

Florida Poison Information Center/Jacksonville
At Shands Jacksonville
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1-800-222-1222

Viral Hemorrhagic Fevers

History

The viral hemorrhagic fevers (VHF) are caused by a taxonomically diverse group of RNA viruses that includes Arenaviridae, the Bunyaviridae, the Filoviridae, and the Flaviviridae. They are all transmitted in their natural setting via animal reservoirs and arthropod vectors. The Arenaviruses are maintained in nature in a rodent reservoir. Included in this category are the Lassa virus, which probably accounts for 40% of all nonsurgical deaths in West Africa; the Junin virus of the pampas of Argentina; the Machupo virus of Bolivia; the Sabia virus of Brazil and the Guanarito virus of Venezuela. The Bunyaviruses include the Phlebovirus, which causes Rift Valley Fever in Africa; Nairovirus, which causes Crimean-Congo VHF in Europe, Africa, and Asia; and Hantavirus, a rodent born virus that causes the Hantavirus Pulmonary Syndrome (Sin Nombre virus), which has recently plagued the Southwest USA. The Filoviridae cause the much written about Marburg and Ebola hemorrhagic fevers, which produced catastrophic outbreaks in Zaire and Sudan in recent years. The Flaviviridae include the historically important mosquito born Yellow Fever and Dengue viruses.

Properties

The VHF viruses are all simple RNA viruses with lipid envelopes. They are susceptible to detergents as well as significant pH changes. They are very stable at neutral pH, however, and have been isolated from patient's blood after weeks of storage at a variety of temperatures. These viruses are also quite stable as aerosols, highlighting their potential as agents of terrorism. Even though these viruses are linked to their reservoirs and vectors, human-to-human spread is possible.

Mechanism of Action

The target organ in the VHF syndrome is the vascular bed. Microvascular insult and increased vascular permeability are responsible for most of the clinical features of VHF. The spectrum of bleeding progresses from mild petechiae and conjunctival injection to frank bleeding from mucosal surfaces with full-blown shock. CNS, pulmonary and hepatic involvement is common. Renal failure is usually secondary to cardiovascular compromise, except in Hantavirus Pulmonary Syndrome, where the kidney is directly involved.

Symptoms

Fever, myalgias, and prostration are common complaints to all VHF agents. Beyond these nonspecific symptoms, the various agents differ in their hemorrhagic components and the specific organs involved. Hemorrhagic manifestations are not prominent for Lassa virus, but are much more common with the South American Arenaviridae. Rift Valley Fever features a mild hemorrhagic component but a marked tendency to cause retinitis. Crimean-Congo HF is noted for profuse bleeding usually associated with DIC. Hantavirus infection ensues usually after exposure to excreta of infected rodents and produces a severe pneumonia with respiratory distress. Renal failure with persistent oliguria is common. Marburg and Ebola viruses produce inflammatory responses of

severe proportions with extremely high mortality. DIC is a prominent component of the clinical picture. Yellow Fever virus causes a severe hepatitis and most people die with a hepatorenal-like picture.

Medical Management

Decontamination: Universal precautions are always recommended when handling VHF patients, including mask, gown, and glove protection. Care should be taken to limit the number of routine blood draws and anything that might lead to the aerosolization of blood.

The medical management of VHF centers on supportive care. Multi-system organ failure is a usual complication and involves the same management given to other critical illnesses. Care should be taken not to expose patients to too many violent transport techniques as they have fragile capillaries. Ground transport is favored over air evacuation. Superinfections, particularly malaria, should be aggressively treated. Intubation and ventilatory support may well prove necessary. Renal function and electrolyte balance can easily become issues, particularly with hantavirus and yellow fever infections. Steroids used empirically have not been proven to be of value.

Bleeding should be treated in a manner similar to DIC management used in other settings: heparin therapy along with replacement of clotting factors and platelets as needed. Mild bleeding should probably not be treated routinely. Shock should be treated with cautious administration of colloid and crystalloid solutions, keeping in mind that pulmonary edema secondary to leaking capillaries is always a concern.

Antibiotics: Ribavirin has proven efficacy against Lassa Fever. Additionally, ribavirin has shown promise as an antiviral against most of the other VHF agents.

Vaccine: The only currently approved VHF vaccine is that for Yellow Fever, but vaccines against the other viruses are currently being fine-tuned.

Bibliography

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