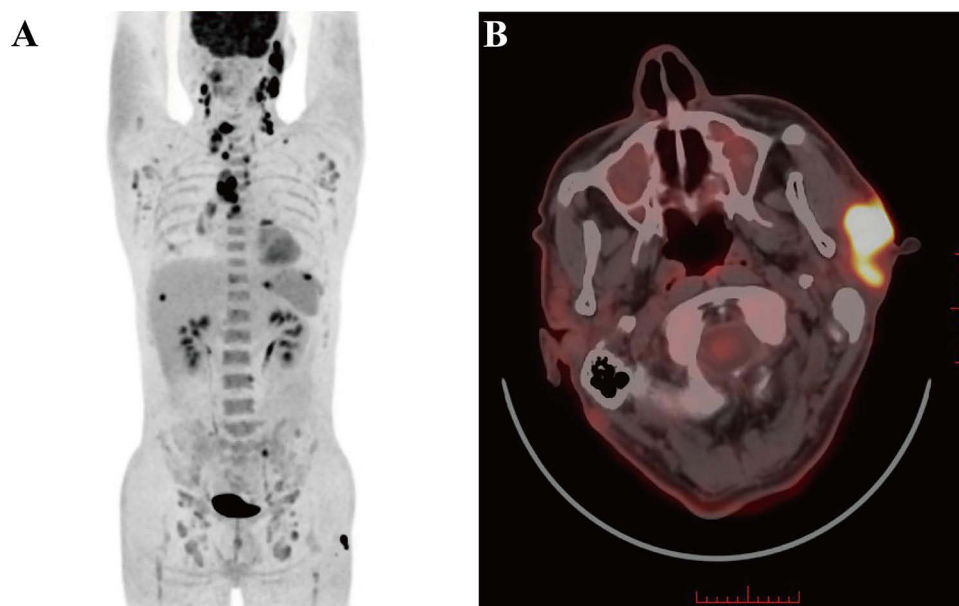


Figure 3 ^{18}F -fluorodeoxyglucose positron emission tomography/computed tomography images of the patient with DL **(A)** Significant lymphadenopathy in the parotid area bilaterally, posterior cervical subcutis bilaterally, left posterior cervical muscular hiatus, neck bilaterally, supraclavicular area bilaterally, axillae bilaterally, mediastinum (zone 1, 2, 4, and 7), right pulmonary hilar, hepatic hilar area, hepatogastric hiatus, retroperitoneum of the epigastric region, pelvic wall bilaterally, and inguinal area bilaterally. **(B)** Lymph node metabolism was markedly elevated in the parotid area bilaterally (left side was more prominent), with maximum standardized uptake value (SUVmax)=15.3 at the most intense point.

Treatment and Outcome

Before admission, the patient's clinical manifestations were mainly extensive rash, lymph node enlargement, and fever. The external hospital preliminarily considered that there was a high possibility of skin and soft tissue infection, and gave a combination of cefotaxime, moxifloxacin, voriconazole, and oseltamivir for anti-infective treatment to treat common infections of bacterial, fungal, and viral pathogens. Some lymph nodes showed a trend of shrinking after treatment. However, there was no significant improvement in skin lesions, which exhibited persistent itching, aggravated local rupture and exudation, and recurrent fever.

After admission, the patient was diagnosed with TM infection mediated by anti-IFN- γ autoantibodies, accompanied by DL and lymphoid tissue hyperplasia. Given the limited effectiveness of the initial empirical anti-infection regimen, we made sequential and phased adjustments to the anti-infection regimen based on pathogen results and immunological status. In terms of antibacterial treatment, the patient was initially treated with cefoperazone-sulbactam combined with linezolid for 3 days, which was gradually adjusted to piperacillin-tazobactam plus linezolid for 2 days. Then, tigecycline combined with piperacillin-tazobactam was applied. The condition was stabilized, and intravenous antibacterial agents were discontinued sequentially. The therapy was transitioned to oral cefdinir for maintenance. In terms of antifungal treatment, the patient was first treated with amphotericin B and then transitioned to voriconazole maintenance therapy after the condition improved. Simultaneously, dexamethasone was administered to regulate the immune response; cetirizine and loratadine were administered to alleviate allergic symptoms. After combined treatment, the patient's body temperature gradually returned to normal, lymph nodes significantly shrank, skin ulceration and exudation improved significantly, rash completely disappeared. The condition was improved, and the patient was discharged ([Figure S1C](#) and [D](#)).

Discussion

This case has significant clinical uniqueness and is the first to report the coexistence of DL and TM infections in HIV-negative adults, suggesting that immunodeficiency mediated by anti-IFN- γ autoantibodies may play a key role in non-traditional susceptible populations. This case also brings several clinical implications. Firstly, for patients with unexplained lymph node enlargement and concurrent opportunistic infections, anti-IFN- γ autoantibody testing should be

Table I Summary of Histopathology and Immunohistochemical Testing of Patients Conducted by the External Hospital and Our Hospital

Tissue/Location	Pathological Features	Immunohistochemistry	Other	Ki-67	Implication
Pathological examination in external hospital					
Lung puncture	No tumor lesions were observed	LCA (+++), CK (-), Syn (-), CKA (-), CD56 (-), P40 (-), TIF-I (-)		About 50%	The cell source is lymphatic system, and no malignant tumor is found
Second group of lymph nodes	Interstitial infiltration of inflammatory cells scattered in fibrous connective tissue, with a few lung tissue gaps widened at the edges	CK7 (+), TIF-I (+)		About 5% in a hot spot	Reactive changes, no evidence of epithelial-derived malignant tumors.
Right cervical lymph node	Lymph nodes show scattered follicles, widened subcortical areas, and focal structural damage. There is obvious fibrous tissue proliferation in the stroma, accompanied by a large number of plasma cells, neutrophils, and a small amount of eosinophil infiltration. Clusters or small clusters of epithelial-like tissue cells can be seen in multiple lesions, with pale staining of the cytoplasm and a transparent appearance. The nucleus is irregular in shape, the chromatin is delicate, and the nucleolus is obvious.	CD5 (+++), CD3 (+, Partially lost), CD20 (-, follicular area+), PAX5 (-, follicular area+), CD21 (+), CD23 (+), BCL-2 (-/+ , germinal center-), CD15 (-, granulocyte+), CD30 (+, About 5% small and medium-sized lymphocytes), ALK1 (-), CD1a (-), Fascin (+), IMP3 (-), HHV8 (-), BCL-6 (-, germinal center +), AE1/AE3 (-), CD10 (-/+ , Found in interstitial spindle cells), EBER (-)		About 20% in outer follicular area	Reactive lymphoid tissue hyperplasia is present, with no lymphoma features observed.
Bone marrow	Low bone marrow hyperplasia, mainly composed of adipose tissue between bone trabeculae, with scattered small amounts of hematopoietic cells	MPO (-), CD235a (+), CD61 (-), TdT (-), CD3 (-), CD4 (-), CD5 (-), CD8 (-)	Ag staining (reticular fibers -), Masson staining (collagen fibers -)		
Pathological examination in our hospital					
Right inguinal lymph node	Lymph node structural disorder; Significant widening of the subcortical area; Visible large number of pale nodules, partially fused; The nodules are mainly composed of dendritic cell-like cells with pale cytoplasmic staining and obvious nuclear grooves, with scattered small amounts of activated lymphocyte-like cells	CD21 (scattered in FDC network), CD20 (Lesion+), CD3 (partial+), CD5 (partial+), CD4 (most+), CD8 (scattered+), CD10 (germinal center+), BCL-6 (germinal center+), PD-I (some+), ICOS (partial+), CD30 (scattered+), S-100 (most+), CD1a (most+), Langerin (single +), CyclinD1 (-), OCT-2 (some weak+)		About 30% in hot spot	Reactive Langerhans cell proliferation, tends to be skin disease-related lymphadenitis
Parotid lymph nodes	Multifocal Langerhans cell histiocytosis	CD20 (+), CD3 (+), CD21 (+), CD1a (many+), Langerin (seveal+), S-100 (many+), BRAF (-), BRAF positive control (+), CD30 (several+)		40%	Multifocal Langerhans cell proliferation tends to be reactive lesions rather than LCH.

Bone marrow	Active proliferation of bone marrow tertiary system, increased proportion of granulocytes, NAP score 309; No obvious morphological abnormalities were observed in the cells. The bone marrow tissue shows an increase of about 20% in plasma cells and an increase of about 40% in the proportion of T cells.	MPO (+), CD15 (+), E-cad (erythroid +), CD42b (+), AE1/AE3 (–), CD117 (several+), CD138 (+), CD38 (+), CD20 (+), CD3 (+), CD34 (several+), S-100 (several+), Langerin (–), CD1a (several+)	HC staining PAS (+), reticulocytes (2+). Molecular testing: TCR and IGH rearrangements were both negative; Karyotype 46, XY (20) Flow cytometry: No abnormalities were observed in T cells, NK cells, and B cell populations	Overall about 80%	Multifocal Langerhans cell proliferation, tending towards reactive lesions rather than LCH
External pathological examination					
Lymph node	The lymph node structure is generally intact, with normal distribution of follicles and subcortical areas, and no significant damage.	CD21 (scattered in FDC network), CD20 (lesion+), CD3 (partial+), CD5 (partial+), CD4 (most+), CD8 (scattered+), CD10 (germinal center+), BCL-6 (germinal center+), PD-1 (several+), ICOS (partial+), CD30 (scattered+), S-100 (most+), CD1a (most+), Langerin (several+), CyclinD1 (–), OCT-2 (several weak+)		30%	Lymph nodes show reactive hyperplasia, with basic preservation of follicular and subcortical structures, accompanied by multifocal Langerhans cell proliferation tends to be non tumor reactive lesions

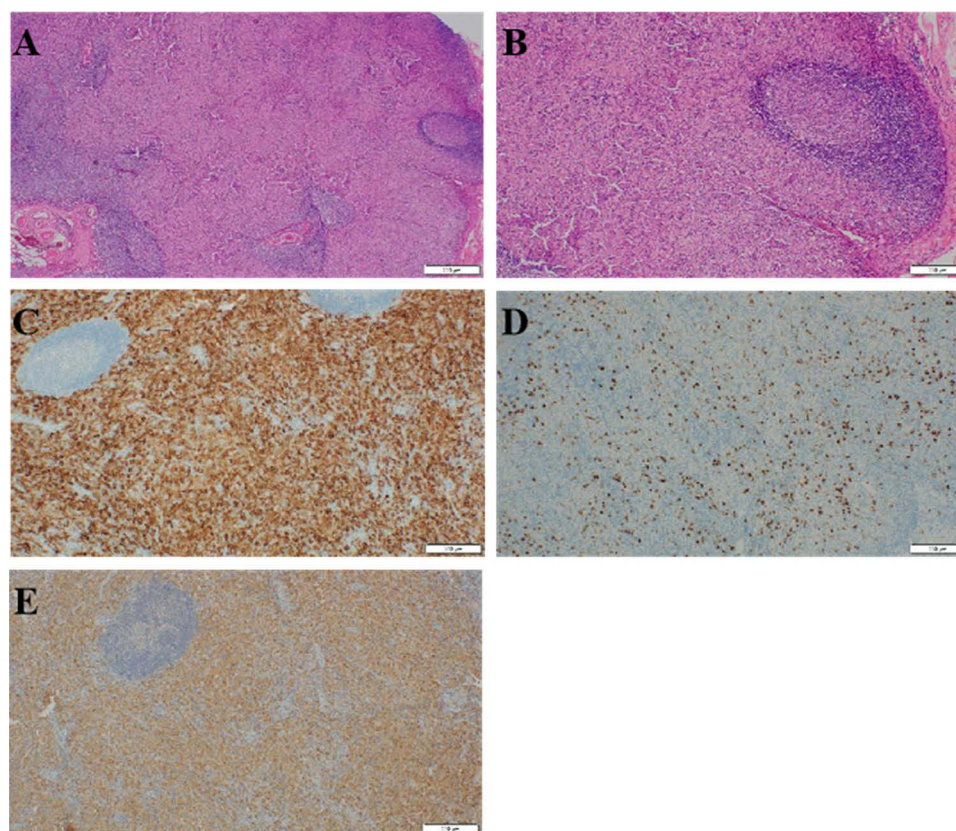


Figure 4 Pathologic manifestations in the right inguinal lymph nodes **(A)** Lymph nodes were structurally disorganized, and the paracortical area was significantly enlarged, with numerous lightly-stained nodules, which were partially fused and had numerous aggregates of cytoplasmic faintly-stained cells, with distinctive nuclear grooves and a small number of scattered activated lymphoid cells, HE×40 **(B)** Histiocytes, Langerhans cells, and cross-finger dendritic cell hyperplasia were seen in the lightly-stained area, HE×100 **(C)** Langerhans cells expressing CD1a were seen in cells in the light-stained area; 100× **(D)** Langerhans cells were positively expressed; 100× **(E)** Langerhans cells and cross-finger dendritic cells expressing S-100 were seen in cells in the lightly-stained area; 100×.

added to identify potential immunodeficiency as early as possible. Secondly, after diagnosis of TM infection, timely initiation of treatment with amphotericin B or voriconazole should be initiated, and the need for combined immune regulation strategies should be evaluated based on the condition. Finally, it is recommended to evaluate the efficacy and prevent recurrence through regular follow-up of lymph node changes, skin lesions, and serum antibody levels. In order to better understand the specificity of this case, we reviewed the DL-related literature in the past decade, focusing on comparing the clinical characteristics and co-infection status of the patients (Table 2). Most DL patients did not experience severe opportunistic infections, which is in sharp contrast to the complex infection status presented in this case, further highlighting the rarity and research value of this case.

The core mechanism in this case lies in IFN- γ autoantibody-mediated Th1-type immunodeficiency. IFN- γ is a crucial cytokine regulating macrophage activation and antifungal immunity, and neutralization of its function by autoantibodies leads to impaired Th1 immune responses.¹² Anti-IFN- γ autoantibodies block IFN- γ binding to its receptor and repress signal transducer and activator of transcription 1 (STAT1) phosphorylation.¹³ STAT1 participates in regulating critical immune processes, including antigen presentation and cytotoxic T cell activity.^{14,15} The disruption of IFN- γ signaling consequently compromises host immune defenses, increasing the susceptibility to bacterial, viral, and other pathogen infections. This patient exhibited significantly elevated serum anti-IFN- γ autoantibodies (29.22 ng/mL) with disseminated TM infection and DL, which is consistent with multiple opportunistic infections and atypical inflammatory responses reported in previous reports.^{8,16,17} It is worth noting that the patient in this case is HIV negative and has not previously used immunosuppressants or other traditional immunodeficiency factors, further suggesting that their immune abnormalities mainly stem from anti-IFN- γ autoantibodies. TM, an intracellular saprophytic fungal pathogen, replicates within macrophages and disseminates via lymphatic circulation to multiple organs, including lungs, lymph nodes, skin and bone marrow,

Table 2 Clinical Characteristics and Infection Status of DL Patients Reported in Literature in the Past 10 Years

Author	Clinical Characteristics									Infection
	Age	Gender	Fever	Weight loss	Lymph Node Enlargement Site	Skin Erythema	Rash All Over The Body	Skin Itching	White Blood Cells ($\times 10^9/L$)	
Elhawary ¹	35 years	Female	Yes	Yes	Over the body	Yes	Yes	/	16	No
Ng ²	50 years	Female	Yes	Yes	Bilateral neck and groin	Yes	Yes	/	/	No
Otsuki ³	8 days	Male	Yes	/	Armpit and groin	Yes	Yes	/	/	Methicillin resistant Staphylococcus aureus and Pseudomonas aeruginosa infections
Alkourbah ⁴	62 years	Female	No	/	Bilateral armpits and groin	/	No	No	4.85	No
Cui ⁵	29 years	Female	Yes	No	Bilateral supraclavicular region, armpits and groin	Yes	Yes	Yes	4.30	No
Srinivasamurthy ⁶	52 years	Female	No	No	Over the body	No	No	No	13	No
Hu ⁷	40 years	Female	Yes	/	Over the body	Yes	Yes	/	16	No
Qureshi ⁸	43 years	Male	Yes	Yes	Bilateral armpits and groin	No	No	No	23.6	No

causing persistent infection.^{4,18} Impaired IFN- γ signaling leads to inadequate immune defense against TM infection, exacerbating repeated, prolonged, and even disseminated infections.¹⁹ Histopathologically, the patient's lymph nodes lacked classical granuloma formation but exhibited abnormal Langerhans cell proliferation and aggregation of lightly-stained cytoplasmic cells in the paracortical region. This phenomenon may be linked to abnormalities of macrophage polarization (M2-dominant phenotype) caused by IFN- γ deficiency.²⁰ DL, in this case, demonstrated a dual pathological pattern. There was hyperplasia of interdigitating dendritic cells and Langerhans cells, accompanied by melanotic pigment deposition, which was consistent with diagnostic criteria for DL.²¹ Moreover, activated T-cell infiltration and upregulation of PD-1/ICOS expression suggested chronic immune activation and T-cell exhaustion induced by TM infection,²² promoting DL progression. Additionally, bone marrow examination revealed CD138+ plasma cell expansion and CD3+ T-cell proliferation, indicating systemic immune dysregulation potentially linked to sustained autoantibody production. These findings suggest that DL is not merely a passive accumulation of skin-derived antigens but also a dynamic outcome of the interaction between infectious pathogens and the immune system. However, due to the possible limitation of local infection lesions and the absence of hyphae or spores in pathological specimens, it is difficult to determine the pathogen solely based on histology. In this case, TM infection was diagnosed through NGS testing of samples taken from skin ulcers, thus supplementing the limitations of pathological analysis.

After long-term diagnosis, the etiology of this patient was finally determined, highlighting the rarity and difficulty of clinical identification of DL. Due to the progressive and multi-regional lymphadenopathy of DL, accompanied by systemic symptoms such as fever, night sweats, and weight loss, its imaging findings (especially high metabolism on PET-CT) are easily confused with malignant lymphoma or metastatic diseases.^{23–25} In the absence of sufficient clinical background information, the histological characteristics of lymph nodes may also mislead pathologists. Therefore, when imaging and pathology suggest the possibility of malignancy but clinical evidence is inconsistent, it is crucial to strengthen multidimensional evaluation. The improvement of diagnostic accuracy relies on the comprehensive integration of pathological, immunological, and clinical information. Pathological examination should systematically evaluate the follicular structure and morphology of the subcortical region, and combine the expression characteristics of immuno-histochemical markers such as CD1a and S-100. Simultaneously, supplementary TCR/IGH gene rearrangement analysis can exclude the possibility of clonal lymphoid proliferation. In patients with opportunistic infections or recurrent lymphadenopathy, further immunological evaluation should be conducted, such as elevated levels of anti-IFN - γ autoantibodies, indicating potential immune deficiencies. In addition, incorporating skin lesions, systemic symptoms, and dynamic changes during follow-up into comprehensive judgment can help improve the overall recognition of DL. For difficult or heterogeneous cases, skin biopsy or multi-site lymph node biopsy can provide additional diagnostic support. Through multidisciplinary comprehensive evaluation, the misdiagnosis risk of DL can be effectively reduced, avoiding unnecessary invasive treatment.

There is currently no standard treatment plan for DL, and treatment should be targeted towards skin diseases or primary diseases. As the skin diseases and primary diseases improve, lymph node enlargement also disappears. Therapeutically, the first-line treatment for TM infection includes amphotericin B, itraconazole, and voriconazole, with early intervention being critical in reducing mortality.²⁶ In our case, the patient responded well to amphotericin B combined with voriconazole, with the infection controlled and the cutaneous lesions improved, suggesting that the therapeutic strategy effectively eliminated the pathogen while partially restoring immune homeostasis. In refractory cases, it is important to consider adjunctive immunomodulatory therapy, but long-term follow-up is necessary to monitor disease progression. Therefore, the management of DL in such patients should focus on controlling the primary infection and immune regulatory strategies.

In conclusion, this case reveals the intricate interplay between TM infection and DL, encompassing both pathogen-driven tissue alterations and sustained immune stimulation-induced T-cell exhaustion and immune imbalance. This study provides important insights for clinical identification of non-traditional susceptible populations and lays the foundation for future exploration of the role of DL in infection-related immunopathology.

Ethics Statement

The study involving humans was approved by the Ethics Committee of Sanming First Hospital Affiliated to Fujian Medical University. This study was conducted in accordance with local legislative and institutional requirements. Consent for publication was obtained from the patient. The patient's informed consent to publish the case details included publication of the images.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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