Monkeypox in human pregnancy: an overview

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Monkeypox is a viral zoonosis caused by the monkeypox virus, an enveloped, double-stranded DNA virus belonging to the Orthopoxvirus genus in the Poxviridae family. Monkeypox has become a disease of global public health significance. Pregnant women are unfortunately among those at an increased risk for exposure to monkeypox because their immune system is altered during pregnancy. They may also be at risk for more severe disease or a worse outcome than others. During pregnancy or while breastfeeding when consideration is given for pre-exposure or postexposure vaccination, nonreplicating (Modified Vaccinia Ankara — Bavarian Nordic) or minimally replicating (LC16, KM Biologics) vaccines are preferred. The ACAM2000 vaccine is contraindicated in pregnancy because it contains live virus particles that can cause fetal vaccinia and fetal death. There are no data to support the use of tecovirimat in pregnant women. However, no fetal adverse effects were noticed when tecovirimat was used in animal studies.

Key words: ACAM2000, monkeypox, MVA-BN, smallpox, tecovirimat

Background

Monkeypox is a viral zoonosis caused by the monkeypox virus, an enveloped, double-stranded DNA virus belonging to the Orthopoxvirus genus in the Poxviridae family. Monkeypox has become a disease of global public health significance. A monkeypox outbreak outside Africa was first reported in 2003 in the United States and was linked to contact with infected pet prairie dogs. By July 21, 2022, 15,735 laboratory-confirmed monkeypox infections were reported by the World Health Organization globally, which was more than double the total number of cases specified in the preceding report of July 9, 2022, meaning that the virus is transmitted in a sustained manner.1 It is feared that in the coming months, we may witness uncontrolled, rapidly expanding monkeypox outbreaks as a response to the lifting of COVID-19 travel restrictions.1

Transmission and clinical features

Transmission occurs through direct contact with lesions from mucous membranes of infected animals or their blood or body fluids. A reservoir of monkeypox is unknown, although rodents are the most likely reservoirs. Human-to-human transmission is through contact with skin lesions, respiratory secretions of an infected person, recently contaminated objects, or vertical transmission. Prolonged face-to-face contact is a prerequisite for transmission by respiratory particles.

The monkeypox virus incubation period has been reported to be 6 to 13 days. Fever, myalgia, back pain, headache, lymphadenopathy, and asthenia characterize a monkeypox viral infection. The face and extremities are affected disproportionately more than other body parts by rashes. Oral mucous membranes, genitalia, conjunctivae, and the cornea are also affected. Monkeypox is commonly a self-limited disease lasting 2 to 4 weeks with a case fatality ratio of around 3% to 6%.1 Monkeypox may be complicated by secondary infections, sepsis, bronchopneumonia, keratitis, and encephalitis.1

Supportive care is mostly adequate. In general, the treatment approach includes antivirals such as tecovirimat, cidovir, and brincidofovir, and Vaccinia Immune Globulin Intravenous (Cangene Corporation, Winnipeg, Canada). Two main vaccines are used in immunization against monkeypox including JYNNEOS (Bavarian Nordic, Hellerup, Denmark), a live, replication-incompetent vaccinia virus, and ACAM2000 (Sanofi Pasteur Biologics LLC, Cambridge, MA), a live, replication-competent vaccinia virus.

In a case series, the outcomes of pregnancy among 4 pregnant women with monkeypox revealed birth of a healthy baby, 2 first-trimester miscarriages, and 1 stillbirth of a macerated baby with skin lesions involving the palms, the soles of the feet, the head, and the trunk.2

Vaccines and antivirals in pregnancy

ACAM2000 (vaccinia vaccine) is a replication-competent smallpox virus vaccine for active immunization against smallpox diseases in persons determined to be highly susceptible to smallpox infections. The variola virus is absent in the vaccine and thus it does not cause smallpox; instead, it is made up of another virus belonging to the poxvirus family and genus

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Orthopoxvirus, called vaccinia virus. It causes rash, fever, and body aches. Modified vaccinia Ankara (MVA) is a third generation, highly attenuated vaccine against smallpox and is used clinically to avoid the unwanted side effects of conventional smallpox vaccines.

JYNNEOS is a replication-deficient smallpox vaccine for smallpox and monkeypox disease prevention. It is a live attenuated vaccine. It can be used in patients who are immunocompromised, such as patients with HIV, and no severe adverse events were noticed.

Antivirals for monkeypox, like tecovirimat, are considered for patients with severe illness and those with immunosuppression. Tecovirimat inhibits the activity of the orthopoxvirus VP37 protein that is important for cell-to-cell and long-range dissemination of the virus. Side effects of tecovirimat include headaches, vomiting and abdominal pain, rashes, purpura, arthralgia, etc. There are no data to support the use of tecovirimat in pregnant women. No adverse fetal effects were noticed when tecovirimat was used in animal studies.

Currently, no monkeypox vaccine is approved for use in pregnant women. The data available for use of the Modified Vaccinia Ankara—Bavarian Nordic (MVA-BN) vaccine in 300 pregnant women did not show an increase in adverse events. The general advice currently is that the MVA-BN vaccine should only be used if the benefits outweigh the potential unknown risk of the vaccine.

Pre- and postexposure prophylaxis

Pregnant women are unfortunately among those at an increased risk for exposure to monkeypox because their immune system is altered during pregnancy. They may also be at risk for more severe disease or a worse outcome than others. Thus, vaccination among them should be considered, especially for post-exposure prophylaxis, following a careful evaluation of the risks and benefits. Those eligible for postexposure prophylaxis include contacts identified by public health officials through case investigation, contact tracing, and risk-exposure assessment. They include presumed contacts who had a sexual partner diagnosed with monkeypox or who had multiple sexual partners (in a jurisdiction with known monkeypox) in the past 14 days.

The pre-exposure prophylaxis is mainly for people at high risk for developing monkeypox (laboratory workers engaged in testing to diagnose monkeypox). During pregnancy or while breastfeeding when consideration is given for pre-exposure or postexposure vaccination, nonreplicating (MVA-BN) or minimally replicating (LC16) vaccines are preferred. If given within 4 days of exposure, the vaccine is likely to prevent monkeypox virus infection. If given 4 to 14 days postexposure, vaccination is likely to reduce symptoms but may not prevent disease development. The ACAM2000 vaccine is contraindicated in pregnancy because it contains live virus particles that can cause fetal vaccinia and fetal death. There are no data to support the use of tecovirimat in pregnant women. However, no fetal adverse effects were noticed when tecovirimat was used in animal studies. Research is needed to fully understand the adverse effects of the monkeypox virus in pregnancy, the utility of preventive measures, and the best treatment strategy.

Conclusion

Monkeypox is a smallpox-like disease that is a globally important emerging infectious disease. Certain populations like pregnant women are at risk for severe disease and should be considered for treatment. Smallpox during pregnancy may be associated with haemorrhagic complications and maternal death. It is recommended that healthcare providers practice universal precautions when handling all patients. There should be clear identification of suspected cases, probable cases, and confirmed cases. Nonreplicating (MVA-BN) or minimally replicating (LC16) vaccines are preferred for use during pregnancy or while breastfeeding. The ACAM2000 vaccine is contraindicated in pregnancy because it can cause fetal vaccinia and fetal death. There are no data to support the use of tecovirimat in pregnant women. However, no fetal adverse effects were noticed when tecovirimat was used in animal studies. Research is needed to fully understand the adverse effects of the monkeypox virus in pregnancy, the utility of preventive measures, and the best treatment strategy.

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