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CASE REPORT

Alteration of liver function due to H1N1 infection: a case report

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Abstract: H1N1 virus is known to affect the respiratory tract. The majority of healthcare providers focus on the respiratory complications attributed to H1N1 infection, overlooking possible multi-organ involvement. We present a rare case of abnormal liver function in a child who was admitted for respiratory illness due to the H1N1 virus. There was a marked elevation in liver function tests concurrent with the respiratory disease. Our patient was treated with oseltamavir for the H1N1 infection, and the liver function levels decreased dramatically in 72 hours.

Keywords: H1N1 subtype influenza A virus, hepatic function impairment

Introduction

Influenza A virus is a single-stranded ribonucleic acid (RNA) that belongs to the orthomyxoviridae family. The virus usually affects the respiratory tract endothelium, and its shedding lasts for 2–5 days after symptoms begin.[1] In the USA, there were 43,000 confirmed cases of H1N1 in 2009. The number of deaths was 400, and 10% of the women who died were pregnant. The Centers for Disease Control and Prevention recommends H1N1 vaccination for children and young adults aged 6 months through 24 years.[2]

The majority of health care providers focus on the respiratory complications attributed to H1N1 infection, and overlook possible multi-organ involvement.

Case presentation

A 22-month-old male was admitted to our hospital due to fever and cough. The fever was subjective and intermittent for 4 days. The cough was described as dry and of 5 days duration. There was no vomiting, diarrhea, rash, or seizures. The mother denied witnessing any ingestion of acetaminophen or toxic material. Past medical history and family medical history were unremarkable. Immunization, including influenza/H1N1, was reported as up to date per parents.

Vitals on admission were as follows: temperature 39°C, respiratory rate 50 breaths per minute, blood pressure 100/70 mmHg, pulse rate 110 beats per minute, oxygen saturation 90% in room air, weight 12.3 kg (50th percentile), height 88 cm (75th percentile), and head circumference 48.2 cm (50th percentile).

On examination, the child was drowsy; oral mucosa was dry; pharynx was erythematous with no associated cervical lymphadenopathy; the respiratory exam showed bilateral diffuse coarse crepitations and no wheezing; the abdomen was soft and mildly distended, with audible bowel sounds; the liver was palpated 3 cm below the right

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costal margin, with possible tenderness in the right upper quadrant, but there was no rebound. The rest of the physical exam was unremarkable.

Initial laboratory investigations were as follows: complete blood count showed a white blood count of 3,500/uL, hemoglobin 12.5 g/dL, platelets of 195,000/uL; erythrocyte sedimentation rate 17 mm/hour; creatinine of 66 umol/L, albumin 25 g/L, alanine aminotransferase (ALT) 2,106 U/L, aspartate aminotransferase (AST) 850 units/L, alkaline phosphatase (ALP) 291 units/L, gamma glutamyl transferase (GGT) 107 units/L, and total bilirubin 13 umol/L; the rest of the chemistry results were unremarkable, as were the coagulation profile, ammonia, and lactate. His venous blood gas was pH 7.2, carbon dioxide partial pressure (pCO_2) 44 mmHg, partial pressure of oxygen (pO_2) 29 mmHg, bicarbonates (HCO_3) 17 mEq/L, with a base excess of 11. Polymerase chain reaction (PCR) was conducted on the nasopharyngeal secretion and was positive for H1N1. Cerebrospinal fluid studies were normal, and urine and blood culture did not grow any organisms. Hepatitis A immunoglobin (Ig)-M was negative, hepatitis B surface antigen and core antibody were negative, hepatitis B surface antibodies were positive, and hepatitis C IgM was negative. Furthermore, and because of the fever and mildly enlarged liver, PCR was conducted on a blood sample to check for herpes simplex virus, adenovirus, Epstein–Barr virus, and cytomegalovirus; results were negative.

A chest radiograph showed bilateral streaky infiltrates with no focal consolidation. An ultrasound of the abdomen showed mild coarse hepatic echo texture with no focal lesion.

Course of hospitalization

The patient was started on 20 mL/kg of normal saline due to dehydration and required non-invasive ventilation due to hypoxia and tachypnea. Oseltamavir course was initiated per the published recommendations of the Centers for Disease Control and Prevention. The patient's general condition improved in 72 hours, and we repeated the liver function tests, which showed AST of 540 units/L, ALT of 510 units/L, and ALP of 172 units/L. The patient was discharged a few days later in good condition. Outpatient follow-up was conducted 2 months after discharge, and the liver function tests were as follows: AST 150 units/L, ALT 15 units/L, and ALP 71 units/L. In a subsequent 4-month post-hospital discharge outpatient visit, AST was 140 units/L, ALT 14 units/L, and ALP 30 units/L.

Discussion

Influenza A/H1N1 virus usually affects the respiratory tract,[1] but the pathogenesis is not yet fully understood.[3] Some authors believe that influenza A virus can affect any organ as a consequence of response to viral antigens.[4] Involvement of other systems by the virus is considered rare. Liver involvement has been documented in patients with complicated avian influenza H5N1.[1]

Fislova et al[3] studied the multi-organ involvement of human strain H1N1 in mice, and concluded that the dissemination of the virus from the lung to other organs is by the process of transient viremia. The study also concluded that the production of cytokine and chemokine induction might be the cause of multi-organ involvement due to respiratory H1N1 infection.

In terms of laboratory testing, Ginocchio et al[5] evaluated multiple test methods to detect H1N1, and concluded that PCR is the most sensitive and specific test to diagnose H1N1.

The neuraminidase inhibitors oseltamivir and zanamivir are being used for the treatment of H1N1.[2]

Papic et al[4] conducted a study in adults where liver function tests (AST, ALT, and GGT) were compared between H1N1 pandemic and seasonal groups. The study concluded that the liver function tests were higher in the pandemic group.

Some authors reported non-respiratory involvement in adult patients with H1N1 infection; Carrillo-Esper et al[1] reported two adult cases of influenza A H1N1 with liver involvement; Huang et al[6] wrote about an atypical adult case with H1N1 infection that was complicated with obstructive jaundice, renal insufficiency, coagulopathy, and acute respiratory distress syndrome; and Penney et al[7] mentioned two cases of pregnant women with elevated transaminases due to H1N1 that responded well to anti-viral medications.

El-Shabrawi et al[8] published a case of acute myocarditis and fulminant hepatic failure in an infant with pandemic human influenza A, H1N1 in a 10-month-old child; while Sánchez-Torrent et al[9] described a 3-month-old infant with H1N1 encephalitis.

Conclusion

H1N1 has been labeled as a culprit of respiratory infections and pulmonary complications. However, involvement of other organs has been overlooked. H1N1 might be a cause of transient elevation of liver function tests and should not be an incentive for ordering an extensive and expensive

work up for hepatitis. However, further studies are needed, not only to investigate the pathophysiology of hepatitis due to H1N1 infection, but also to create a guideline regarding monitoring of multi-organ involvement due to the virus.

Disclosure

The authors report no conflicts of interest related to this work.

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