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Emerging Rift Valley fever in China: What should be known?

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EDITOR'S NOTE

On 23rd July, 2016, China confirmed the **first imported case of Rift Valley fever**, drawing attention from researchers towards this viral disease. APJTB reported the important information on Rift Valley fever timely.

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ABSTRACT

Rift Valley fever is an important viral infection that is rarely reported in Asia. The recent emergence of this infection in China is a big global interest. In this short article, the author reviewed and presented important information on this disease.

1. Introduction

Rift Valley fever is an arthropod-borne *Phlebovirus* infection. The Rift Valley fever virus can cause Rift Valley fever. Rift Valley fever is an important viral infection that is rarely reported in Asia. Recently, one case of Rift Valley fever was confirmed in China, drawing attention from researchers towards this viral disease. The recent emergence of this infection in China is a big global interest. In this short article, the author reviewed and presented important information on this disease.

2. What to know about Rift Valley fever

2.1. Epidemiology

The Rift Valley fever is the disease that is endemic in sub-Saharan Africa region, Egypt, Madagascar, and Arabian Peninsula [1–4]. It is considered as an important zoonotic arboviral disease that is a threat to human health, animal health and production [3]. Large epizootics occur at irregular intervals in Africa. The problem is common when there are an above-average rainfall, a persistent flooding and an increase in numbers of floodwater-breeding mosquitoes [1–3]. The strong correlation between rainfall and occurrence of Rift Valley fever is widely mentioned. Pretorius *et al.* noted that epizootics of Rift Valley fever were often associated with periods of heavy rainfall, which is the suitable environmental condition for mosquito vectors breeding [4]. Nevertheless, in seasons with normal or low rainfall, enzootic circulation can occur, implying existence of a natural host that could act as a cryptic carrier during inter-epizootic periods [4]. The expansion of the disease outside Africa has been proposed for many years and it is believed to be due to the importation of infected animals to the new area [5]. Gradual spread and geographical extent of disease are confirmed and become the focus in public health at present [6].

Nevertheless, the great concern is on the recent problems of zoonosis. There are many new reports on human infections. Baba *et al.* noted that Rift Valley fever increases the potential public health and socioeconomic impacts of future outbreaks [7]. The zoonosis is important to be mentioned. Human infection is already reported and the contact with infected animals or their body fluids directly becomes the important mode of transmission [5–9]. In addition, the transmission through mosquito bites is also possible and makes the situation more complex [5–12].

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2.2. Vector and transmission

Concerning the transmission of Rift Valley fever in animal, it is mainly transmitted as a vector borne disease and the important vector is mosquito [10]. The *Culex* spp. are reported to be the important vector for this disease. For the human case, the infection might be due to direct contact with infected animals or their products or due to mosquito bites [5–12]. The extension of the disease epidemiology to the new areas such as East Asia is believed to be due to importation of mosquito vector from endemic area by direct flight [13]. Lernout *et al.* concluded that human beings and animals share the same way of transmission of Rift Valley fever as vector borne disease with mosquitos being the important vector [14]. Nevertheless, there are also some reports on the uncommon modes of transmission of Rift Valley fever in human beings. The vertical transmission has just been reported for few years [15,16]. This can result in fetal death [16]. This transmission can be seen despite there is no maternal viremia [17]. Recently, there was an assessment on the risk for nosocomial transmission of Rift Valley fever and no risk was reported [18].

2.3. Clinical manifestation, diagnosis and treatment

In animal, Rift Valley fever can cause abortion in pregnant animals and result in fatality of fetuses [1–3]. For diagnosis of animal infection, several laboratory techniques can be used, such as agar gel precipitation test, complement fixation test, serum neutralisation test and indirect immunofluorescence assay [1–3]. Concerning human infection, Rift Valley fever is mainly a zoonosis. The infected case might have acute influenza-like illness [19–21]. When infected, in both animals and humans, the primary site of viral replication is the hepatic tissue [20]. Hemorrhagic complication, neurological problems, ocular problems and hepatitis can also be observed. According to the recent report by Rakotoarivelo *et al.*, hemorrhagic, neurological, and ocular manifestations were observed in 87.5%, 43.8% and 6.3% of cases, respectively [19]. For diagnosis in human cases, the final diagnosis is usually based on molecular diagnostic test [19–21]. The cases usually have moderate to severe fever but not fatal [20].

Concerning treatment of Rift Valley fever, there is still no specific antiviral drug. The treatment for Rift Valley fever is usually symptomatic and supportive treatment and the protocols used in other arboviral disease can be applied. The same treatment used for dengue infection could be applied in any cases with hemorrhagic presentation. Correction of anemia in severe case is needed [22]. For the cases with central nervous system problem, the standard treatment for viral encephalitis can be applied. For the cases with severe clinical problems, multi-organ failure can be observed and the high mortality was reported (one-third) [22].

3. Prevention

Similar to other arboviral diseases, control of vector is a basic method for primary prevention of this disease. In humans, avoiding contact with suspicious infected animals and animal products is suggested [5]. For animals, the vaccine is available (inactivated or live attenuated vaccine) [1–3]. For human, there is still no vaccine. The human vaccine is still under development [8,12,23].

4. Emergence of human Rift Valley fever

As already noted, human Rift Valley fever is the big public health concern at present. Existence of the disease in the new area becomes the important public health issue. The emerging infection can be due to many situations. The first situation is the imported infected animal acting as the source of local transmission and zoonosis. The second situation is the disease carried by traveler returning from endemic area to his/her hometown. The recent emerging human case of Rift Valley fever in East Asia is the issue for present discussion.

The Rift Valley fever becomes the new concern in Korea. For a few years, there have been some reports on the seroprevalence in local animals [24,25]. Nevertheless, although there is a risk on vector, the present situation is still “a disease free” situation in Korea.

There is still no problem of Rift Valley fever in Japan at present.

The emergence of Rift Valley fever in China is an interesting situation. The imported case from Angola is the first human case reported in China [26]. The case is a male patient presenting with acute febrile illness. This is the warning sign indicating the necessity to perform a disease control towards Rift Valley fever in China.

5. Conclusion

Rift Valley fever is an important viral disease that can be seen in both animals and human beings. In general, human Rift Valley fever is considered as a zoonotic disease and the possibility of epidemic due to vector borne transmission is confirmed. The extension of its primary endemic area to the new setting and increased number of zoonotic cases bring attention of the medical scientists worldwide. The recent emerging case in China can be a good sign and warning for the possible problem of Rift Valley fever in East Asia.

Conflict of interest statement

I declare that I have no conflict of interest.

References

[1] Gerdes GH. Rift Valley fever. *Rev Sci Tech* 2004; **23**(2): 613-23.
[2] Gerdes GH. Rift Valley fever. *Vet Clin North Am Food Anim Pract* 2002; **18**(3): 549-55.
[3] Métras R, Cavalerie L, Dommergues L, Mérot P, Edmunds WJ, Keeling MJ, et al. The epidemiology of Rift Valley fever in Mayotte: insights and perspectives from 11 years of data. *PLoS Negl Trop Dis* 2016; **10**(6): e0004783.
[4] Pretorius A, Oelofsen MJ, Smith MS, van der Ryst E. Rift Valley fever virus: a seroepidemiologic study of small terrestrial vertebrates in South Africa. *Am J Trop Med Hyg* 1997; **57**(6): 693-8.
[5] Ganter M. Zoonotic risks from small ruminants. *Vet Microbiol* 2015; **181**(1–2): 53-65.
[6] Nanyingi MO, Munyua P, Kiama SG, Muchemi GM, Thumbi SM, Bitek AO, et al. A systematic review of Rift Valley fever epidemiology 1931–2014. *Infect Ecol Epidemiol* 2015; http://dx.doi.org/10.3402/iee.v5.28024.
[7] Baba M, Masiga DK, Sang R, Villinger J. Has Rift Valley fever virus evolved with increasing severity in human populations in East Africa? *Emerg Microbes Infect* 2016; **5**: e58.
[8] Mansfield KL, Banyard AC, McElhinney L, Johnson N, Horton DL, Hernández-Triana LM, et al. Rift Valley fever virus: a

review of diagnosis and vaccination, and implications for emergence in Europe. *Vaccine* 2015; **33**(42): 5520-31.
[9] Himeidan YE, Kweka EJ, Mahgoub MM, El Rayah el A, Ouma JO. Recent outbreaks of Rift Valley fever in East Africa and the Middle East. *Front Public Health* 2014; **2**: 169.
[10] Tantely LM, Boyer S, Fontenille D. A review of mosquitoes associated with Rift Valley fever virus in Madagascar. *Am J Trop Med Hyg* 2015; **92**(4): 722-9.
[11] Linthicum KJ, Britch SC, Anyamba A. Rift Valley fever: an emerging mosquito-borne disease. *Annu Rev Entomol* 2016; **61**: 395-415.
[12] Bird BH, McElroy AK. Rift Valley fever virus: unanswered questions. *Antivir Res* 2016; **132**: 274-80.
[13] Kim HJ, Lyoo HR, Park JY, Choi JS, Lee JY, Jeoung HY, et al. Surveillance of Rift Valley fever virus in mosquito vectors of the Republic of Korea. *Vector Borne Zoonotic Dis* 2016; **16**(2): 131-5.
[14] Lernout T, Cardinale E, Jego M, Desprès P, Collet L, Zumbo B, et al. Rift Valley fever in humans and animals in Mayotte, an endemic situation? *PLoS One* 2013; **8**(9): e74192.
[15] Adam I, Karsany MS. Case report: Rift Valley fever with vertical transmission in a pregnant Sudanese woman. *J Med Virol* 2008; **80**(5): 929.
[16] Arishi HM, Aqeel AY, Al Hazmi MM. Vertical transmission of fatal Rift Valley fever in a newborn. *Ann Trop Paediatr* 2006; **26**(3): 251-3.
[17] Antonis AF, Kortekaas J, Kant J, Vloet RP, Vogel-Brink A, Stockhofe N, et al. Vertical transmission of Rift Valley fever virus without detectable maternal viremia. *Vector Borne Zoonotic Dis* 2013; **13**(8): 601-6.
[18] Al-Hamdan NA, Panackal AA, Al Bassam TH, Alrabea A, Al Hazmi M, Al Mazroa Y, et al. The risk of nosocomial transmission of Rift Valley fever. *PLoS Negl Trop Dis* 2015; **9**(12): e0004314.
[19] Rakotoarivelo RA, Andrianasolo R, Razafimahefa SH, Randremandranto Razafimbelo NS, Randria MJ. [Severe presentations of Rift Valley fever in Madagascar]. *Med Mal Infect* 2011; **41**(6): 318-21. French.
[20] Paweska JT. Rift Valley fever. *Rev Sci Tech* 2015; **34**(2): 375-89.
[21] Pépin M, avec la participation de la CIRE Réunion-Mayotte et l'Institut de Veille Sanitaire (InVS). [Rift Valley fever]. *Med Mal Infect* 2011; **41**(6): 322-9. French.
[22] Boushab MB, Savadogo M, Sow MS, Fall-Malick FZ, Seydi M. [Severe hemorrhagic form of Rift Valley fever in Mauritania]. *Bull Soc Pathol Exot* 2015; **108**(2): 102-6. French.
[23] Kortekaas J. One health approach to Rift Valley fever vaccine development. *Antivir Res* 2014; **106**: 24-32.
[24] Kim HJ, Nah JJ, Moon JS, Ko YJ, Yoo HS, Kweon CH. Competitive ELISA for the detection of antibodies to Rift Valley fever virus in goats and cattle. *J Vet Med Sci* 2012; **74**(3): 321-7.
[25] Kim HJ, Park JY, Jeoung HY, Yeh JY, Cho YS, Choi JS, et al. Serological surveillance studies confirm the Rift Valley fever virus free status in South Korea. *Trop Anim Health Prod* 2015; **47**(7): 1427-30.
[26] China Daily. China confirms first imported Rift Valley Fever case. Beijing: China Daily; 2016. [Online] Available from: http://africa.chinadaily.com.cn/china/2016-07/24/content_26199100.htm [Accessed on 25th July, 2016].