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*Case Report*

# COVID-19 mRNA vaccine triggering dermatomyositis: A case report

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## ABSTRACT

The battle against SARS-COV-2 is rising and the hope in the safety and effectiveness of immunization against this virus is growing up, even though serious and severe adverse events are scarcely observed. In this article, we report a case of mRNA vaccine induced an autoimmune dermatomyositis with features of severity that are managed by immunosuppressants medications and still in regular follow-up. Inflammatory dermatomyositis can be triggered after vaccination with COVID vaccine in the same mechanism that COVID-19 infection-induced myositis.

**Keywords:** Dermatomyositis, mRNA vaccine, COVID-19, Heliotrope rash, Cyclophosphamide

## INTRODUCTION

COVID-19 vaccination is associated with a substantially lower frequency of serious systemic immune-mediated adverse events than is COVID-19 itself, one of the serious adverse events that have been reported is post-vaccine-related myositis.[1]

## CASE REPORT

In this article, we report a 55-year-old man with a history of COVID-19 infection 4 months before his presentation that was treated uneventfully at home, presented 4 days after the second dose of Pfizer mRNA vaccine with painful proximal muscles weakness of both lower limbs that progressed in a few days to involve both upper limbs with sparing distal muscles groups, with the development of non-pruritic periorbital red or violaceous erythema of both eyelids (heliotrope rash), with slightly elevated, violaceous, pink, or dusky red papules located over the dorsal side of the metacarpal or interphalangeal joints and over the extensor side of the elbow, and knee joints (Gottron's papules), erythematous rash over face and neck (v sign), and over the shoulders (shawl sign) [Figure 1].

Vital examination for fever revealed a low-grade fever of 37.5 centigrade. Acute-phase reactants were elevated (erythrocyte sedimentation rate: 60 mm/h [normal, 0–20]), (positive C-reactive protein without titer). Complete blood picture parameters were within normal. Elevated Creatine phosphokinase (CPK) 2000 units/L (normal, 39-308 units/L). Serum glutamic-oxaloacetic transaminase and serum glutamic-pyruvic transaminase were within normal 29.24 units/L, respectively (normal, 0–40 units/L). Polymerase chain reaction testing for SARS-CoV-2 was negative. Thyroid-stimulating hormone was 1.13 mlU/L (normal, 0.27–4.20 mlU/L). Serum Vitamin D3 level was 23 ng/ml (normal, 30–100 ng/ml). Serum electrolytes were within normal range. Anti-nuclear antibody (ANA) concentration of 0.8 IU/ml (negative, less than 1 IU/ml). An extractable nuclear antigen (ENA) panel's results were negative. Electromyography of the right, left vastus lateralis, and deltoid muscles revealed spontaneous activity in the form of sharp waves and fibrillations and small polyphasic motor unit action potentials, as shown in [Figure 2]. Muscle biopsy revealed dermatomyositis features.

Computed tomography neck, chest, and abdomen were normal as part of malignancy screen. Carcinoembryonic antigen, CA19.9, and prostate-specific antigen were 0.5 ng/ml, 9.98 U/ml, and 0.133 ng/ml, respectively (within normal references). The patient was diagnosed with vaccine-induced dermatomyositis and oral prednisolone 60 mg/day was started combined with methotrexate tablet 12.5 mg/week, folic acid tablet 5 mg/week, and Vitamin D3 supplementation.

Two weeks later, the patient developed oropharyngeal dysphagia to solid food, his CPK became 8590 U/L(normal, 39–308 U/L), LDH 1055 U/L (normal, 120–300 U/L), and ferritin 2335 ng/ml (normal, 30–400 ng/ml).

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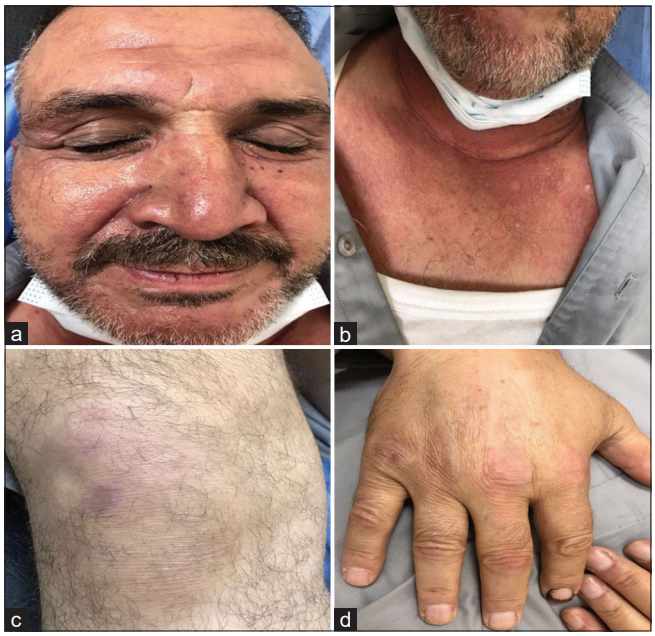


**Figure 1:** Dermatomyositis rash: (a) Heliotrope rash, (b) V shape rash, (c) Gottron's rash on the right knee, and (d) Gottron's rash on the right hand.

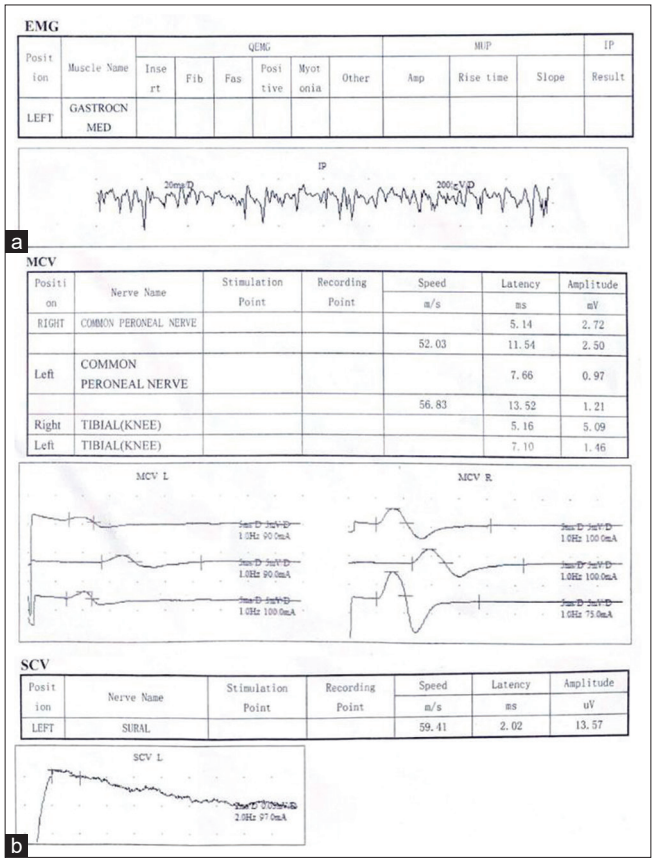


**Figure 2:** (a) EMG tracings and (b) EMG tracings (continued).

Hence, 3 days pulses of IV methylprednisolone 750 mg had been given to the patient along with IV cyclophosphamide 1 g with adequate hydration.

One week later, there was an improvement in the skin rash and resolution of dysphagia with mild improvement in the proximal muscles weakness. His CPK became 1940 U/L and ferritin >2000 ng/ml. After 6 monthly doses of IV cyclophosphamide, there was a complete resolution of the proximal muscles weakness for both upper and lower extremities, his CPK 95 U/L, ferritin 339 ng/ml, and he is on regular monthly follow-up with planning to prescribe a maintenance quarterly IV cyclophosphamide for him.

## DISCUSSION

COVID-19 causes thromboinflammation through hyperinflammation, thrombocytopathy, and endotheliopathy which lead to COVID-19 vasculitis or immune-mediated syndromes. Immune system changes in COVID-19 patients can promote a CD4-Th2 response rather than a CD4-Th1 response against the SARS-CoV-2 virus, resulting in Type 3 hypersensitivity with vascular immune complex deposition, complement activation, and generalized immune cell recruitment.[2]

Because of the high antigenic similarity between the SARS-CoV-2 spike protein and human proteins, anti-SARS-Cov2 antibodies may bind to human antigens such as ENAs, nuclear antigens, and myelin basic proteins.[3] Indeed, new data suggest that COVID-19-infected critically ill patients may acquire a post-infectious immune-mediated myopathy, the causes of which are unknown.[4]

Some patients have a Type I interferon signature and a perifascicular expression of major histocompatibility complex antigens, which is similar to dermatomyositis. Vaccine antigens are recognized by the immune system in the vast majority of vaccine recipients, and local immune cells are stimulated, followed by the recruitment of circulating immune cells to the local site. These cells secrete a variety of vasodilators and cytokines that only cause local inflammation. As a result, vaccine reactogenicity is sufficient to elicit protective responses without causing significant systemic consequences. Injection site reaction and transient axillary lymphadenopathy are both classic examples of vaccine-induced local and self-limiting immune responses. These vasodilators and cytokines cause a short-term systemic inflammatory response syndrome when they enter the bloodstream. Hyper-reactive or prolonged reactogenicity to host antigens can result in more serious complications such as myositis, vasculitis, thrombosis with thrombocytopenia syndrome, or Guillain–Barré syndrome. Inflammatory myositis after immunization could be caused by the same processes that cause COVID-19-related immune myopathy.[1]

In the literature, an association of myositis post-COVID-19 vaccination was reported in three cases that received ChAdOx1

nCoV-19 vaccination treated with oral steroids with or without mycophenolate mofetil.[1] Another case report of deltoid muscle myositis related to a post-COVID vaccine was reported.[5]

## CONCLUSION

With the discovery of multiple serologic autoimmune antibodies post-COVID infection, post-vaccination inflammatory myositis may develop as a result of the same mechanisms that cause COVID-19-related immune myopathy. This suggests an epiphenomenon rather than the activation or unmasking of a specific immune response directed to the muscles.[6]

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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The authors received no financial support.

### Conflicts of interest

There are no conflicts of interest.

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