Cureus
Part of SPRINGER NATURE

Open Access Case Report

Development of Explosive Acne Fulminans After SARS-CoV-2 Vaccine Administration: A Case Report

Review began 10/23/2026
Review ended 11/13/2026
Published 11/16/2026

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DOI: 10.7759/cureus.119790

James M. Fritsche [1]

1. Aviation Medicine, Naval Hospital Jacksonville, Jacksonville, USA

Corresponding author: James M. Fritsche, jfritsche18@elmira.edu

Abstract

This is a case study of a 23-year-old, active-duty male with a history of acne vulgaris but no personal history of vaccination reactions who was administered the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) vaccine and subsequently developed nodulocystic acne. He denied excessive physical activity, current anabolic steroid use, and changes in medications during that time frame; however, he admitted to using anabolic steroids and testosterone in the year prior to vaccine administration. The patient had dozens of thick, firm hypertrophic pink scars on the chest and back with surrounding tan macules on his back. The patient was treated with oral isotretinoin and pulsed dye laser (PDL) with eventual post-inflammatory hyperpigmentation noted after treatment. Although acne fulminans (AF) developed one month after SARS-CoV-2 administration, this is a hypothesis-generating clinical observation and temporal proximity alone does not prove causation.

Categories: Epidemiology/Public Health, Allergy/Immunology, Dermatology
Keywords: acne maligna, acne scars, isotretinoin use, pulsed dye laser, sars-cov2 vaccines

Introduction

Acne maligna or acne fulminans (AF) is a rare dermatologic disorder that often presents acutely as a painful, ulcerative, and hemorrhagic form of acne [1]. According to Bhatia et al. (2021), there have been fewer than 200 reported cases of AF, most of which involve young men with various clinical presentations [2]. In certain patients, it may be associated with more systemic symptoms, including polyarthritis and fever [1]. In addition, AF may lead to bone lesions and laboratory abnormalities [1]. Because of its rarity, the etiology of AF is not well understood. Massa et al. (2017) describe the use of high-dose isotretinoin as a potential trigger of AF when treating patients with severe acne. They also describe the role of *Propionibacterium acnes* in activating the inflammatory cascade seen in the development of acne, often universally [3]. In addition, an association with synovitis-acne-pustulosis-hyperostosis-osteitis (SAPHO) syndrome and the response to infliximab highlight that increased levels of inflammatory cytokines, most notably tumor necrosis factor-α (TNF-α), may play a role in AF pathogenesis [4]. Lastly, Saint-Jean et al. (2015) suggest that testosterone use and disuse may also trigger AF [5]. In fact, Melnik et al. (2007) documented a case of AF in a bodybuilder who was self-medicating with anabolic steroids and testosterone [6]. This observational study demonstrated AF development after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) administration, but temporal proximity alone does not prove causation, and causality cannot be established.

Case Presentation

Our patient was a 23-year-old, active-duty male with a history of acne vulgaris and no personal history of vaccination reactions who was administered the SARS-CoV-2 vaccine and subsequently developed nodulocystic acne. The patient was administered the Pfizer SARS-CoV-2 vaccine in mid-January 2022. In Month 1, the patient presented to Dermatology with symptoms of painful and tender ulcerated nodules on the chest and back, bilateral shoulder pain, mild fatigue, but denied sudden or fluctuating fever and weight loss resulting in extreme malaise. The patient denied excessive physical activity, current anabolic steroid use, and changes in medications during that time frame; however, he admitted to using anabolic steroids and testosterone in the year prior to vaccine administration. He denied allergies altogether, including drug, environmental, and food. His personal vaccination history included meningococcal vaccine (MGC), Adenovirus, polio, tetanus, diphtheria (Td), Hepatitis A, and annual influenza vaccination. Vitals demonstrated a minimally elevated temperature of 99.8 °F, but were otherwise unremarkable. Physical exam was significant for (1) open and closed comedones, (2) inflammatory papules and pustules, (3) nodular lesions, and (4) severe acneiform scarring on chest and back, including linear stria-like scarring on shoulders (Figure *1*). Labs taken in mid-February 2022 did not demonstrate leukocytosis or elevated inflammatory markers, CRP, and ESR at the time (Table *1*). An allergy and immune workup, outside of CRP and ESR, was not performed, leaving alternative triggers unresolved. AF is diagnosed clinically by the abrupt onset of severe inflammatory acne characterized by painful, ulcerative, and hemorrhagic nodules and pustules, typically involving the upper trunk. Systemic manifestations may include fever, malaise, myalgia,

and arthralgia. Laboratory findings may include leukocytosis and elevated inflammatory markers; however, no specific laboratory abnormality is diagnostic. Other diagnoses considered were acne conglobata and rosacea fulminans. Based on the sudden, explosive onset and visual examination coupled with subjective systemic symptoms, the patient was diagnosed with AF.



FIGURE 1: Papules, pustules, small hemorrhagic crusts, and scar formation were scattered on the chest and back of the patient with AF after SARS-CoV-2 immunization administration and prior history of anabolic steroid and testosterone use, but not in the year prior to vaccination.

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; AF: acne fulminans

Automated Hematology		
WBC	5.76 10*3/uL	4.50-11.00 10*3/uL
RBC	5.56 10*6/uL	3.90-5.90 10*6/uL
Hemoglobin	15.7 g/dL	13.0-17.5 g/dL
Hematocrit	48.30%	39.0-53.0%
MCV	86.9 fL	80.0-100.0 fL
MCH	28.2 pg	26.0-35.0 pg
MCHC	32.5 g/dL	32.0-36.0 g/dL
RDW-SD	38	35.1-43.9
RDW-CV	11.80%	11.6-14.4%
Platelets	218 10*3/uL	140-440 10*3/uL
MPV	10.5 fL	6.3-10.5
Routine Chemistry		
Sodium	141 mmol/L	136-145 mmol/L
Potassium Lvl	4.5 mmol/L	3.5-4.5 mmol/L
Chloride	108 mmol/L	98-107 mmol/L
CO2	26.7 mEq/L	22.0-29.0 mEq/L
AGAP	6	N/A
BUN	19.9 mg/dL	8.9-20.6 mg/dL
Creatine Level	1.00 mg/dL	0.70-1.30 mg/dL
BUN/Creat Ratio	17.90 ratio	N/A
eGFR CKD EPI	108 mL/min	N/A
Glucose Lvl	83 mg/dL	70-99 mg/dL
Calcium	10.4 mg/dL	8.4-10.2 mg/dL
Specific Inflammatory Labs		
CRP	0.9 mg/dL	<1.0 mg/dL
ESR	13 mm/hr	<15 mm/hr

TABLE 1: Lab results five weeks after SARS-CoV-2 vaccine administration in a patient who developed AF with a prior history of anabolic steroid and testosterone use but not in the year prior to vaccination.

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; AF: acne fulminans; MCV: mean corpuscular volume; MCH: mean corpuscular hemoglobin; MCHC: mean corpuscular hemoglobin concentration; RDW: red cell distribution width; SD: standard deviation; CV: coefficient of variation; MPV: mean platelet volume; AGAP: anion gap; BUN: blood urea nitrogen; eGFR: estimated glomerular filtration rate; CKD-EPI: Chronic Kidney Disease Epidemiology Collaboration

The patient was prescribed Accutane 10 mg daily along with 1 mg/kg/day oral prednisolone. He presented for follow-up in Month 2, with remission of systemic symptoms and improvement of nodular lesions and papules but continued hypertrophic scarring. Accutane was increased to 40 mg daily and oral prednisolone was discontinued. During follow-up in Month 4, the patient continued to have multiple nodular lesions and papules, and Accutane was increased to 80 mg daily. He presented to follow-up in Month 6 with improved response and few nodules and papules compared to treatment onset (Figure *2*). Although the patient did have significant hypertrophic scarring on the shoulders, back, and chest, which was treated with intralesional triamcinolone and pulsed dye laser (PDL) with a positive response. The patient has since

transferred to a different command.



FIGURE 2: Acne fulminans after the oral prednisolone and Accutane regimen

Discussion

As a result of SARS-CoV-2 mass vaccination, there have been increased reports of cutaneous adverse events (CAEs) that have been related to the administration of the SARS-CoV-2 vaccine [7]. McMahon et al. (2021) conducted a registry-based retrospective study that documented cutaneous reactions following messenger RNA (mRNA)-1273 (Moderna) and BNT162b2 (Pfizer-BioNTech) COVID-19 vaccinations in 414 subjects [8]. Although a spectrum of CAEs were recorded, the most common reactions were local injection site reactions, erythromelalgia, flares of psoriasis, and swelling [8]. Kim et al. (2023) documented a rare case of AF in a 15-year-old male after COVID-19 vaccination administration [9]. This CAE was in the absence of new drug administration, signs of infection, or immunological factors known to trigger AF [9]. Despite the absence of some alternative precipitating factors, causality remains unproven given the lack of epidemiologic evidence, the single-case design, and the inability to consider all confounding factors. Bhargava et al. (2022) describe a separate report of a neutrophilic pustular eruption five days after ChAdOx1 nCoV-19 vaccination [10]. Despite initially having AF in their differential, Bhargava et al. favored a Behcet-like inflammatory eruption due to the acral distribution and prominent genital and oral ulcerations uncharacteristic of AF [10]. Regardless, the limited direct evidence in the case, coupled with AF not being the diagnosis, further disputes a causal association between vaccine administration and AF. Collectively, the available literature provides limited cases of documented AF after COVID-19 vaccination. Due to the rarity of reported cases, the possibility of alternative confounding factors, and the lack of controlled studies, causal certainty cannot be established.

Conclusions

This patient was an otherwise healthy, 23-year-old, active-duty male with a history of acne vulgaris but not AF, with no recent medication changes, changes in physical or dietary regimens, or relevant family history. Although admitting to prior anabolic steroid and testosterone use in the past, he denies usage during the year prior to vaccine administration. There were limitations with this observational study, which did not address all alternative triggers such as hormonal imbalances, known genetic predisposition, and viral infections associated with SAPHO syndrome. The study also took place in the setting of temporal

coincidence and absence of causal evidence. The association with SARS-CoV-2 vaccine administration and AF development is preliminary, unproven, and hypothesis-generating, and more research needs to be done to better inform future patients who may be at risk.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: James M. Fritsche

Acquisition, analysis, or interpretation of data: James M. Fritsche

Drafting of the manuscript: James M. Fritsche

Critical review of the manuscript for important intellectual content: James M. Fritsche

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Acknowledgements

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