

Toxic Shock Syndrome Following Influenza-like Illness: The First Case Report in a Young Child

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Toxic shock syndrome in children following infection with influenza is a very rare syndrome. If it is not diagnosed quickly, it may cause significant morbidity and mortality. For diagnosis of toxic shock syndrome, clinical and laboratory criteria are used. Our patient is a 3.5-year old boy who admitted to the hospital with high fever, weakness, toxicity, hypotension and skin rash due to influenza-like illness (fever, pharyngitis, rhinitis and non-productive cough) associated with gastrointestinal symptoms, elevated liver enzymes levels, low platelet count and mucosal hyperemia. After the treatment, he recovered and was discharged from the hospital in good condition, but had mild scaling on the soles of the feet and between toes. To our knowledge, this is the first reported case in a young child. There is not any specific diagnostic test for toxic shock syndrome diagnosis, and the diagnosis is based on clinical and laboratory findings. Therefore, the early detection and treatment of the condition is very important because delay in treatment leads to increased mortality and morbidity.

Keywords: Toxic shock syndrome; Influenza; *Staphylococcus aureus*

1. Introduction

Influenza is an acute respiratory disease caused by *Influenza* virus. It suddenly begins with fever, chills, headache, myalgia, malaise, anorexia, sore throat and non-productive coughs. The main complications of influenza are secondary bacterial infections, which are characterized by persistent fever and worsening disease (1). Influenza causes a significant morbidity and mortality among children (1). The mortality rate of disease in Iranian infants was 7.4% in 2009 (2).

Toxic shock syndrome is a multi-systemic disease caused by toxic shock syndrome toxin-1 (TSST-1) and some other enterotoxins produced by *Staphylococcus aureus* or colonized *Staphylococcus* (1, 3). Many of the toxic shock syndromes are reported in 15-25 years old women during menstruation, especially when they use the tampons or other vaginal devices. It also occurs in children with Staphylococcal infections, especially burns; sinusitis, tracheitis, pneumonia, empyema, abscess, osteomyelitis and primary bacteremia (1). Toxic shock syndrome (TSS) is diagnosed based on its clinical symptoms. It starts with sudden onset of high fever, vomiting, diarrhea, headache, sore throat and muscle ache. A diffuse macular rash occurs in the first 24-hour associated with sore throat, mouth, tongue and conjunctiva. Other symptoms including impaired consciousness, hypotension and oliguria. In severe cases it can lead to shock and disseminated intravascular coagulation (DIC). For differential diagnosis,

the Kawasaki disease, scarlet fever, leptospirosis, toxic epidermal necrolysis, and measles should be considered (1). Kawasaki disease is clinically very similar to TSS, but usually some of clinical features such as rapidly progressive illness, diarrhea, vomiting, and hypotension are not complained in Kawasaki disease.

The first treatment step includes rapid fluid replacement to prevent and treat low blood pressure, kidney failure and cardiovascular collapse. Initial antibiotic therapy consists of intravenous beta lactamase resistant anti Staph (In areas with a high prevalence of resistant *staphylococcus*, vancomycin is the treatment of choice) and a protein synthesis inhibitor drug such as clindamycin. Antibiotic treatment is continued for at least 10-14 days. In some cases, inotropics are required for the treatment of shock. Intravenous immune globulin (IVIG) can be considered in patients with serious TSS who do not respond to other therapies, because it can neutralize the toxin in serum (4). Mild scaling of skin starts after 5-7 days in the trunk and limbs, and severe desquamation may be seen in the palms after 10-12 days until one month (5). Toxic shock syndrome in children following influenza is a very rare disease, and the early diagnosis and treatment of this disease is important (1).

2. Case Report

The patient is a 3.5-year old boy with a history of epilepsy,

Implication for health policy/practice/research/medical education:

Some flu complications need to be diagnosed and treated quickly. Therefore, we should consider it.

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who was admitted to the pediatric ward of Ayatollah Mousavi Hospital, Zanjan, Iran, in January 2013 (during the influenza epidemics), with flu symptoms such as fever, pharyngitis, rhinitis, non-productive coughs and vomiting.

After admission, the patient's condition worsened presenting fever, altered levels of consciousness, persistent vomiting, and diarrhea, which started later. The patient's general appearance was very toxic with diffuse erythematous rash on trunk and extremities. Conjunctiva, oral mucosa and throat were congested, in addition to hypotension (systol-

ic blood pressure 60 mmHg). We used modified Glasgow Coma scale (GCS) (6) (or pediatric GCS) table to assess impairment of consciousness. Chest radiography did not show any specific findings. Laboratory evaluations showed mild thrombocytopenia (118.000/mm), and increased liver enzyme tests [AST = 95 mg/dL (with upper normal limit of 35 mg/dL), ALT = 52 mg/dL (with upper normal limit of 35 mg/dL)]. Blood cultures were negative. The patient was diagnosed with toxic shock syndrome [he fulfilled all the major criteria and at least three minor criteria (Table 1)].

Table 1. Diagnostic Criteria for Staphylococcal Toxic Shock Syndrome (1, 4)

Criteria	Signs and Symptoms
Major (all required)	
	Fever (> 38.8°C)
	Rash (erythroderma with convalescent desquamation)
	Hypotension (orthostatic, shock, below age-appropriate normal)
Minor (any 3 or more)	
	Mucous membrane inflammation
	Vomiting, diarrhea
	Liver abnormalities (bilirubin or transaminase two times greater than upper normal limit)
	Thrombocytopenia
	Central nervous system abnormalities (alteration in consciousness without focal neurological signs)
	Kidney disorders
	Muscular disorders

The patient was immediately transferred to the intensive care unit and fluid therapy with normal saline was administrated. Clindamycin and vancomycin prescribed and then single dose of intravenous immunoglobulin (IVIG) (400 mg/kg) were administered due to the severity of disease. During the stay in the ICU ward, the patient's condition improved, blood pressure gradually normalized, and the fever disappeared.

After a few days, the patient was transferred to the pediatric ward and ultimately discharged from hospital with good health condition. *Staphylococcus* antibiotic therapy was continued orally at home. At discharge day, fine scaling on the soles of the feet and between fingers observed.

3. Discussion

Toxic shock syndrome is a multi-system disorder that involves multiple organs. The disease is uncommon in children but sometimes is occurred following staphylococcal infections. This disease was rarely reported following influenza infections (1, 7, 8) and after searching the related literature, our case is the first reported pediatric case. Although in this case the coinfection of influenza and staphylococci infection was not ruled out.

During the influenza epidemic, its diagnosis in young children can be made based on the clinical symptoms (1). Our patient was admitted 5 days after onset of typi-

cal clinical features of influenza during the flu epidemic. Positive results of PCR for influenza decrease after the first 72 hours, (4) therefore, we did not send samples for PCR detection. For detection of toxic shock syndrome, there is not any specific tests, and the diagnosis is based on clinical and laboratory criteria (1, 4). Blood cultures are less helpful. Therefore, early detection and treatment of the disease is very important because delay in treatment leads to increased mortality and morbidity. The ESR (erythrocyte sedimentation rate) and CRP (C-reactive protein) levels were not very high and we excluded Kawasaki disease due to the absence of typical and atypical KD criteria and presence of hypotension and rapidly progressive illness, so we did not performed echocardiography. Most cases reported the toxic shock syndrome as a secondary disease of influenza, were followed by upper and lower respiratory tract *Staphylococcus aureus* infections (tracheitis, sinusitis, pneumonia) (7, 8) which is usually associated with persistent fever and worsening of illness. TSS also can occur without any identifiable focus of infection (4). If the flu worsens, a secondary infection as a complication of the disease should be considered (1). Although most cases of secondary infections are due to pneumococcus, in more severe cases staphylococcus plays an important role (5). Our patient did not have any underlying immunodeficiency pathology, like other cases of toxic shock syndrome

following influenza infections (7, 8) and, like most of the reported cases, had not received influenza vaccine. As a result, influenza vaccination, particularly in young children can strongly reduce most of the secondary bacterial infections and is highly recommended (1, 4, 5).

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Authors' Contribution

The authors contributed equally in this article.

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