ORIGINAL ARTICLE J. Med. Sci. (Peshawar, Print) April 2014, Vol. 22, No. 2: 89-92

PRESENTATION AND PREVENTION OF DENGUE FEVER

Amir Khan[1], Muhammad Tariq Mehr[2], Al-Aman Shaukat[2]

Department of Medicine, Mardan Medical Complex, Mardan - Pakistan

Department of Medicine, Khyber Teaching Hospital, Peshawar - Pakistan

ABSTRACT

Objective: To know the presentation and prevention of Dengue Fever.

Material and Methods: Patients suspected to be suffering from Dengue Virus infection were admitted at Mardan Medical Complex (MMC), Mardan. Patients were admitted in concordance with the hospital's admission policy and treated in an isolation room specified for Dengue cases. All the patients were treated with rigorous preventive measures including antipyretics and fluid requirements, education, properly covering water containers, use of disinfectants and mosquito repellants and maintenance of toilet hygiene. Detailed clinical history was taken from all the patients including the areas visited and the signs and symptoms. Ten cc of the blood was taken and analyzed for peripheral blood smear, Liver function tests, coagulation and renal profile. Another 5 cc of blood was sent to analyze for the Dengue serology using antibody detection against anti-NS1 antibodies.

Results: In total, 326 patients were reported during September to October 2013 at MMC, Mardan. Only 21 patients had actually visited areas including endemic zones outside Mardan prior to becoming symptomatic. Eighteen patients had visited swat during an outbreak, one patient reportedly visited Chitral, one paid a visit to Lahore and one resident of Swabi had visited Islamabad. The case fatality rate was zero for all the cases. Only fourteen of the in-patients needed transfusion with platelet concentrates, FFPs and/or packed cells based upon reports of their clinical and hematological perimeters. Twenty patients left against medical advice but had a satisfactory follow-up on subsequent out-patient visit. No death was reported among all the patients.

Conclusion: The primary objective of the attending physician should be to provide necessary symptomatic support and guidance with a keen observation of the patient's biochemical and clinical perimeters. However, primary preventive measures are the most important aspect of dealing with this burgeoning health problem.

Key Words: Dengue, Infection, prevention, Viral, Illness.

INTRODUCTION

Dengue is a self-limiting viral illness with no residual complications at convalescence. Dengue Fever is the undisputed vector-borne heist of South and East Asia in the 21st century. The disease infects roughly 50 to 100 million cases a year[1], with nearly half a million patients ending with life threatening complications. The disease frequency has increased over 25 to 30 folds from 1950 onwards. The first ever recorded pandemic took place in 1780. Lately in the 20th century, the 1950s saw a major epidemic engulfing South-East Asia. A far-end spectrum of the disease known as Dengue-Hemorrhagic Fever (DHF) resulted in thousands of deaths over ensuing period. The epidemic dengue was second only to malaria by the 90s, with over 40 million infected cases/ year and thousands diagnosed with DHF.

Dengue Fever has been endemic to Pakistan since 1994. More seriously, the outbreaks have expanded to involve northern areas like Swat and Northern Punjab presenting with perennial cycles. The recent outbreak of 2013 occurred in Swat valley of Pakistan with six-thousand reported cases. Dengue Fever, also known as the 'Break-Bone' fever is caused by a mosquito borne single positive stranded RNA virus, 'the Dengue virus' classified in the genus flaviviradae. The vector is usually one of several sub-species belonging to the genus Aedes, notably A. aegypti.

The virus has 4 noted serotypes i.e. DENV 1 to 4. Humans and some non-human primates act as primary hosts. The female Aedes will acquire the infection from a human host in the initial 2-10 days of febrile period, attaining a highly infective reservoir status over ensuing 8-10 days. The virus has no known detrimental effect on the mosquito itself that remains infected for life. Commonly a bite will transmit a single serotype at a time. Aedes Aegypti lives in close proximity to human dwellings lays its eggs in contaminated waters and will prefer to feed on human blood.

The virus enters a host body after a vector bite and is avidly taken up by the white blood cells, resulting in the production of interferons and cytokines responsible for many of the systemic features of the disease process

Address for Correspondence:
Dr. Amir Khan
Head Department of Medicine,
Bacha Khan Medical College, Mardan - Pakistan
Cell: 0300-9599034
Email: dramirkhan58@yahoo.com

like aches and pains, fever etc. Severe infection is categorized by severe viremia, capillary leakage and shock.[2] Mortality rate is significantly magnified in the latter.

A far-right variant of the clinical presentation is DHF/ DSS. The complication is characterized by hemodynamic shock. The introduction of a second viral serotype into a patient's body previously infected with a different one, results in uncontrolled viremia and potentially fatal consequences. The proposed mechanism is what is regarded as Antibody-Dependant Enhancement or 'ADE'.[3,4] This occurs when non-neutralizing anti-virus antibodies facilitate virus entry into cells that otherwise are lacking receptors for viral entry. These antibodies bind to the Fc- receptors on cellular surfaces. The virus binds to the antigen binding site of the antibody, at the other end. In this way primary defensive mechanisms of the body like the macrophages are infected, with lethal consequences like inhibition of effective and proliferation of non-effective immune response.[5]

Notable risk factors for the disease include younger age, female sex, high BMI, viral load and co-existing chronic debilitating disease processes like diabetes, asthma. In over 80%, the infection is asymptomatic, with mild febrile illness in 10%. The most significant symptom is myalgia and generalized malaise describing the 'crack-bone' symptoms.[6] A small minority progress to more fatal outcome like DHF/ DSS. The incubation period ranges between 3 and 14 days. Fever developed beyond 15 days after return from a visit to an endemic area is 'highly unlikely to be dengue, therefore other differentials must be sort.

The initial 3 days of fever is explained only by non-specific symptoms of severe aches and pains all over, followed by a febrile spike of 104 F persisting for 3-7 days. It may be associated with systemic signs like rash, gastroenteritis with mucosal petechie.[7] The fever is usually intermittent and bi-phasic with a second surge after 48 to 72 hours. There is increased capillary leakage, a potentially lethal consequence magnified several times with DHF/ DSS transition. In uncomplicated cases, recovery is guaranteed with return of vital signs and body function.

There is no specific anti-viral treatment for dengue. The management consists mainly of oral rehydration therapy in most cases. Anti-pyretics are utilized for fever and pain. Paracetamol is preferred over aspirin and ibuprofen due to increased risk of bleeding with the later. More severe cases of systemic hypo-perfusion is managed with i.v fluids to maintain a urinary output of 1ml/kg/hr. Whole blood and fresh frozen plasma can be transfused. Nonetheless due to a common familial background with the HCV virus family i.e. Flavivirdae, (Nucleoside Inhibitors) like Ribavarin have been considered in certain clinical circles but not recommended due to lack of superior evidence based guidelines. Novel approaches like DNA or RNA decoy molecules are still experimental.[8] The most important aspect of treatment is 'prevention of a re-exposure.'

WHO Guidelines for Dengue Prevention: 9 Integrated vector management (IVM):

Integrated vector management is defined as 'rational decision making process for optimal vector control.' The purpose of IVM is to modify habitats that have the greatest conducive properties for vector breeding, so as to potentially nullify overall environmental impact and utilize minimal resources at hand. It includes environmental Management in the form of solid waste disposal, Improvement of water supply and storage systems, mosquito-proofing of water containers, chemical Control using insecticides and larvecides and use of space sprays in cases of ongoing epidemics. Space sprays should ideally be applied 2-3 times for 10 days to reduce emerging crops of adult vectors.

MATERIAL AND METHODS

Patients suspected to be suffering from Dengue Virus infection were admitted at Mardan Medical Complex (MMC), Mardan. Patients were admitted in concordance with the hospital's admission policy and treated in an isolation room specified for Dengue cases. All the patients were treated with rigorous preventive measures including antipyretics and fluid requirements, education, properly covering water containers, use of disinfectants and mosquito repellants and maintenance of toilet hygiene. Detailed clinical history was taken from all the patients including the areas visited and the signs and symptoms. Ten cc of the blood was taken and analyzed for peripheral blood smear, Liver function tests, coagulation and renal profile. Another 5 cc of blood was sent to analyze for the Dengue serology using antibody detection against anti-NS1 antibodies.

RESULTS

In total, 326 patients were reported during 01 September to 30 October 2013 at MMC, Mardan. Only 21 patients had actually visited areas including endemic zones outside Mardan prior to becoming symptomatic. Eighteen patients had visited swat during an outbreak, one patient reportedly visited Chitral, one paid a visit to Lahore and one resident of Swabi had visited Islamabad (Table 1). The age and sex stratification of the included patients are shown in Table 2.

The case fatality rate was zero for all the cases. Only fourteen of the in-patients needed transfusion with platelet concentrates, FFPs and/or packed cells based upon reports of their clinical and hematological perimeters. Table shows occurrence of Dengue Fever including deaths from 2006 to 2011. Twenty patients left against medical advice but had a satisfactory follow-up

Table 1: District wise distribution of Dengue Fever patinets

S. No.	District Name	No. of patients
1.	Mardan	283
2	Swat	21
3.	Nowshera	14
4.	Swabi	02
5.	Charsadda	06

Table 2: Age and sex wise distribution of Dengue Fever

Age group	Male	Female
0-30 years	158	29
31+ years	117	22
Total	275	51

Table 3: Dengue Fever cases reported from Pakistan, 2006 to 2011[1]

Year	Suspected cases	Confirmed cases	Deaths
2006	4,961	1,931	41
2007	2,304	1,226	18
2008	2,792	2,469	17
2009	1,940	1,085	13
2010	15,901	11,024	40
2011	2,52,935	17,057	219

on subsequent out-patient visit. No death was reported among all the patients.

DISCUSSION

Dengue Fever has been reported in various parts of Pakistan. Previously unknown in this part of the world, the people infected with the virus has shown a gradual upsurge from 41 deaths in 2006 to 219 till 2011. A systematic review of the English language literature from 1990 to 2007 identified 15 studies that evaluated the usefulness of clinical criteria to distinguish dengue from other febrile illnesses among populations living in dengue-endemic areas.[10] Although study methodologies varied widely, and many weaknesses in study design and/or reporting were identified, low platelets, white blood cell and neutrophil counts, elevated hepatic transaminases, and the presence of petechiae, were associated with a confirmed diagnosis of dengue across multiple studies.

One study of children with febrile illnesses in Thailand reported that some clinical features, such as a positive tourniquet test, leukopenia, thrombocytopenia, and increased serum aspartate transaminase (AST) levels, were more frequent in patients with dengue than in those with other febrile illnesses.[11] However, none of these features of classic DF is sufficiently sensitive or specific to permit a reliable diagnosis. In regions (and seasons) with a high incidence of DHF, the positive predictive value of the case definition is high. Laboratory tests confirm dengue virus infection in as many as 90 percent of such cases.[12]

The most frequently used serologic tests for the diagnosis of acute dengue virus infection are the hemagglutination inhibition (HI) assay and IgG or IgM enzyme immunoassays. Complement fixation and neutralizing antibody assays are more technically demanding and are used in specialized laboratories only.The HI assay historically has been and remains the gold standard for serologic testing for dengue virus-specific antibodies.[13] Analysis of paired acute and convalescent serum samples is essential; a fourfold or greater rise in HI antibody titer between acute and convalescent samples defines acute infection.

The antibody response will depend on whether the patient has primary or secondary dengue virus infection. In primary infection, HI antibodies develop late (after the fifth day of illness) and reach titers of less than 1:1250 in the convalescent phase. By contrast, HI antibodies rise early in secondary infection and reach titers above 1:1250 (often 1:10,240 or higher) in the convalescent phase.[14]

Immunoassays for the detection of dengue virus-specific IgG antibodies have demonstrated sensitivity and specificity of approximately 99 percent and 96 percent, respectively, compared with the HI assay.[15] As with the HI assay, diagnosis of acute dengue virus infection using the IgG ELISA requires testing of paired acute and convalescent serum samples, showing a greater than fourfold rise in antibody titer.

CONCLUSION

The primary objective of the attending physician should be to provide necessary symptomatic support and guidance to the patient with a keen observation of the patient's biochemical and clinical perimeters.

RECOMMENDATIONS

The hospital administrative authority has to ensure in their capacity, of preventive measures to avoid development of Dengue Hemorrhagic Fever in any reported case.

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