A Case of Breakthrough Mpox Infection after Immunization

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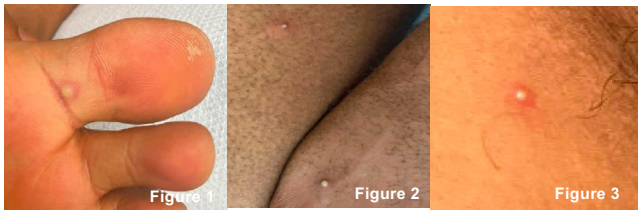
Introduction

- Since May 2022, there has been a global outbreak of Mpox with over 30,000 US cases reported as of May 2023. This outbreak has disproportionately affected gay and bisexual men and gender diverse populations.
- Clinical manifestations of mpox are variable and can include a prodrome of systemic symptoms including fever, chills, headache, body aches, fatigue, followed by the onset of mucosal and cutaneous lesions with varying appearance. Severe disease and death can occur in individuals with HIV and other immune-compromising conditions.
- In 2019, the JYNNEOS vaccine, a live-attenuated non-replicating vaccinia virus vaccine (MVA-BN), was FDA approved for administration as a 2-dose subcutaneous (SQ) vaccination series for smallpox and mpox prevention in adults at high risk for infection.
- Compared to SQ immunizations, intradermal (ID) immunizations offer the potential ability to generate robust immune responses at significantly lower doses, thus aiding vaccine conservation efforts.[2]
- In August 2022, the FDA issued an emergency use authorization for both SQ and ID delivery of the JYNNEOS vaccine to prevent mpox disease in persons at high risk for infection[1]. Clinical trials evaluating vaccine efficacy and vaccine delivery method are limited.

Case Presentation

- A 36-year-old male with virally suppressed HIV (CD4 count of 482/33%) on daily Biktarvy presented with one month of painful penile ulcerations, inguinal lymphadenopathy, urethral discharge, and an evolving pustular body rash.
- In the month prior to admission, he was treated in the outpatient setting for pharyngeal gonorrhea, primary syphilis with IM benzathine penicillin, and purulent soft tissue infection with penile ulcer culture growing S. pyogenes treated initially with doxycycline followed by amoxicillin-clavulanate without improvement.
- He ultimately presented to the ED with worsening appearance of the penile lesion, urethral discharge, and mixed skin lesions including pustules on the extremities and ulcers on the face and penis (Figures 1-5).
- Work up for HSV, VZV, syphilis, chlamydia, gonorrhea was negative (Table 1).
- While hospitalized, he was treated for possible chancroid, HSV, and bacterial superinfection with ceftriaxone, doxycycline, and valacyclovir.
- Test results for mpox lesion-based PCR returned positive after hospital discharge, and he was treated with 14 days of tecovirimat.
- He previously received the JYNNEOS vaccine series for mpox prevention intradermally >6 months prior to admission.

Case Presentation



Figures 1-3: Pustules located on plantar surface of the great toe (1), anterior thigh and dorsal hand (2), and axilla (3).

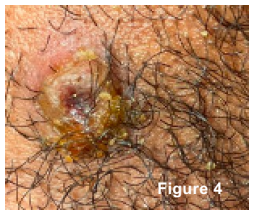


Figure 4: Cheek ulcerative lesion.

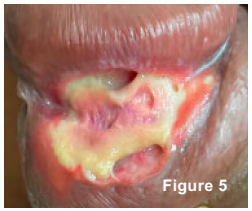


Figure 5: Penile exudative lesion.

Syphilis Screen (RPR)	Positive, titer 64 (same as 2 weeks prior)
Gonorrhea NAAT (urine)	Negative
Chlamydia NAAT (urine)	Negative
HSV 1&2 PCR lesion swab, serum serologies	Negative PCR, negative HSV-2 IgG, positive HSV-1 IgG
VZV PCR lesion swabs	Negative
Blood cultures	No growth
Mpox PCR lesion swabs	Positive

Table 1: Inpatient diagnostic testing.

Discussion

1. The diagnosis of mpox should be suspected in individuals with symptoms consistent with mpox and epidemiologic risk factors (sexual activity, contact with individuals with classic rash, MSM, endemic travel). Clinicians should maintain a high index of suspicion for mpox when evaluating genital ulcers and other mucocutaneous lesions in sexually active individuals regardless of immunization status. Diagnosis and treatment in this case were delayed.

2. ID vaccination with JYNNEOS offers a cost-effective public health strategy to generate similar immune responses against mpox at lower vaccine doses (1/5th standard SQ dose), thus promoting vaccine conservation during a global outbreak.[2] Studies evaluating the effectiveness of JYNNEOS vaccine to prevent mpox have demonstrated ~86% efficacy after 2 doses for both ID and SQ routes of administration. However, breakthrough mpox cases have been reported after both methods of vaccine delivery.[3]

3. Clinical trials are needed to determine if route of JYNNEOS administration affects immunization efficacy.

4. Further education and vigilance is needed in primary care, urgent care, and emergency department settings to promote early recognition and diagnosis of mpox.

References

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2. Brooks JT, Marks P, Goldstein RH, Walensky RP. Intradermal Vaccination for Monkeypox Benefits for Individual and Public Health. New England Journal of Medicine. 2022;387(13):1151-1153.

3. Dalton AF, Diallo AO, Chard AN, et al. Estimated Effectiveness of JYNNEOS Vaccine in Preventing Mpox: A Multijurisdictional Case-Control Study – United States, August 19, 2022- March 31, 2023. MMWR Morb Mortal Wkly Rep 2023, 72:553-558.

4. Deputy NP, Deckert J, Chard AN, Sandberg N, Moulia DL, Barkley E, Dalton AF, Sweet C, Cohn AC, Little DR, Cohen AL, Sandmann D, Payne DC, Gerhart JL, Feldstein LR. Vaccine Effectiveness of JYNNEOS against Mpox Disease in the United States. N Engl J Med. 2023 Jun 29;388(26):2434-2443.

5. Preliminary JYNNEOS Vaccine Effectiveness Estimates Against Medically Attended Mpox Disease in the U.S., August 15, 2022 – October 29, 2022 | Mpox| Poxvirus | CDC. www.cdc.gov. Published March 22, 2023.

Acknowledgements

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