

Cutaneous mucormycosis following COVID-19 vaccination in a patient with bullous pemphigoid



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INTRODUCTION

Mucormycosis is a severe fungal infection caused by the *Mucor* genus, and infections often occur in immunocompromised individuals.¹ The major risk factors include diabetes, being a transplant recipient, a history of trauma or burns, prolonged corticosteroid treatment, and hematologic malignancies.² Early identification is paramount given the *Mucor* species predilection for vascular invasion, paucity of effective antifungal treatments, and a reported 96% mortality in disseminated disease.²

Although cutaneous mucormycosis has been associated with adhesive tape and other adhesive devices in premature infants and adults with immunodeficiency, it has never been reported at the site of prior vaccination.²⁻⁴ We report a case of cutaneous mucormycosis at the site of COVID-19 vaccination with messenger RNA (mRNA)-1723 (Moderna).

CASE REPORT

A 94-year-old man with hypertension and bullous pemphigoid presented with a new, intensely pruritic papule that developed at the injection site of the first dose of mRNA-1723, received 2 days prior to the presentation. Following vaccination, an adhesive bandage was applied that remained in place for 24 hours. Severe pruritus developed 2 days after the inoculation and vigorous scratching ensued. On examination, a 5-mm erythematous papule was noted overlying the right deltoid. The differential diagnosis included a lesion of bullous pemphigoid, bullous impetigo, and allergic or irritant contact dermatitis to the adhesive. A 4-mm punch biopsy was obtained. Histopathologic examination revealed suppurative

Abbreviation used:

mRNA: messenger RNA

and granulomatous dermatitis surrounding a neutrophilic microabscess in the reticular dermis. Thick-walled, nonseptate, bifurcated hyphae were identified within the infiltrate and inside the multinucleated giant cell (Figs 1 and 2). Periodic acid–Schiff stain confirmed the presence of fungal hyphae (Fig 3). Cutaneous mucormycosis was suspected, and the patient was successfully treated with 100 mg of intravenous micafungin administered daily for 2 weeks. Tissue polymerase chain reaction was positive for *Rhizopus oryzae* complex. The second dose of mRNA-1723 was administered without subsequent complications.

DISCUSSION

This is an unusual case of cutaneous mucormycosis at the site of vaccination. In the 1970s, a series of *Rhizopus* infections associated with adhesive dressing had been reported.⁴⁻⁶ Diligent measures by the production company thereafter decreased the association between the dressing and mucormycosis, although additional clusters have been reported,^{7,8} as have cases related to adhesive dressings around ostomy sites.⁹ Cutaneous mucormycosis has also been documented in association with intravenous access and medication injections in immunocompromised and immunocompetent patients.⁷ It is plausible that mucormycosis from an adhesive dressing applied to the injection site could be the

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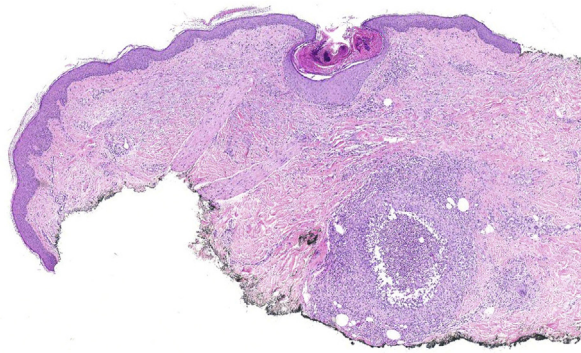


Fig 1. Within the reticular dermis, there was granulomatous and suppurative dermatitis surrounding a neutrophilic microabscess. (Original magnification: $\times 40$.)

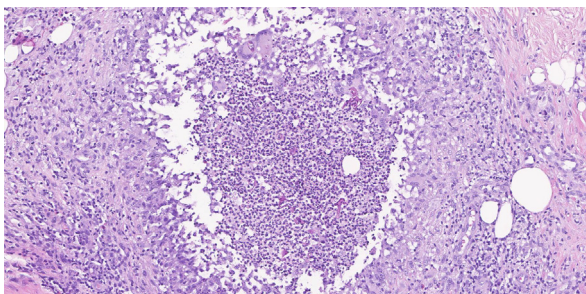


Fig 2. Neutrophilic microabscess containing thick-walled, nonseptate, bifurcated, hyphae and phagocytosed hyphae within a multinucleate giant cell. (Original magnification: $\times 400$.)

source of the infection in the patient in our case. Alternatively, repeated excoriation at the vaccination site may have introduced the organism. Lastly, direct inoculation of the infectious agent via a contaminated syringe or vaccine is an additional consideration.

However, the depth of the identified organism in the reticular dermis militates against direct inoculation, as mRNA-1723 is administered intramuscularly. Application of clobetasol 0.05% ointment for the patient's bullous pemphigoid as well as age-related immunosenescence and diminished epidermal barrier may have contributed to the development of cutaneous mucormycosis at the site of vaccination.¹⁰ Nevertheless, the precise mechanism of fungal inoculation remains unclear, and the above explanations are speculative.

This case highlights the need for an understanding of the context and circumstances surrounding the suspected drug-related reactions, particularly in the current climate of vaccine hesitancy. A cursory review of this case could lead to false attribution of an adverse event to an unrelated medication or

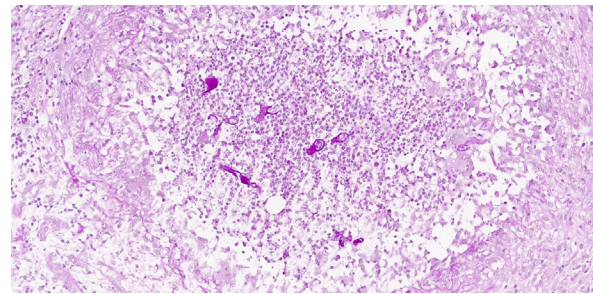


Fig 3. Periodic acid–Schiff stain highlighted the hyphal elements. (Original magnification: $\times 400$.)

device. Although widespread vaccination of the public and health care workers is essential, it is critically important to continue monitoring, reporting, and investigating the adverse effects associated with the vaccines to improve their safety over time.

Conflicts of interest

Dr West is a former executive and current member of the Board of Directors at Genzada Pharmaceuticals. Drs Shah, Simpson, and Rainwater have no conflicts of interest to declare.

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