SKIN

BRIEF ARTICLE

COVID-19 Vaccination as a Precipitating Factor in Cutaneous Lupus Erythematosus with Lupus Nephritis: A Clinical Case Report

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ABSTRACT

The advent of the COVID-19 vaccine has improved global mortality, but recent literature suggests that COVID-19 vaccinations may induce or exacerbate autoimmune rheumatic diseases. Here, we present a 64-year-old woman with a history of Evans syndrome, pernicious anemia, and positive antinuclear antibody (ANA) who developed systemic lupus erythematosus (LE) presenting with cutaneous involvement following her first Moderna COVID-19 vaccine dose. She presented with a pruritic rash, malaise, and paresthesia ten days after vaccination. Clinical examination revealed erythematous, scaly, annular plaques on her face, ears, upper extremities, and chest, hand edema, and a palatal erosion. Laboratory findings included an elevated ANA titer (1:640), positive anti-RNP and anti-Ro antibodies, hematuria and proteinuria. This contrasted with previous laboratory results from 2019, where her ANA titer was higher at 1:2560, with anti-RNP elevated at 358 and anti-Ro at 252. Skin biopsy confirmed cutaneous LE and renal biopsy confirmed membranous lupus nephritis. Treatment included hydroxychloroquine, mycophenolate mofetil, prednisone, clobetasol ointment, and triamcinolone ointment, with subsequent improvement. Although rare, COVID-19 vaccination should be considered as a potential trigger for LE, particularly in patients with predisposition to autoimmune disease. Vaccination against COVID-19 should still be encouraged among patients with autoimmune rheumatic diseases, preferably during remission and before the initiation of disease-modifying antirheumatic drugs.

INTRODUCTION

Global administration of COVID-19 vaccines has marked a significant milestone in combatting the spread and impact of the SARS-CoV-2 virus.[1] While these vaccines have demonstrated safety and efficacy, several adverse reactions have been reported in the medical literature. One emerging area of concern is the association between COVID-19 vaccinations and the emergence and exacerbation of autoimmune diseases.[2,3,4,5] This case report describes a patient with new-onset systemic lupus erythematosus (LE) presenting with cutaneous LE after COVID-19 vaccination.

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CASE REPORT

A 64-year-old female with a history of Evans Syndrome, pernicious anemia, and positive antinuclear antibody (ANA) presented for a dermatology telehealth consultation with new-onset erythematous and pruritic eruption.

The patient initially experienced malaise, fatigue, pruritus and paresthesias in her palms, followed by the development of a bilateral palmar rash that subsequently spread to her left arm, bilateral cheeks, and both ears. She denied any history of a similar rash. She endorsed arthralgias and malaise; review of systems was otherwise negative. She had received the first dose of the Moderna COVID-19 vaccine 10 days prior to the onset of the rash.

Physical examination revealed indurated, scaling, erythematous plaques with central hypopigmentation and peripheral deep erythema diffusely on the face, ears, upper extremities, chest and upper back (**Figure 1**). She was started on an oral steroid taper, superpotent topical steroids and strict photoprotection.

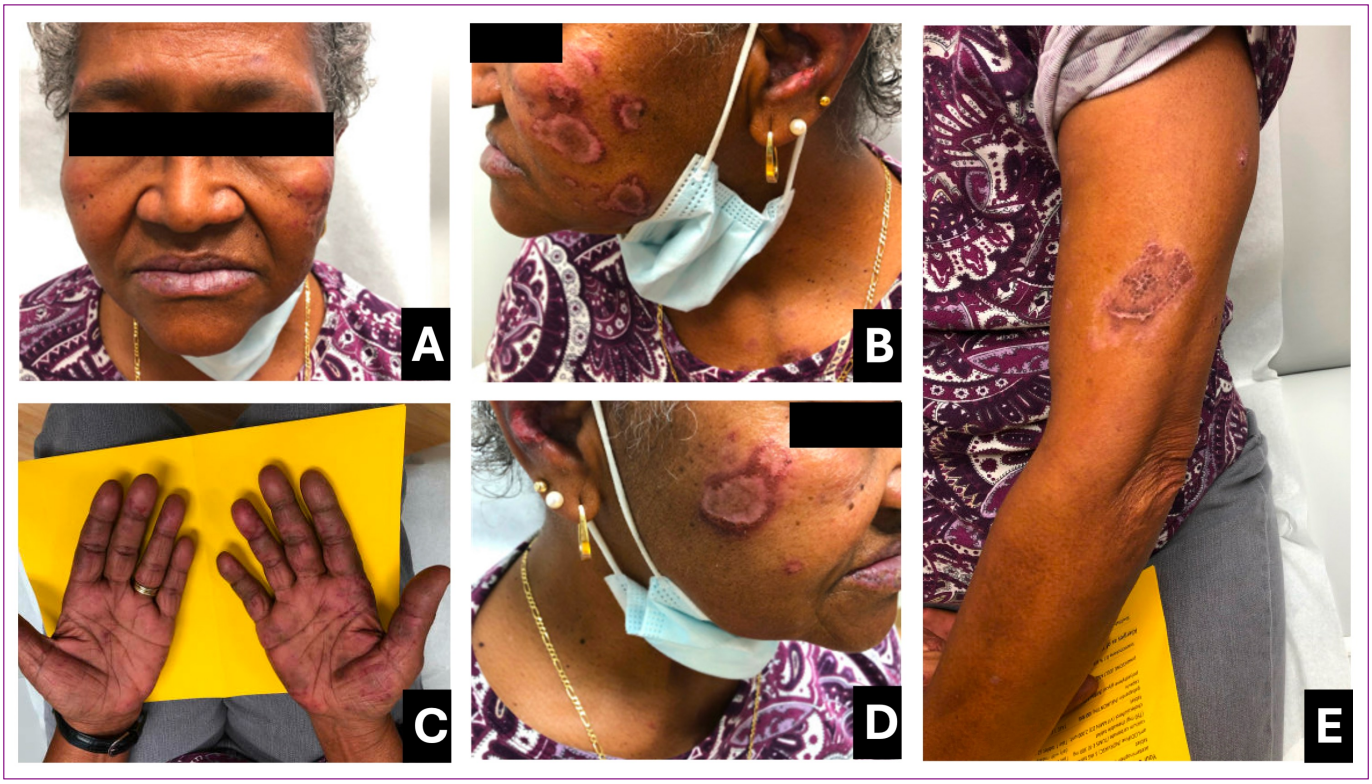

Figure 1. Erythematous and dyspigmented annular plaques with scale and erosion on the bilateral cheeks (A,B,D), palms (C), left upper arm (E) and conchal bowl of the left and right ear (B,D).

Skin biopsy demonstrated focal interface changes characterized by lymphocytic exocytosis and dyskeratotic cells with associated melanin pigment incontinence and a superficial to mid-dermal perivascular lymphocytic infiltrate (**Figure 2**). Comprehensive laboratory evaluation revealed an elevated ANA titer of 1:640 and positive anti-RNP and anti-Ro antibodies. These differed from her previous results in

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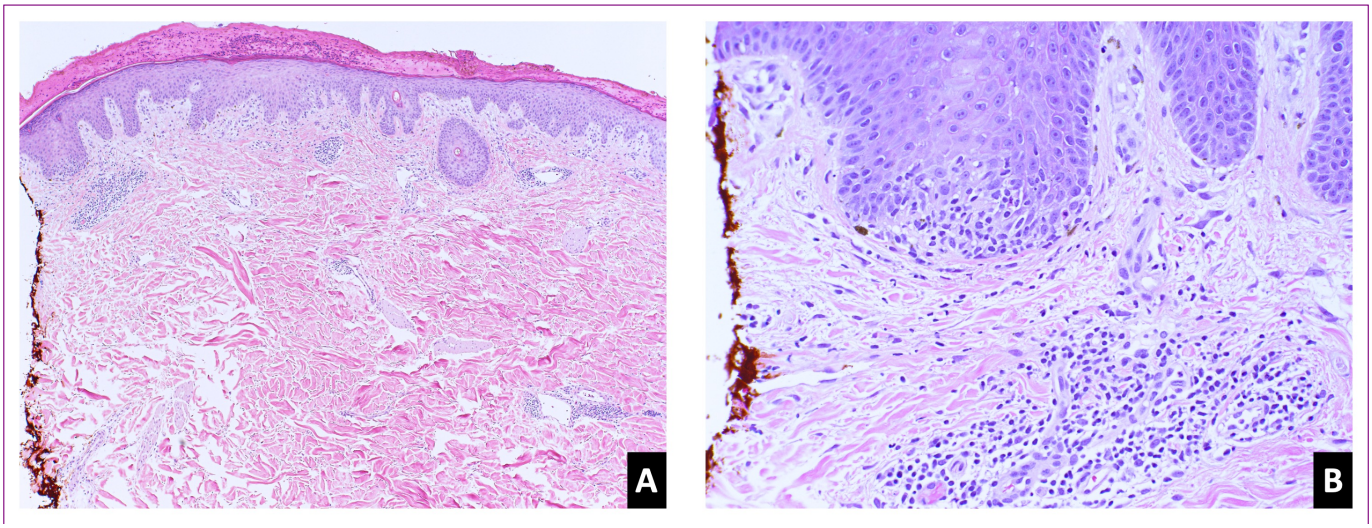

Figure 2. Cutaneous Lupus Erythematosus (A) Hematoxylin and Eosin (H&E) at 4x. Low-power image of skin immediately adjacent to a region of ulceration. There is an inflammatory serum crust and epidermal acanthosis. On the left-hand side of the image, subtle interface changes are seen as well as a superficial to mid-dermal perivascular lymphocytic infiltrate. (B) H&E 20x: Higher power image of the interface dermatitis demonstrates subtle basal vacuolization, lymphocytic exocytosis, and associated basally-oriented dyskeratotic keratinocytes. In the dermis, there is melanin pigment incontinence and a perivascular lymphocytic infiltrate.

2019, in which her ANA titer was higher at 1:2560, with anti-RNP at 358 and anti-Ro at 252. Although creatinine was normal, she had a urine protein to creatinine ratio of 1.1 mg/mg and urinalysis showed 2+ protein and 3+ blood.

Subsequently, the patient underwent a renal biopsy, which demonstrated class V lupus nephritis. She was started on hydroxychloroquine and mycophenolate mofetil with improvement of cutaneous symptoms and laboratory findings at follow up.

DISCUSSION

This case provides support for an association between COVID-19 vaccination and the development of cutaneous and systemic LE, particularly in patients with predisposition to autoimmune disease. Our patient's clinical presentation, with the emergence of new-onset cutaneous LE, proteinuria and positive serologies within ten days post-Moderna vaccination, aligns temporally with existing literature documenting adverse autoimmune reactions following COVID-19 vaccination.[3,4,5,6]

Type 1 interferons play a role in the pathogenesis of autoimmune rheumatic diseases, including LE, through the elevation of nuclear antigen-containing immune complexes. This elevation can increase production of type 1 interferons, disrupting B- and T-cells' tolerance mechanisms. This leads to the promotion of ANA, a hallmark in autoimmune diseases.[7] Further, patients with elevated ANA may have high interferon signatures in the absence of rheumatologic disease.[7] Both mRNA and adenoviral vaccines against SARS-COV-2 work by stimulating the immune system through the production of spike proteins and type 1 interferons;[8] this mechanism of enhancing type 1 interferon signaling has been

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theorized to contribute to vaccine-related autoimmune adverse events.[2]

Despite a growing body of literature associating autoimmune disease emergence and exacerbation with COVID-19 vaccination, on the whole, these reactions are quite rare, and billions of doses have been safely administered.[9] Patients with established autoimmune diseases have worse outcomes with COVID-19 infection, and the benefits of vaccination generally outweigh the risks.[6] COVID-19 vaccination is recommended for at-risk patients including those with pre-existing autoimmune conditions.[6] For patients with suspected or confirmed underlying rheumatological conditions, when possible, vaccines should be administered during periods of disease remission or prior to starting disease-modifying antirheumatic drugs.[10]

The positive response to immunosuppressive therapy observed in this case underscores the significance of prompt intervention and accurate diagnosis in mitigating the impact of vaccine-associated autoimmune reactions. The successful management of the patient's cutaneous LE and identification of lupus nephritis highlights the importance of a multidisciplinary approach to management. This case emphasizes the need for careful monitoring and a patient-centered approach to vaccination in patients with autoimmune conditions.

Conflict of Interest Disclosures: None

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