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Case Report

Wrist Extensor Tenosynovitis After COVID-19 Vaccination

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We present the case of a 54-year-old right-handed woman with no medical history of rheumatic disease or trauma to the upper extremities who developed painful nodules along her left upper extremity and torso immediately after receiving the mRNA-1273 SARS-CoV-2 vaccine booster for COVID-19 in her left upper extremity. Most of the nodules subsided within several days, but several persisted over the dorsum of the left wrist with physical examination and imaging findings consistent with second and fourth extensor compartment tenosynovitis. She ultimately underwent excision of the left wrist extensor tenosynovitis, followed by a repeat excision for recurrence of symptoms.

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Adverse effects of the SARS-CoV-2 vaccines and booster vaccines have been well-documented in the literature.¹ Reporting of less common side effects secondary to vaccine administration has increased. Arthritic and inflammatory reactions have been well-documented, with most cases typically treated conservatively with non-steroidal anti-inflammatory medication with or without glucocorticoids.² This report highlights the clinical presentation of an inflammatory complication after administration of the COVID-19 vaccine requiring surgical management.

Since the initial introduction of SARS-CoV-2 vaccines, nearly 70% of the population of the United States has completed the entire “primary series” of COVID-19 vaccinations, with 17% of the population having received at least one booster dose.³ Volume of literature on reported side effects of the vaccine has increased, including but not limited to unilateral axillary and/or cervical lymphadenopathy in the ipsilateral arm,⁴ neurologic effects,⁵ injection site pain, erythema, induration or edema, fatigue, headache, fever, chills, myalgia, arthralgia, lymphadenopathy, and hypersensitivity reactions.⁶ A number of uncommon reactions have also been reported, including Bell’s palsy with the mRNA-1273 SARS-CoV-2 (MODERNA) vaccine, local inflammatory reactions such as bursitis, and infectious processes such as septic arthritis.^{7–9} This publication reports on a case of extensor tenosynovitis in the

ipsilateral upper extremity after vaccination with the SARS-CoV-2 mRNA MODERNA vaccine.

Case Report

A 54-year-old right-handed woman presented to the outpatient clinic with a chief complaint of multiple months of painful nodules over the dorsum of her left wrist. She reported that she received her first booster shot of the MODERNA mRNA-1273 SARS-CoV-2 vaccine 3 months before this presentation in her left arm. Immediately after administration of the booster beginning on the day of injection, she developed painful nodules that tracked along her entire left upper extremity and her torso. Many of the nodules subsided over the following 3 months before this clinic presentation, except for those at the dorsum of the left wrist. She reported that these nodules persisted and were painful with any active or passive range of motion of her left wrist and extension of the fingers.

On clinical examination, multiple palpable fluid-filled nodules over the dorsum of the wrist at the extensor tendon sheath were observed. No signs of erythema or infection existed, and the patient endorsed pain at the dorsal wrist with resisted extension of the wrist and digits. The range of motion of the wrist was limited secondary to pain. Finkelstein’s test was negative, and the patient was otherwise neurovascularly intact with intact sensation to light touch over the median, radial, and ulnar nerve distributions and appropriate capillary refill of the fingertips.

Magnetic resonance imaging (MRI) of the left wrist was obtained 109 days after the vaccine booster administration,

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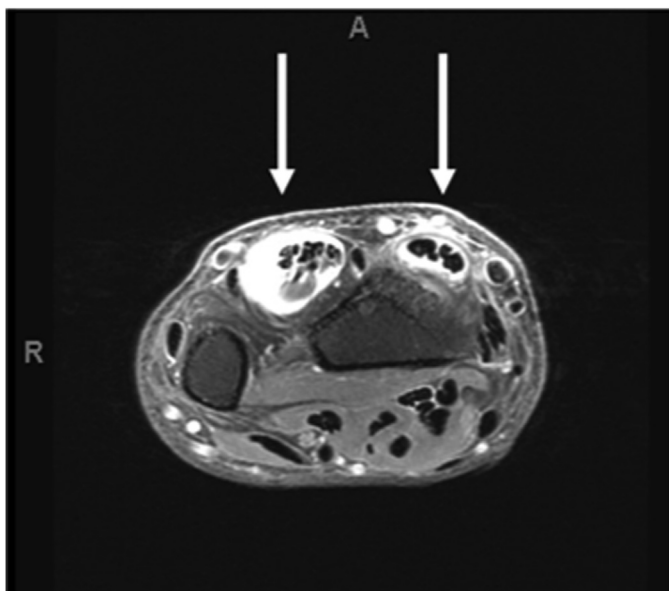


Figure 1. Axial MRI demonstrating second and fourth compartment extensor tenosynovitis.

demonstrating severe tenosynovitis of the fourth extensor compartment and mild tenosynovitis of the second extensor compartment, as well as pericapsular edema, bone marrow edema, and cystic/erosive changes consistent with potential inflammatory arthritis (Figs. 1, 2). Given the severity of her symptoms and advanced imaging findings consistent with inflammatory tissue, the patient elected to pursue tenosynovectomy of the left wrist extensor compartments.

The patient presented for surgery approximately 7 months after the initial onset of her symptoms. The nodules were marked, and an incision was made along the dorsum of the hand between the third and fourth extensor compartments. Dissection to the extensor retinaculum revealed tenosynovium “bulging” underneath the retinaculum. The extensor retinaculum was removed, the extensor pollicis longus was released and transposed, and the posterior interosseous nerve was resected. The exposed tenosynovium was excised from the dorsal wrist and along the tendons, measuring $4 \times 3 \times 2$ cm (Fig. 3). No immediate surgical complications were noted.

Surgical pathology of the excised tenosynovium demonstrated synovial hyperplasia with mild chronic inflammation. At her first follow-up visit, the patient reported overall pain improvement, but with continued difficulty with wrist range of motion. She was referred to occupational therapy starting at 6 weeks after surgery, and she attended 13 sessions over 10 weeks. At the 3-month follow-up, she reported continued pain and swelling over the wrist, and a repeat MRI of the left wrist was obtained demonstrating the recurrence of her synovitis.

She was subsequently taken back to the operating room, where dissection was made through the old incision, and synovitis was again encountered and excised from the extensor tendon. Surgical pathology of the excised tenosynovium from the second surgical excision demonstrated fibrosis and reactive changes. After surgery, the patient attended 11 occupational therapy sessions over 11 weeks and was discharged with recommendations for a home exercise plan.

Written informed consent was obtained from the patient for the publication of this case report and accompanying images.



Figure 2. Coronal MRI demonstrating second and fourth compartment extensor tenosynovitis.

Discussion

This is a case of a 54-year-old patient who presented with second and fourth extensor compartment tenosynovitis of the left upper extremity after receiving the mRNA-1273 SARS-CoV-2 (MODERNA) COVID-19 vaccine. The patient presented with painful nodules in the ipsilateral upper extremity and torso immediately after receiving the vaccine in the left arm, which subsequently localized to the extensor tendons of the second and fourth extensor compartments of the wrist. Advanced imaging revealed signal changes within these compartments consistent with an inflammatory process. She underwent surgical excision of the nodules, with repeat excision for recurrence.

The side effect profiles of the two most widely utilized COVID-19 vaccines from Pfizer and MODERNA have been well-documented. These include but are not limited to local injection site complications¹ (eg, pain, redness, and swelling), systemic events¹ (eg, fatigue, headache, or myalgias), and rare serious adverse events¹⁰ (eg, cardiomyopathy, thrombosis, and Guillain-Barré Syndrome).¹¹ The number of reports describing less common side effects attributable to COVID-19 vaccination has increased. To our knowledge, this is the first report of extensor tenosynovitis in the injected arm of a patient who received a COVID vaccination.

Extensor tenosynovitis in and of itself is a well-established phenomenon. This patient presented with extensor tenosynovitis of both the second and fourth extensor compartments. Extensor tenosynovitis of the second extensor compartment is relatively uncommon. It is typically associated with frequent and repetitive use of the wrist, often occurring in athletes such as rowers. Tenosynovitis of the fourth extensor compartment has multiple etiologies and is often seen in the setting of Rheumatoid arthritis or other inflammatory causes. It can also present in a non-rheumatoid setting, such as after a distal radius fracture or other wrist trauma.¹²



Figure 3. Postdebridement extensor tendons (left) and excised tenosynovitis specimen (right).

This patient's reported symptoms presented immediately after receiving her first vaccine booster shot. Searching the "Vaccine Adverse Event Reporting System" database provided by the Centers for Disease Control and Prevention reveals to date, 26 reported instances of "tenosynovitis," of which 7 are attributed to the MODERNA vaccine, 16 to the Pfizer–Biontech version, and 3 cases to vaccines from other pharmaceutical companies.¹³ Given that the pathology report of the surgically excised tissue demonstrated "fibrosis and reactive changes," it is likely that the vaccine itself did not cause the extensor tenosynovitis, but rather, the vaccine-induced immune-mediated response localized to the affected compartments. That being said, the patient was able to undergo expectant management of her symptoms. Given that there have only been 26 reported cases of tenosynovitis of the approximately 69.5% of the entire US population which has completed the primary series of vaccinations per the Centers for Disease Control and Prevention, this is an adverse effect of the utmost rarity and should not deter patients from undergoing vaccination.² Finally, further exploration via well-controlled studies is needed to explore the potential causal relationship between COVID-19 vaccination and inflammatory complications. Clinicians should be cognizant of the various presentations to allow for prompt and appropriate management.

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