SARS-CoV-2 mRNA Vaccination-Induced Autoimmune Polyarthritis Like Rheumatoid Arthritis

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SARS-CoV-2 mRNA Vaccination-Induced Autoimmune Polyarthritis Like Rheumatoid Arthritis

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*Written consent was obtained from the patient. The Institutional Research Ethics Board does not require board review for a single case report when the patient’s privacy is protected.

Abbreviations:

ACPA, anti-citrullinated protein antibody; T1DM, type 1 diabetes mellitus; RA, rheumatoid arthritis; RF, rheumatoid factor.
Letter to the Editor

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To the Editor: The vaccine mRNA is sensed by multiple pattern recognition receptors of dendric cells, leading to type I interferon secretion. This interferon response promotes the adaptive immune reaction to provoke antiviral response and probably interferonopathy including type 1 diabetes mellitus (T1DM), lupus and thyroiditis. Indeed, not merely SARS-CoV-2 infection but also vaccination induces disease flare-up in patients with rheumatoid arthritis (RA). We here report an elderly woman with autoimmune background who received BNT162b2, resulting in new-onset autoimmune polyarthritis like RA.

A 77-year-old non-smoking woman manifested bilateral arthritis of wrists, fingers and toes in late June 2021. She was diagnosed with slowly progressive insulin-dependent DM and Hashimoto’s thyroiditis in 2015. In May 2021, she developed fatigue and the SARS-CoV-2 PCR using nasopharyngeal specimen was positive. Fortunately, her SARS-CoV-2 infection ended up only fatigue without any febrile and respiratory symptoms. Then, she received the first BNT162b2 (BioNTech-Pfizer) vaccination with her wishes in early June, subsequently developing peripheral polyarthritis. Laboratory findings showed an elevated level of C-reactive protein (3.2 mg/L, reference: <1.4) and matrix metalloprotease-3, and positivity of rheumatoid factor (RF) and anti-citrullinated protein antibody (ACPA) (22.7 U/mL). Ultrasound and MRI demonstrated synovitis in the fingers and wrists. We considered the mRNA vaccination-induced transient autoimmune phenomenon and provided supportive care using analgesics. However, she wished to finish the second BNT162b2 in July, resulting in symptomatic worsening with elevated levels of C-reactive protein (12.8 mg/L), RF, metalloprotease-3 and ACPA titer (39.1 U/mL). We diagnosed the patient with BNT162b2-induced new-onset autoimmune arthritis like RA and administered methotrexate. A month later, her arthritis was dramatically ameliorated with decreased inflammation. However, the RF and ACPA titers maintained high levels with active synovitis (Figure).

We believe that this patient with autoimmune background newly developed RA-like autoimmune arthritis, which was perhaps mRNA vaccination-induced interferonopathy. In autoimmune diseases including T1DM and RA, they share several common genetic variants deciding disease risk and autoimmune mechanisms. Similar molecular signatures at the target tissues in T1DM and RA are confluent with types I interferon signaling. It is biologically plausible that SARS-CoV-2 mRNA vaccination developed new-onset RA-like arthritis. This case reiterates the importance of interferon signaling for...
developing autoimmune diseases in predisposed individuals. Available mRNA vaccines are reported to rarely, but rationally induce autoimmune flare-up.\textsuperscript{2-4} The reported percentage of flare-up ranges from 3 to 14%, but it might be overestimated because the definition of flare-up includes fever and musculoskeletal symptoms similar to adverse effects of vaccination, and the flare-up decision depends on patient’s self-reports.\textsuperscript{3} However, the cases of mRNA vaccination-induced autoimmunity do exist. Nonetheless, there is established treatment for many autoimmune diseases. Therefore, we advocate that the vaccination outweighs possible risks for autoimmune developments, to end the unjustifiable threat by COVID-19.

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References


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Figure legend

Figure. Clinical course of SARS-CoV-2 vaccination-induced autoimmune polyarthritis

Clinical course demonstrated by disease activity of rheumatoid arthritis as SDAI, laboratory findings including ESR, RF, ACPA and MMP-3, and imaging studies such as joint ultrasound and MRI. In ultrasound studies, the right MCP joint of forefinger and wrist were focused. MRI studies revealed synovitis as gadolinium-enhanced high intensity area in the right wrist (arrow). Small upper right panel showed coronal slice directed by a broken reference line.

ACPA = anti-citrullinated protein antibody; ESR = erythrocyte-sedimentation rate; MCP = metacarpophalangeal; MMP-3 = matrix metalloproteinase-3; MRI = magnetic resonance imaging; RF = rheumatoid factor
CRediT Statement

Conceptualization: Nobuya Abe
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