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Case Report

COVID-19 vaccine induced subacute cutaneous lupus erythematosus

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ABSTRACT

It has been documented that COVID-19 vaccinations have been associated with the exacerbation of underlying autoimmune conditions as well as the new onset development of these disorders. In the following case, we present a 60-year-old Caucasian female with no prior documented autoimmune history who developed a blistering rash four days after receiving Moderna's messenger ribonucleic acid vaccine. Initial laboratory and histopathology findings revealed elevated inflammatory markers and interface dermatitis. Over the course of several weeks, her rash progressed to bleeding and desquamation that covered approximately 80% body surface area. Further workup indicated positive ANA antibody and SS-A/Ro antibody leading to the diagnosis of subacute cutaneous lupus erythematosus (SCLE). She was treated with systems and topical steroids, as well as hydroxychloroquine. Six months post-diagnosis revealed marked improvement of her skin findings. Given the onset of her symptoms in relation to vaccine administration, it is suspected that Moderna's vaccine may be associated with autoimmune disease onset.

Keywords: COVID-19, Lupus erythematosus, Systemic, COVID-19 vaccines, Vaccines, Autoimmune disease

INTRODUCTION

Subacute cutaneous lupus erythematosus (SCLE) is a phenotypic variant of lupus erythematosus. The initial presentation of SCLE includes erythematous macules and/or papules that can evolve into psoriasiform or annular plaques with overlying scale. In some cases of SCLE, vesiculobullous changes can occur along the edges of these plaques leaving a crusted appearance mimicking Steven-Johnson Syndrome/toxic epidermal necrolysis.[1] Half of patients will have a positive antinuclear antibody (ANA) and one-third will have anti-Sjögren's-syndrome-related antigen A (Ro) (Anti-SSA) autoantibodies. Other laboratory findings can include elevated inflammatory markers and cytopenias.[1] On histopathology, SCLE usually presents as an interface dermatitis with areas of vacuolar alteration of basal keratinocytes. Dermal edema and mucin deposition are also found. We present a case of SCLE after vaccinations with Moderna's messenger ribonucleic acid (mRNA)-1273.

CASE REPORT

A 60-year-old Caucasian female with past medical history of end stage renal disease, hypothyroidism, and Raynaud's phenomenon, and no known history of underlying cutaneous autoimmune disease presented to the emergency department (ED) with a six-week history of progressive rash and recent onset of fever and chills. The rash initially presented with blistering four days after receiving the second dose of Moderna's COVID-19 initial vaccination formulation. She failed outpatient treatment with two six-day courses of methylprednisolone and antibiotics including ciprofloxacin and amoxicillin.

On physical examination there were areas of crusting consistent with prior blistering involving over 30 % body surface area (BSA) including her upper back, flanks, chest, abdomen, arms, hips, face, and lower lip; however, no active blistering was present. Labs were notable for erythrocyte sedimentation rate (ESR) 106 mm/hr (0-20 mm/hr), C-reactive protein 2.9 mg/dl (<1.00 mg/dl), ferritin 2,348 ng/ml (10-29 ng/ml) procalcitonin 0.73 ng/ml (<0.10 ng/ml), absolute lymphocyte count 0.47 10^3/µl (0.8-5.3 10^3/µl). The patient was transferred to a burn center for concern of Stevens-Johnson syndrome.

Punch biopsies of the right upper chest and right lateral upper arm were obtained. Biopsy results revealed a vacuolar interface dermatitis with a slight increase in dermal mucin deposition narrowing the differential to include the following: a medication-related reaction mimicking collagen vascular disorder; post vaccination cutaneous reaction; collagen vascular disorders such as lupus erythematosus variants. She was discharged home on triamcinolone 0.1 % ointment to be applied twice daily to her body lesions and triamcinolone 0.025% for her facial lesions.

The patient's lesions did not improve with topical steroids, and she returned to the ED two weeks later with continued rash and new onset generalized body aches (Figure 1). ESR was 43 mm/hr. She was prescribed a five-day course of prednisone 40 mg and advised to continue with topical steroid regimen.

The patient's skin findings did not improve, and she again presented to the ED two weeks later with fever, decreased appetite, and further worsening of her rash with bleeding and desquamation along with drainage and swelling of the left upper extremity. The rash was painful to the touch and now involved approximately 80% of the body including the chest, abdomen, bilateral upper and lower extremities, and back (Figures 2 and 3). Labs were again remarkable for elevated inflammatory markers along with a lactic acid of 3.6 mmol/l (<1.90 mmol/l). She was admitted for sepsis secondary to progressive skin rash and started on intravenous fluids, vancomycin, meropenem, and methylprednisolone 60 mg every eight hours. Autoimmune workup was remarkable for positive ANA antibody and SS-A/Ro antibody IgG >8 U/ml (<1.0 U/ml). Pertinent negative autoantibody and infectious testing included double-stranded DNA, AA-B/LA antibody, HIV, RPR. Blood cultures grew *Staphylococcus epidermidis*. She was again transferred to an academic center for further workup and management.

Biopsies were again obtained with results consistent with earlier diagnosis of interface dermatitis. Additional negative autoantibody testing included cardiolipin, Staclot-LA, and B26P. History revealed symptoms of dry eyes and mouth suggestive of diagnosis of SCLE and Sjögren's. She was started on IV methylprednisolone 60 mg IV every 12 hours then discharged with oral prednisone taper, hydroxychloroquine 200 mg every Monday/Wednesday/Friday after hemodialysis, triamcinolone 0.1% twice daily with occlusion, and trimethoprim/sulfamethoxazole prophylaxis. The patient was lost to follow up with dermatology. Patient did return to our facility 6 months later showing an improvement of her condition (Figure 4).

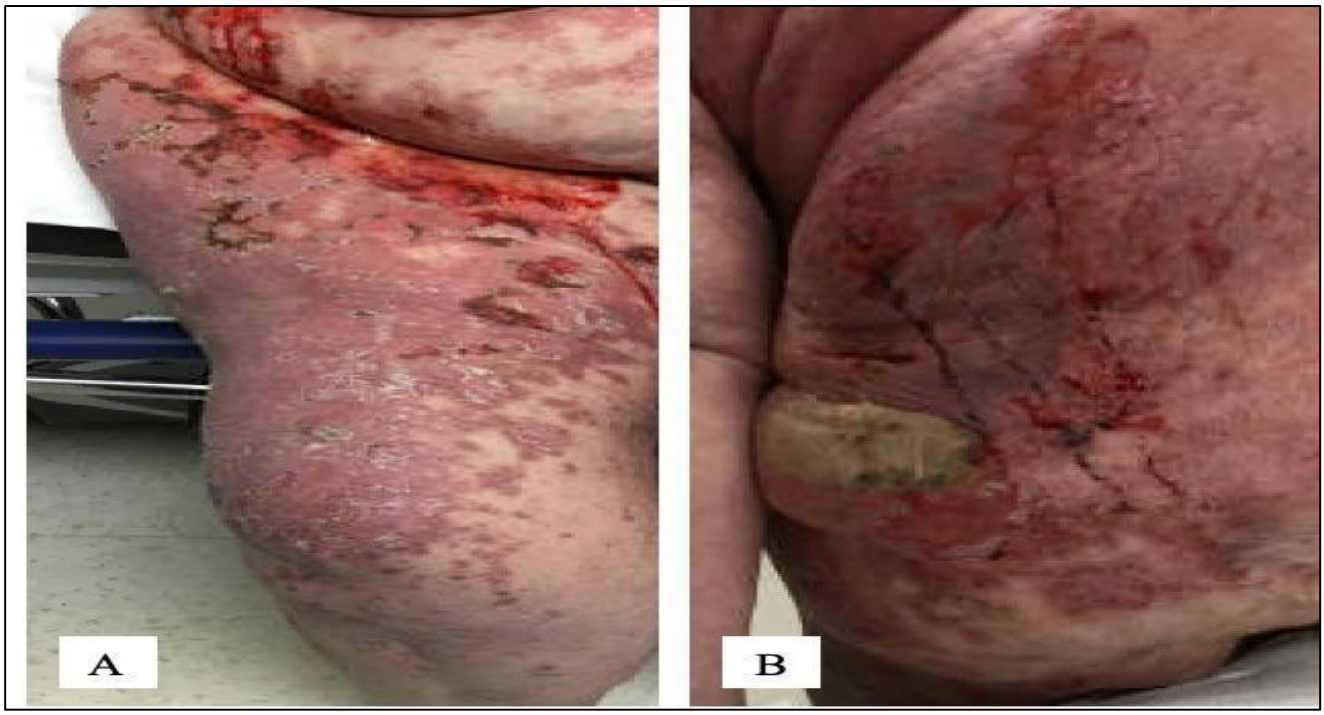

Figure 1 (A and B): Rash involving right upper extremity, left upper extremity, right lower extremity and left lower extremity.

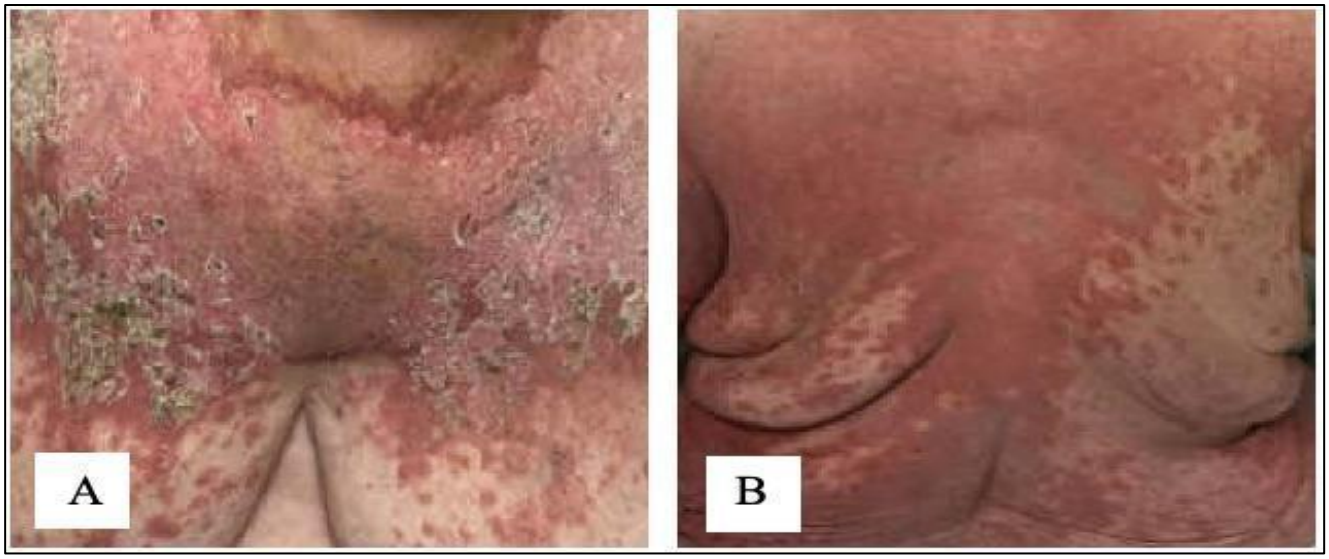

Figure 2 (A and B): Rash involving the upper chest and back.

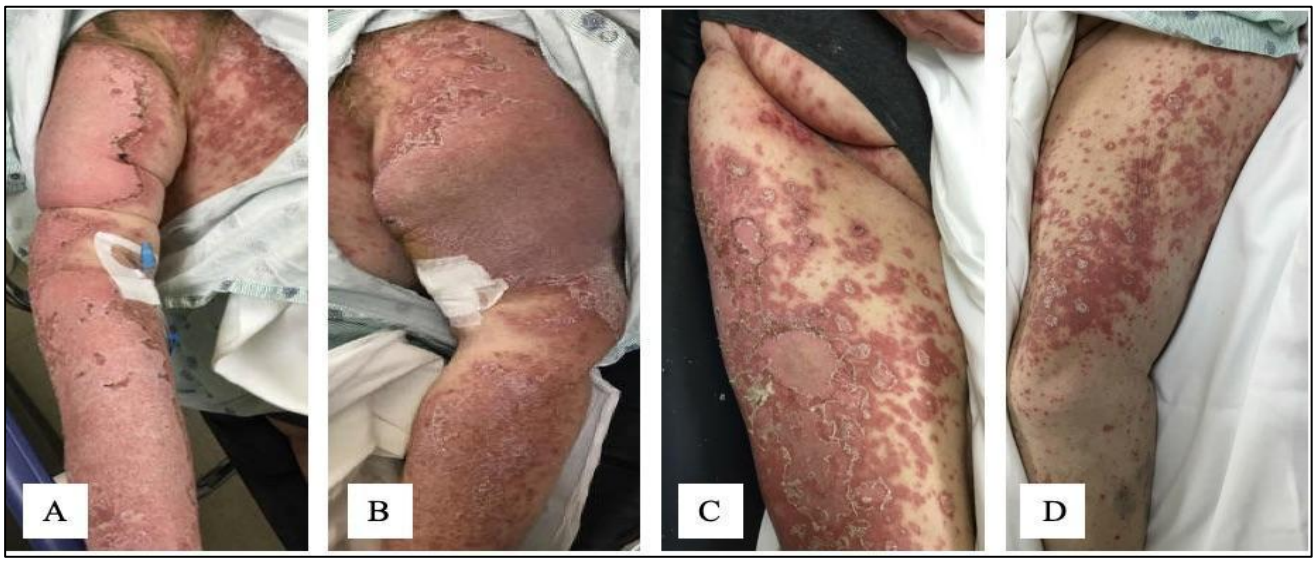

Figure 3 (A-D): Notable skin findings on the right lower quadrant and upper thigh and left hip and buttock regions.

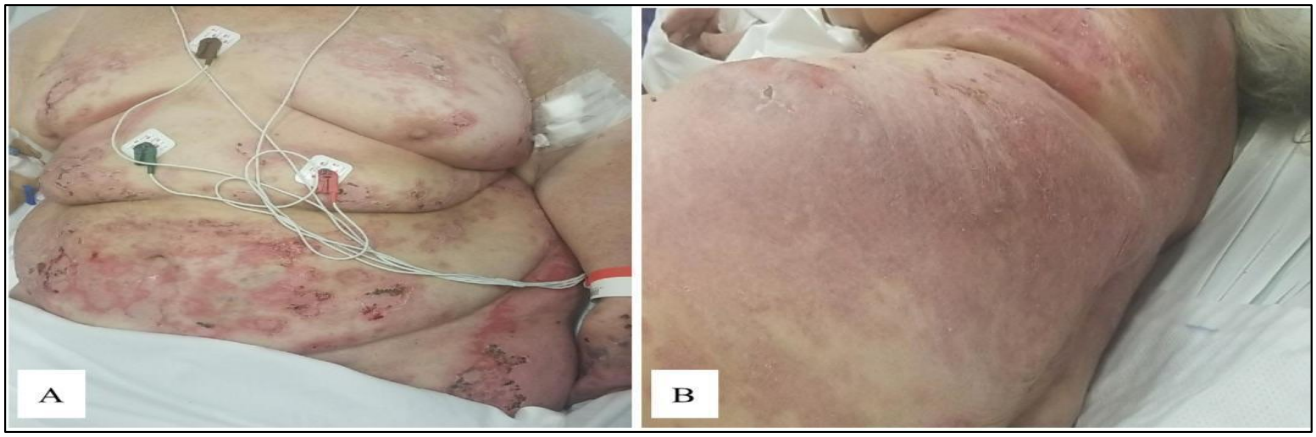

Figure 4 (A and B): Marked improvement of skin findings of the chest and abdomen and back and left hip/buttock region.

DISCUSSION

There have been numerous cutaneous reactions documented following vaccine administration since the release of the various COVID-19 vaccinations. The era that encompassed the COVID-19 pandemic leaned on pharmaceutical companies to create a vaccine to halt the spread of COVID-19 and expedite the end of the pandemic. The emergency utilization authorization (EUA) allowed Moderna and Pfizer to make their respective vaccines available to the populace. Even with safety trials, post production adverse outcomes occurred like other pharmaceuticals.

In the case presented above, our patient was diagnosed with SCLE based on physical exam, biopsy, and antibody results following her second dose of Moderna's vaccine. It was noted that this had likely been an undiagnosed condition that was exacerbated by the vaccine. She had no previous diagnosis of cutaneous lupus. However, the patient did have a documented history of hypothyroidism which is most commonly autoimmune in origin, as well as Raynaud's phenomenon, which can be primary or secondary in the setting of an underlying autoimmune condition.[2] It has been noted that a history of autoimmune conditions such as hypothyroidism can increase the risk of developing subsequent autoimmune pathologies.[3,4] It is possible that our patient had previous signs and symptoms of cutaneous lupus that went unnoticed and therefore undiagnosed which would support the idea that the vaccine served as a trigger for an exacerbation.

A systematic review performed by Avallone et al provided a collection of various cutaneous reactions that occurred following the administration of COVID-19 vaccines including, but not limited to those produced by Moderna.[5] In this report, six cases of new onset cutaneous lupus had been identified, three of which were associated with the Moderna vaccine, making this a plausible explanation for our patient's presentation. Vaccines have been questioned as potential etiologies of autoimmune diseases for decades and this is no different than with the COVID-19 vaccinations. Theories such as molecular mimicry, vaccine adjuvants, and autoantibody production have been identified as potential links between the vaccine and onset of autoimmune diseases such as vaccine-induced immune thrombotic thrombocytopenia, immune thrombocytopenic purpura, autoimmune liver diseases, systemic lupus erythematosus, to name a few.[6,7] Several case reports have identified individuals with no prior autoimmune history who were diagnosed with systemic lupus erythematosus following COVID-19 vaccination.[8-10] Despite the links associated between vaccination and disease onset, the precise mechanisms for how these reactions occur is still not fully understood and therefore we cannot assume causality.

Given our patient's history, we cannot exclude the possibility that she had undiagnosed cutaneous lupus erythematosus in which case the vaccine triggering an exacerbation is a very likely explanation for her presentation. However, the vaccine inducing the onset of her disease cannot be excluded. Regardless, cutaneous lupus flares following COVID-19 vaccination whether an undiagnosed condition is present or not, is still rare.[5]

CONCLUSION

This case aims to highlight the potential triggering and/or exacerbation of cutaneous autoimmune conditions in the setting of COVID-19 vaccinations. Awareness of this potential outcome can hopefully expedite diagnosis and treatment to prevent extensive cutaneous involvement and complications as seen in our patient. Although the above case highlights a potentially rare yet discouraging side effect of the COVID-19 vaccines, it is important to weigh this risk with the known positive benefits of vaccination, especially in patients with underlying comorbidities.

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