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Marburg Virus Disease: A Review Literature

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Abstract

Marburg virus disease was identified for the first time in 1967 during an epidemic in Marburg and Frankfurt, Germany, after infected monkeys were imported from Uganda. Available and scattered data of Marburg virus disease were collected and summarized in the present report. Marburg virus global data including epidemiology, reservoir host, Clinique, diagnostic, transmission and prevention were reviewed. It is a serious and usually fatal disease caused by a virus of the same family as that at the origin of the Ebola virus disease. Because of their extreme pathogenicity and lack of vaccine at present, they are considered a potential biological weapon of category 4. The fatality rate varies from 25% during the first outbreak appeared in a laboratory in 1967 to over 80% between 1998 and 2000 in the Democratic Republic of Congo during the outbreak in Angola in 2005. *Roussettus aegyptiacus* is considered as the natural reservoir of this virus. The identification of the natural reservoir of this virus should foster the development health measures and prevention campaigns to the population to reduce the apparition and emergence of potential outbreaks of hemorrhagic fever.

Keywords

Marburg virus disease; Pathogenicity; Natural reservoir; Development health measure

Introduction

Marburg virus global data

Marburg virus disease (formerly known as Marburg haemorrhagic fever) was identified for the first time in 1967 during an epidemic in Marburg and Frankfurt, Germany, and in Belgrade, former Yugoslavia, after infected monkeys were imported from Uganda [1]. It is a serious and usually fatal disease caused by a virus of the same family as that at the origin of the Ebola virus disease. Both Marburg and Ebola viruses belong to the family Filoviridae (Filovirus). In contrast to the latter, for which five species exist, the Marburg virus comprises only one species composed of two distinct lines (MARV and RAVN) according to phylogenetic studies [2]. Although they are caused by different viruses, the two diseases are similar clinically. These viruses are among the most virulent pathogens in humans. Both diseases are rare but can cause dramatic outbreaks causing many deaths. The fatality rate varies from 25% during the first outbreak appeared in a laboratory in 1967 to over 80% between 1998 and 2000 in the Democratic Republic of Congo during the outbreak in Angola in 2005 [3,4]. Because of their extreme pathogenicity and lack of vaccine at present, they are considered a potential biological weapon of category 4. Their handling therefore requires extreme safety conditions [4].

Epidemiology

The first case of contamination identified on the African continent took place in 1975 in Johannesburg, in a young man returning from a trip to Zimbabwe [5]. Subsequently, the virus caused sporadic epidemics in Kenya [6,7] and Uganda [8,9]. The first episode of community epidemic in Africa took place between 1998 and 2000 in the Democratic Republic of Congo. During this outbreak, 154 cases including 128 deaths were identified. These were the first cases reported in the country [10]. Between October 2004 and August 2005, Angola experienced its first epidemic near the border with the Democratic Republic of Congo. The balance was 252 cases including 227 deaths [11]. It is still the most important Marburg virus outbreak to date. The last appearance of the Marburg virus was in Uganda in October 2014, with only one confirmed case reported near the capital Kampala. Two exported cases were reported among travelers returning from Uganda, one in the Netherlands (2008), the other in the USA (2008) [12,13].

Marburg reservoir host

Previous studies detected antibodies against Marburg virus in the serum of only one of ten species caught. It is the Egyptian flying fox (*Roussettus aegyptiacus*), a migratory frugivorous bat whose range includes the whole of the African continent south of the tropic of cancer. In addition, the search for fragments of the viral genome carried out on 283 specimens of *Roussettus aegyptiacus* showed that the liver and spleen of four of them contained RNA sequences belonging to 3 different genes of the Marburg virus. The serum of three of these four specimens also contains antibodies specific for Marburg virus. The simultaneous presence of specific antibodies against both viruses and viral RNA fragments strongly suggest that this bat species carries the virus but does not develop the symptoms, pointing to Egypt's flying fox as the natural reservoir of this virus [14,15].

Clinic

At the onset of the disease, non-specific symptoms resemble those of influenza or malaria. Three to fourteen days after infection (incubation time), the disease suddenly starts with high fever, chills, extreme fatigue, headache, nausea, vomiting and diarrhea [3,4]. Weight loss, abdominal, muscular and joint pain, and breathing difficulties are some of the observed common symptoms.

After this first phase, Marburg fever may cause haemorrhage, i.e., characteristic bleeding such as vomiting of blood, hemorrhage in the gums, nosebleeds, petechiae (small spots on the surface of the skin or mucous membranes due to rupture of blood capillaries). The patient's condition deteriorates sharply as the disease progresses; it can cause jaundice, pancreatitis, delirium, shock, liver or multiple organ failure (multi-organ failure). The mortality rate is high and ranges between 25 and 80%.

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Diagnostic

Samples taken from patients are extremely bio hazardous; laboratory tests carried out on samples that have not been inactivated must be carried out under maximum biological confinement conditions. All biological samples must be protected in triple packaging when transported in the country and abroad. In practice, Polymerase Chain Reaction (PCR) is the most reliable and fastest method of detection in an emergency setting. Indeed, viremia (appearance of the virus in the blood) occurs as soon as the symptoms appear, thus making it possible to detect the viral genome [16]. The first clinical signs of Marburg disease are similar to those of several endemic diseases in Africa such as malaria, typhoid fever or Lassa fever, which can make diagnosis difficult, especially in an isolated case.

Transmission

The virus is transmitted from animals to humans or from person to person. In the first case, transmission is by contact with bats or monkeys, or their bodily secretions [14,17]. Since the virus is difficult to pass from one person to another, human-to-human contamination is rare. Transmission is possible following close contact with an infected person, such as blood, feces, vomit, urine, saliva or semen [3]. Note that an infected person remains contagious after his death. It is important to note that manipulation error or non-compliance with safety conditions when handling the virus in the laboratory has been described as causing human contamination in Russia in 1990 [18].

Prevention

There is no vaccine against Marburg virus disease or specific treatment. The main prevention measures focus mainly on avoiding direct contact with blood, saliva, vomiting, urine, or other body fluids from people with Marburg virus disease and avoid close contact with potential vectors, dead or alive, as both can spread the virus.

Conclusions

In the future, the results of this research should allow better delineation geographical areas potentially concerned by the presence of the Marburg virus, extending it to include West Africa, which is an important migratory region for fruit bats from Egypt. The identification of the natural reservoir of this virus should also foster the development health measures and prevention campaigns to the population to reduce the apparition and emergence of potential outbreaks of hemorrhagic fever.

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