Dengue & Chikungunya Fever

A World Wide Problem

John Gibson, MD
Introduction

Dengue is an arthropod-borne disease caused by any one of four closely related related viruses. Infection with one serotype of dengue virus provides immunity to that serotype for life. A person can be infected as many as four times, once with each serotype. Dengue viruses are transmitted from person to person by *Aedes* mosquitoes (most often *Aedes aegypti*) in the domestic environment. Endemic in Asia for many years, in the past 20 years, dengue transmission and the frequency of dengue epidemics has increased greatly in most tropical countries of the American region.
The Culprit!

- *Aedes aegypti*
Current Dengue Map from CDC

Distribution

Areas infested with *Aedes aegypti*
Areas with *Aedes aegypti* and dengue epidemic activity
Texas Woman’s Death From Domestically Acquired Dengue Fever Complications Highlights Need For Dengue Vigilance
Symptoms and Signs

- Fever
- Pain
- Anorexia
- Abdominal Pain
- Nausea and Vomiting
- Petechial Rash
Exam

- Appearance
- Fever range 102 to 105
- Tourniquet Test
- Liver/Epigastric Tenderness
- Lab Findings: CBC, UA special tests
- XRAY: Pleural Effusions,
Clinical Case Definition for Dengue Hemorrhagic Fever

4 Necessary Criteria:

- Fever, or recent history of acute fever
- Hemorrhagic manifestations
- Low platelet count (100,000/mm$^3$ or less)
- Objective evidence of “leaky capillaries:”
  - elevated hematocrit (20% or more over baseline)
  - low albumin
  - pleural or other effusions
Laboratory Tests in Dengue Fever

- Clinical laboratory tests
  - CBC--WBC, platelets, hematocrit
  - Albumin
  - Liver function tests
  - Urine--check for microscopic hematuria

- Dengue-specific tests
  - Virus isolation
  - Serology
Positive Tourniquet Test
Clinical Course

- 4 to 7 Days
- Bimodal Course (?
  Multiple strains)
- Recovery
- When to worry
Warning Signs for Dengue Shock

Four Criteria for DHF:
- Fever
- Hemorrhagic manifestations
- Excessive capillary permeability
- \( \leq 100,000 / \text{mm}^3 \) platelets

Initial Warning Signals:
- Disappearance of fever
- Drop in platelets
- Increase in hematocrit

Alarm Signals:
- Severe abdominal pain
- Prolonged vomiting
- Abrupt change from fever to hypothermia
- Change in level of consciousness (iritability or somnolence)

When Patients Develop DSS:
- 3 to 6 days after onset of symptoms
Treatment

- Careful watch of Vital Signs
- IV Hydration
- Monitoring of CBC (Esp HCT and Platelet Cnt)
- “Judicious use of platelets”
- “ICU” care
Post Dengue Syndrome

- Depression
- Chronic Fatigue
- Neuropathy
- Arthritis/Arthalgia
Chikungunya Fever

“Joint Break Fever”
A re-emerging problem
Derivation of Terms

- Chikungunya: local language of Tanzania meaning "that which bends up" or "stooped walk" because of the incapacitating arthralgia caused by the disease.
Chikungunya fever is a viral disease transmitted to humans by the bite of infected mosquitoes. Chikungunya virus is a member of the genus Alphavirus, in the family Togaviridae. First diagnosed in E. Africa over 50 years ago, it is now spreading throughout Africa, Asia, Europe and now the Americas.
Where is this thing?
Cases in 2014
Recent Epidemics

- In India, nearly 1.4 million cases of chikungunya fever were reported in 2006, and outbreaks have continued to occur. The appearance and spread of chikungunya virus in India was observed after a hiatus of almost 32 years \([15,16]\). Chikungunya virus also reappeared in Malaysia in 2006 \([17]\) in Thailand in 2008, and in small outbreaks in Singapore in 2008. Last year, over 50,000 cases in Southern Thailand have been reported.
The Culprit! (once again)

- *Aedes aegypti*, Aedes albopictus
Aedes Albopictus
Virology:

- Chikungunya is a single-stranded RNA virus of the genus Alphavirus (Togaviridae family). It was first isolated from mosquitoes and humans during an outbreak in Tanganyika (Tanzania) in 1952-53. Thus far, three lineages distinguishable by genotypic and antigenic characteristics have been identified: the clusters of central/east Africa, West Africa, and Asia.

- Other alphaviruses that cause illnesses associated with fever and arthralgia or arthritis include O'nyong-nyong (Central Africa), Barmah and Ross River viruses (Australia and the Pacific), Semliki virus (Africa), Mayaro virus (South America), and Sindbis group viruses (widespread excluding the Americas).
Symptoms and Signs

- Incubation: 3 to 7 days
- Fever: 1 to 5 days
- Rash: maculopapular rash on limbs/trunk
- Anorexia, Nausea and Vomiting
- Severe Joint Pain for up to 6 months
Physical examination

- Periarticular edema or swelling has been observed in 32 to 95 percent of cases. In one series large joint effusions were noted in 15 percent of cases.

- Peripheral lymphadenopathy (most often cervical) may be present (9 to 41 percent of cases)

- Conjunctivitis may be observed
Persistent symptoms

- **Persistent symptoms** — Following acute illness (usually lasting 7 to 10 days),
- **Rheumatologic** signs and symptoms including arthritis/arthralgia, edematous polyarthritis of fingers and toes, morning pain and stiffness and severe tenosynovitis (especially of wrists, hands and ankles).
- **Carpal tunnel syndromes** may result from hypertrophic tenosynovitis. In addition, patients may report joint or bone pain at sites of previous injury.
- **Unusual joints** (such as sternoclavicular or temperomandibular joints) are involved.
- **Raynaud phenomena** in the second or third month following infection have been described in up to 20 percent of cases.
Severe Complications

- Severe complications include respiratory failure, cardiovascular decompensation, myocarditis, acute hepatitis, renal failure and neurologic involvement. Meningoencephalitis is the most common neurologic complication; other manifestations include acute flaccid paralysis and Guillain Barré syndrome. Ocular manifestations (iridocyclitis, retinitis, episcleritis, macular choroiditis) and sensorineural hearing loss have also been described. In Reunion, the estimated incidence of severe disease (e.g., hospitalized patients with complications, such as respiratory failure, meningoencephalitis, acute hepatitis, or kidney failure) was 17 per 100,000 population.
Laboratory Tests in ChikV Fever

- Clinical laboratory tests
  - Serology
  - ELISA: positive at about Day 5
  - Viral Cultures: possible, but not usually done
  - Clinical Presentation is usually sufficient
  - Differential from Dengue Fever
Treatment

- Treatment of chikungunya infection consists of supportive care including anti-inflammatory and analgesic agents. No antiviral agents have been shown to be effective in human infection. Prevention consists of minimizing mosquito exposure. Patients receiving care in an area inhabited by mosquitoes competent to transmit chikungunya should be treated in screened, mosquito-free areas or under a bednet to avoid spread.