Acute Arthritis of the Hip in a Child Infected With the Lyme Spirochete

ANDREW MILLER, M.D., ROBERT P. STANTON, M.D., AND STEPHEN C. EPPES, M.D.

Acute Lyme arthritis may mimic acute pyogenic arthritis. Although the arthritis associated with infection with the spirochete, *Borrelia burgdorferi*, is more commonly seen in the chronic stage (Stage III) of the disease, occasionally it may present as the initial clinical manifestation. A five-year-old girl with acute arthritis of the hip is reported to discuss classification and management of arthritis associated with Lyme disease.

The hip joint is the most common site for septic arthritis in the pediatric population. Early diagnosis and surgical decompression are essential to prevent the sequelae of femoral head necrosis and rapid degenerative arthritis. The majority of cases of septic arthritis in childhood result from *Staphylococcus aureus;* however, less common pathogens include *Hemophilus influenzae, Escherichia coli,* and *pneumococcus.* Unlike septic arthritis of the knee or ankle, which may be treated with serial aspirations or arthroscopic lavage, open surgical decompression remains the treatment of choice for septic arthritis involving the hip.

Lyme disease should be considered in the differential diagnosis of septic arthritis. Classically, Lyme disease presents with *Erythema chronicum migrans* (ECM) three to 30 days after inoculation with *Borrelia burgdorferi.* The rash may be associated with a fever, minor constitutional symptoms, and regional lymphadenopathy. Neurologic signs and cardiac conduction abnormalities may follow within two months. The first-stage musculoskeletal manifestations include migratory arthralgia, bursitis, tendonitis, and myalgia. These symptoms are transient and present within days to weeks after inoculation, often in association with fever, rash, and constitutional symptoms. Chronic arthritis associated with villous synovial hypertrophy and a mononuclear infiltrate occurs almost exclusively in the chronic stage (Stage III) of the disease. The authors present a case of Lyme disease that simulates acute septic arthritis of the hip.

CASE REPORT

A five-year-old girl was admitted with a three-day history of right hip pain, a limp, and a low-grade fever. No history of trauma, prodromal illness, or contact with ticks was elicited. Physical examination of the child was notable for pain with passive flexion, extension, and rotation of the right hip. The patient preferred to hold her right hip in a flexed, abducted, and externally rotated position. Roentgenograms demonstrated slight widening of the joint space of the right hip (Fig. 1) whereas a technetium-99 bone scan revealed increased uptake in the metaphyseal region of the right proximal femur on delayed images. Ultrasound of the right hip joint demonstrated a large effusion (Fig. 2).

On admission, the patient's temperature was 38.2°. She had a white blood cell count of 12,200 mm^3, a normal differential, and erythrocyte sedimentation rate (ESR) of 73 mm/hour.

From the Alfred I. duPont Institute, Wilmington, Delaware.

Reprint requests to Robert P. Stanton, M.D., c/o Editorial Services, Alfred I. duPont Institute, P.O. Box 269, Wilmington, DE 19899.

Received: January 29, 1990.
Revised: June 17, 1991.
Accepted: June 19, 1991.

FIG. 1. Anteroposterior view of the pelvis demonstrates subtle widening of joint space on right.

Based on the high suspicion of septic arthritis, an aspiration of the right hip was performed. Five milliliters of mucopurulent fluid was obtained. Gram stain of the fluid revealed 3+ white blood cells with no visible bacteria. An anterior decompression of the right hip was then performed. Postoperatively, the patient was treated with intravenous cefuroxime. Despite finding thick purulent material within the hip joint, intraoperative cultures remained negative after 72 hours of incubation. Postoperatively, the patient's clinical condition improved. She was afebrile by the third postoperative day despite continued elevation of her ESR to 101 mm/hour.

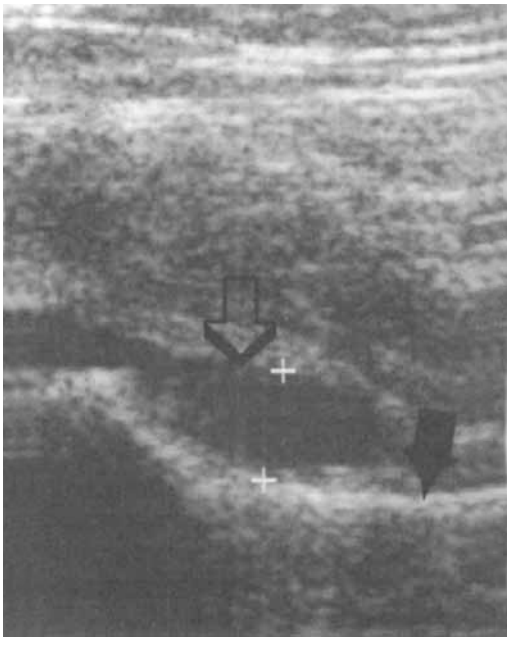

FIG. 2. Ultrasound examination of the hip. A large effusion is noted between the femoral neck (solid arrow) and the joint capsule (hollow arrow).

On the sixth postoperative day, the Lyme enzyme-linked immunosorbent assay (ELISA) IgG titer was reported as 1:2560. In the authors' laboratory, a modified ELISA is performed using a preparation of *E. coli* to reduce levels of cross-reacting antibodies. Optical density readings are expressed as titers based on studies with known positive sera; values greater than 1:80 are considered positive with a high degree of specificity for infection with *B. burgdorferi*.[2] The Western blot assay demonstrated antibodies to 12 spirochetal antigens including the 41 and 60 kd proteins (greater than four bands is considered positive [reactive]).

A two-week course of intravenous cefuroxime was followed by two weeks of oral amoxicillin. The patient's clinical examination was normal at a five-week postoperative examination; however, her Lyme ELISA titer remained elevated at 1:320, and she retained reactivity to ten antigens on her Western blot.

DISCUSSION

Most reported cases of acute Lyme arthritis occur in the knee joint, are short in dura-

tion, and are part of a clinical picture of migratory polyarthralgia.[1,3] Arthralgia associated with synovial hypertrophy and joint effusions is characteristic of the chronic stage of the disease. Lyme disease must be considered in the differential diagnosis of acute septic arthritis, especially in the northeastern United States, Northern Pacific coast, and upper midwest, where the disease has become endemic.

Because fewer than 30% of patients with Lyme arthritis report contact with ticks and fewer than 45% describe a rash, identification of Lyme arthritis may be difficult on clinical grounds alone.[1] The Lyme ELISA is the most commonly performed test for antibodies to *B. burgdorferi*. Almost all patients produce antibody titers to *B. burgdorferi* within weeks to months of inoculation. False-negative titers have been reported, particularly after early but incomplete antibiotic treatment.[6] Improved sensitivity and specificity of the immunoassay have been attained by using gel electrophoresis preparations of the *B. burgdorferi* proteins,[5] *i.e.*, the Western blot technique, which can detect either IgG or IgM (acute disease) antibodies.[4] First-stage symptoms (fever, ECM, arthralgia) are not frequently accompanied by positive serologic findings by either technique, whereas the later development of arthritis usually has both positive ELISA and several "bands" on the Western blot.[4]

The synovial fluid in Lyme disease may also mimic that seen in septic arthritis. High concentrations of white blood cells, 80,000/mm^3 or higher, with a polymorphonuclear predominance, are often seen. Gram stains and cultures are inevitably negative because *B. burgdorferi* concentrations are low and they fail to grow on ordinary media. Lyme serologic study performed on synovial fluid often produces positive results.

Lyme arthritis, as noted above, usually involves the knee or other large joints (but less often the hip) and may involve several joints, although usually not simultaneously. Pain is not severe and other acute signs of inflammation are less pronounced than in septic arthritis. Fever, usually significant in septic arthritis, is low grade in Lyme arthritis. The distinction is important because treatment differs. Lyme arthritis should be treated with tetracycline or amoxicillin. More advanced cases, or those not responsive to oral therapy, require parenteral therapy with either high-dose penicillin G or a cephalosporin, such as ceftriaxone. With proper treatment, response is usually prompt in the majority of cases.

REFERENCES

1. Eichenfield, A. H., Goldsmith, D. P., Loeb, F. X., Ross, A. H., and Athreya, B. H.: Childhood Lyme arthritis: Experience in an endemic area. Arthritis Rheum. 28:S35, 1985.
2. Fawcett, P. T., O'Brien, A. E., and Doughty, R. A.: An adsorbtion procedure to increase the specificity of enzyme-linked immunosorbent assays for Lyme disease without decreasing sensitivity. Arthritis Rheum. 32:1041, 1989.
3. Jacobs, J. C., Stevens, M., and Duray, P. H.: Lyme disease simulating septic arthritis. [Letter.] JAMA 256:1138, 1986.
4. Rose, C. D., Fawcett, P. T., Dubbs, S. B., Singsen, B. H., and Doughty R. A.: Use of western blot and enzyme-linked immunosorbent assays to assist in the diagnosis of Lyme disease. Pediatrics 88:465, 1991.
5. Steere, A. C.: Lyme disease. N. Engl. J. Med. 321:586, 1989.
6. Steere, A. C., Green, J., Schoen, R. T., Taylor, E., Hutchinson, G. J., Rahn D. W., and Malawista, S. E.: Successful parenteral penicillin therapy of established Lyme arthritis. N. Engl. J. Med. 312:869, 1985.