

# Lethal influenza B in a child

## Abstract

**Case presentation:** We report a case of a 7 year old female patient that presented with a history of upper respiratory symptoms, fever and altered mental status, admitted to the pediatric intensive care unit for suspected encephalitis. Cardiac arrest occurred suddenly, the patient didn't respond well to the resuscitation efforts, and she died in less than 16 hours of admission.

**Diagnosis:** A fatal case of influenza B occurring in the epidemic season.

**Conclusion:** Influenza B infection might begin with benign symptoms, but could cause a rapid and fatal myocarditis. Early diagnosis and intervention are helpful to prevent fatal outcomes.

**Keywords:** delirious behavior, altered mental status, influenza b virus, myocarditis, encephalitis

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## Background

Influenza is frequently a self-limited respiratory tract illness in pediatric population. Twenty percent of children worldwide develop symptomatic influenza A and B infections yearly.<sup>1</sup> Nonetheless, severe complications have been reported, for instance, influenza viruses were rarely associated with muscular and neurological symptoms.<sup>2</sup>

## Case report

This is a case of a 7-year-old girl, known to have asthma, presenting for mild upper respiratory symptoms, with a fever that started five days prior to presentation but started decreasing in frequency two days prior to admission. After 2 days of illness, she was seen by a physician with a diagnosis and started on amoxicillin-clavulanic acid.

The next day, she was seen in an E.R., for persistence of symptoms, where chest X-ray and blood work up done, which were normal and in favor of viral infection so antibiotics were stopped.

At day 4 of illness, she presented to the E.R. of our hospital with a state of somnolence and asthenia, with normal vital signs and physical exam, which required only intravenous hydration and patient improved and was discharged home. Labs were also normal that day and in favor of a viral infection. Patient was recommended to do a nasal swab viral PCR for confirmation of diagnosis of possible flu infection. Next day patient was seen by her pediatrician for worsening fatigue and somnolence and she was hospitalized for an acute onset of altered general status and disturbance to her consciousness.

Upon admission, she was disoriented, somnolent, hypothermic (temperature 35.2°), hypotensive (blood pressure (BP) of 70/40 mmHg), sinus tachycardia (heart rate (HR) of 140 beat per minute), and prolonged expiratory phase on lung auscultation with a saturation of 98%. Otherwise the rest of her physical exam was normal. She was transferred to P.I.C.U with a diagnosis of encephalitis for observation.<sup>3</sup>

Among the numerous etiologies of delirious behavior in children, infection is the most common cause and encephalopathy being the first differential to be ruled out.<sup>1</sup> Where the main workup was directed towards ruling out encephalitis. A spinal tap and head computed tomography scan were performed as part of the workup.

Blood workup showed a normal white blood cell count of  $5 \times 10^3/\text{m}^3$  with a neutrophilic percentage of 55% and a lymphocytic percentage

of 35%, negative C - reactive protein (0.23mg/dl) and Cerebral Spinal Fluid analysis was negative (White blood cell of 1/mm<sup>3</sup>, red blood cell of 5/mm<sup>3</sup>, a glucose level of 90mg/dl and a protein level of 17mg/dl). On chest X-ray, heart was normal in size with lung hyperinflation and mild perihilar infiltrates on the right side.

Patient's general status improved after several boluses and warming blankets, she became more responsive but remained agitated and tachycardic with a HR 180 beats per minute. Her mental state relatively improved and she was oriented to time, place and person, and complained of general restlessness during her stay.

Sudden cardiac arrest occurred after 16 hours of hospitalization, patient didn't respond to all resuscitation efforts to die later on without final diagnosis of her case. Chest X-ray which was done during resuscitation showed a heart normal in size and with no changes from previous X-rays.

Postmortem investigation was positive to Influenza B from a nasopharyngeal specimen. In addition, autopsy showed a normal heart on gross anatomy, but histologically there was myocyte necrosis associated with edema and a lymphocytic infiltrate suggestive of myocarditis.

## Discussion

Influenza B is a common illness during the winter season.<sup>5</sup> Although most of the symptoms are from the upper respiratory tract, yet influenza B infection can be associated with various neurological diseases such as encephalitis, encephalopathy, seizures, as well as Reye syndrome and muscular symptoms.<sup>4</sup> Early diagnosis by recently available polymerase chain reaction techniques is important for possible early antiviral treatment to avoid rare but fatal cardiac involvement. Viral infection is thought to be the most common etiology for Myocarditis. Till recently, influenza B virus was not present on the list of viruses leading to myocarditis.<sup>7</sup> However, with the emergence of lethal complications of Influenza B, the approach in dealing with this virus is yet to be studied and discussed.<sup>6</sup>

In literature, resources about myocarditis caused by Influenza B are sparse, especially in the pediatric population and most recent articles stressed on the fact that Influenza B seems to be more severe than thought.

The aim of this case report is to draw the attention to the atypical presentation of a patient with myocarditis caused by an Influenza

B infection. It's worth considering myocarditis in the differential diagnosis of a child presenting with altered mental status.

Physicians should be alert to the possibility of rare but severe complications during influenza B epidemics. The association between the influenza outbreaks and the incidence of cardiovascular events has been previously described, with Influenza B myocarditis being the least reported (0.7%), followed by influenza A (1.3%) and C (3.6%).<sup>7</sup>

Early diagnosis is crucial in the case of myocarditis, taking in consideration the fact that cardiac support is necessary for increasing survival chances.

Currently, biventricular support with ECMO (extracorporeal membrane oxygenation) is one of the chosen approaches for mechanical circulatory support. It allows peripheral cannulation and is recommended for young children and infants.<sup>6</sup> However the ECMO is not present in all hospital centers, such in our case.

It should be noted that antiviral treatment (oseltamivir phosphate) must be started within 48 hours of influenza illness onset to be efficacious and is especially useful if combined with the influenza vaccination. Starting the antiviral treatment after 48 hours of beginning of the illness won't affect the outcome.<sup>8</sup>

Vaccination is the main stay prevention method that is currently recommended by the AAP and CDC to decrease complications from influenza infection. The flu vaccine should be prioritized in patients with chronic pulmonary disease, like asthma, to lower the rate of morbidity and mortality in this population. Children that are at high risk from influenza infection should be considered for antiviral treatment in the first 48 hours of symptoms for ideal effect. As well as to be started in patients with severe presentation suspected due to influenza virus even after 48 hours of the beginning of the illness.<sup>9</sup>

## Conclusion

The reported case provides a reminder that patients with viral illness demonstrating symptoms of influenza A or B, can range from a mild disease to a fatal one, with myocarditis being one of the complications.<sup>5</sup> Furthermore, echocardiography should be considered in the work up of patients presenting with a sudden atypical altered mental status to rule out myocarditis especially during the outbreaks of influenza virus. Prevention, early suspicion and diagnosis, cardiac support and antiviral treatment might be helpful in such acute severe presentations to decrease the rate of mortality.

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## Conflict of interest

The authors declare no conflict of interest.

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