

Rhabdomyolysis following pandemic influenza A (H1N1) infection

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ABSTRACT

Rhabdomyolysis is uncommon but potentially life-threatening. We present a 17-year-old patient who developed rhabdomyolysis following pandemic influenza A (H1N1/09) infection. With aggressive hydration her renal function remained normal throughout the entire disease course, and she steadily improved clinically. Although pneumonia and acute respiratory distress syndrome are the most common severe complications of H1N1/09 infection, clinicians should be aware that H1N1/09 infection may be complicated by rhabdomyolysis.

KEYWORDS

Rhabdomyolysis, pandemic, influenza A (H1N1)

INTRODUCTION

Rhabdomyolysis, most frequently caused by crush injury, a comatose or postictal state, postoperative surgical trauma, or excessive physical exertion, is a syndrome characterised by muscle necrosis and the release of intracellular muscle constituents into the circulation.^{1,4} The severity of disease can range from asymptomatic elevations in serum muscle enzymes to life-threatening conditions. Pandemic influenza A (H1N1/09) infection is a rare cause of rhabdomyolysis. We describe a pandemic influenza A (H1N1/09)-infected patient with complicating rhabdomyolysis.

CASE REPORT

A previously healthy 17-year-old girl presented to us with a cough of three days duration. Two days before presentation, she had myalgia and weakness which resolved that day after bed rest. One day before presentation, the patient treated herself with over-the-counter cold medications for a presumed common cold, without significant improvement. She noted recent contact with a classmate suffering fever and cough of unknown cause. She denied other symptoms and did not have any medical or family history, regular or illicit drug use, recent immunisation, travel, trauma, extraordinary exercise or similar episodes of myalgia. On examination she was slender, afebrile, normotensive and not lymphadenopathic. Heart, lung, motor function, sensory response and skin examinations were normal. A rapid antigen test for influenza A was positive. Urinalysis was positive for trace blood with a pH of 6.5 but no red or white blood cells on microscopy. Other laboratory data showed a markedly raised creatine kinase (CK) at 192.372 U/l (normal 0.533 to 3.001 U/l), and elevated aspartate aminotransferase (AST) at 4.318 U/l (normal 0.217 to 0.633 U/l), lactic dehydrogenase (LDH) at 5.084 U/l (normal 1.667 to 3.167 U/l), alanine aminotransferase (ALT) at 1234 U/l (normal 0.050 to 0.617 U/l) and CK-MB at 1.134 U/l (normal 0 to 0.167 U/l). C-reactive protein and erythrocyte sedimentation rate, initially slightly elevated, normalised one day later. Chest X-ray, electrocardiogram, complete blood counts, routine clinical chemistries, thyroid function, coagulation tests, troponin I, and antinuclear antibody test were normal. Blood/throat swab cultures for bacteria, urine myoglobin and serology for cytomegalovirus and Epstein-Barr virus were all negative.

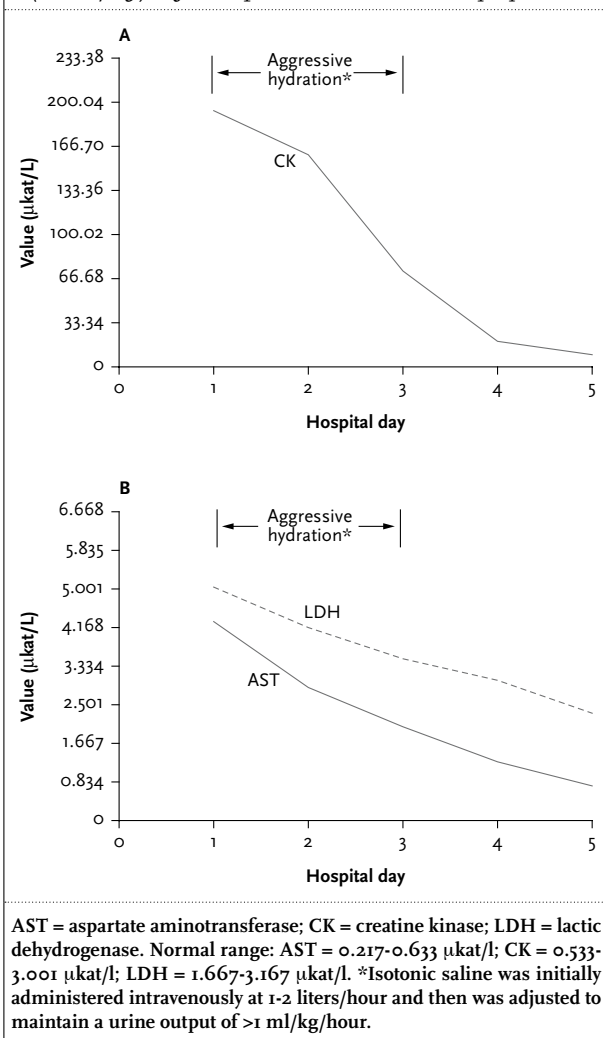
The girl was admitted with a diagnosis of rhabdomyolysis presumably from influenza A infection. Three hours after admission, she had fever which resolved with acetaminophen and oseltamivir (75 mg twice daily for five days) one day later. Pandemic influenza A (H1N1/09) virus was identified by real-time reverse-transcriptase polymerase chain reaction of nasopharyngeal smear at the National Laboratory of Taiwan Centers for Disease Control. With aggressive hydration for rhabdomyolysis, her renal function and electrolytes remained normal and the muscle enzyme values gradually declined as the patient improved clinically. On hospital day 5, the ALT and LDH had normalised, AST was just above normal, and CK decreased to 10.119 U/l (figure 1); the patient was subsequently discharged. One week later, she remained asymptomatic, and her AST and CK had normalised.

DISCUSSION

Rhabdomyolysis has multiple aetiologies, among others, trauma, intense exercise, infection, drugs or toxins, genetic defects, and metabolic or neuromuscular diseases have been described.^{1,4} Viral aetiology, mostly influenza, has been reported to be the predominant cause of infection-induced rhabdomyolysis.^{2,4,5} The mechanisms of rhabdomyolysis caused by influenza virus remain unclear. Certain hypothetical mechanisms, including muscle damage due to direct viral invasion or induction by an immune-mediated action, have been proposed.^{2,4,6} Recent reports^{7,8} showed that >40% of pandemic influenza A (H1N1/09) admissions had abnormal muscle enzyme values, implying that pandemic influenza A (H1N1/09) virus might cause muscle damage or inflammation. The classic triad of rhabdomyolysis includes myalgia, red-to-brown or dark urine and muscle weakness. However, <10% of patients with rhabdomyolysis show all three classic features and 3.6% have dark urine,^{2,3} implicating a potentially insidious onset. The diagnosis of rhabdomyolysis is confirmed by laboratory studies. Myoglobinuria can produce pigmenturia thus aiding in the diagnosis of rhabdomyolysis. Although myoglobinuria is usually detected in cases of rhabdomyolysis, rhabdomyolysis does not necessarily result in visible myoglobinuria. Myoglobin has a short half-life (2-3 hours) and could be rapidly and unpredictably eliminated by hepatic metabolism and renal excretion.⁹ The test for myoglobin in plasma or urine would be negative before any medical attention is sought; thus, the diagnosis of rhabdomyolysis cannot be completely ruled out.^{1,4,9} The classic laboratory finding as the diagnostic criteria for rhabdomyolysis is an elevated serum CK of ≥ 5 times the normal value, in which the CK is almost entirely of skeletal muscle fraction.^{1,10} The complications of rhabdomyolysis include hyperkalaemia, hypocalcaemia, cardiac dysrhythmias, cardiac arrest, acute renal failure, disseminated intravascular coagulation and compartment syndrome. Acute renal failure is the most common among them and has been reported in 13 to 50% of patients with rhabdomyolysis.³ The mechanisms of renal damage include tubular obstruction, the toxic effect of free chelatable iron on tubules, and vasoconstriction.^{1,4} Hypovolaemia or dehydration and aciduria (urine pH <6.5) have been suggested as crucial factors in the development of renal failure from rhabdomyolysis;^{1,2} therefore, early and aggressive fluid repletion and bicarbonate therapy if necessary are the standard treatment to prevent acute renal failure.^{1,4,9}

To date, there have been only three case reports of pandemic influenza A (H1N1/09)-associated rhabdomyolysis in the literature;¹¹⁻¹³ two cases appeared to have respiratory distress syndrome or pneumonia with complicating rhabdomyolysis and one case with

Figure 1. Serum creatine kinase (panel A), aspartate aminotransferase, and lactic dehydrogenase (panel B) levels during hospitalization in pandemic influenza A (H1N1/09)-infected patient with rhabdomyolysis



mild asthma had triadic features of rhabdomyolysis. In the present report, the previously healthy patient did not present with severe respiratory illness caused by pandemic influenza A (H1N1/09) infection, and there were no apparent symptoms suggestive of rhabdomyolysis, implying the capacity of this novel virus for causing this clinical effect with obscure presentation.

CONCLUSION

Clinicians should consider a pandemic influenza A (H1N1/09) infection in any person with cold-like symptoms and suspected contact history in the worldwide pandemic surroundings. Although pneumonia and acute respiratory distress syndrome are the most common severe complications of the pandemic influenza A (H1N1/09) infection,^{7,8,14} physicians should also be aware that pandemic influenza A (H1N1/09) infection may be complicated by rhabdomyolysis.

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