



# Managing Dengue Fever in Heart Failure: A Case Report

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## Abstract

**Introduction:** Dengue fever remains an infectious disease that reaches epidemic proportions in many tropical countries. Its management remains a challenge, more so in patients, who have chronic medical conditions that require fluid restriction, such as dengue fever.

**Case Presentation:** This case report will investigate the management of fluid replacement in a chronic heart failure patient with dengue fever, Mr ZK, in a district hospital of the state of Selangor in Malaysia a year ago. His fluid requirement was managed based on the existing guidelines, his clinical status, and blood parameters. He was safely discharged after three days of hospital stay without any of the complications of chronic heart failure or dengue fever.

**Conclusions:** Management of dengue fever in patients, who have fluid restriction as one of their management regimens remains a huge challenge, requiring regular monitoring, and good clinic acumen. This was one of the elements explored in this case report.

**Keywords:** Dengue, Fever, Fluid Balance, Heart Failure, Malaysia

## 1. Introduction

Heart failure patients are often advised for fluid restriction to relieve the extra fluid load on the heart (1). On the other end, patients with dengue fever are often fluid depleted and often need fluid replacement, especially in those with dehydration, reduced oral intake, and poor urinary output (2).

The question is what happens if the situation demands fluid replacement in a heart failure patient: On one end is the worry of fluid overload and on other end is fear of inadequate fluid replacement to replenish the intravascular volume, especially in cases of dengue fever with warning signs. There is a lack of literature on cases of dengue fever in a heart failure patient. There are literature describing cardiac complications of dengue fever, including arrhythmias, dilated cardiomyopathy, complete heart block, heart failure, acute pulmonary edema, cardiogenic shock, and myocarditis, which are often fatal (3-6). This, therefore, necessitates dissemination of this case report to look at the practical aspects of managing such a case. This is important as dengue fever is a major killer and deaths due to dengue are preventable as statistics have shown that nearly 70% of unfortunate fatalities had actually sought medical attention within the first 3 days of onset (7).

Admission criteria include mainly the presence of

warning and danger signs and symptoms, which include persistent vomiting, presence of severe abdominal pain, lethargy, sudden behavioural changes like restlessness or drowsiness, presence of haemorrhagic manifestations like haematuria, melaena, haematemeses or excessive menstruation, cold peripheries, giddiness secondary to postural hypotension, decreased urine output or inability to tolerate oral fluids for the last six hours, presence of ascites or pleural effusion, tender hepatomegaly and rapidly rising haematocrit with concurrent fall in platelet level (7). Other admission criteria include lack of social support and presence of markers of poor prognosis, including presence of chronic medical diseases, such as chronic heart failure, diabetes mellitus, hypertension, obesity and extreme of ages, i.e. very young or elderly patients (7).

This case report looked at the successful management of this scenario, all at a district hospital.

## 2. Case Presentation

Mr ZK, a 56-year-old male with underlying heart failure and hypertension referred to the emergency department of a district hospital in the northern Selangor state of Malaysia complaining of fever and generalised point pain for 4-days. This is a district hospital with 150 beds, run

mainly by medical officers with occasional outpatient visits by specialists. It has four wards, one combined general medical and surgical each for males, females and paediatric age group, one obstetrics and gynaecology ward and one emergency ward. Due to non-availability of 24-hour specialist services at the hospital, serious and life-threatening cases, who may need urgent surgery or ventilation are referred to the nearest tertiary hospital located about 60 km away. Other than fever and arthralgia, Mr ZK also had vomiting and diarrhoea for two days associated with loss of appetite. There was no shortness of breath, abdominal pain, decrease in urine output or bleeding tendencies. Two days earlier, he had sought treatment at a nearby general practitioner clinic yet his symptoms remained unresolved. His last paracetamol intake was 24 hours ago.

On physical examination, Mr ZK was alert and conscious. His vital signs were stable, including a blood pressure of 140/90 mmHg, pulse rate 96 beats per minute, temperature of 37.1°C, and respiratory rate of 16 breaths per minute. His body mass index was 32.3 kg/m<sup>2</sup>, placing him into the category of obesity. The measurement of the vital signs, weight, and height were done with regular calibrated medical equipment, including a sphygmomanometer, mercury thermometer, weighing machine, and stadiometer. His hydration and perfusion status was otherwise good. On cardiovascular examination, the jugular venous pressure was normal at 4 cmH<sub>2</sub>O (normal level taken  $\leq$  4 cm) and the apex beat was slightly displaced at the fifth intercostal space 1 cm lateral to the left midclavicular line. There was bilateral pedal oedema up to the mid-shin. The respiratory examination showed bilateral basal crepitation. Abdominal and back examination did not show any ascites or sacral oedema, respectively.

Investigations showed a haemoglobin of 14 g/L, haematocrit of 45%, reduced white blood cell count of  $2.7 \times 10^9$ /L, and a low platelet of  $75 \times 10^9$ /L, based on investigations done on a venous blood sample at the validated full blood count machine in the same hospital. A raised haematocrit usually indicates plasma leakage in a patient with dengue. In patients with previously unknown baseline haematocrit level, haematocrit level of  $\geq 46\%$  and  $\geq 42\%$  in Malaysian males below and above the age of 60 years old usually indicates raised haematocrit compared to  $\geq 40\%$  in Malaysian females (2). According to the world health organization, significant thrombocytopenia in dengue fever is  $< 100 \times 10^9$ /L, as thrombocytopenia can also be caused by drug intake or other viral infections (2). Other blood tests including renal profile, liver function test, coagulation profile, and random blood sugar, were unremarkable except for a mild increase in liver transaminases. Dengue serology for immunoglobulin M antibodies was also ordered, which

turned out to be positive.

Classifying this case as dengue fever in the defervescence phase and acknowledging the chronic medical problems that this patient was having, including hypertension and chronic heart failure and the fact that he was obese (which are all markers of severe dengue and hence higher risk of dengue-related fatality), he was admitted to the ward. In the ward, his oral furosemide of 40 mg once a day was converted to the intravenous form of the same dose. Strict input and output chart was started together with daily body weight monitoring.

Initially, Mr ZK was started on 2 pints of normal saline daily, with adjustment to be made according to his urinary output and body weight. If urinary output remained above 500 mLs and weight gain was less than 2 kg over 2 days, this fluid regimen was continued. There was no change in this fluid regimen as Mr ZK was passing about 600 to 700 mLs of urine per day and his weight did not increase beyond 2 kg in addition to absence of acute heart failure symptoms and signs, except bilateral pedal oedema up to mid-shin and bilateral basal lung crepitation.

His full blood count also showed improvement in his platelet count (75 to 70 to 72 to  $80 \times 10^9$ /L) and haematocrit (45% to 44% to 42% to 41%). White blood cell count normalised to  $4.2 \times 10^9$ /L and haemoglobin remained within the normal range. These findings are summarised in [Table 1](#).

With improvements in his oral intake and blood parameters, including cessation of vomiting and diarrhoea and presence of stable vital signs, he was discharged with his old medications and advised to take between 1 and 1.5 litres of fluid daily. He was seen one week later, when repeat platelet count showed a marked improvement to  $272 \times 10^9$ /L.

The study of this case indicated that it is possible to manage the co-morbidity of heart failure and dengue fever by paying attention to fluid balance and clinical parameters, and also had lessons on maintaining a good fluid balance. In the literature, there is a significant absence of reporting of such cases i.e. managing dengue fever in the presence of heart failure. Weak points were that perhaps a specialist advice should have been sought which wasn't, as heart failure cases can deteriorate very fast, especially when decompensation occurs. Furthermore, if the patient was admitted to a tertiary hospital with more manpower and availability of ventilators, it is unclear whether invasive or non-invasive ventilation would have been a better option.

**Table 1.** Summary of Full Blood Count Parameters for Mr ZK

Day	Parameters			
	White Blood Cell Count, $\times 10^9/L$	Haemoglobin, g/L	Haematocrit, %	Platelets, $\times 10^9/L$
1 (admission)	2.7	14.2	45	75
2	2.6	14.1	44	70
3	3.4	13.9	42	72
4 (discharge)	4.2	14.0	41	80

**Table 2.** Management of Fluid Overload in Patients with Dengue Fever

Haemodynamic Status	Presence of Shock	Haematocrit	Management
Unstable	Yes	High	Colloid fluid bolus 10 mL/kg over an hour. Intravenous furosemide 10 - 20 mg bolus at 30 minutes of starting the colloid bolus and repeated if necessary
Unstable	Yes	Low or normal (possible massive internal bleeding)	Urgent blood transfusion. While awaiting for blood to arrive, 500 mL of colloid fluid bolus can be administered
Stable	No	Normal or low	Advise for fluid restriction with careful regular monitoring. Intravenous furosemide 10 - 20 mg can be given in the presence of acute pulmonary oedema and repeated every 30 minutes as necessary
Stable	No	High	Advise for fluid restriction with careful regular monitoring. In patients with fluid overload as evidenced as massive pleural effusion or gross ascites and poor peripheral circulation, therapeutic aspiration is advised.

### 3. Discussion

Management of fluid balance in patients that are in need of fluid restriction is indeed challenging. This includes conditions, such as heart failure, renal failure, and liver failure. In patients with heart failure, it's the fluid overload that provides the impetus for acute decompensation of heart failure that will require hospital stay (8).

Fluid overload is associated with a worse prognosis and substantial morbidity and mortality (9). The National Heart Foundation of Australia has nicely summed up on how to manage fluid requirements in a heart failure patient (10). This will include some of the steps taken in this case, including restricting fluid intake to not more than 2 litres per day (or up to 1.5 litres in cases of fluid overload as shown by increase in body weight of more than 2 kg over 2 days and symptoms of acute heart failure), and self-adjusting their diuretic dose, according to the physician's advice.

A review by Ralapanawa et al. also identified presence of chronic heart failure to be associated with a higher risk of fluid overload secondary to plasma leakage in dengue fever (11). It is important to identify early signs of fluid overload to prevent further deterioration in patient's conditions. This will include recognizing clinical features, such as periorbital oedema, respiratory distress, lung crepitation, signs indicating pleural effusion or ascites and raised jugular venous pressure. Late signs of fluid overload

will be the development of pulmonary oedema and irreversible shock (11). Treatment of a patient demonstrating clinical features of fluid overload is based on the haemodynamic status and haematocrit level. The management of patients with dengue fever having fluid overload can be summarised as below in Table 2 (11):

Although recent reports showed that the number of dengue fever cases and mortality has fallen in Malaysia, it still remain a disease that is of national concern (12). Patients with conditions requiring fluid restriction may be infected with dengue fever and will therefore require active intervention as outlined above.

#### 3.1. Conclusion

In conclusion, management of dengue fever in a heart failure patient is indeed challenging and strict monitoring of clinical vital signs and general condition of the patient is important to avoid deterioration in patient's health. Reference to evidence-based guidelines will ensure best treatment outcome for the patient in most instances.

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