A Rare Case of Digital Ulceration and Gangrene as an Initial Presentation of Systemic Lupus Erythematosus in a Child

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Case Report

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Abstract

Systemic lupus erythematosus (SLE) is an intricate autoimmune disorder that can manifest a plethora of symptoms. Tissue-binding autoantibodies and intracrine immune complexes orchestrate the initial harm to organs and cellular structures. Amid its expansive array of manifestations, dermatological indications, notably digital gangrene and ulcers, are rare occurrences in the context of systemic lupus erythematosus and typically emerge in the advanced stages of the ailment. In this discussion, we present an exceptional case of early-onset digital gangrene and ulcers in a youthful patient grappling with systemic lupus erythematosus. This is a case study of a 7-year-old male who sought medical attention with urticarial rashes over his entire body and face, skin desquamation, and sporadic fever episodes. The preliminary assessment encountered challenges in distinguishing this presentation from acute urticaria. However, subsequent in-depth diagnostic scrutiny and serological analysis substantiated the patient's affliction with SLE. Digital gangrene, ulcers, and vasculitis became evident at the distal portions of the fingers. The diagnosis was conclusively established through clinical and serological methods. The patient exhibited positive results for antinuclear antibodies (ANA), anti-ribonuclear protein (Anti-RNP) antibodies, anti-Smith (Anti-Sm) antibodies, and anti-Sjögren's syndrome-related antigen A (Anti-SS-A) antibodies. This case underscores the pivotal importance of acknowledgment of the rare and severe manifestations of SLE in the realm of medical practice.

Introduction

Systemic Lupus Erythematosus (SLE) denotes an autoimmune malady that impinges upon a spectrum of bodily systems, which includes the integumentary, musculoskeletal, renal, cardiovascular, pulmonary, neurological, hematological, and other organ systems [1]. This condition happens when the immune system attacks healthy somatic tissues by mistake, causing a chain reaction of inflammatory responses and a wide range of clinical signs [2]. SLE is characterized by alternating phases of exacerbation and remission, and its impact on an individual's constitution is markedly heterogeneous. Beyond conventional indicators such as fatigue, cutaneous eruptions, and arthralgia, SLE may occasionally present with atypical or less familiar clinical features. Of note, digital ulcers, characterized by intractable pain and protracted healing periods, can manifest as an infrequent initial symptom of SLE [3]. Given that lupus has phenotypic and genotypic heterogeneity, diagnosing and treating it is not an easy task [4]. The etiology of digital ulcers is posited to emanate from compromised blood perfusion to the digits, often stemming from vascular inflammation, endothelial injury, or concomitant Raynaud's phenomenon, a phenomenon with established links to SLE [5]. In the case under consideration, we are presented with a clinical scenario involving a 7-year-old male child who initially manifested with digital ulcers. Positive titers of ANA, anti-RNP, anti-Sm, and anti-SS-A antibodies accompanied this presentation.

Case presentation

The case pertains to a 7-year-old male child of Dravidian descent who presents with a three-week history of diffuse rash spanning his dorsal trunk (Figure 1-A) and facial regions, accompanied by skin desquamation on the palms. Additionally, the patient exhibits digital pain, ulceration on the distal extremities (Figure 1-B), and blackish discoloration and gangrenous features of the left third toe (Figure 1-C) and right fourth finger (Figure 1-D). Concurrently, the child experienced recurring fever episodes. Physical examination revealed frontal baldness (Figure 1-E) and a bluish discoloration to the tongue (Figure 1-F), while all vital signs remained within normal parameters. Notably, there is no reported photosensitivity. Peripheral pulses were palpable, and the Sexual Maturity Rating (SMR) aligns with the patient's age with a normal genital examination. The remaining aspects of the physical evaluation revealed no anomalies.

Figure 1 here.

Laboratory findings indicate a hemoglobin level of 13.4 g/dl (Normal Value [NV]: 11.5–15.5), a total white blood cell count of 15,300 cells/mm3 (NV: 5000–10000), a platelet count of 340,000 cells/mm3 (NV: 100000–400000), and a C-Reactive Protein (CRP) level of 5.7 mg/dl (NV: 0–5 mg/l). Positive results emerge from immunological assessments, encompassing anti-nuclear antibodies, anti-Sm antibodies, anti-SS-A antibodies, and anti-RNP antibodies. Conversely, anti-neutrophilic cytoplasmic antibodies (ANCA), anti-Sjögren's syndrome type B (Anti-SSB), and anti-mitochondrial M2 antibody (Anti-M2) antibodies exhibit negative outcomes. Detailed ANA profile results are presented in Table 1. Doppler ultrasound of both the upper and lower limbs appeared normal.

Table 1 here.

In order to differentiate the vascular etiology underpinning the cutaneous manifestations, a battery of tests was conducted. The tests done were prothrombin time (PT), anti-cardiolipin antibodies, anti-beta2 glycoprotein antibodies, cryoglobulin analysis, and lupus anticoagulant assessment, all of which yielded negative results. The patient's lipid profile was in the normal range. Furthermore, serological investigations for hepatitis B, hepatitis C, and the human immunodeficiency virus (HIV) yielded negative results.

The history that suggested infection, trauma, the Raynaud phenomenon, diabetes mellitus, and exposure to chemicals was absent. There was no family history of any thromboembolic events.

Following the American College of Rheumatology criteria (ACRC), the child was diagnosed with SLE with digital ulceration and gangrene.
The patient was prescribed prednisone (2 mg/kg/day) for three months. Gradually, the prednisone dose was reduced to 5 mg/day for the next three months. The digital ulcers and cutaneous manifestations were successfully treated (Figure 2) with steroid administration, silver sulfadiazine, and hydroxyzine.

Figure 2 here.

The child was followed every 3 months for a year, and gradual remission was observed with no recurrence of any cutaneous or thromboembolic events.

**Tables:**

<table>
<thead>
<tr>
<th>Antigen</th>
<th>Intensity</th>
<th>Class</th>
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<tbody>
<tr>
<td>Ribonucleoprotein (RNP)</td>
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<td>++</td>
</tr>
<tr>
<td>Smith(Sm)</td>
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<td>++</td>
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<td>immunoreactive fragment-70(sci)</td>
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</tr>
<tr>
<td>AMA M2</td>
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</table>

**Discussion**

As common as they are in connective tissue disorders, the development of digital ulcers and gangrene in SLE is exceedingly rare, even rarer when they present as a primary manifestation. Dubois and Arteberry [6] and Alarcon-Segovia and Osmundson [7] were the first to report SLE with distal gangrene. In a United Kingdom (UK) study involving patients with SLE, 12% of the 179 patients with skin involvement reported having cutaneous vasculitis [8]. This patient has no history of SLE or any manifestation of connective tissue or an inflammatory disorder. Critical peripheral ischemia (CPI) is defined as pain, pallor, ulceration, and necrosis of the digits. In a UK study of 485 patients with SLE, critical peripheral ischemia was seen in 7 out of the 485 patients (1.4%) [9].

The major risk factors for the development of digital gangrene in SLE are vasculitis, including small and large vessels, atherosclerosis, and microvascular thromboembolism, with vasculitis of the cutaneous type occurring frequently [9]. In juvenile SLE, there are two different categories of skin manifestations: one that is specific to SLE [facial malar rash, discoid lupus erythematosus (DLE)], and one that is not specific to lupus type (cutaneous vasculitis). It frequently involves the upper and lower limbs, as we saw in our patient. Our patient had elevated CRP at the initial presentation but had no history of Raynaud's phenomenon. SLE can be associated with antiphospholipid antibodies (APLA) given the role the pathophysiology of antiphospholipid syndrome (APS) plays in the development of digital gangrene. Antiphospholipid antibodies in APS syndrome contribute to microthrombus formation and subsequent digital gangrene. But this patient tested negative for APLA and lupus anticoagulant (LAC) antibodies.

The cutaneous vasculitis can lead to petechiae, purpura, ulceration, necrosis, and gangrene, of which necrosis and gangrene result from decreased tissue perfusion. This is a small-vessel vasculitis mediated via immune complexes [10]. These immune complexes lodged on the basement membranes of the skin activate the complement system and cause inflammation. The cutaneous vasculitis can be a sole manifestation of SLE vasculitis or it can be part of the large multiorgan involvement. This patient also presented with symptoms such as fever and diffuse erythematous wheals on the face and body, especially on the back, prompting us to initially think it was urticaria. With digital ulceration and gangrene, urticaria is a rare feature of SLE, especially as a primary presentation. Urticaria was resolved after 24 hours of treatment with hydroxyzine.
It is worth noting that SLE-related digital gangrene is more commonly seen in the adult age group. The occurrence of digital gangrene in pediatric age groups is rare, as in our case. A study involving 50 adult female SLE patients found that the individuals who developed cutaneous vasculitis were younger when compared to patients who did not develop vasculitis [11]. SLE vasculitis and related digital gangrene can be treated with a variety of drugs, and drug combinations include corticosteroids, immunosuppressant drugs such as mycophenolate mofetil [12], and monoclonal antibodies such as rituximab. According to a study done by Liu et al. on 2684 patients with SLE showed Raynaud's phenomenon (RP), elevated serum C-reactive protein (CRP), and lengthy disease duration (> or equal to 4 years) all increased the risk of developing digital gangrene and early treatment with steroids (prednisone > or equal to 1mg/kg/d started within 3 weeks) significantly reduced the risks of amputation [13].

This 7-year-old patient was prescribed prednisone (2 mg/kg/day) for the first three months. The prednisone dose was reduced gradually to 5 mg/day for the next three months, and the patient went into remission at the first follow-up with no recurrence of digital ulcers, urticarial rashes, or new manifestations.

**Conclusion**

In conclusion, the presented case underscores the importance of recognizing atypical initial manifestations of systemic lupus erythematosus (SLE) in pediatric patients. The occurrence of digital ulceration and gangrene, while rare, highlights the diverse clinical spectrum of SLE and the need for early diagnosis and multidisciplinary management to prevent complications and ensure optimal outcomes in affected children.

**Statements and Declaration**

**Consent**: Written informed consent for publication of the case details and images was obtained from the patient's parental guardian.

**Conflicts of Interest**: The authors declare no conflicts of interest related to this work.

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**References**


**Figures**
Figure 1

A) Patients showing diffuse rash on the dorsal trunk; B) Patient showing ulceration in the left great toe; C) Digital gangrene in the left 3rd toe; D) Digital gangrene in the right 4th finger; E) Frontal baldness in the patient; F) Cyanosis of tongue.

Figure 2

Improvement of skin lesions and cyanosis of the tongue after corticosteroid administration. Improvement of digital gangrene in the right 4th digit (B). Improvement of ulceration of left great toe (C).

The child was followed every 3 months for a year, and gradual remission was observed with no recurrence of any cutaneous or thromboembolic events.