

Dengue Fever: Diagnosis, Prevention & Control

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Dengue virus infections are significant causes of morbidity and mortality in many parts of the world, including India. The dengue virus is believed to cause three forms of clinical syndrome, namely, classical or viral dengue fever, dengue hemorrhagic and dengue shock syndrome.

Dengue Fever is a self-limiting disease and represents the majority of cases of dengue infection. In some situations it manifests in severe forms as hemorrhagic and shock syndrome. The first major outbreak of dengue fever accompanied by DHF was reported in Calcutta in 1963. About sixty outbreaks have been reported during the period 1956-1996. Because dengue infections have the potential of rapid spread leading to an acute public health problem, special attention is required to be paid for its surveillance, prevention and control. It is a life threatening fever and is transmitted through the Aedes Mosquito (day biter) an indoor vector of man. This disease is also called Break Bone or Dandy Fever.

Definition

Dengue fever is an acutely infectious mosquito borne viral disease characterized by episodes of 'Saddle back fever', severe pain in postorbital region and in the muscles, joints and bones, accompanied by an initial erythema and a terminal rash of

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varying morphology.

Etiology

The exciting cause is a specific filterable virus demonstrable in the blood of patients from one day before the initial fever to 3 or 4 days after the onset. The blood of patients may be infective when inoculated intravenously or subcutaneously.

Epidemiological Features Agent:

Dengue is caused by group B arbovirus (flabby virus) and the virus has four distinct antigenic serotype that is 1,2,3 and 4 and is transmitted by certain species of Aedes Mosquito that is Aedes aegypti, culex fatigans and aedes albopictus.

Vector of Transmission

Aedes aegypti is the main vector of dengue transmission in India. Dengue outbreaks have also been attributed to Aedes albopictus. However, Aedes polynesiensis and species of Aedes scutelloris complex have also been incriminated as vector in other South East Asian countries.

The mosquito has characteristic white strips on the back and legs. It is also known as tiger mosquito. The mosquito rests indoors, in closets and other dark places. Outside it rests where it is cool and shady. The female mosquito lays eggs in clean water containers, in and around homes, schools and work places. The larvae hatch from the mosquito eggs, and live in the

water for about a week, then they change into a round pupal stage for one or two days after which the adult mosquito emerges ready to bite.

The mosquito is a domestic breeder. Mosquito breeding can occur in any water catching or water storage containers such as desert coolers, over head tanks, discarded buckets, tires, utensils and large containers used for collecting rain water which are not emptied and cleaned periodically. Since water is essential during the first 8 days in the life of mosquito, emptying containers once a week will greatly reduce the risk of dengue fever.

Aedes mosquito can fly upto a limited distance of 400 meters but can spread over vast distances mechanically in various types of vehicles used by man.

The outbreaks of dengue fever / DHF are most likely to occur in the post monsoon period when the breeding of the mosquito is highest.

Host

Age - It can occur at any age.

Sex - Both sexes are susceptible

Immunity - No previous

immunity

Environment - Epidemic usually occurs after rainy season.

Mode of Transmission

The transmission cycle in dengue is direct i.e. 'man - mosquito - man'. The vector aedes aegypti acquires the virus by feeding on a patient during the first three days (viraemic stage) of illness. After an extrinsic incubation period of 10-15 days, the mosquito becomes infective and

is able to transmit the infection to man.

Incubation period

It is usually 5-6 days though it may vary from 3-15 days after the bite by the mosquito.

Pathophysiology

Entry of virus causes viraemia and the onset of fever persists for about three days. It produces endothelial swelling, perivascular oedema and infiltration with mononuclear cells in the small blood vessel leading to varying signs and symptoms.

Types of Dengue Fever

The three main types of dengue fever are:

Dengue Viral (classical) Fever (DVF)

Signs and Symptoms:

The invasive symptoms usually start abruptly with severe pain in a single joint and spreads rapidly to the bone and other joints shifting around from one to another. Fever may rise upto 105 F or 40.6 C accompanied with malaise, chills, severe headache, post orbital pain, backache, pain in the extremities and sore throat. The fever and other symptoms usually persist for two to four days followed by remission with profused sweating.

Dengue Hemorrhagic Fever (DHF)

Signs and Symptoms:

Following symptoms in addition to features of DVF, maculopapular, scarlatiniform or petechial rash appear on third day of illness that is red spots seen all over the body. The lesion first appears on the dorsum of the hands and feet which spreads in other part of the body. Fever, headache, nausea, vomiting, abdominal pain, pharyngitis, cough,

dyspepsia and coffee coloured vomiting also appear.

Dengue Shock Syndrome Signs and Syndrome

In addition to signs and symptoms of the above clinical features, patients may go to shock. DSS usually occurs between 2-6 days often with sudden collapse or prostration, cold and clammy extremities, and week thready pulse, circumoral cyanosis along with hemorrhagic manifestations that is petechial purpura at the site of injection. Occasionally epistaxis, haemetemesis, Malena or subarachnoid haemorrhage. The patient can develop peripheral circulatory failure and go into prolonged hypotensive shock with oliguria and arise the non-protein nitrogen content of blood.

Diagnosis

It is done by clinical features and laboratory findings.

DHF is confirmed by standard Tourniquet Test, that is

- ♦ Apply sphygmomanometer cuff to the arm and take blood pressure.
- ♦ Inflate cuff so that it registers a pressure midway between that of systolic and diastolic blood pressure.
- ♦ Hold it for five minutes.
- ♦ Examine the cubital fossa for petechiae if > 20 petechiae in 3.c.m. diameter circles, the test is positive.

Laboratory Tests

- ♦ **Thrombocytopenia** (1,00,000/mm³ or less)
- ♦ **Haemoconcentration:** Hamatocrit increased by 20 percent or more of base line value.
- ♦ **Leukopenia** with a relative lymphocytosis that is blood

picture returns to normal within one week after the fall of temperature.

- ♦ **Serologically:** Rising titer of neutralizing antibodies can be demonstrated on the serum of patient.
- ♦ A rising titer of IgG antibody in patient's sera taken at an interval of 10 days or more in confirmatory. LgG antibodies indicate previous infections and are useful for conducting sero – epidemiological studies to determine the extent of silent infection and immunity level in the local population.
- ♦ The diagnosis of Dengue Fever can be confirmed by serological tests. The tests include detection of IgM antibodies which appear around the end of first week of onset of symptoms and are detectable for 1-3 months after the acute episode.

Prevention and Control

Mosquito Control

To prevent mosquito bite,

- ♦ Use mosquito nets or repellent at night
- ♦ Use mosquito repellent cream on exposed parts both day and night
- ♦ Cover whole body parts to avoid exposed arms and legs.

To prevent mosquito breeding places

- ♦ Clean or remove breeding places of *Aedes aegypti* usually broken utensils, cigarette tins etc.
- ♦ Periodical cleaning or drying of man made water tanks, water containers etc.
- ♦ Aerosol spray, ultra low volume quantities of malathion or sumathion.

Treatment

The management of dengue

fever is symptomatic and supportive management.

- ◆ Fever: Provide tepid sponge and antipyretic drugs.
- ◆ Nausea and vomiting: increase fluid intake by intravenously or orally. Administer antacids and anti emetics.
- ◆ Bed rest is advisable during the acute febrile phase.
- ◆ Loose stool ~ Increase fluid intake and administer electrolyte therapy like ORS
- ◆ A rise in haematocrit value indicates significant plasma loss and a need for parenteral therapy.
- ◆ The type of fluids used are crystalloid that is 5% dextrose in lactated ringers solution etc and colloid i.e. dextran 40 and plasma.
- ◆ Management of shock
- ◆ Replacement of plasma loss with isotonic salt solution at the rate 10-20 ml./k.g. body weight/hr.
- ◆ Blood transfusion is indicated in cases with profound or persistent shock despite declining haematocrit values after initial fluid replacement.

Nursing Diagnosis

- ◆ Alteration in body temperature hypothermia related to disease process.
- ◆ Alteration in nutrition less than body requirement related to self induced vomiting.
- ◆ Alteration in comfort related to headache and body ache.
- ◆ High risk for infection related to inadequate primary defenses.
- ◆ Anxiety related to prognosis of the disease, death or recovery.

Nursing Management

Objectives

The client will

- ◆ Maintain body temperature between 97 – 99 F.
- ◆ Be able to meet her nutritional requirements as evidenced by maintaining 95-98% of the clients previous body weight.
- ◆ Be comfortable by relieving her pain
- ◆ Be protected from infection
- ◆ Be relieved of anxiety and spiritual distress
- ◆ Be comfortable with 8-10 hrs of sleep and bed rest.

Nursing Interventions

- ◆ Admit the client for timely attention
- ◆ Allow the client to explain her feelings
- ◆ Monitor vital signs four hourly.
- ◆ Give tepid sponge
- ◆ Provide small frequent feeds.
- ◆ Maintain IV infusion on flow 2 pints in 12 hrs.
- ◆ Administer antibiotics
- ◆ Administer analgesics if pain persist
- ◆ Give adequate explanation regarding disease condition
- ◆ Help the patient to meet her spiritual needs
- ◆ Provide psychological support
- ◆ Prevent secondary infection
- ◆ Observe and report as often as required and signs of shock.
- ◆ Amount of fluid given should be constantly monitored. Any evidence of swelling, shortness of breath or puffiness may indicate fluid over load.
- ◆ Maintain good IPR with patient.
- ◆ Provide calm and quiet environment for the patient.

environment for the patient.

- ◆ Administer sedatives if needed.
- ◆ Administer medications carefully as prescribed by the physician.

A Case Study

Mrs. Radha, a well nourished, fair looking, 34 year-old-woman, was admitted in the hospital on 22-6-03 with the complaints of fever associated with chills and rigors, severe body ache, headache and nausea. On admission, she was febrile, 101°F, Blood Pressure was 120/70 mmHg, Pulse 80/mt, respiration 18/mt. She looked very tired and toxic Tepid sponging, Inj. Ketanov 30m.g. IM, IV fluids normal saline, ringer lactate, 10% Dextrose with polybion were given to the patient. Blood investigations done for Hb, Total count, Differentiate count, ESR, Platelet count, packed cell volume, RBS, RFT Cholesterol, ½ LFT, CPK and urine for albumin, sugar and sediments. All the investigations were within normal limits. Second day erythematous macular rashes appeared over the face, body and the temperature was in the range of 101 - 103.6°F. Inj. Efcolin and tepid sponge were given. It took three days for the rashes to disappear. For about seven days, temperature remained high in a range of 101 - 103.6°F. IV Fluids continued along with oral rehydration.

On 7th day, the patient developed distended abdomen and complained of abdominal pain and also had loose stool and vomiting. She was advised to have an ultra sonography, which revealed mild ascites and bilateral pleural effusion. Same day ½ LFT, Hb and PLC were repeated. In this SGPT was 83 IU/L, SGOT was 118 IU/L, PLC was 0.90 lakh/cumm and Hb was 10.4

g.m. %. Same day dengue virus IgM was found positive, 0.90 OD units (Above 0.50 is positive). Mrs. Radha was shifted immediately to Medical Intensive Care Unit.

The patient was observed very closely. Same treatment continued with special attention on her hydration. Mrs. Radha was anxious and apprehensive regarding her condition. Constant reassurance and psychological support was given to the patient. Her hygienic and nutritional needs were met. Slowly her general condition improved, temperature became normal and loose stool and vomiting were also better. PLC, $\frac{1}{2}$ LFT and Hb were repeated and it was found to be normal. On 2nd day in MICU, Radha's vital signs were within normal limits. Inj. CP 20 LU IV 6th hourly started along with other

medication as she developed mild thrombophlebitis with secondary infection. Mrs. Radha kept in MICU for four days and was shifted to the ward in a stable condition.

She was closely observed and cared again for another three days in the ward. Mrs. Radha started to take normal foods and IV infusions and Inj. CP were stopped after 5 days. She was able for self ambulation and in doing activities of daily living. Mrs. Radha was prepared for discharge and was discharged on 7-7-03. She was advised to continue multi vitamin and to have follow up after two weeks.

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