

Streptococcus pyogenes pyomyositis

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Group A beta-hemolytic *Streptococcus pyomyositis* continues to be an uncommon disease. We present a case of a 7-year-old boy with an M protein type 1, streptococcal pyrogenic exotoxin A and B, *Streptococcus pyogenes* pyomyositis and streptococcal toxic shock syndrome.

In the past 15 years there has been a resurgence of severe, invasive Group A beta-hemolytic *Streptococcus* (GABHS) infections, including necrotizing fasciitis and streptococcal toxic shock syndrome.^{1,2} Nonetheless GABHS pyomyositis has remained a relatively uncommon infection, particularly in children.^{3,4} Adams et al.⁵ documented only 21 cases from 1900 to 1985 and only 1 younger than 12 years of age. We present a case of a 9-year-old boy with GABHS pyomyositis and streptococcal toxic shock syndrome.

CASE REPORT

A previously healthy 7-year-old boy was admitted to the hospital with a history of fever, leg pain, abdominal discomfort and refusal to walk. Three weeks before admission the patient and his two siblings had a self-limited, flu-like illness with sore throat and fever to 39°C. Four days after this initial illness, the patient had intermittent fever and malaise. Because of these symptoms the patient's mother administered 200 mg of ibuprofen two to four times a day for 2 weeks. Two days before admission the patient was evaluated in the outpatient department for fever, vague right leg pain and malaise. There was no history of recent trauma. At that time his physical examination was unremarkable. Laboratory studies revealed an erythrocyte sedimenta-

tion rate of 81 mm/h (normal, <15 mm/h), C-reactive protein of 3.2 mg/dl (normal, <0.4 mg/dl) and a white blood cell count of 20 600 cells/mm³ (36% band forms, 58% granulocytes, 6% monocytes). A blood culture was obtained and subsequently reported as sterile. Plain radiographs of hips, right knee and right femur were normal. The patient was seen in follow-up the next day, at which time he now complained of bilateral leg pain and weakness and new onset of dull intermittent abdominal pain. On examination he was afebrile but had right upper quadrant abdominal tenderness with a liver edge palpable 2 cm below the right costal margin. Once again he had a normal hip and knee examination bilaterally. Additional laboratory studies revealed elevated aminotransferase values: the aspartate aminotransferase was 258 units/l (normal, 9 to 45 units/l); and the alanine aminotransferase was 211 units/l (normal, 8 to 63 units/l). A three phase technetium bone scan was obtained and interpreted as normal.

Within 24 h the patient was admitted to the hospital because of worsening abdominal pain and severe, proximal left leg pain. On admission he had a temperature of 39.2°C, a heart rate of 102 beats/min and a blood pressure of 102/54 mm Hg. His examination was significant for an ill general appearance, right upper quadrant abdominal tenderness and moderate to severe pain on palpation of his left thigh. He had limited left hip and knee flexion because of pain in his thigh, but there was no skin erythema or edema, nor were there any joint abnormalities. Laboratory evaluation revealed a normal creatinine phosphokinase (42 units/l; normal, 24 to 204 units/l), leukocytosis with neutrophilia and persistently elevated aminotransferases. Additional blood cultures were obtained, however, antibiotics were not initiated. Twelve hours after admission the patient's temperature increased to 40.0°C, his left thigh became edematous, warm and exquisitely tender and he complained of increasing abdominal pain. A magnetic resonance image of his left thigh showed edema within the vastus lateralis and intermedius with a small amount of fluid tracking underneath the fascia, suggesting a diagnosis of myositis (Fig. 1B). There was no evidence of fasciitis, osteomyelitis or soft tissue abscesses. The patient was given intravenous oxacillin and clindamycin.

The patient remained febrile and became hypoten-

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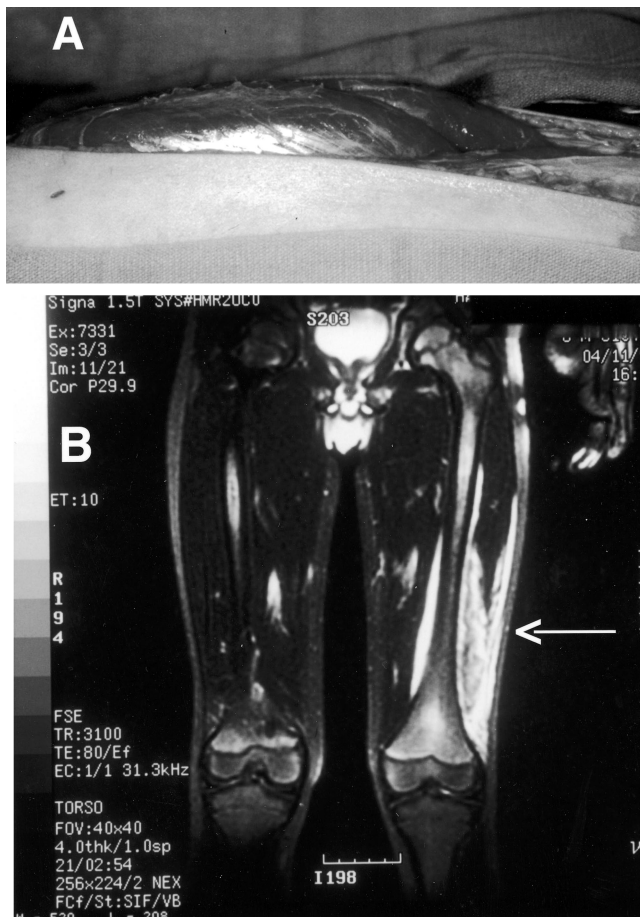


FIG. 1. A, initial left thigh intraoperative findings revealed an edematous, "boggy" muscle. B, MRI revealed edema within the left vastus lateralis (arrow) and intermedialis with fluid tracking underneath the fascia.

sive (80/50 mm Hg), requiring multiple intravenous fluid boluses with normal saline. In addition he had chemical evidence of early disseminated intravascular coagulation. Once the patient was stabilized a left thigh needle biopsy was performed. Gram-stained smear of material from the muscle biopsy revealed Gram-positive cocci in chains suggestive of *Streptococcus* (the culture was later positive for GABHS). Oxacillin was changed to penicillin and he was taken to the operating room for urgent debridement and irrigation of his left thigh. Findings in the operating room included an edematous, "boggy" muscle without purulence (Fig. 1A). The patient was returned to the operating room daily for the next 3 days for repeated debridement. GABHS was isolated from the first two of four intraoperative muscle debridements. The muscle biopsy demonstrated acute pyomyositis with focal necrosis.

Throat cultures were obtained from the patient before initiating antibiotic therapy. Throat cultures were also obtained from his two siblings and both parents. GABHS was isolated from both the patient and his

brother. Both strains were sent to the World Health Organization Collaborating Center for Reference and Research on Streptococci at the University of Minnesota Medical School where they were both found to be M protein type 1 serotypes as well as producers of streptococcal pyrogenic exotoxins A and B.

The patient went home 19 days after admission. On follow-up examination his wound had closed and his left leg had recovered a normal range of motion. The patient has reinstated his normal physical activities without any limitations.

DISCUSSION

There are several factors thought to predispose patients to invasive GABHS infections, including nonpenetrating trauma, the use of nonsteroidal antiinflammatory agents (NSAIDs)⁶ and viral infections like varicella.⁷ After an episode of pharyngitis our patient received ibuprofen at least three times a day for 2 weeks before hospital admission. It is possible that the administration of NSAIDs may have predisposed him to disseminated GABHS disease as a complication of untreated streptococcal pharyngitis. There are several proposed mechanisms by which NSAIDs may play a role in invasive GABHS infections. The relief of painful symptoms may mask the disease progression and ultimately delay the diagnosis.⁸ In addition NSAIDs may increase the production of cytokines such as tumor necrosis factor alpha, interleukin 1 and interleukin 6, which are mediators of shock.⁷ Also NSAIDs have been shown to suppress granulocyte functions such as chemotaxis, oxidative burst, phagocytosis and bacterial killing.⁸

The aggressive nature of GABHS pyomyositis and other invasive GABHS infections may be attributed to several virulence factors including M protein and extracellular toxins such as streptococcal pyrogenic exotoxins. M protein on the cell wall provides antigenic variation and blocks opsonization by the complement alternate pathway, thus evading phagocytosis. Of the more than 20 types of M protein, invasive GABHS infections have primarily been associated with serotypes M-1 and M-3.¹⁻² Although both our patient and his brother had similar strains of GABHS, only one developed invasive disease. There is also documentation in the literature that "invasive strains" have been isolated from individuals with uncomplicated GABHS pharyngitis or tonsillitis, suggesting that both host and bacterial factors play a role in pathogenesis.¹

The mainstay of treatment for GABHS pyomyositis is surgical debridement in addition to parenterally administered antibiotics. Aggressive GABHS infections such as pyomyositis and necrotizing fasciitis respond less well to penicillin.² In 1952 Eagle⁹ used a mouse model to demonstrate the failure of penicillin to cure *Streptococcus pyogenes* myositis if antibiotics were

administered late in the course of infection or after a high inoculum of organisms. The "Eagle effect" is thought to be associated with decreased concentration of penicillin-binding proteins in the stationary phase of growth, enabling persistence of the organism. In 1988 Stevens et al.⁹ demonstrated that clindamycin was more effective than penicillin in treating *S. pyogenes* myositis in a mouse model, even if treatment was delayed. In addition Zimbelman et al.¹⁰ reported that patients with deep infection were more likely to have a favorable outcome if initial treatment included a protein synthesis-inhibiting antibiotic compared with treatment with a cell wall-inhibiting antibiotic alone. Although urgent debridement is essential in cases such as the one presented here, the use of clindamycin could have had a positive impact on the outcome of our patient.

This case exemplifies several aspects of GABHS pyomyositis. First, the physical examination was misleading, causing a delay in the diagnosis. Magnetic resonance imaging proved to be more useful than plain radiographs and a bone scan. Hence primary care providers must have a high index of suspicion to make the diagnosis. Second, we were able to isolate a similar strain from the patient's pharynx and muscle. Interestingly the patient's sibling was an asymptomatic carrier of a similar strain, suggesting that both host and bacterial factors play a significant role in the pathogenesis of this disease process. Finally, although the literature reports a mortality of 80% for patients with

GABHS pyomyositis, we believe that appropriate use of antibiotics including clindamycin in combination with early surgical debridement improve the outcome.

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