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A Literature Review of Monkeypox

Parlarp Chulapana , Rattanarat Meechai
Rajinibon School

***Corresponding Author:**
Parlarp Chulapana
Rajinibon School

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Abstract

Human monkeypox is a zoonotic Orthopoxvirus with a presentation similar to smallpox. Furthermore, Monkeypox has recently emerged around the world.Clinical differentiation of the disease from smallpox and varicella is difficult. Laboratory diagnostics are principal components to identification and surveillance of disease. Epidemiological studies are needed now because there is currently no proven treatment for human monkeypox.(Di Giulio, D. B., & Eckburg, P. B.,2004) New therapeutics and vaccines offer hope for the treatment and prevention of monkeypox; however, more research must be done before they are ready to be deployed in an endemic setting. There is a need for more research in the epidemiology, ecology, and biology of the virus in endemic areas to better understand and prevent human infections. By doing so,it will raise awareness of the disease among people all over the world. (Andrea M. McCollum, Inger K. Damon,2014).

Keywords: monkeypox, Orthopoxvirus, smallpox, vaccination, infections, diagnosis, prevention

Introduction

The Origin Of Monkeypox

Monkeypox was initially recognized in 1958 as a viral eruption of captive primates.(Reed, K. D., Melski, J. W., Graham,…,2004) The first cases in humans were reported in 1970 in Basankusu district, Equateur Region, Zaire,in 1970, 2 years after the last case of smallpox had occurred in the area. It is a disease that resembles smallpox clinically, but which differs from it in important epidemiological aspects. Some features of the first 21 human monkeypox cases have been reviewed earlier.(Breman, J. G., Kalisa-Ruti,…,1980)

Clinical Data On Human Monkeypox

Incubation period was defined as the number of days between contact with a symptomatic monkeypox patient and development of rash. Rash was chosen as the benchmark of infection for estimating incubation periods because families were better able to recall the day of rash onset than to recall the day of fever onset. To obtain the best estimate of the MPXV incubation period, we identified patients who reported clear dates of exposure and rash onset in our investigation and in the published literature. We determined a mathematical distribution of incubation times and calculated the mean, median, and range for the central 75% of the cases.(Nolen, L. D.,…,2016)

Monkeypox is believed to be the virus that transmitted to humans during handling of infected animals or by direct contact with the infected animal's body fluids or lesions. Person-to-person spread by large respiratory droplets during prolonged face-to-face contact can occur but is much less efficient than that seen with smallpox.The clinical features of human monkeypox closely resemble those of ordinary smallpox. After a 10–14-day incubation period, prodromal illness with fever, malaise, and swollen

lymph nodes are observed in most of the patients before the development of rash. Other signs and symptoms of monkeypox include chills and/or sweats, headache, backache,sore throat, cough, and

shortness of breath. Lymphadenopathy,which has been observed in 90% of unvaccinated patients, is not a common feature of smallpox and is therefore considered to be a key distinguishing feature of monkeypox. The prodromal period generally lasts 1–3 days before the occurrence of the typical maculopapular rash. During the first week of the rash, the patient is considered to be infectious and should be isolated until all scabs separate and results of throat swab PCR are negative. The clinical progress is very similar to that of ordinary smallpox lesions. During a 2–4-week period, lesions progress from macules to papules, vesicles, and pustules, followed by umbilication, scabbing, and desquamation. Although the rash starts mainly on the trunk, it can spread in a peripheral distribution to the palms and soles of the feet. Lesions can be observed on mucous membranes, in the mouth and tongue, and on the genitalia.(Weinstein, R. A., Nalca, A., Rimoin,…,2005).In addition to skin lesions, extracutaneous manifestations, such as secondary skin and/or soft-tissue infection (19% of cases), pneumonitis (12%), ocular complications (4%–5%), and encephalitis (1%) can be observed in patients infected with MPXVDi.(Giulio DB, Eckburg PB. ,2004)The fatality rate is 10%, and death generally occurs during the second week of the disease.(Weinstein, R. A., Nalca, A., Rimoin,…,2005)

Case Report

The first case, a Nigerian naval officer, his symptoms were fever, lymphadenopathy and a rash in the groin area.3 days later the rash had spread to the torso, face and arms. Multiple samples including swabs of the lesions were sent for testing at the PHE Rare and Imported Pathogen Laboratory (RIPL). Monkeypox virus DNA was detected by multiple molecular assays and subsequently confirmed by sequencing analysis.

The second case is a UK resident, his symptoms were fever, lymphadenopathy, a scrotal lump and an itchy maculopapular rash. The rash was reported to have started on the face and later spread to other areas including the palms of the hands and had become pustular. On clinical examination the patient had crops of vesicles that were progressing and lesions on the mucosal surfaces of the mouth. Multiple samples, including swabs from the lesions, sent to RIPL confirmed the presence of monkeypox DNA by multiple molecular assays.(Vaughan, A., Aarons,…,2018)

The third case is a Family from Delta State, Nigeria. This case developed a vesicular lesion, with further vesicles developing over the next week. However, on the day after, following discussion between the emergency department and the UK Imported Fever Service,This Case was transferred to a high consequence infectious diseases (HCID) Unit in Liverpool, England. Based on urine samples and skin swabs collected on that day, Public Health England's Rare and Imported Pathogens Laboratory confirmed 2 days later, by PCR and sequencing, the West African clade of monkeypox virus.

Concurrently, This case's spouse and four young children were placed under active surveillance. The youngest child developed lesions compatible with early monkeypox; the decision was made to transfer the spouse and all four children to the same HCID Unit in Liverpool. Meanwhile, The case was well, afebrile, and all skin lesions had crusted. The three children with no features clinically compatible with monkeypox remained with the family for monitoring and remained asymptomatic.After that, The case was discharged with the three children who did not develop monkeypox while under active surveillance within the 21-day follow-up period .However, the other adult member of the family ,who resided in the same isolation room for the duration of their hospital admission, developed a vesicular rash.(Vaughan, A., Aarons,…,2020)

Monkeypox Global Outbreak

Outbreak	Place of outbreak	Year
1	Statens Serum Institute,Copenhagen, Denmark	1958

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2	Rotterdam Zoo, Netherlands	1964-1965
3	National Institute of Public Health,Utrecht, Netherlands	1964-1965
4	Walter Reed Army Institute,Washington, D.C., USA	1961
5	Merck, Sharp & Dohme, Research Laboratories, West Point, Penn., USA	1959
6	National Center for Primate Biology, Davis, Calif., USA	1966
7	Lederle Laboratories, Pearl River,New York, N.Y., USA	before 1966
8	The Dow Chemical Company Biological Laboratories, Zionsville,Ind., USA	1965
9	Wyeth Laboratories, Inc.Marietta, Penn, USA	1966
10	Centre d'ensoignement et de Recherches de Médecine Aéronau-lique, Paris, France	1968
11	Basankusu Territory	1970
12	Various – national total	1981-1986
13	Katako-Kombe HZ	1996-1997
14	Kasai Oriental	1996-1997
15	Katako-Kombe, Lodja Nord, Sud HZ	1997
16	Sankuru	1999
17	Equateur Province	2001
18	Businga	2002
19	Bokungu HZ	2013
20	Ateki HZ	2016
21	Sankuru	2018

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22	NA (ISDR data)	2001-2013
23	Pimu CAR/DRC border	2001
24	Deep forest, Southern CAR	2010
25	Bria	2015
26	Mbomou province	2015-2016
27	Haute-Kotto health district	2016
28	Alindao-Mingala Health District	2016
29	M'baïki district	2017
30	Bangassou, sub-district Rafai	2017
31	Bambari, Ippy sub-district	2018
32	Mbaïki: Bangandou sub-district	2018
33	Likouala department	2003,2010,2017
34	Unity State	2005
35	ND	1989
36	Njikwa Health District	2018
37	Lambarene	1987
38	Region between Lamberene and N'Djole	1991
39	Abia State	1971
40	Oyo State	1978
41	24 States	2017-2018
42	Moyamba District	1970-1971
43	Pujehun district	2017

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(Arita, I., Gispen,…,1972) & (Beer, E. M., & Rao, V. B. 2019)

Prevention And Treatment

Vaccination combined with an aggressive surveillance program ultimately resulted in the global eradication of smallpox. Unfortunately, eradication of monkeypox is not possible because of the existence of an animal reservoir. However, vaccination with vaccinia virus (the smallpox vaccine) is highly protective against infection with MPXV.(Weinstein, R. A., Nalca, A., Rimoin,…,2005) In fact, researchers in the 1960s showed that monkeys could be successfully immunized against monkeypox by smallpox vaccination.(McConnell S, Herman YF, Mattson DE, Huxsoll DL, Lang CM, Yager RH, 1964.) Moreover, not only were reduced numbers of human monkeypox cases observed in Africa among persons who were vaccinated, many of the cases were extremely mild (with very few lesions), and some cases may have been subclinical. Due to these reasons, the Centers for Disease Control and Prevention recommends pre-exposure vaccination for persons who are investigating animal or human monkeypox cases, health care workers who are caring for patients with monkeypox, anyone who has direct contact with suspected MPXV-infected animals,and laboratory workers who handle specimens that may contain MPXV.There are currently no licensed antiviral drugs available for the treatment of MPXV infection.However human use Cidofovir which is a broad-spectrum antiviral drug that has activity against many DNA viruses, including MPXV. Furthermore Cidofovir has not been used to treat orthopoxvirus infection in humans but has been tested extensively in laboratory animals. Modified forms of cidofovir that can be given orally are currently in development and have shown some promise in a mouse model of orthopoxvirus infection but much work and research need to be performed, especially in nonhuman primates, before a licensed drug will be available to treat human monkeypox infections.(Weinstein, R. A., Nalca, A., Rimoin,…,2005)

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