Acute Fulminant Myocarditis and the 2009 Pandemic Influenza A Virus (H1N1)
O Adedayo¹, N Iheonunekwu², D Jefferson³

ABSTRACT
The 2009 Pandemic Novel Influenza A [H1N1] resulted in mild disease mostly but severe cases and death were associated with pneumonia, respiratory failure and multi-organ failure. We present a case of severe disease with acute heart failure and arrhythmia due to fulminant myocarditis in a 50-year old obese man with diabetes mellitus.

Keywords: Influenza myocarditis, H1N1 myocarditis, viral myocarditis

INTRODUCTION
The 2009 Pandemic influenza A virus (H1N1) affected an estimated 41–84 million people worldwide causing an average of 11 690 deaths (1). Severe disease and hospitalization was mostly associated with viral pneumonia, secondary bacterial pneumonia, respiratory failure and multi-organ dysfunction (2, 3). This is a report of severe cardiac complication due to fulminant myocarditis in a patient with H1N1 and no known pre-existing cardiac disease.

CASE REPORT
A 50-year old white male was seen at the George Town Hospital, Cayman Islands on July 29, 2009. He presented to the emergency room about 2:55 am with an acute onset of shortness of breath and severe orthopnea. He had no chest pain and no previous history of cardiac disease. His cardiac symptoms were preceded by a two-day history of fever and productive cough. His other medical problem was diabetes mellitus treated with oral hypoglycaemic agents.

On examination, he was obese with body mass index [BMI] of 41 and was in severe respiratory distress. He was apprehensive and very diaphoretic. His temperature was 38.5°C, respiration 36/minute and heart rate 214 beats/minute; blood pressure was initially 180/127 mm Hg but decreased to 90/50 mmHg over 24 hours. His lungs had extensive bilateral crepitations, and heart sounds were S1, S2 with tachy-cardia. His abdomen was normal and he had no pedal edema.

His laboratory findings showed a white cell count of 10.10 x 10⁹/L, haemoglobin [Hb] 17.1g/dL, haematocrit (Hct) 48.10% and platelets 174 X 10⁹/L. His blood chemistry, sodium (Na) was 136mmol/L, potassium (K): 3.9 mmol/L, chloride (Cl): 100 mmol/L, bicarbonate: 18 mmol/L, blood urea nitrogen (BUN): 13 mg/dL, creatinine: 1.0 mg/dL, blood glucose: 490 mg/dL, aspartate aminotransferase (AST): 10 iu/L, alanine aminotransferase (ALT): 105

From: ¹²Department of Medicine, and ³Intensive Care Unit, George Town Hospital, Grand Cayman, Cayman Islands.

Correspondence: Dr O Adedayo, Department of Medicine, George Town Hospital, PO Box 915 Grand Cayman, Cayman Islands, E-mail: oadedayo@hotmail.com
Cardiac biomarkers are only elevated in a small number of patients with myocarditis thus a negative cardiac marker does not exclude myocarditis (4). In a study of elevation of cardiac biomarkers in biopsy proven myocarditis, cardiac troponin I [cTnI] was elevated in 18 of 53 patients [34%] and creatinine kinase MB[CK-MB] in 3 patients (5).

His cardiac catheterization did not show any significant coronary artery obstructive lesion. Though he had an initial transient hypertension, he became hypotensive subsequently as he had no previous history of hypertension. Endomyocardial biopsy is definitive but was not done in this case. Influenza virus is a known but very rare cause of acute viral myocarditis and may be responsible for death. In an autopsy review of 47 deaths from the influenza virus during 2003–2004 seasonal influenza in the USA by Guarner et al, myocarditis was seen in 6 out of 20 cases [30%] (6).

The clinical presentation of influenza associated myocarditis may range from mild progressive dyspnoea to acute fulminant cases with arrhythmia and haemodynamic instability as in this case (7). There may be electrocardiographic changes of left bundle branch block, S-T elevation and Q waves, as well as echocardiographic findings of hypokinesis and akinesis (7). The cardiac symptoms are usually preceded by a flu-like illness in all cases.

The mechanism of viral myocarditis may include viral induced cell mediated cytotoxicity or myocardial damage by pro-inflammatory cytokines (4). Acute influenza virus is associated with release of cytokines which includes pro-inflammatory cytokines as IL-1beta, IL-6, IL-18 and tumour necrosis factor alpha [TNF-alpha] (8).

The over-expression of pro-inflammatory cytokine Tumour Necrosis Factor [TNF] alpha as well as TNF-alpha receptors 1 and 11 in patients with acute viral myocarditis including influenza virus correlated with severe myocardial necrosis on histology as well as clinically severe cardiac dysfunction (9).

In a recent review of the immunologic profile and disease severity due to the 2009 Pandemic H1N1, a higher level of pro-inflammatory cytokines were seen in patients with Adult Respiratory Distress Syndrome [ARDS] and death compared with mild disease (10). Out of the 23 patients with severe disease due to ARDS or death, 21.7% had myocarditis (10). In another case series, EL-Said et al reported four cases of H1N1 influenza associated myocarditis in children (11). Our case is the first fully reported case in an adult not associated with pneumonia using Pubmed search though this complication was noted in 5 cases with severe disease by Too et al, ages not known, and 3 were post-mortem findings (10). The patient developed an acute thrombosis of the cephalic vein possibly due to endothelial damage from pro-inflammatory cytokines.

Diabetes mellitus and obesity are both associated with critical illness due to H1N1 virus (3, 12). Obesity was the most prevalent underlying disease in a review of 58 patients critically ill with H1N1 in Mexico occurring in 36.2% of patients while diabetes mellitus was seen in 17.2% (12).

We report that the 2009 pandemic influenza A virus (H1N1) may cause severe heart disease in adults and cardiac
complications should be looked for during all influenza outbreaks.

ACKNOWLEDGEMENT
The authors acknowledge the assistance of Dr Joseph Barefoot in doing echocardiography, Dr Kevin Coy, cardiac catheterization and the Caribbean Epidemiology Centre in performing H1N1 confirmatory testing.

REFERENCES