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BRIEF REPORT

# Mpox Infection in Children—Infection Control Implications for Household Contacts

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Mpox has recently re-emerged as a global entity of concern. We report one of the first pediatric cases in the United States and provide updated recommendations relevant to infection control and prevention measures of those in close contact with mpox.

**Keywords.** complications; infection control; orthopox; tecovirimat.

Monkeypox virus is a zoonotic orthopoxvirus phylogenetically related to variola (the agent of smallpox). Initially isolated in a laboratory primate during the 1950s, outbreaks of mpox (formerly known as monkeypox) were subsequently identified in both laboratory and zoo animals [1]. The first human case of mpox was observed in the Democratic Republic of the Congo in 1970, and sporadic cases have been seen throughout Central and West Africa. The first outbreak outside of Africa occurred in 2003 within the United States when 71 human cases were linked to the handling of pet prairie dogs infected when co-housed at a distribution center with imported African rodents [2].

More recently, mpox has re-emerged, with >78 000 reported cases as of November 7, 2022 [3]. Though historically zoonotic exposures have been implicated in human infection, cases during the recent outbreak have not been linked to exposure to traditional reservoirs of the virus. Instead, the majority of cases have occurred via presumed person-to-person transmission in men who have sex with men [4]. Mechanisms of person-to-person transmission include direct contact with infectious lesions and, less frequently, indirect contact through fomites and prolonged exposure to respiratory secretions.

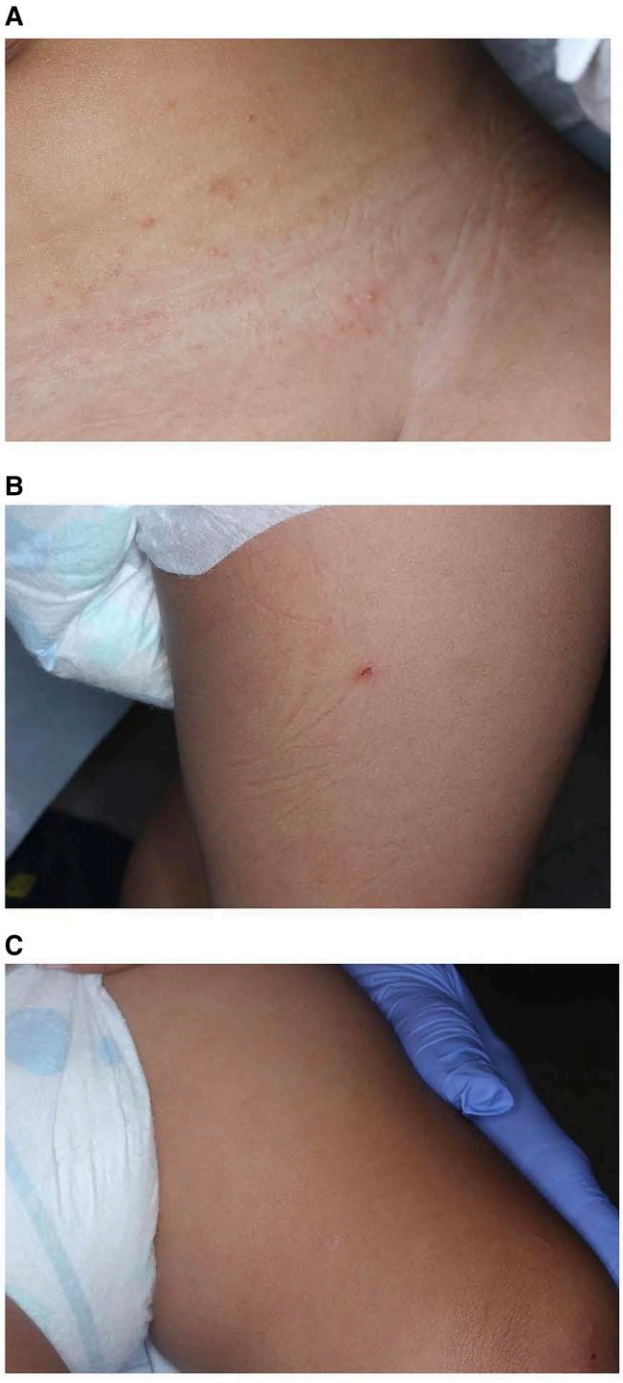


**Figure 1.** *A*, Abdomen. *B*, Left leg. *C*, Right leg.

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These mechanisms have critical implications for household contacts of those with mpox and may potentiate more wide-scale distribution of infection.

## CASE REPORT

A toddler under the age of 3 with no significant medical history was evaluated 6 days after onset of skin lesions and cough. He was afebrile, and scattered pustular lesions were noted over his left thigh and flank (Figure 1*A*–*C*). The remainder of his examination was normal.

The patient's primary caregiver had systemic symptoms of headaches, hoarseness, lymphadenopathy, and skin lesions beginning 8 days before the child's illness. After onset of skin lesions, the caregiver reported using gloves and covering areas with active lesions to limit direct contact with the child. However, as the primary caregiver, routine care including diaper changes, hugging, and playing continued. The caregiver was diagnosed with mpox and began treatment with tecovirimat (600 mg orally twice daily) on the same day the child became symptomatic.

The child's flank lesion was unroofed, swabs taken, and the laboratory confirmed nonvariola orthopoxvirus infection. In the setting of a known exposure, the patient's guardian was offered compassionate use tecovirimat therapy for the child, and consent was obtained from the caregiver. Two hundred milligrams of tecovirimat was administered twice daily for 14 days (capsules were opened and mixed with 30 mL of milk for each dose). Baseline laboratory work revealed a white blood cell count of 10.9 thousand/μL, platelet count of 513 thousand/μL, and a serum creatinine of 0.28 mg/dL. Hepatic function testing was within the normal ranges.

Seven days after treatment initiation, there were no systemic symptoms, and his initial lesions improved, though he developed new lesions on his face and buttocks. No adverse effects of tecovirimat were noted. On follow-up 21 days after tecovirimat initiation, all signs and symptoms of mpox had resolved with no adverse effects noted. The patient began isolating at home after the first skin lesion was identified by the caregiver. No additional cases among household contacts of the patient or their caregiver were identified after strict isolation procedures were followed by both.

## DISCUSSION

This case describes mild mpox infection in a toddler following close household contact with known mpox infection. Historically, sporadic outbreaks of mpox reported in Central and West Africa have documented variable clinical outcomes among pediatric patients [5]. During the 2003 outbreak in the United States, the initial patient evaluated was a 3-year-old girl who developed cellulitis and fever after being bitten by a prairie dog. Her mother later became ill and was diagnosed with mpox, prompting wider investigation [1]. More recently, 1 case of mpox was described in a child under the age of 2 following travel to Nigeria [6]. The patient was hospitalized with fever and a vesicular rash that resolved by day 12 of illness. Of note, while both parents were concurrently diagnosed with mpox, 3 siblings of the pediatric patient tested negative for orthopoxvirus immunoglobulin G. In the current mpox global outbreak, relatively few pediatric cases have been reported [7]. This may reflect its unique presentation and epidemiologic associations [4, 8].

Transmission historically has largely been attributed to animal-to-human contact via bites and scratches and preparation of infected animal products such as bushmeat, as well as person-to-person transmission via close, direct contact with infected individuals and indirect contact through contaminated fomites [4]. Transmission has also been considered via respiratory secretions, though this is thought to be rare [8]. Patients are infectious from onset of symptoms (including prodrome when present) until lesions crust and fall off with formation of new underlying skin. The 2022 outbreak has been deemed atypical for several reasons including epidemiology, location of rash, and absence or timing of prodromal symptoms in some patients, making rapid and accurate diagnosis more difficult [4].

This case demonstrates the importance of maintaining strict infection control practices during mpox, particularly within a household. An analysis of mpox surveillance data in Zaire from 1981 to 1986 revealed a crude secondary attack rate among contacts of 0.03 (~3% probability of becoming infected from another person); however, the risk for contacts living within the same household was nearly twice as high compared with contacts outside of the household [9].

Contact with contaminated fomites is thought to be another potential route of transmission. A prior study demonstrated presence of infection-competent mpox from several environmental samples obtained from a household 3 days after the index patient was admitted to the hospital [10]. Similarly, a recent study from the United States demonstrated widespread household contamination with mpox DNA, though no culturable virus was ultimately isolated [11]. Avoiding sharing utensils, drinking glasses, bed linens, and clothing, frequent hand washing, and appropriate disinfection of contaminated surfaces are some measures that should be implemented in affected households [12]. While isolation is recommended for patients with mpox, this could prove to be challenging in households or schools with children where the primary caregiver is infected; new strategies to prevent household exposure of vulnerable patients may be needed.

We observed new lesions in other areas in our patient 7 days after initiating treatment. This may have been due to autoinoculation. Patients with mpox are advised to avoid scratching lesions to reduce spread to other parts of the body and to promote healing. This recommendation may not be feasible

in younger children due to their limited ability to follow directions and understand implications.

In this report, the patient received tecovirimat after consultation with the US Centers for Disease Control and Prevention, an antiviral medication approved for the treatment of smallpox by the US Food and Drug Administration and available by an expanded access Investigational New Drug (EA-IND) protocol for empiric treatment of nonvariola orthopox infections [13]. Oral dosing is weight-based, with a minimum weight of 13 kg, and can be administered crushed. Data regarding efficacy in humans are limited, though in vitro testing has demonstrated activity against a range of orthopoxviruses [14]. JYNNEOS vaccine is approved for the prevention of smallpox and MVPX in the United States, though there are limited efficacy or effectiveness data in the current outbreak. JYNNEOS is available for children 12 months of age and older via expanded access as an investigational new drug; however, it has not been licensed for use in patients under the age of 18 years in the United States [15]. Additional studies into mpox transmission dynamics, infection prevention, and treatment strategies are needed to better inform guidance for caregivers and optimize care of high-risk patients including pediatric patients in the current outbreak.

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***Potential conflicts of interest.*** The authors: no reported conflicts of interest.

***Patient consent.*** Written informed consent was obtained. The design of the work was approved by the University of California–Davis institutional review board.

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