Rift Valley Fever

by

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Rift Valley Fever Overview

- Named after outbreak in Kenya
- Acute febrile disease
  - Sheep, cattle, goats
  - High abortion rates and death in young
- Can affect humans
- Heavy rainfalls
- Arthropod vector
  - Most commonly mosquito
Rift Valley – Kenya

- 1900’s: First recognized in sheep
- 1930: Agent isolated
- Intermittent outbreaks in Kenya
  - 1950-51, major epizootic
    - 500,000 sheep abortions
    - 100,000 sheep deaths
Egypt: 1977-1978

- **Humans**
  - 18,000 cases
  - 598 deaths
    - Encephalitis and hemorrhagic fever
    - Case-fatality less than 1%

- **Ruminants**
  - Abortions and deaths
    - Sheep, cattle, goats
    - Water buffalo, and camels
Other Important Outbreaks

- **1987: Senegal, Africa**
  - Differed from other outbreaks
    - Not associated with rainfall

- **1997-98: Kenya, Africa**
  - Largest outbreak reported
  - 89,000 humans cases - 478 deaths

- **2000-01: Saudi Arabia and Yemen**
  - First outbreak outside of Africa
Current outbreak in Kenya

- Garissa, Wajir, Ijara, Kilifi, Tana River, Malindi, Isiolo, Kirinyaga, Kajiado, and Taita Taveta
- Animal cases in Kitui, Makueni, Mombasa, Moyale, Lamu, Thika, Mwingi and Naiwasha
- More than 120 human deaths
Epidemiology

- Endemic in tropical Africa
  - Cyclic epidemics 5-20 year
    - Susceptible animal populations
  - Abnormally heavy rainfalls
Reservoir

- Mosquitoes – *Aedes* species
  - Transovarial transmission
  - Eggs dormant for long periods
  - Heavy rainfall, eggs hatch

- Ruminant amplifying host

- Secondary vectors can be infected
  - *Culex* and *Anopheles* mosquito species
  - Biting flies: midges, phlebotomids, stomoxids, simulids
Transmission

- **Arthropod vector**
  - Mosquitoes
    - *Aedes*
    - *Anopheles*
    - *Culex*
    - Others
  - Biting flies possible vectors
Other Modes of Transmission

- Tissue or body fluids of infected animals
- Direct contact or aerosolization
  - Aborted fetuses
  - Slaughter
  - Necropsy
- No person-to-person transmission
Human Disease

- **Incubation period:** 2-6 days
  - Inapparent or flu-like signs
    - Fever, headache, myalgia, nausea, vomiting
    - Recovery in 4-7 days
  - Retinopathy
  - Hemorrhagic fever
  - Encephalitis
- **Overall mortality** ~1%
Human Disease

- Retinopathy (1-10%)
  - 1-3 weeks after onset of symptoms
  - Conjunctivitis
  - Photophobias
  - Can lead to permanent vision loss
  - Death is uncommon
Human Disease

- **Hemorrhagic fever**
  - 2-4 days after fever
  - Melena, hematemesis, petechia, jaundice, shock, coma
  - Death
  - Case-fatality is ~50%

- **Encephalitis**
  - 1-3 weeks after onset of symptoms
  - Can occur with hemorrhagic fever
Diagnosis and Treatment

**Diagnosis**
- ELISA, human blood
- Demonstration of viral antigen

**Treatment**
- Symptomatic and supportive therapy
- Replacement of coagulation factors
- Ribavirin may be helpful
<table>
<thead>
<tr>
<th>Mortality 100%</th>
<th>Severe Illness Abortion Mortality</th>
<th>Severe Illness Viremia Abortion</th>
<th>Infection Viremia</th>
<th>Refractive to Infection</th>
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</thead>
<tbody>
<tr>
<td>Lambs</td>
<td>Sheep</td>
<td>Monkeys</td>
<td>Horses</td>
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<tr>
<td>Calves</td>
<td>Cattle</td>
<td>Camels</td>
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<td>Rabbits</td>
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<tr>
<td>Kids</td>
<td>Goats</td>
<td>Rats</td>
<td>Dogs</td>
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<tr>
<td>Puppies</td>
<td>Humans</td>
<td>Squirrels</td>
<td>Monkeys</td>
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<tr>
<td>Kittens</td>
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<tr>
<td>Some rodents</td>
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Post Mortem Lesions

- Hepatic necrosis
  - Liver enlarged, yellow, friable
  - Petechial hemorrhages prominent
    - Cutaneous
    - Serosal
Control & Prevention

- Immunization of ruminants
- Avoid and control vectors
- Sleeping under ITNs Personal protective equipment
  - Aborted fetuses, necropsy
- Avoid contact with infected tissues and blood
- Restrict movement of animals
- Precautions when travelling
Rift Valley Fever Vaccine

- Veterinary
  - Live attenuated vaccine (single dose). Causes abortion if given to pregnant animals
  - Killed vaccine (multiple doses). Do not cause abortions

- Human vaccine
  - Inactivated vaccine. Used to protect veterinary and laboratory personnel
THANK YOU!