

Sclerotic skin disease development following COVID-19 vaccination



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INTRODUCTION

Vaccination is an essential preventative measure against the spread of certain infectious diseases. However, there may be an association between vaccination and subsequent autoimmune reactions.¹ We present 2 cases of patients with prior autoimmune skin disease progressing to new-onset sclerotic skin disease following messenger RNA (mRNA) COVID-19 vaccination. To our knowledge, this pattern has never been reported in the literature and represents potential COVID-19 vaccine adverse effects, of which clinicians should be aware.

CASE REPORT

Case 1

A 60-year-old woman with a 14-year history of discoid lupus presented 6 weeks after the first dose of the Moderna COVID-19 vaccine with severe widespread muscle pain and a new rash that she initially noticed 2 weeks after the first dose of the vaccine. The second vaccine dose was given 4 weeks after the first, and the patient did not notice any change in her rash or muscle pain temporally associated with the second dose. Treatment for her lupus prior to presentation included hydroxychloroquine 400 mg/day and clobetasol 0.05% ointment. She reported no flares of her cutaneous lupus in the 6 months prior to receiving her first vaccine dose. Physical examination at the time of presentation showed hidebound skin with shiny surfaces on the face, chest, lower portion of the legs, back,

Abbreviation used:

mRNA: messenger RNA

abdomen, and forearms (Fig 1). A biopsy from the right side of the back demonstrated dermal mucin deposition and a perivascular and perifollicular lymphoplasmacytic infiltrate (Fig 2). Laboratory testing revealed a creatine kinase level of 2757 U/L (reference range, 32-182 U/L), an aldolase level of 40.8 U/L (reference range, 3.3-10.3 U/L), and positivity for Ku, U1 small nuclear ribonucleoprotein particle, and U2 small nuclear ribonucleoprotein particle antibodies. A second biopsy from thickened skin on the left side of the chest demonstrated dermal sclerosis (Fig 3). Altogether, these findings were consistent with new-onset scleroderma-myositis overlap. Treatment with prednisone and mycophenolate mofetil led to normalization of creatine kinase, while skin thickening continued to progress.

Case 2

A 72-year-old woman presented with a new rash that began within 4 weeks of receiving the second dose of the Pfizer-BioNTech COVID-19 vaccine. She had a history of morphea limited to the abdomen diagnosed one year previously that had resolved with 0.05% betamethasone cream and 0.005% calcipotriene cream. Physical examination revealed skin thickening on the arms and legs, as well as puckering

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Fig 1. Case 1. **A**, Upper portion of the chest showing hidebound skin with a shiny surface consistent with scleroderma. **B**, Image of lower portion of the left leg demonstrating hardening and tightening of skin with superimposed scale and hyperpigmented patches. **C**, Forearm transitions from soft skin to shiny, hidebound skin.

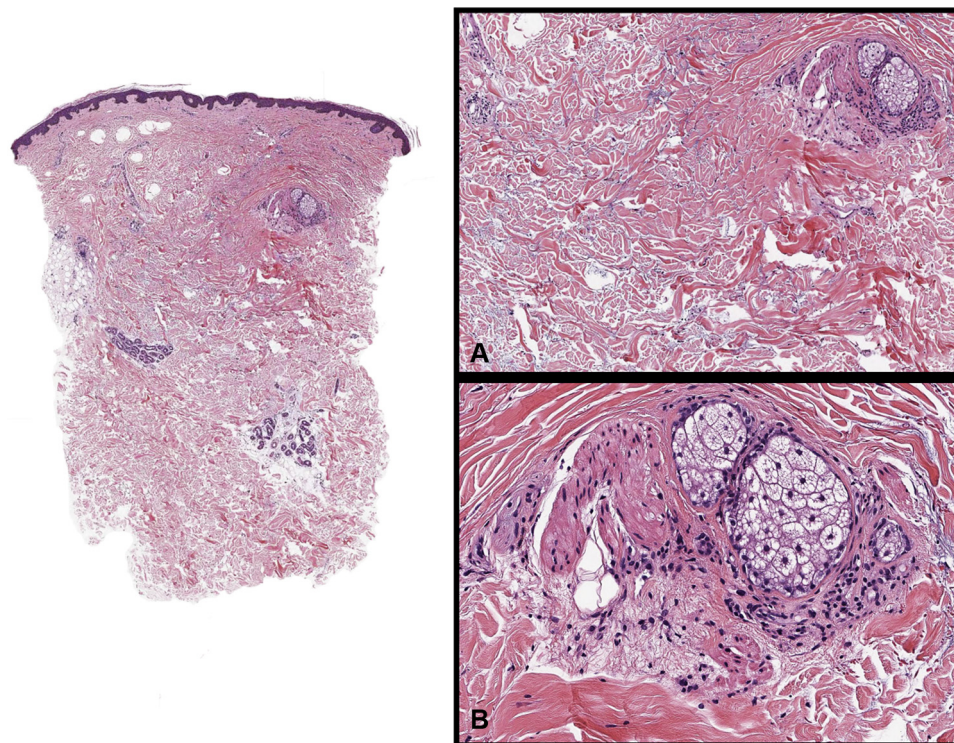


Fig 2. Biopsy taken from the back revealed marked increase in interstitial mucin throughout the specimen (**A**, Hematoxylin-eosin stain; original magnification, 70 \times). A mild superficial perivascular and perifollicular lymphoplasmacytic infiltrate was observed (**B**, Hematoxylin-eosin stain; original magnification, 200 \times).

of skin on the arms. Laboratory testing revealed an eosinophil count of 1280/mm³ (reference range, 0-700/mm³) or 13.9% eosinophils (reference range, 0%-6%). Magnetic resonance imaging of the calf demonstrated moderate diffuse skin thickening with perifascial and intramuscular edema (Fig 4). These findings were consistent with new-onset eosinophilic fasciitis. Treatment with mycophenolate

mofetil and prednisone led to normalization of the eosinophil count and skin softening.

DISCUSSION

We present 2 cases with prior rheumatic cutaneous disease who progressed to new-onset sclerotic skin disease following receipt of mRNA vaccines against COVID-19. To our knowledge, no

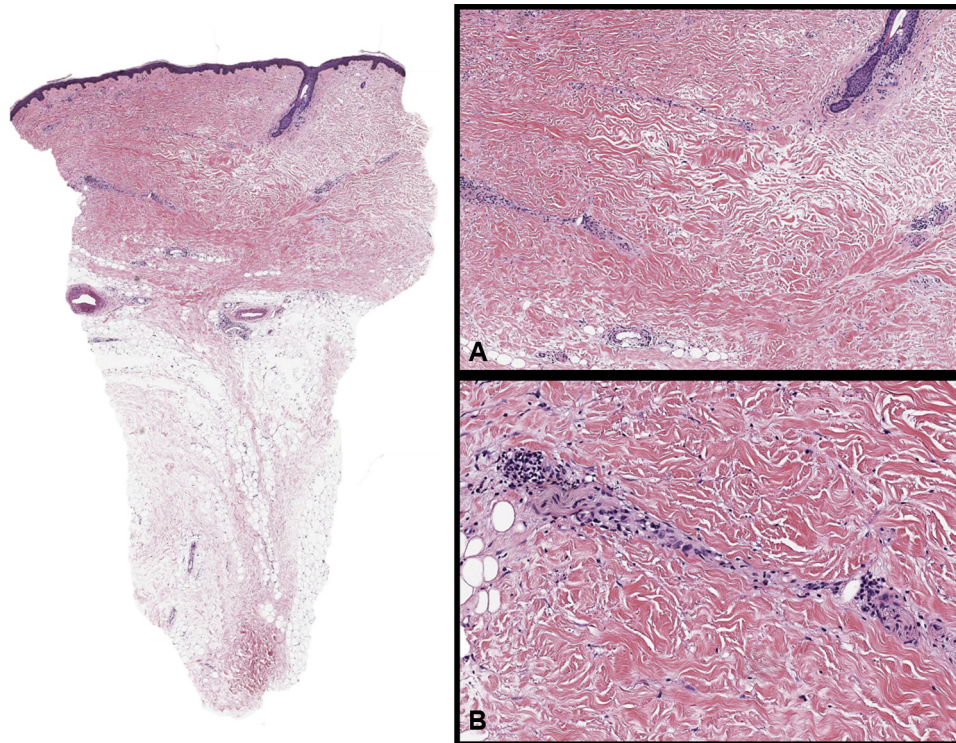


Fig 3. A full-thickness punch biopsy taken from the chest revealed marked dermal sclerosis without extension into the subcutaneous adipose tissue. Thickened collagen bundles with interstitial dermal edema (**A**, Hematoxylin-eosin stain; original magnification, 50 \times) and a mild lymphoplasmacytic infiltrate were observed within the dermis (**B**, Hematoxylin-eosin stain; original magnification, 150 \times).

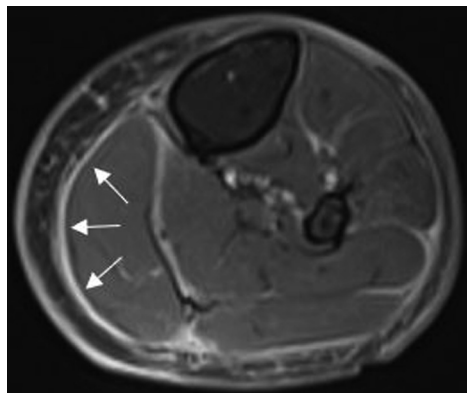


Fig 4. Case 2. Magnetic resonance imaging demonstrates moderate, diffuse skin thickening and edema of the muscles of the calf. In addition, perifascial edema tracks along the posterior muscles of the calf and, to a lesser extent, the lateral and anterior compartments (*white arrows*).

other cases of patients developing scleroderma-myositis overlap or eosinophilic fasciitis after inoculation with a COVID-19 vaccine have been reported. However, development of other skin diseases, such as new-onset blistering disorders, following COVID-19 vaccination have been reported. A previously healthy patient who received

the Pfizer-BioNTech COVID-19 vaccine and then developed pemphigus vulgaris was reported by Solimani et al.² Tomayko et al³ also described 12 patients who first developed bullous pemphigoid following mRNA COVID-19 vaccines. One patient with prior bullous pemphigoid was also shown to have worsened disease after a COVID-19 vaccine.³

Development of new-onset sclerotic skin disease following various vaccines have been reported. Sugiura et al⁴ presented a case of a patient who received the influenza vaccine and then developed unilaterally dominant eosinophilic fasciitis. A case of morphea profunda development following the diphtheria-tetanus-pertussis vaccine has also been reported.⁵ It is hypothesized that vaccines could induce new-onset autoimmune diseases by stimulating a diffuse immune response, resulting in increased production of autoantibodies.⁶ Vaccine components may also be structurally similar to autoimmune disease antigens, and thus inoculation may lead to the formation of cross-reactive antibodies, which could trigger the development of autoimmune diseases.⁶ The Pfizer-BioNTech and Moderna COVID-19 vaccines are the first use of mRNA vaccines in humans, and their potential for unintended autoimmune disease stimulation

remains to be fully elucidated.⁷ The lipid nanoparticles used in this type of vaccine induce powerful immune responses, and thus may stimulate unintended autoimmune phenomena.⁸ Given the current widespread COVID-19 vaccination effort underway, the temporal association presented here between COVID-19 vaccines and newly diagnosed sclerotic skin diseases could be coincidental. It is also possible that the reactions following COVID-19 vaccines represent flares of previously existing undiagnosed diseases, though this is pure speculation.

The data presented here suggest a potential relationship between mRNA COVID-19 vaccines and new-onset sclerotic skin diseases. Clinicians should have knowledge of this potential adverse effect, as the widespread vaccination effort against COVID-19 continues. Given the risks of severe morbidity and mortality associated with COVID-19, physicians should encourage full vaccination. However, more exploration of all autoimmune reactions possibly developing from mRNA COVID-19 vaccines is needed.

Conflicts of interest

None disclosed.

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