



## Dengue Infection Could Provoke Cardiac Arrest and Death

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### Abstract

**Background:** Dengue is one of the most important viral diseases around the world, particularly in tropical regions. Evidences showed that dengue can cause cardiovascular complications.

**Case presentation:** We report a case of male patient, 37 years old, black and without personal history of disease that had cardiac arrest and died by pulmonary hemorrhage.

**Conclusion:** Early diagnosis and prevention of dengue fever is essential for the appropriate supportive treatment and management and can improve the patient survival. If significant cardiac involvement and failure is present, preventive management strategies and advanced life support should be applied to prevent mortality and morbidity by dengue.

### Keywords

Dengue, Severe dengue, Cardiac arrest, Cardiopulmonary resuscitation, Emergency medical services

The literature has reported direct cardiac and pulmonary involvement in morbidity and mortality of dengue patients [5-7]. Evidences showed that dengue can cause myocardial impairment, arrhythmias [2], dilated cardiomyopathy [8] and presence of signs of shock such as tachycardia, thin pulse, hypotension pale and cold skin and respiratory distress evidenced by, tachypnea, dyspnea, use of accessory muscles, wing motion nose and cyanosis [4]. However, there is limited data relative to other physiological organic system disturbances, due dengue infection, as respiratory system. Our case report describes a patient infected by dengue admitted to the emergency department that present cardiac arrest (CA) and unfortunately died by pulmonary hemorrhage.

### Data Collection and Emergency Care

The dengue case report was obtained of a sample of 285 consecutive patients who were diagnosed with CA from one year follow-up (1 February 2011 to 31 January 2012). The data collection and emergency care were performed by trained nurses in the Recommended Guidelines for Reviewing, Reporting, and Conducting Research on In-hospital Resuscitation (Utstein Style Report) [9]. The study was approved by the Ethics Committee of the Universidade Federal de São Paulo. All procedures were performed according to the Declaration of Helsinki.

### Case Report

Male patient, 37 years old, black, independent to perform functional activities of daily living, without personal history of disease, and no current pharmacological treatment. He was accompanied by a diagnosis of dengue fever for five days, admitted to the emergency room with chest pain in the dorsal region associated with dyspnea, and cold sweating.

### Introduction

Currently, dengue is one of the most important emerging viral diseases around the world [1,2]. This disease is caused by the infection of dengue virus, which is transmitted by a mosquito called *Aedes aegypti*. Particularly, the highest incidence of dengue is seen in Southeast Asia, India, and the American tropics [3]. Recent data suggest that infected individuals account for about half a million hospitalizations for hemorrhagic fever, and twenty thousand deaths occur every year in the world, with around 2.5 million people living in transmission areas at risk of disease. In areas where there is circulation more than one serotype can be severe forms of the infection, characterized by bleeding, circulatory shock and death [4].

When the patient came to the emergency room was conscious, breathing, and had pulse. In the initial evaluation presented 89% of oxygen saturation and in the chest X-ray had diffuse pulmonary infiltrate. The results of laboratory tests showed: erythrocytes 5.75 M/uL; hemoglobin 16.3 g/dl; hematocrit 49.1%; leukocytes 8360/ $\mu$ L; atypical lymphocytes 6.0%; platelets 86000/ $\mu$ L; activated partial thromboplastin time 68.5; prothrombin time 14.2; prothrombin activity 85; INR 1.11; urea 29 md/dl; creatinine 0.73 mg/dl; glutamic oxalacetic transaminase 165 U/L; glutamic pyruvate transaminase 54 U/L; gamma glutamyltransferase 47 U/L; alkaline phosphatase 92 U/L and creatine kinase 2095 U/L.

He was placed in the oxygen face mask and receiving antibiotic treatment. After 12 hours of hospitalization experienced worsening of respiratory distress and then had cardiac arrest (CA). The patient received care in the emergency room and CA was witnessed. The presumed cause of the CA was acute respiratory failure and the initial rhythm was pulseless electrical activity. Immediately, cardiopulmonary resuscitation (CPR) was started, with ventilations, external chest compressions, and administration of epinephrine. After 37 minutes, the patient died and the death cause was pulmonary hemorrhage.

## Discussion

In our study, the patient infected by dengue, unfortunately, present CA and died by respiratory complications associated with pulmonary hemorrhage since chest X-ray present diffuse pulmonary infiltrate, despite of emergency monitoring and health care. Particularly, this event associated with dengue infection has rarely been reported by the medical literature [10-12]. However, dengue can cause diffuse alveolar hemorrhage which represents a syndrome that can complicate many clinical conditions. It is recognized by the signs of acute cough, hemoptysis, diffuse radiographic pulmonary infiltrates, and hypoxemic respiratory distress (our patient in the initial evaluation presented 89% of oxygen saturation) [11].

The pathophysiology of extreme dengue fever (dengue haemorrhagic) is a transient increase in pulmonary vascular permeability resulting in plasma leakage [13,14] and cardiovascular collapse [2]. The most common causes of death in dengue haemorrhagic include bleeding into vital organs, massive bleeding, and hypovolaemic shock [5,15,16]. The pathogenesis of hypovolaemic shock is poorly understood and traditionally, has been described to loss of intravascular fluid due to increased capillary permeability and bleeding [3,5,17].

Previously, Wali JP et al. [5] report a dengue case infection of 44-year-old patient which evolves to dilated cardiomyopathy. In addition, this patient presented severe acute pulmonary symptoms (hypoxic respiratory failure) and despite aggressive treatment, patient died. Pulmonary involvement is related to severe forms of the disease and it is necessary to consider other diagnostic possibilities during dengue outbreaks [10].

Note that in some cases of death from suspected dengue serology for this disease can be negative, requiring a necropsy, which may show involvement of the various organs and systems by the disease [4].

## Final Considerations

Dengue has become very prevalent in tropical and subtropical regions, affecting hundreds of thousands people [10]. Early diagnosis and prevention of dengue fever is essential for the appropriate supportive treatment and management and can improve the patient survival [5,18]. Cardiac dysfunctions, and consequently other physiological system complications (pulmonary disorders), may have a contributing role in the pathogenesis of shock and could also influence the outcome of the dengue, despite the mechanism leading to the development of shock is complex and remains largely unknown [5]. If significant cardiac involvement and failure is present, preventive management strategies and advanced life support should be applied to prevent mortality and morbidity by dengue. However, lung abnormalities are not common in dengue infection and probably reflect increased vascular permeability due to cardiac dysfunction.

Despite of this, it is important that health professional know about this complication of dengue.

## Consent

This study was approved by the Ethics and Research Committee of Universidade Federal de São Paulo (protocol - 0030/2011). All procedures were performed according to the Declaration of Helsinki. Due to the observational nature of the data collection and the severity of the patients' condition, the study was granted release from consent term.

## Competing Interests

None.

## Author's Contributions

CRVC have made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data; RLV, CABL and MSA have been involved in drafting the manuscript or revising it critically for important intellectual content; ANA and AFTG have given final approval of the version to be published and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

## References

1. Boutayeb A (2006) The double burden of communicable and non-communicable diseases in developing countries. *Trans R Soc Trop Med Hyg* 100: 191-199.
2. Yacoub S, Wertheim H, Simmons CP, Screaton G, Wills B2 (2014) Cardiovascular manifestations of the emerging dengue pandemic. *Nat Rev Cardiol* 11: 335-345.
3. World Health Organization (1997) Dengue haemorrhagic fever: diagnosis, treatment, prevention and control, 2nd edition. Geneva: World Health Organisation.
4. Filho LAS, Carvalho AAB, Vicentini CB (2015) Circulatory shock autopsy evaluation for haemorrhagic complications: dengue? *Rev Pat Tocantins*. 2(3):29-37.
5. Wali JP, Biswas A, Chandra S, Malhotra A, Aggarwal P, et al. (1998) Cardiac involvement in Dengue Haemorrhagic Fever. *Int J Cardiol* 64: 31-36.
6. Promphan W, Sopontammarak S, Pruekprasert P, Kajornwattanakul W, Kongpattanyothin A (2004) Dengue myocarditis. *Southeast Asian J Trop Med Public Health* 35: 611-613.
7. Wichmann D, Kularatne S, Ehrhardt S, Wijesinghe S, Brattig NW, et al. (2009) Cardiac involvement in dengue virus infections during the 2004/2005 dengue fever season in Sri Lanka. *Southeast Asian J Trop Med Public Health* 40: 727-730.
8. Tahir H, Daruwalla V, Hayat S2 (2015) Myocarditis leading to severe dilated cardiomyopathy in a patient with dengue Fever. *Case Rep Cardiol* 2015: 319312.
9. Cummins RO, Chamberlain D, Hazinski MF, Nadkarni V, Kloock W, et al. (1997) Recommended guidelines for reviewing, reporting, and conducting research on in-hospital resuscitation: the in-hospital "Utstein style". *American Heart Association. Ann Emerg Med* 29: 650-679.
10. Rodrigues RS, Brum AL, Paes MV, Póvoa TF, Basilio-de-Oliveira CA, et al. (2014) Lung in dengue: computed tomography findings. *PLoS One* 9: e96313.
11. von Ranke FM, Zanetti G, Hochegger B, Marchiori E (2013) Infectious diseases causing diffuse alveolar hemorrhage in immunocompetent patients: a state-of-the-art review. *Lung* 191: 9-18.
12. Marchiori E, Ferreira JL, Bittencourt CN, de Araujo Neto CA, Zanetti G, et al. (2009) Pulmonary hemorrhage syndrome associated with dengue fever, high-resolution computed tomography findings: a case report. *Orphanet J Rare Dis* 4:8.
13. Deen JL, Harris E, Wills B, Balmaseda A, Hammond SN, et al. (2006) The WHO dengue classification and case definitions: time for a reassessment. *Lancet* 368: 170-173.
14. Tagore S, Yim CF, Kwek K (2007) Dengue haemorrhagic fever complicated by eclampsia in pregnancy. *Singapore Med J* 48: e281-283.
15. Halstead SB (1982) Dengue: hematologic aspects. *Semin Hematol* 19: 116-131.
16. Kouri GP, Guzmán MG, Bravo JR, Triana C (1989) Dengue haemorrhagic fever/dengue shock syndrome: lessons from the Cuban epidemic, 1981. *Bull World Health Organ* 67: 375-380.
17. Dhawan R, Khanna M, Chaturvedi UC, Mathur A (1990) Effect of dengue virus-induced cytotoxin on capillary permeability. *J Exp Pathol (Oxford)* 71: 83-88.
18. Waduge R, Malavige GN, Pradeepan M, Wijeyaratne CN, Fernando S, et al. (2006) Dengue infections during pregnancy: a case series from Sri Lanka and review of the literature. *J Clin Virol* 37: 27-33.