Streptococcal Toxic Shock Syndrome Manifesting as Peritonitis in a Child

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Abstract: Streptococcal toxic shock syndrome (TSS) with the initial manifestation of peritonitis is rare. We report the case of a 5-year-old girl who presented with peritonitis and shock. Emergency laparotomy was performed but no perforated visceral organ was found. Acute respiratory distress syndrome, impaired renal function, and coagulopathy developed later. Group A β-hemolytic Streptococcus (GAS) was isolated from the pleural effusion and the diagnosis of streptococcal TSS was made. This association highlights the need for thorough examination and close observation in the management of childhood peritonitis.

Key words: group A Streptococcus peritonitis toxic shock syndrome

Group A Streptococcus (GAS) is known to cause infections such as pharyngitis, pneumonia, impetigo, erysipelas, necrotizing fasciitis, and septicemia, and can be complicated by rheumatic fever, glomerulonephritis, and erythema nodosum [1]. In 1987, Cone et al described two patients with severe GAS infections who had clinical features similar to staphylococcal toxic shock syndrome (TSS). This syndrome was designated streptococcal TSS [1]. Due to the availability of effective antimicrobial agents, improvements in sanitation, or a probable decrease in the virulence of the microorganism, the frequency and severity of these infections has declined [2]. However, in the past few years, there appears to have been a change in the spectrum of disease caused by GAS, including more frequent reports of streptococcal TSS. The reemergence of serious infection is probably related to the renewed prevalence of more virulent strains and more susceptible host factors [3].

Here, we report a case of streptococcal TSS with the initial presentation of peritonitis and shock. A high degree of suspicion is important to make this diagnosis and to achieve good therapeutic results.

Case Report

A previously healthy 5-year-old girl was referred from a local clinic. She had had intermittent fever with sore throat for 2 days. Four episodes of vomiting had been noted before the development of fever. Dyspnea and tachycardia developed gradually. She complained of abdominal pain with diarrhea since that morning. At the emergency room, her consciousness was clear. Physical examination revealed a body temperature of 36.7°C, pulse rate of 145 beats per minute, and blood pressure of 58/30 mmHg. Diffuse tenderness and rigidity of the abdominal wall with silent bowel sounds were noted. Complete blood cell count revealed a leukocyte count of 13,320/µL with 3% metamyelocytes, 28% band form, and 59% polymorphonuclear leukocytes. Platelet count was 14,200/µL. Chest roentgenography showed a clear lung field with an elevated left hemi-diaphragm. No free air was noted (Fig. 1). Plain abdominal film showed local ileus (Fig. 2). Abdominal echography demonstrated decreased bowel peristalsis with some ascites at the Douglas pouch. Peritonitis with shock was diagnosed.

Fluid challenge, inotropic agent, and antibiotic treatment with ticarcillin disodium plus clavulanate potassium, amikacin, and metronidazole were given. Emergency laparotomy was performed on the same day. However, no perforated visceral organ was found, and only about 100 mL yellowish ascites, a hyperemic appendix, and disseminated mesenteric lymphadenopathy with dilated ileum and colon were noted. Only incidental appendectomy was performed and an ascites sample was sent for bacterial culture. The culture did not yield any pathogen. Hypotension persisted and acute respiratory distress syndrome developed after surgery. Strong inotropic treatment with full doses of dopamine, dobutamine, and norepinephrine were used to normalize blood pressure. Chest roentgenography 1 day after surgery showed bilateral hazing (Fig. 3). Leukocytosis (white
blood cell count, 20,600/µL), thrombocytopenia (platelet count, 67,000/µL), and impaired renal function (blood urea nitrogen/creatinine, 63.8/2.1 mg/dL) developed on the day after surgery. Chest echography revealed bilateral pleural effusion. Paracentesis from the right pleural cavity yielded 116 mL of turbid, yellowish, sticky fluid with 50,300 leukocytes/mL, 70,000 red blood cells/mL, 3.1 g/dL protein, 65 mg/dL glucose, and 19,900 U/L lactate dehydrogenase. Numerous polymononuclear cells with gram-positive cocci were seen on Gram’s stain of the fluid, so the antibiotic regimen was changed to vancomycin, ceftazidime, metronidazole, and azithromycin. Bacterial culture of the pleural effusion yielded GAS that was sensitive to penicillin. Diagnosis of streptococcal TSS was confirmed by culture result and clinical findings.

Thereafter, penicillin G (370,000 U/kg/d) was administered for 4 days. However, fever and intermittent abdominal pain persisted. Culture from the tip of the penrose drain placed during surgery grew methicillin-resistant Staphylococcus aureus, and possible secondary infection was suspected. The final antibiotic regimen used was vancomycin and cefotaxime. Fever subsided gradually thereafter and no fever was noted after the 19th day after surgery. Cefotaxime was discontinued but vancomycin was used for another 10 days until the patient’s activity and appetite improved. She was discharged after hospitalization for 29 days without residual symptoms.
Primary peritonitis is a diffuse suppurative peritoneal infection without an identifiable source that may occur in healthy infants and children as well as in children with underlying disease such as immunodeficiency, cirrhosis, and nephrotic syndrome. Primary peritonitis is not a common pediatric disease. Studies from the early 1900s reported peritonitis in 10% of pediatric abdominal emergencies, whereas reviews conducted in the 1960s and 1970s noted a marked decrease in the incidence of primary peritonitis [5]. Streptococcus pneumoniae and GAS were the traditional etiologic agents [6]. By the 1970s, the number of nephrotic children with streptococcal peritonitis had declined, and the relative frequency of peritonitis caused by gram-negative bacilli and staphylococci apparently had increased. Primary peritonitis was often misdiagnosed as appendicitis. Reddened intestine and enlarged mesenteric lymph nodes were often noted as surgical findings [6].

Streptococcal TSS occurs in people of all ages; most do not necessarily have predisposing underlying diseases [7]. Pain involving an extremity, usually abrupt in onset and severe, and fever are common early symptoms. Eighty percent of patients have clinical signs of soft tissue infection. Most patients (70%) progress to necrotizing fasciitis or myositis and require surgical debridement, fasciotomy, or amputation [8]. Multisystem disease with acute respiratory distress syndrome and renal failure frequently develop, as well as fever, striking leukocytosis, and elevated creatine kinase concentrations. Unusual presentations include endophthalmitis, pneumonia, peritonitis, perihepatitis, and myocarditis [7].

Primary peritonitis associated with streptococcal TSS has rarely been reported. A review of the literature revealed only two childhood cases. The first was a 13-day-old infant [9] and the second was a 2-year-old girl [10]. The 13-day-old female patient had a 3-day history of erythematous rash and diarrhea, vomiting for 24 hours, and refusal to feed. She had a distended, rigid abdomen with absent bowel sound and blood pressure of 54/30 mmHg on admission. Initial investigations showed leukocytosis, thrombocytopenia, and prolonged prothrombin and partial thromboplastin time. Profound shock developed over the next 18 hours. Laparotomy was performed and purulent peritoneal fluid was found. High-dose penicillin was administered. Blood and peritoneal cultures grew GAS that was sensitive to penicillin. Mechanical ventilation was required for another 3 days after the operation and desquamation occurred for more than 1 week, affecting most of her body. Spiking fever with a pneumonia patch in the right lower lobe was noted. She was finally discharged after 22 days in the hospital after discontinuing antibiotic therapy 1 day previously. Intermittent fever continued for a further 20 days and she was asymptomatic and thriving on follow-up thereafter.

The previously reported 2-year-old female had had diarrhea and vomiting for 2 days and 1 day of fever and irritability before admission [10]. She remained febrile and continued to have intermittent abdominal pain and diarrhea after admission. On the third day of hospitalization, distended abdomen and faint periumbilical erythema developed. Paracentesis yielded cloudy, yellowish fluid with polymorphonuclear leukocytes and abundant intracellular and extracellular gram-positive cocci. Signs of shock developed 5 hours later. Her respiratory condition deteriorated over the next 24 hours and she required intubation. Her leukocyte and platelet counts fell to 5,200/µL and 82,000/µL, respectively. GAS grew from peritoneal fluid, blood, and urine cultures. She received clindamycin and ceftriaxone for a total of 14 days and 400 mg/kg of intravenous immunoglobulin (IVIG) daily for 5 days. Erythematous macular rash waxed and waned over several weeks with intermittent desquamation that eventually involved her forearms, palms, ankles, and soles as well as her flanks, periumbilical area, and lower abdomen. Fever with temperature greater than 39°C persisted for another 2 weeks after the discontinuation of antimicrobial therapy. She had been hospitalized...
for 47 days at that time, when there was complete resolution of all symptoms and laboratory abnormalities.

Comparison with the two previously reported cases revealed that all three patients initially presented with vomiting and diarrhea but progressed to shock. The two previously reported cases had abdominal tenderness and rigid abdomen with positive culture results from peritoneal fluid, and later developed impaired respiratory function. Although our patient initially had clinical manifestations of peritonitis, the ascites culture did not yield bacterial growth, suggesting that her peritonitis may have been part of a systemic immunologic response towards severe GAS infection that does not favor direct invasion of GAS to the peritoneal cavity. This finding is different from the previous reports and highlights the possible association of GAS infection and peritonitis.

Both the previously reported case in a 13-day-old girl and our patient were treated with penicillin. The previously reported case in a 2-year-old was treated with clindamycin, ceftriaxone, and IVIG. All three of these cases had prolonged fever and hospitalization.

Although penicillin G remains the drug of choice for the treatment and prevention of GAS infection, some clinical failures with penicillin therapy have been reported [11, 12]. In particular, failure might occur in more invasive GAS infections such as myositis, necrotizing fasciitis, and empyema [13]. Our patient also experienced a delayed clinical response. Penicillin G was administered but high fever persisted and the regimen was switched to vancomycin and cefotaxime. The relative ineffectiveness of penicillin in settings where very high concentrations of the organism are present may explain the lack of response in our patient. Under these high-inoculum conditions, streptococci exhibit a slower growth rate which results in diminished expression of the target sites for penicillin activity (ie, penicillin-binding proteins) and decreased susceptibility to penicillin [14]. Clindamycin was a more effective antibiotic in a mouse model of streptococcal myositis when penicillin was ineffective [15]. Because clindamycin inhibits protein synthesis, its efficacy is not dependent on penicillin-binding proteins. In addition, clindamycin inhibits the synthesis of both M protein (an important antiphagocytic virulence factor) and streptococcal pyogenic exotoxins (SPEs). Although there are no controlled clinical studies demonstrating that the addition of clindamycin improves the outcome in patients with severe invasive GAS infections compared with penicillin alone, many experts recommend intravenous administration of clindamycin (25–40 mg/kg/d in three or four divided doses) in addition to penicillin [16]. Additional therapeutic modalities with IVIG have been attempted in the treatment of streptococcal TSS and were effective in the few cases reported [17–20]. IVIG has been postulated to be beneficial in addition to appropriate antimicrobial therapy through its blocking or inactivating of SPEs, which stimulates proliferation of T lymphocytes, resulting in a decrease in the production of inflammatory cytokines that may play a major role in the pathogenesis of this disease [16, 21]. In view of the possible increasing prevalence of severe streptococcal infections, a high index of suspicion and prompt therapy are needed to improve the outcome of patients with streptococcal TSS.

References