Clin. Lab. 2024;70:XXX-XXX

CASE REPORT

Systemic Lupus Erythematosus Complicated with Mycobacterium Leprae Infection: a Rare Case Report

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SUMMARY

***Background*: In December 2023, our hospital confirmed a case of systemic lupus erythematosus complicated with *Mycobacterium leprae* infection. The patient has extensive patchy erythema on the back and face, with obvious itching. There are multiple subcutaneous masses on both hands, some of which are accompanied by tenderness, wave sensation, and other symptoms. The patient's mother has a history of leprosy and close contact with the patient. The patient tested positive for syphilis antibodies 2 years ago and did not receive formal treatment. There is no other history of chronic illness.**

***Methods:* Under local anesthesia, the left hand skin lesion was excised, followed by tissue pathological biopsy, acid-fast staining, mNGS, and serum Treponema pallidum antibody detection.**

***Results:* Pathological biopsy results: A large number of foam-like histiocytes, lymphocytes, and plasma cells were mainly found in the superficial and deep layers of the dermis, as well as around the blood vessels and sweat glands in the subcutaneous fat. Cellulose-like degeneration is seen in some blood vessel walls. Tissue acid-fast staining: positive, tissue mNGS detection: *Mycobacterium leprae*. Clinical diagnosis: 1. Borderline leprosy, 2. Subacute cutaneous lupus erythematosus. Treat with methylprednisolone 32 mg qd po + aluminum magnesium suspension 15 mL tid po + calcium carbonate D3 tablets 0.6 g qd po + rifampicin 450 mg qd po + dapsone 100 mg qd. After 10 days of treatment, the patient improved and was discharged from the hospital.**

***Conclusions: Mycobacterium leprae* infection occurs during SLE treatment and is often difficult to distinguish from skin symptoms caused by SLE. In the clinical treatment of infectious diseases, the effect of conventional antibacterial drugs is not good. The auxiliary examination indicates severe infection and the routine culture is negative. The possibility of special pathogen infection should be considered in combination with the medical history. With the popularity of new detection methods such as mNGS, the importance of traditional smear detection methods cannot be ignored.**

(Clin. Lab. 2024;70:xx-xx. DOI: 10.7754/Clin.Lab.2024.240149)

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Case Report accepted February 2, 2024

KEYWORDS

Mycobacterium leprae, systemic lupus erythematosus, mNGS

CASE PRESENTATION

Case

The patient, a 42-year-old female, came to our hospital for treatment in December 2023 due to extensive patchy erythema on her back and face, obvious itching, and multiple subcutaneous masses on her hands, some of which were accompanied by tenderness, wave sensa-

tion, and other symptoms. The patient developed symmetrical thumb sized erythema on the cheek 2 years ago without any obvious cause and was not taken seriously. Subsequently, the erythema on the face gradually expanded, causing itching and tension on the face. The patient went to another hospital for treatment and underwent facial skin biopsy. The diagnosis was subacute cutaneous lupus erythematosus, and oral medication such as methylprednisolone tablets, thalidomide tablets, and hydroxychloroquine sulfate tablets were given. Although the above symptoms have improved, they have not been cured. The patient's mother has a history of leprosy and close contact with the patient. The patient tested positive for syphilis antibodies 2 years ago and did not receive formal treatment. There is no other history of chronic illness. Specialized situation: The patient has extensive patchy erythema on the back (Figure A) and face, with unclear boundaries and high skin temperature. Multiple subcutaneous masses on both hands, with tenderness in the skin lesions, and no obvious deformation or swelling in the joints of the limbs. Auxiliary examination: Blood routine: White blood cell 11.13 x 10^9/L, RBC average hemoglobin concentration 315 g/L, monocyte percentage 11.3%, total monocyte count 1.26 x 10^9/L, total neutrophil count 7.25 x 10^9/L, whole blood high-sensitivity C-reactive protein 36.34 mg/L. Urine routine: urine specific gravity 1.034, protein+-, occult blood+, red blood cell count 98.30/μL, mucus filament 6.40/μL, RBC quantification 84.00/μL by microscopy, urine protein quantification: total protein 0.15 g/L. Blood lipids: triglycerides 2.04 mmol/L, high-density lipoprotein cholesterol 1.24 mmol/L, liver function test: total protein 58.5 g/L, albumin 37.2 g/L, lactate dehydrogenase 269.4 U/L, myocardial enzyme spectrum 4 items: creatine kinase 31.70 U/L, α-Hydroxybutyrate dehydrogenase 195.00 U/L, quantitative urine protein measurement (24-hour urine): total protein 0.14 g/24-hour urine, complete set of pathogenic tests: positive Treponema pallidum antibody. Under local anesthesia, the left hand skin lesion was excised and tissue pathological biopsy, acid-fast staining, and mNGS detection were performed. Pathological biopsy results: Dense excessive keratinization, mild epidermal hyperplasia, and intact basal layer. Massive foam like histiocytes, lymphocytes, and plasma cells are mainly seen in the superficial and deep dermis and around the blood vessels and sweat glands in the subcutaneous fat, and cellulose like degeneration is seen in some blood vessel walls. Acid-fast staining results of the organization: Acid-fast bacteria+++ (Figure C); The laboratory analyzed the microbial nucleic acid sequences in biopsy tissue using mNGS, and within 72 hours, the results showed infection with *Mycobacterium leprae*. Clinical use of methylprednisolone tablets 32 mg qd po + aluminum magnesium suspension 15 mL tid po + calcium carbonate D3 tablets 0.6 g qd po + rifampicin 450 mg qd po + dapsone 100 mg qd po for treatment. Treatment for 10 days, with a small amount of patchy erythema on the back and face, with clear boundaries. There is no obvious redness or swelling in the surrounding tissue of the hand wound, and no obvious purulent discharge was observed (Figure B). The condition improved and the patient was discharged. After discharge, the patient continued treatment at the local infectious disease prevention and control institution.

DISCUSSION

In recent years, there has been an increasing number of reports on Mycobacterium infection, but mainly focused on infections caused by Mycobacterium tuberculosis and non Mycobacterium tuberculosis, with few reports on Mycobacterium leprosy. This article reports a case of systemic lupus erythematosus complicated with *Mycobacterium leprae* infection, and the patient has a history of Treponema pallidum infection. There have been no previous reports of related cases. *Mycobacterium leprae* belongs to the class of Mycobacterium and is a typical intracellular bacterium that cannot be cultured *in vitro* in the laboratory [1]. Imaging examination and acid-fast staining have similar manifestations [2], which increases the difficulty of differential diagnosis. Therefore, it is difficult to diagnose in a timely manner in clinical practice, and may even cause misdiagnosis.

The patient in this case was diagnosed with SLE in an external hospital 2 years ago and was treated with oral methylprednisolone tablets, thalidomide tablets, hydroxychloroquine sulfate tablets, etc. After treatment, although the symptoms improved, there were occasional relapses. There are research reports that the serum of SLE patients often has abnormalities in their own immune system, leading to poor resistance to pathogens [3]; glucocorticoids and immunosuppressants need to be used during the treatment process, further reducing the patient's immune resistance [4]. In addition, the patient tested positive for syphilis antibodies 2 years ago and did not receive formal treatment. Treponema pallidum can damage bone [5], respiratory [6], digestive [7], and other systems, causing tissue and organ damage, leading to weakened immunity, and in severe cases, disability [8]. The long-term use of immunosuppressants and the damage of Treponema pallidum to tissues and organs pose great challenges to the immune defense ability of patients.

Mycobacterium leprae infection occurs during SLE treatment and is often difficult to distinguish from skin symptoms caused by SLE. In the pathology of SLE skin lesions, there may be granulomatous lesions, but when diagnosed and treated with immunosuppressive therapy, SLE presents with skin granulomatous lesions, especially accompanied by ulceration [9]; After strengthening immunosuppressive therapy, if the lesion does not improve, the possibility of special pathogen infection should be considered. In addition, laboratory examination results showed that the patient had anemia and hypoalbuminemia, and blood routine WBC count, neutrophil count, and whole blood high-sensitivity C-reactive

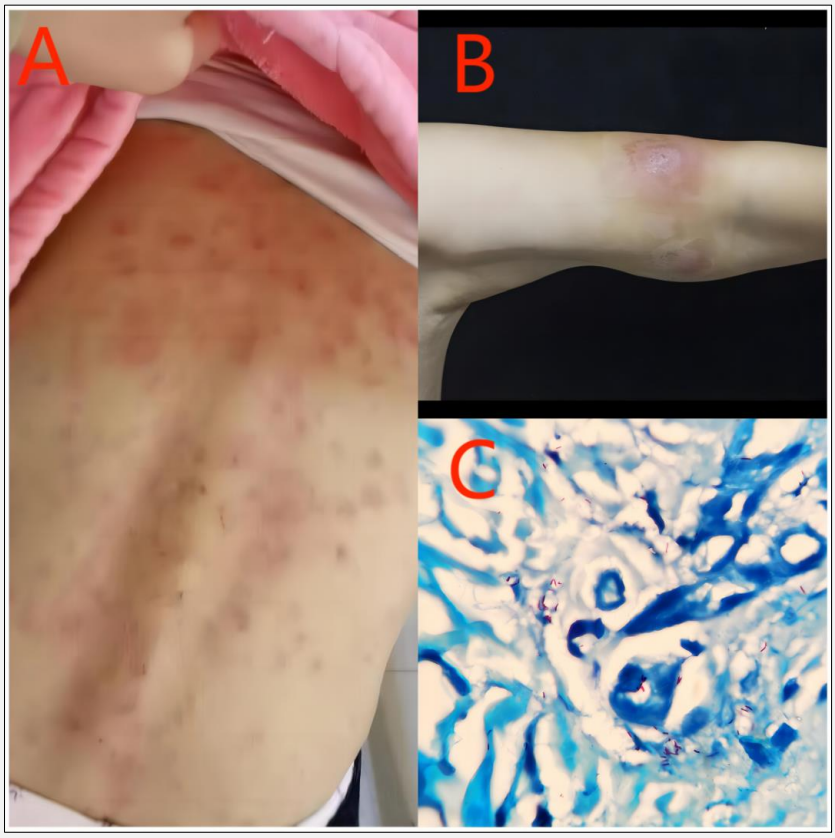

Figure. Clinical and bacteriological images:
Figure A: Widespread patchy erythema on the patient's back.
Figure B: After treatment of hand lump.
Figure C: Acid-fast staining of pathological tissues x 1,000.

protein were significantly increased, indicating severe infection. After clinical treatment with antibacterial, antiviral, and antifungal agents, the effect was not satisfactory. Considering the patient's mother's history of leprosy, a preliminary clinical diagnosis of SLE combined with *Mycobacterium leprae* infection was made. To distinguish between infectious diseases and skin lesions caused by SLE, skin biopsy was performed. The histopathological results showed excessive dense keratinization, mild epidermal hyperplasia, and intact basal layer. Massive foam like histiocytes, lymphocytes, and plasma cells are mainly seen around the vessels and sweat glands in the superficial and deep dermis and subcutaneous fat, and cellulose like degeneration is seen on some vessel walls. In addition, they were positive for acid-fast bacteria in tissues: +++. The laboratory analyzed the microbial nucleic acid sequences in biopsy tissue using mNGS, and within 72 hours, the results showed infection with *Mycobacterium leprae*. Therefore, the patient was diagnosed with systemic lupus erythematosus combined with *Mycobacterium leprae* infection. She received treatment with methylprednisolone tablets 32 mg qd po + aluminum magnesium suspension 15 mL tid po + calcium carbonate D3 tablets 0.6 g qd po + rifampicin 450 mg qd po + dapsone 100 mg qd po. After 10 days of treatment, the original symptoms significantly improved, and the patient continued treatment at the local infectious disease prevention and control institution after discharge.

In summary, this article reports a case of systemic lupus erythematosus complicated with *Mycobacterium leprae* infection. The laboratory confirmed this case through a combination of traditional smear detection methods and a novel mNGS detection method. We believe that in the clinical treatment of infectious diseases, the effect of conventional antimicrobial treatment is not good. The auxiliary examination indicates that there is serious infection and the routine culture is negative. We should consider the possibility of special pathogen infection in combination with the history of the disease, so as to

start the combined treatment after early diagnosis.

Ethics Approval and Consent to Participate:
Ethical review and approval was not required for this study. The patient provided written informed consent to participate in this study.

Consent for Publication:
The patient provided written informed consent for study publication.

Availability of Data and Materials:
The original data and materials presented in the study are included in the article. Further inquiries can be directed to the corresponding author.

Declaration of Interest:
The authors declare no competing interests.

Source of Funds:
This study was supported by the Chongqing Science and Health Joint Medical Research Project Fund (2022 QNXM034).

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