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## Case Report

# Influenza vaccine related periostitis: A case report of a rare complication <sup>☆</sup>

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## ABSTRACT

As social distancing guidelines continue to diminish across the country, viral pathogens that were once absent during the COVID-19 pandemic, such as influenza and RSV, have once again become prominent. Although serious side effects of vaccinations are rare, local complications of bursitis and skin and soft tissue infections are well-documented in the literature. We present a case of 1 such rare side effect: influenza vaccine related periostitis. A 39-year-old male patient presented with left shoulder pain which developed 2 days after an influenza vaccination administered to the left deltoid. His symptoms were persistent despite rest and 1 week trial of NSAIDs. MRI imaging demonstrated marrow edema and a periosteal reaction of the left shoulder. Overall, vaccine induced periostitis is poorly documented in the literature and the pathophysiology has not been fully characterized. Further research is crucial to identify patient specific risk factors and to raise awareness of this rare complication to promote swift diagnosis and effective treatment.

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## Introduction

Viral pathogens that were once absent during the COVID-19 pandemic, such as influenza, have once again become prominent, highlighting the importance of routine vaccination in addition to ongoing COVID booster vaccines [1]. Although serious side effects of vaccinations are rare, local complications such as bursitis and tendinitis as well as skin and soft tissue infections are well-documented in the literature

[2–5]. Suboptimal needle placement during intramuscular injection is the most common mechanism of injury for mechanical/inflammatory vaccine-related complications [6–9]. High-deltoid positioning of the needle can result in a local inflammatory response involving the rotator cuff tendons, manifesting clinically as tendonitis and infiltration of injectate into the subacromial/subdeltoid bursa can cause bursitis [2]. Proper injection technique is crucial to preventing local musculoskeletal complications. With increasing vaccination requirements there likely will be a commiserate increase in

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incidence of complications, including less commonly seen sequelae of local inflammation at the injection site. We present a case of one such rare side effect that is poorly documented in the literature: influenza vaccine related periostitis.

### Case report

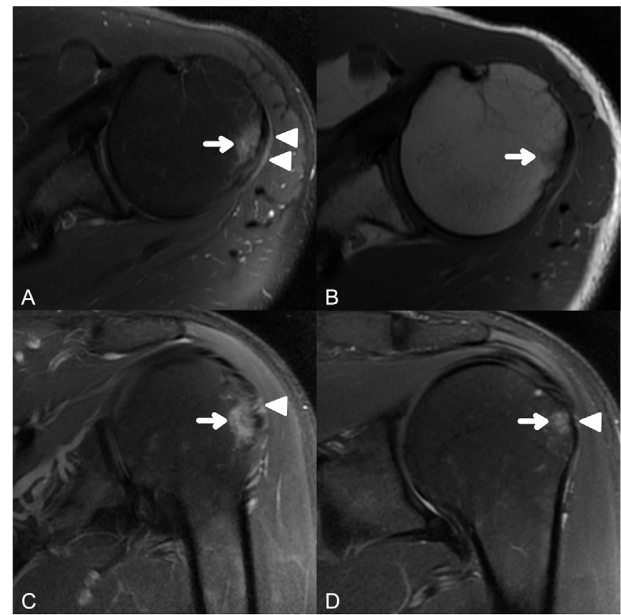
A 39-year-old male patient with no pertinent past medical history presented to clinic with left shoulder pain. The patient reports the pain developed 1-2 days after receiving an influenza vaccination in left shoulder. The pain was described as sharp and centered around the site of injection in his posterolateral shoulder, most pronounced with overhead activity and external rotation. Initial conservative management with 1 week of NSAIDs provided temporary relief, however the pain returned following return to normal activity. There was no history, recent or remote, of trauma to the left shoulder or recent changes in activity types or level. The patient denied any shoulder weakness or sensation of instability. Physical examination revealed tenderness to palpation of the posterolateral humeral head but full range of motion, 5/5 strength of the rotator cuff, and negative Neer's and Hawkin's tests for impingement.

Following the initial presentation, a shoulder radiograph was obtained which was unremarkable. There was no fracture, cortical erosions to suggest infection or inflammatory arthropathy, or significant soft tissue abnormality. Given the unclear clinical picture and negative radiograph, MRI was performed to evaluate for soft tissue pathology or subtle osseous abnormality. Axial T1-weighted and T2-weighted fat saturated images as well as T2-weighted fat saturated images demonstrate focal marrow edema at the humeral greater tuberosity with overlying periosteal reaction as well as tendinosis and peritendinitis of the teres minor tendon (Fig. 1). There was no evidence of rotator cuff tear, myositis, fluid collection, or bursitis. Findings were favored to represent periostitis with reactive marrow edema and teres minor tendinosis and peritendinitis secondary to deep placement and injection of vaccine needle. Conservative management with NSAIDs and rest was continued with further patient counseling. The patient returned to clinic approximately 2 months later with approximately 50% symptomatic improvement following activity modification with occasional NSAID usage.

There is a paucity in the literature documenting any cases of vaccine related periostitis in adult populations. A single article from 1968 documented periostitis following smallpox vaccination in the clavicle of a 24-year-old patient six days following vaccination [10]. Both the present case and the case reported in the literature describe patients of similar ages and reactions within a week of vaccine administration.

### Discussion

The present case report is the second case in roughly 60 years describing periostitis related to vaccination administration. There have been multiple cases of iatrogenic periostitis published in the literature. In particular, voriconazole induced periostitis is well documented, most notably



**Fig. 1 – Axial T2 FS (A), axial T1 (B), and coronal T2 FS (C,D) MR sequences of the shoulder demonstrate T2 hyperintense (white arrows) and T1 hypointense (black arrows) marrow signal of the greater tuberosity with overlying thin T2 hyperintense signal (white arrowhead), compatible with marrow edema-like signal and periosteal reaction.**

with the use of chronic voriconazole therapy in immunosuppressed patients following organ transplantation. In 2016, A systematic review of case reports, case series, and observational studies was conducted of voriconazole induced periostitis [11]. The authors discovered 26 articles, all of which reported periostitis after duration of treatment that ranged from 6 weeks to 8 years [11]. Since 2016, additional case reports on this have been published [12,13]. In addition, iatrogenic causes of periostitis have been reported among neonatal patients. Prostaglandin induced periostitis has been reported as a complication of treatment in neonatal patients with congenital heart disease. In 1994, a case series described 5 infants being treated for congenital ductal-dependent heart disease who developed periostitis with the earliest onset being 14 days after prostaglandin infusion [14]. In more recent years, similar cases have been documented in 2017 and 2022 [15,16]. Among reported cases of vaccine related periostitis, patients displayed symptoms within a week of vaccine exposure. In contrast, among reported cases of voriconazole and prostaglandin induced periostitis, patients present later and varied often within 2 weeks to years of drug exposure.

Overall, vaccine induced periostitis is poorly documented in the literature and the pathophysiology has not been fully characterized. We describe a case in a 39-year-old male who developed periostitis after influenza vaccination and after 2 months of treatment with activity modification with occasional NSAID usage showed 50% symptomatic improvement. The case of influenza vaccine related periostitis we describe likely was a result of a combination of factors such as me-

chanical injury from the needle and/or injection technique in addition to inflammation from the injectate [17,18]. Further research and documentation is crucial to identify patient specific risk factors and to raise awareness of this rare complication to promote swift diagnosis and effective treatment.

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## Disclosures

Kaitlyn Julian – Nothing to disclose

Kevin Sweetwood – Nothing to disclose

Daria Motamedi – Nothing to disclose

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## Patient consent

Informed written consent was obtained from the patient for publication of this case report and all imaging studies. Consent form on record.

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## CRedit authorship contribution statement

**Kaitlyn R. Julian:** Investigation, Resources, Writing – original draft. **Kevin Sweetwood:** Conceptualization, Supervision, Writing – review & editing. **Daria Motamedi:** Conceptualization, Supervision, Writing – review & editing.

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