American Journal of Current Medicne

http://www.ivyunion.org/index.php/ajcm/

Case Report

Acute Pancreatitis and Diabetes Mellitus Caused by Dengue

Sreenivasa Rao Sudulagunta[1*], Mahesh Babu Sodalagunta[2], Shyamala Krishnaswamy Kothandapani[3], and Mohammed Aheta Sham[3]

[1] Columbia Asia Hospital, India

[2] KS.Hegde Medical College, India

[3] Ambedkar Medical College, India

Abstract

In this article, an aramid of 4,4′-(1,3-phenylenedioxy)dianiline and terephthaloyl chloride was prepared. Afterwards, Nylon 6/6 and aramid were used to prepare sol-gel coated and non-coated blend fibers reinforced with nanodiamond (ND). In this way, four types of fibers were fabricated i.e. aramid/Nylon 6/6 fibers (Ar/N66) and aramid/Nylon 6/6/nanodiamond fibers (Ar/N66//ND) and sol-gel coated s-Ar/N66 and s-Ar/N66//ND fibers. The fibers were fabricated *via* Brabender single screw extruder at 200 ℃. The Ar/N66 and Ar/N66//ND fibers were coated by means of simple dip-coating technique. Fourier transform infrared spectroscopy was used for structural characterization. Scanning electron microscopic images of non-coated and sol-gel coated fibers were scanned for morphological comparison. Glass transition temperature of the sol gel s-Ar/N66 fibers increased up to 232 ℃, while that of s-Ar/N66//ND was enhanced to 240 ℃ relative to neat fibers. Moreover, the sol-gel coated s-Ar/N66//ND (8.08%) fibers had higher water absorbing tendency than non-coated Ar/N66//ND (7.66 %).

Keywords: Dengue shock syndrome; Acute pancreatitis; Diabetes Mellitus

Academic Editor: Xiaoning Peng, MD, PhD, Hunan Normal University School of Medicine, China

Received: August 4, 2015; **Accepted**: September 29, 2015; **Published**: October 28, 2015

Competing Interests: The authors have declared that no competing interests exist.

Consent: Consent was taken from the patient for publication of this case report.

***Correspondence to**: Dr.S.SREENIVASA RAO, MD General Medicine, Dr.B.R.Ambedkar Medical College, Shampura main road, Bangalore-560045, India; **Email**: asheesgreat@yahoo.com

Introduction

Dengue fever (UK /ˈdɛŋgeɪ/ or US /ˈdɛŋgiː/), also called as breakbone fever, is a mosquito-borne tropical disease and the most common arthropod-borne viral (arboviral) illness in humans. Worldwide around 2.5-3 billion people live in approximately 112 countries that experience dengue transmission. Estimates suggest that 50 to 528 million people worldwide a year, causing around half a million hospitalizations [1], [2]. Dengue hemorrhagic fever (DHF) is an endemic disease in South East Asia including India [3-11]. Four serotypes of Dengue virus were documented till now which are DEN-1, DEN-2, DEN-3 and DEN-4 respectively [10, 11].

Each year dengue hemorrhagic fever worldwide causes 22,000 deaths (mainly in children) [12, 13], [14]. In the last 50 years Dengue incidence increased 30 fold according to WHO [14]. Mean cost of illness from dengue was higher than other febrile illnesses [15] and has a disease burden estimated at 1,600 disability-adjusted life years per million population [16], which is a matter of serious concern in developing countries [17]. Dengue fever is a self-limiting illness with a mortality rate of less than 1%. With adequate treatment, dengue hemorrhagic fever has a mortality rate of 2-5%. When left untreated, dengue hemorrhagic fever mortality rate reaches as high as 50%. The fatality rate of dengue shock syndrome varies by country ranging from 12-44%.

Severe dengue (dengue hemorrhagic fever-DHF and dengue shock syndrome-DSS) causes serious complications due to plasma leak, fluid accumulation in body cavities, respiratory distress, severe bleeding, or organ dysfunction. Various common complications include encephalitis, myocarditis, acute motor weakness, Guillan–Barre like syndrome, acute liver failure, lupus erythematosus, hemophagocytic syndrome, acute kidney injury etc. [18]. Acute pancreatitis is a rare complication of Dengue and few cases were reported regarding new onset Diabetes in Dengue infection.

Case report

A 30 year-old man was bought to emergency room with breathlessness, generalized fatigue with gasping for breath. As GCS was 5/15 patient was intubated and mechanically ventilated in Intensive care unit. History from relatives revealed fever with chills since 6 days and shortness of breath from 2 days for which he was admitted in local clinic and was treated with prophylactic antibiotics. Patient was diagnosed with dengue fever as the NS1 antigen and dengue IgM antibody being positive. Patient's platelet count dropped to 12000/ microliter and was given 1 single donor platelet concentrate transfusion.

As the condition of the patient deteriorated, he was referred to our hospital. Relatives denied illegal drug use or but informed presence of infected people with dengue in his village. His physical examination during admission was remarkable for fever (40 ℃), hypotension (BP: systolic 70 mm of hg), cyanosis and other signs of systemic inflammatory response syndrome (SIRS), including increased respiratory (38/min) and heart (136/min) rates. Systemic examination revealed dullness on bilateral infra scapular, interscapular, axillary and infra axillary areas. Bilateral basal crepitations were present.

Chest radiography showed bilateral pleural effusion with alveolointerstitial infiltrate in left hemithorax. Patient was started on antibiotics Levofloxacin 750mg 24hourly in view of increased WBC count (25900/ mm^3) and chest radiography features. 3 samples of Blood culture and endotracheal tube aspirate for influenza were sent.

Investigations revealed total white blood cell count of 25,900 /mm3 (neutrophils 24%, lymphocytes 70%,

eosinophils 3%, monocytes 3%) ESR 50mm/hr.), hemoglobin of 10.3mg/dl, platelet count of 9000/microliter, red blood cell (RBC) of 42300/mL, hematocrit of 48.5 and mean corpuscular volume (MCV) of 90.1 fL. The arterial blood gases had pH of 7.32, a PO2 of 61 mmHg, PCO2 of 35.5mmHg and 17.2 mmol/l of bicarbonate. Renal function test was abnormal with creatinine of 2.6mg/dl and blood urea of 70mg/dl. Liver function test was normal except for mild elevation of SGOT and SGPT.ECG showed tachycardia and ST –T changes in lead 3. Echocardiography was normal with ejection fraction of 60%. An ultrasound abdomen revealed bulky and hypoechoic pancreas indicative of pancreatitis, fatty liver and ascites [Figures 1-3].

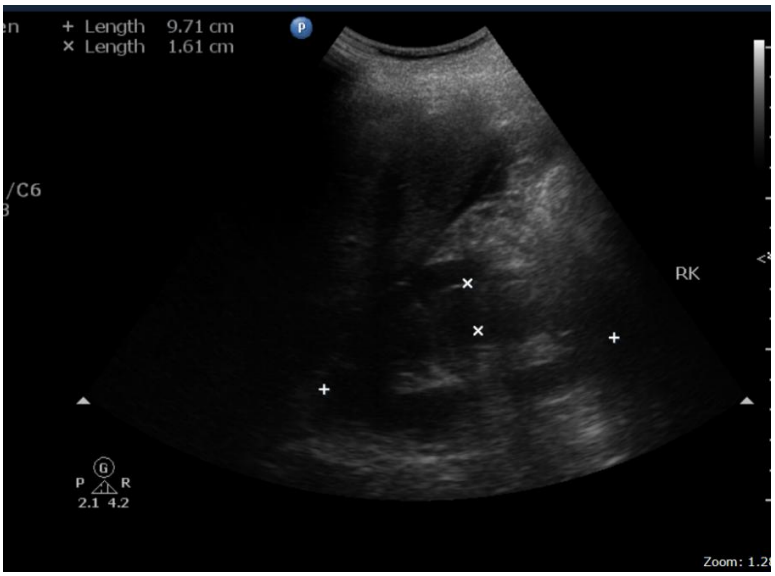

Figure 1 Ultrasound abdomen showing bulky and hypoechoic pancreas indicative of pancreatitis, fatty liver and ascites.

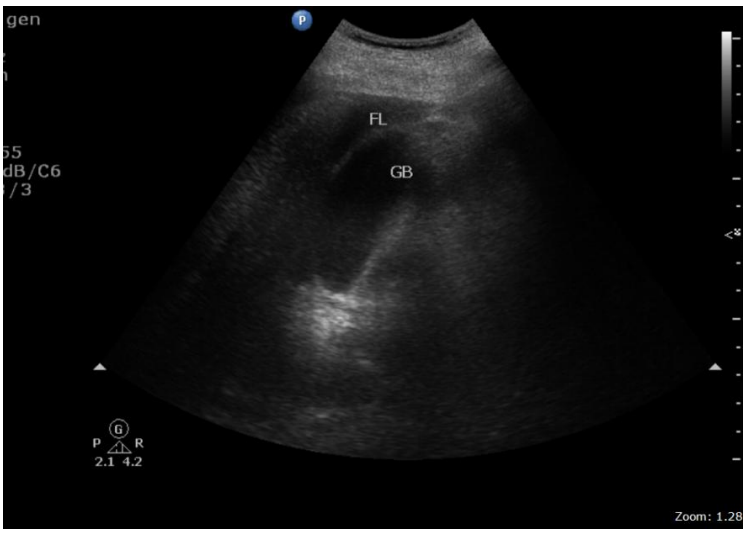

Figure 2 Ultrasound abdomen showing gallbladder wall thickening, fatty liver and ascites.

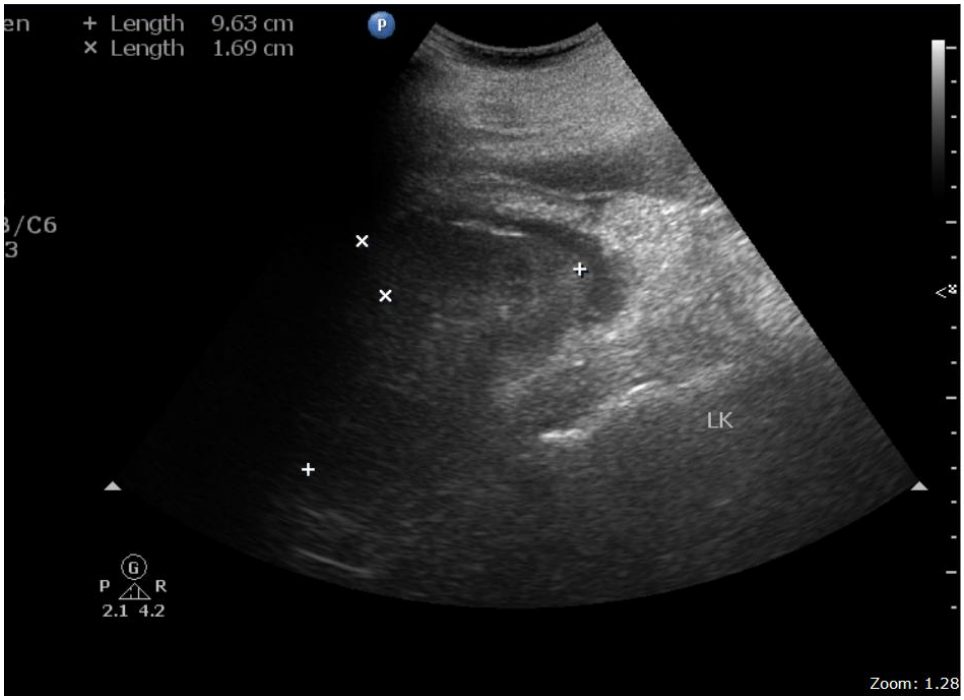

Figure 3 Ultrasound abdomen showing bulky and hypoechoic pancreas indicative of pancreatitis, fatty liver and ascites.

Computerized tomography of abdomen revealed diffusely enlarged pancreas with scattered non enhancing areas suggestive of necrosis, extensive peripancreatic fat stranding, moderate ascites and bilateral pleural effusion [Figures 4-8].Investigations revealed hyperlipasemia and hypocalcaemia with serum amylase of 2350.0 U/L (normal range 30-110 U/L); serum lipase of 975.0 UI/L (normal range 23.0-300.0 UI/L) and calcium 6.16 mg/dL (normal range 8.4-10.2 mg/dL). Investigations done 4 days ago in a local clinic including Fasting and post prandial blood sugars, lipid profile were normal.

On admission random blood sugar was 200mg/dl. 4th hourly GRBS was persistently high above 200mg/dl. Glycosylated hemoglobin was 5.1. Patient was diagnosed as severe dengue hemorrhagic fever with acute pancreatitis, new onset diabetes Mellitus, acute kidney injury, and decompensated shock. Mechanical ventilation was continued with PEEP of 8cm of H20. Intravenous fluids 0.9% NS at 20 mL/kg/h initially and then infusion of 10 mL/kg/h was given. Condition of patient deteriorated on 2nd day with oliguria, shock and multiple organ dysfunction syndrome (MODS). Patient required blood transfusion, inotropic support (Dopamine at 15 µg/min) and crystalloids. Patient was given 2 packed RBC transfusion, 2 single donor platelets and fresh frozen plasma.

Condition of patient improved progressively with improvement of blood pressure, no bleeding manifestations and radiography revealing reduction in pulmonary infiltrates. Patient was extubated on day 6 with continuation of antibiotics. All blood cultures as well as serological tests including HIV were negative. On day 8 WBC count was 9600/mm3, Platelet count was 149,000/microliter and hemoglobin was 10.4g/dl. But, patient continued to have high blood sugars and was advised insulin to be continued. On day 10 patient was discharged after repeat Ultrasound abdomen showing reduction of pancreatitis and ascites.

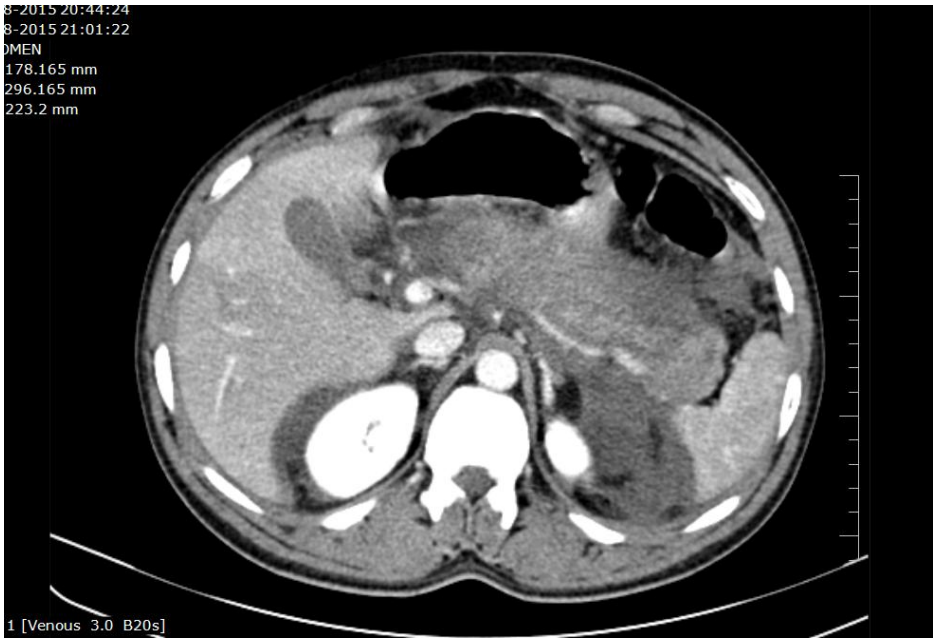

Figure 4 Diffusely enlarged pancreas with scattered non enhancing areas suggestive of necrosis, extensive peripancreatic fat stranding, moderate ascites and bilateral pleural effusion.

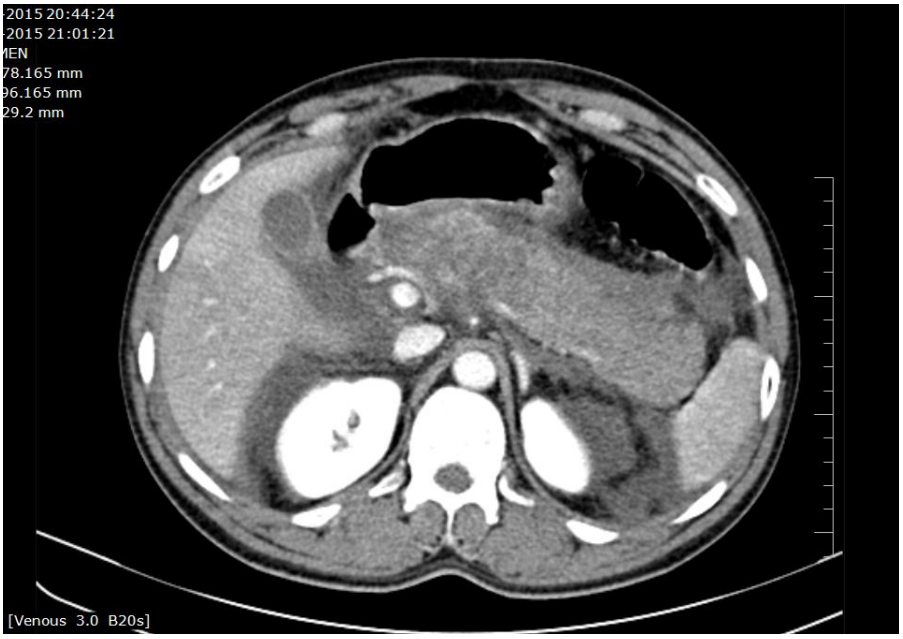

Figure 5 Diffusely enlarged pancreas with scattered non enhancing areas suggestive of necrosis, extensive peripancreatic fat stranding, moderate ascites and bilateral pleural effusion

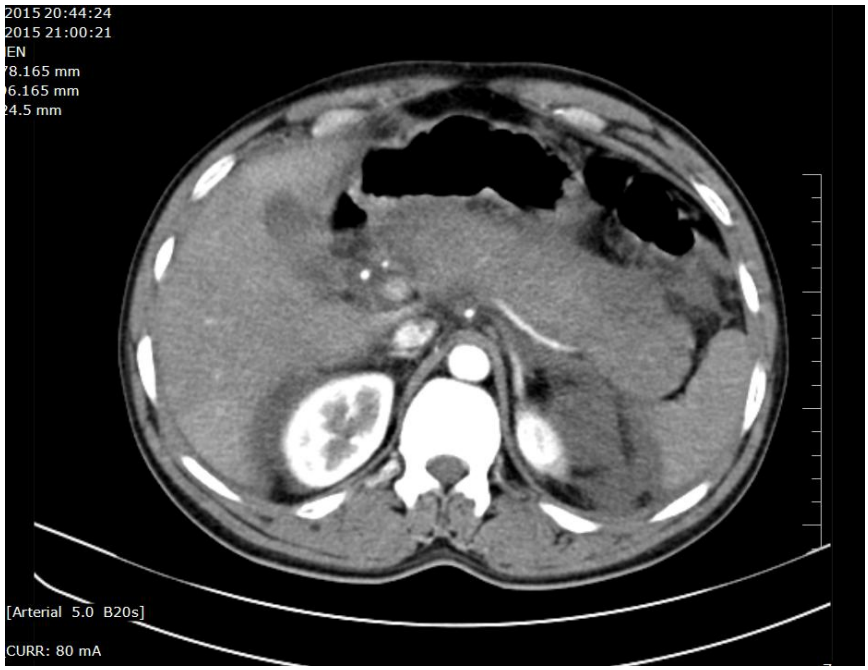

Figure 6 Diffusely enlarged pancreas with scattered non enhancing areas suggestive of necrosis, extensive peripancreatic fat stranding, moderate ascites and bilateral pleural effusion

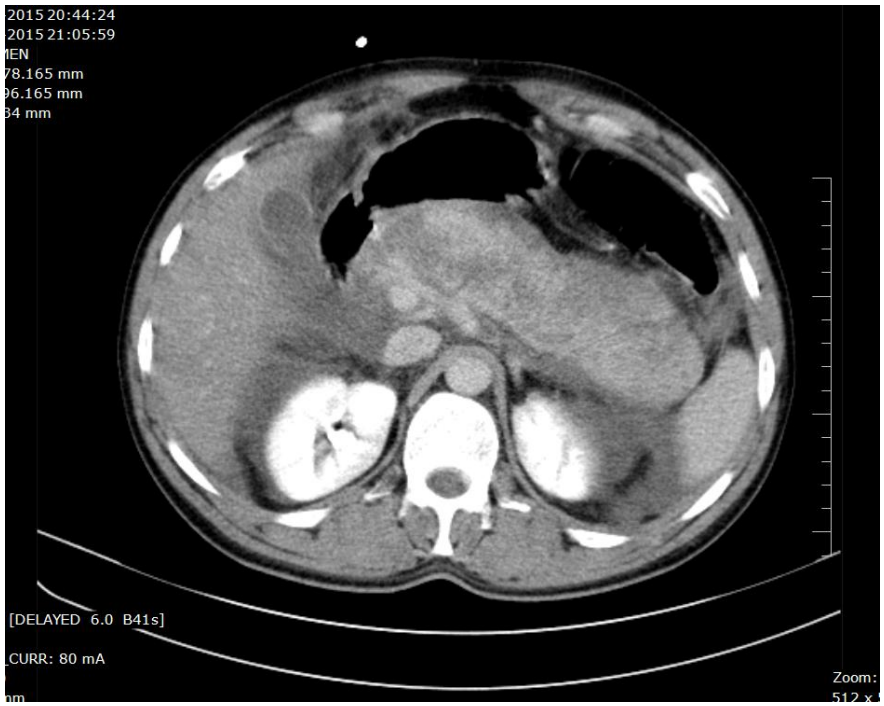

Figure 7 Diffusely enlarged pancreas with scattered non enhancing areas suggestive of necrosis, extensive peripancreatic fat stranding, moderate ascites and bilateral pleural effusion

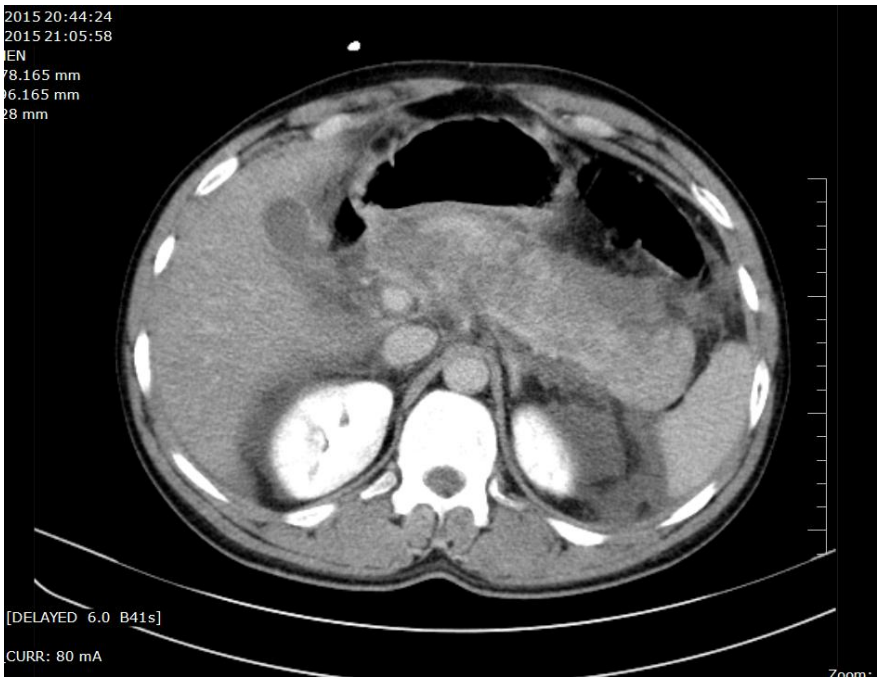

Figure 8 Diffusely enlarged pancreas with scattered non enhancing areas suggestive of necrosis, extensive peripancreatic fat stranding, moderate ascites and bilateral pleural effusion

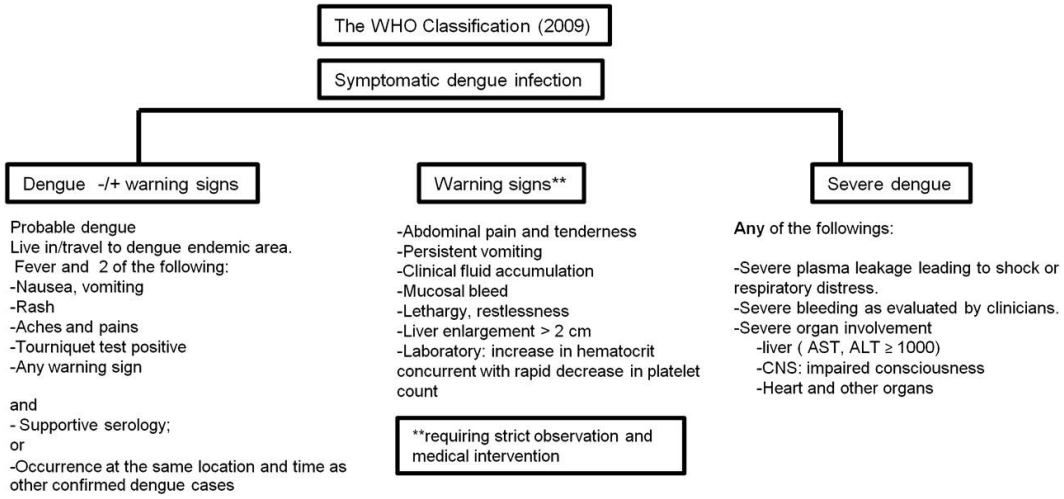

Figure 9 WHO classification of Dengue

Discussion

Infection with one dengue serotype results in lifelong homotypic immunity and a very brief period of partial heterotypic immunity, but an individual can be infected by all 4 serotypes separately. Dengue is transmitted by

the bite of an infected Aedes (subgenus Stegomyia) mosquito [19]. Female Aedes mosquitoes feed during daytime inflicting an innocuous bite, on the back of the neck and the ankles usually. They are easily disturbed during a blood meal, and they move on to another individual, making them efficient vectors. Entire family members can develop infection within a 24- to 36-hour period, due to a single infected mosquito. Transmission occurs after 8-12 days of viral replication in the salivary glands of mosquito (extrinsic incubation period). Life span of A aegypti ranges from 15 to 65 days.

Incubation period of Dengue is 3-14 days (average 4-7 days) and viral replication occurs in target dendritic cells. Infection of target cells in reticuloendothelial system, such as dendritic cells, hepatocytes, and endothelial cells occur [20-23]. WHO (2009) classification of Dengue is illustrated in Figure 9. The four cardinal features of dengue hemorrhagic fever are increased vascular permeability, fever, hemorrhage, and marked thrombocytopenia (100,000 cells/mm3 or lower). Dengue shock syndrome (DSS) is usually characterized by a rapid, weak pulse with narrowing of the pulse pressure (<20 mmHg (2.7 kPa), regardless of pressure levels, e.g. 100/90 mmHg (13.3/12.0 kPa)) or hypotension with cold, clammy skin and restlessness.

The acute surgical complications of dengue fever are acute appendicitis, acute pancreatitis, acute acalculous cholecystitis and nonspecific peritonitis. Other atypical presentations described are neurological (encephalopathy, seizures, acute motor weakness, neuritis, Guillane-Barre syndrome, acute viral myositis, hypokalemic paralysis, and acute encephalitis); hepatic (acute hepatic failure, hepatomegaly, coagulation disturbances); cardiac (myocarditis, sinoatrial block, atrio-ventricular dissociation); acute kidney injury, systemic lupus erythematosus, Kawasaki disease, uveitis, acute inflammatory colitis, hemophagocytic syndrome etc.

Our patient met the WHO criteria (2012) of case definition of severe dengue [24]. Acute pancreatitis diagnosis was based on clinical features, history of epigastric pain, fever, abdominal tenderness, enlargement of the pancreas on ultrasound examination and CT abdomen with normal hepatobiliary function, increased serum amylase and lipase 3 times above normal. One series regarding DHF outbreak in Taiwan (2002) reported pancreatitis (defined by a lipase level 3-fold greater) in three patients with acute DHF and few other reports from other asian countries [25]. Acute pancreatitis causing Diabetes mellitus is a very rare manifestation of dengue [26-29].

The cause for dengue fever presenting with acute abdomen is unclear. Pancreatic histology reports are not available to prove direct viral invasion. The exact mechanism of pancreatitis is not clear and was thought to be multifactorial. Several hypotheses were proposed based on other viral pancreatitis research. They include direct inflammation, destruction of pancreatic acinar cells; autoimmune response to pancreatic islet cells with viral infection as a trigger, similarity between viral and islet cells antigens inducing autoimmune response, edema of the ampulla of Vater causing obstruction to the outflow of pancreatic fluid.

Conclusion

Very few cases were reported dengue causing pancreatitis and permanent insulin requiring diabetes. This complication is underreported and lack of awareness may prove fatal to a patient in Dengue shock syndrome (DSS). Even though pancreatitis treatment doesn't differ from other causes, more chances of bleeding and increased capillary permeability causing third space loss should be addressed more aggressively.

References

1. Whitehorn J, Farrar J. Dengue. ***Br Med Bull***. 2010, **95**:161-73
2. Bhatt S, Gething PW, Brady OJ et al. The global distribution and burden of dengue. ***Nature***. 496 (7446): 504-507
3. Gubber DJ. Dengue and dengue haemorrhagic fever. ***Clinical Microbiology Reviews***. 1998, 11:480-496
4. DepKes RI. Profil kesehatan Indonesia 2001: Menuju Indonesia sehat 2010. Jakarta: Dep Kes RI. 2002. p. 36-37
5. Wang JY, Tseng CC, Lee CS, Cheng KP. Clinical and upper gastroendoscopic features of patients with dengue virus infection. ***J Gastroenterol Hepatol***. 1990, 5:700-701
6. David CW. clinical Practice. Acute pancreatitis. ***NEJM***. 2006, 354:2142-2150
7. Abou-Assi S, O'Keefe SJ. Nutrition in acute pancreatitis. ***J Clin Gastroenterol***. 2001, 32:203-209
8. Bui-Mansfield T. Acute pancreatitis in patients with hemorrhagic fever with renal syndrome. Available from http://www.acute pancreatitis in patients with hemorrhagic fever with renal syndrome - Military Medicine Encyclopedia_com.htm. downloaded 2009
9. CDC. Dengue and dengue hemorrhagic fever: Information for health care practitioners. Available from url: http://www.Dengue & DHF Information for Health Care Practitioners - CDC Division of Vector-Borne Infectious Diseases (DVBID).htm. downloaded 2009
10. Wu KL, Changchien CS, Kuo CM, Chuah SK, Lu SN, Eng HL et.al. Dengue fever with acute acalculous cholecystitis. ***Am J Trop Med Hyg***. 2003, 68:657-660
11. World Health Organization. Dengue haemorrhagic fever. Diagnosis, treatment, prevention and control. 2 nd edition. Geneva. 1997
12. Malavige GN, Fernando S, Fernando DJ, Seneviratne SL. Dengue viral infections. ***Postgrad Med J***. 2004, 80(948):588-601
13. Stephenson JR. Understanding dengue pathogenesis: implications for vaccine design. ***Bull World Health Organ***. 2005, 83(4):308-314
14. World Health Organization. Impact of Dengue. Available at http://www.who.int/csr/disease/dengue/impact/en/index.html. Accessed: October 14, 2011
15. Anderson KB, Chunsuttiwat S, Nisalak A, Mammen MP, Libraty DH, Rothman AL. Burden of symptomatic dengue infection in children at primary school in Thailand: a prospective study. ***Lancet***. 2007, 28. 369(9571):1452-1459
16. Guzman MG, Halstead SB, Artsob H et al. Dengue: a continuing global threat. ***Nature Reviews Microbiology***. 2010, **8** (12 Suppl): S7-S16
17. Suaya JA, Shepard DS, Siqueira JB, et al. Cost of dengue cases in eight countries in the Americas and Asia: a prospective study. ***Am J Trop Med Hyg***. 2009, 80(5):846-855
18. Gupta N, Srivastava S, Jain A, Chaturvedi UC. Dengue in India. ***Indian J Med Res***. 2012, 136:373-390
19. Engelthaler DM, Fink TM, Levy CE, Leslie MJ. The reemergence of Aedes aegypti in Arizona. ***Emerg Infect Dis***. 1997, 3(2):241-242

20. Dejnirattisai W, Duangchinda T, Lin CL, Vasanawathana S, Jones M, Jacobs M, et al. A complex interplay among virus, dendritic cells, T cells, and cytokines in dengue virus infections. ***J Immunol***. 2008, 181(9):5865-5874
21. Halstead SB, Heinz FX, Barrett AD, Roehrig JT. Dengue virus: molecular basis of cell entry and pathogenesis, 25-27 June 2003, Vienna, Austria. ***Vaccine***. 2005, 23(7):849-856
22. Limjindaporn T, Wongwiwat W, Noisakran S, Srisawat C, Netsawang J, Puttikhunt C, et al. Interaction of dengue virus envelope protein with endoplasmic reticulum-resident chaperones facilitates dengue virus production. ***Biochem Biophys Res Commun***. 2009, 379(2):196-200
23. Zhang JL, Wang JL, Gao N, Chen ZT, Tian YP, An J. Up-regulated expression of beta3 integrin induced by dengue virus serotype 2 infection associated with virus entry into human dermal microvascular endothelial cells. ***Biochem Biophys Res Commun***. 2007, 356(3):763-768
24. Handbook for clinical management of dengue. WHO and Special Programme for Research and Training in Tropical Diseases (TDR) report. Number of pages: vii, 111 p. Publication date: November 2012
25. Wijekoon CN, Wijekoon PW. Dengue hemorrhagic fever presenting with acute pancreatitis. ***Southeast Asian J Trop Med Public Health***. 2010, 41:864-866
26. Jusuf H, Sudjana P, Djumhana A, Abdurachman SA. DHF with complication of acute pancreatitis related hyperglycemia: A case report. ***Southeast Asian J Trop Med Public Health***. 1998, 29:367-369
27. Chen TC, Perng DS, Tsai JJ, Lu PL, Chen TP. Dengue hemorrhagic fever complicated with acute pancreatitis and seizure. ***J Formos Med Assoc***. 2004, 103:865-868
28. Fontal GR, Henao-Martinez AF. Dengue hemorrhagic fever complicated by pancreatitis. ***Braz J Infect Dis***. 2011, 15:490-492

    Lee IK, Khor BS, Kee KM, Yang KD, Liu JW. Hyperlipasemia/pancreatitis in adults with dengue hemorrhagic fever. ***Pancreas***. 2007, 35:381-382