

Anna Moniuszko¹, Janusz Popko², Tomasz Guszczyn², Tomasz Waliński², Wioletta Żukiewicz-Sobczak³,
Sławomir Pancewicz¹

LYME DISEASE WITH EFFUSION EITHER IN HIP OR KNEE IN CHILDREN FROM PODLASKIE REGION TREATED IN CLINIC IN 2004-2010

¹The Department of Infectious Diseases and Neuroinfections, Medical University of Białystok, Poland;

²The Department of Pediatric Orthopedics and Traumatology, Medical University of Białystok, Poland;

³ Institute of Agricultural Medicine, Lublin, Poland

ABSTRACT

OBJECTIVES. Lyme disease (LB) relatively commonly causes arthritis among patients, especially in LB endemic area. The aim of the study was to analyze the prevalence of LB in children with hip and knee effusion in the North Eastern region of Poland. Conclusions from our study should justify the need of taking into account LB in the diagnosis of hip or knee effusion in children.

MATERIALS AND METHODS. The medical records of 321 children, aged 2-18 years, with synovitis of the hip or knee were reviewed.

RESULTS. In 273 cases with hip effusion: 32 (11.72%) patients were diagnosed with LB, 233 (85.74%) with transient arthritis, 6 (2.19%) with purulent arthritis, and 2 (0.73%) with juvenile idiopathic arthritis. In 48 cases with knee effusion: 12 (25%) patients were diagnosed with Lyme arthritis, 24 (50%) with transient arthritis, 5 (10.42%) with reactive arthritis, 4 (8.33%) with juvenile idiopathic arthritis, and 3 (6.25%) with purulent arthritis.

CONCLUSIONS. The high prevalence of LB in children with hip or knee effusion in endemic areas suggests the need of diagnostics also for LB in all patients presenting with acute monoarticular arthritis.

Antibiotic treatment results in complete recovery.

Key words: *Lyme arthritis, effusion in hip, effusion in knee, endemic regions*

INTRODUCTION

Lyme borreliosis (LB), caused by infection with the spirochete *Borrelia burgdorferi*, transmitted by the *Ixodes* tick, living in endemic areas of the United States and Europe, has had an increasing tendency of incidence in many countries (1). In Poland, the main endemic areas of *Borrelia burgdorferi* occurrence are the Masurian and Podlaskie Regions (2,3).

The clinical manifestations of LB can be divided into three phases: early localized, early disseminated and late. Early localized disease is characterized by the appearance of the characteristic skin lesion, erythema migrans (EM), with or without constitutional symptoms. Early disseminated disease is characterized by multiple EM lesions, arthritis, neurologic and cardiac abnormalities. Late LB is typically associated with intermittent

or persistent *Lyme arthritis* (LA) involving one or a few large joints, especially the knee, and neurological problems such as encephalopathy or polyneuropathy (4). In children and adults, late LB usually has a similar course. However, in children acrodermatitis chronica atrophicans and neuroborreliosis occur rarely. The presenting manifestation of late LB may be arthritis. Children develop LA more often than adults (5). In LA, the affected joint is usually swollen and may be tender. Most children with LA of the knee can walk without difficulty despite some limitation in range of motion. Associated fever and erythema of the involved joint are uncommon. The characteristic feature of LA in children is the synovial fluid white blood cell count, which usually ranges from 20 000 to 60 000 cells/ μ L (6).

In the Northern Regions of the United States, Milewski et al., based on joint aspiration analysis, found

Table I. Definitive diagnosis of patients with effusion of hip or knee, based on radiological examinations and laboratory tests.

	N	Diagnosis				
		Transient arthritis	Lyme arthritis	Juvenile idiopathic arthritis	Reactive arthritis	Purulent arthritis
Hip	273	233 (85.74%)	32 (11.72%)	2 (0.73%)	-	6 (2.19%)
Knee	48	24 (50%)	12 (25%)	4 (8.33%)	5 (10.42%)	3 (6.25%)

that 31% of 391 children with various swollen joints and 45% with swollen knees were diagnosed with LA (7). In *Borrelia burgdorferi* endemic areas, Thompson et al. recommend testing all patients with acute mono-articular arthritis in the direction of Lyme arthritis (8). It seems that the prevalence of LA is high in the Podlaskie region, which is considered to be endemic for tick-borne diseases.

The aim of this study was to analyse the prevalence of LA in children from the Podlaskie region and their response to treatment. Moreover, we wanted to increase awareness of the need of inclusion LA in the diagnostic process of hip or knee effusion in children, especially in LB-endemic areas.

MATERIALS AND METHODS

In total, 273 patients with synovitis of the hip (145 girls and 128 boys), aged 2-18 years, and 48 patients with synovitis of the knee (23 girls and 25 boys), aged 2-17 years, admitted to the Department of Pediatric Orthopedics and Traumatology of the Medical University of Białystok between 2004-2010 were included in the study. None of the patients had neurological or dermatological manifestations of LB.

Comparative X-ray and ultrasonography (real time, linear, high-frequency 5 MHz transducer from Siemens Sonoline LM.) were taken in all patients on the day of admission, during treatment, and after discharge from the hospital.

For each patient, the following tests were performed: complete blood count (CBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), serum rheumatoid factor (RF), and joint fluid evaluation. In all patients, the ELISA test to detect anti-*B. burgdorferi* antibodies was performed and, if necessary, confirmed with Western blot.

Anti - *B. burgdorferi* antibodies concentration of IgM and IgG class were measured using ELISA kits, High Sensitivity, BIOMEDICA (Austria). The confirmation test, Western blot, was performed using Milenia Western Blot DPC Bierman, Germany. Only a positive Western blot test was considered evidence of infection with *B. burgdorferi*.

All 48 patients with knee and 3 with hip effusions had arthrocentesis. A puncture of the hips was performed under general and of the knee under local anesthesia.

The study was approved by the local ethics committees, and all patients or parents of the children signed informed consent forms.

RESULTS

Among the children admitted to the Department of Pediatric Orthopedics and Traumatology of the Medical University of Białystok with hip effusion, 32 (11.72%) were diagnosed with LD. Lyme borreliosis was diagnosed in every fourth child (25%) among children admitted to our Department with knee effusion (tab. I).

In 273 cases with hip effusion: 233 (85.74%) were diagnosed with transient arthritis, 6 (2.19%) with purulent arthritis, and 2 (0.73%) with juvenile idiopathic arthritis. In 48 cases with knee effusion: 24 (50%) were diagnosed with transient arthritis, 5 (10.42%) with reactive arthritis, 4 (8.33%) with juvenile idiopathic arthritis, and 3 (6.25%) with purulent arthritis (tab. I).

All LA patients were treated with antibiotics. For children under 12 years old, amoxicillin (50mg/kg/day divided into three doses) or cefuroxime (30 mg/kg/day divided into two doses) was administered for 28 days.

For children over 12 years old, doxycycline (4mg/kg/day) was applied for 28 days. One patient, a 15-year-old boy with LA, did not respond to antibiotic therapy and his knee effusion has remained for more than 1 year. In this case, he underwent arthroscopic synovectomy.

DISCUSSION

The inflammation of joints in children are frequent pathology in pediatric orthopedics. Joint insufficiency in children may be caused by transient arthritis, juvenile idiopathic arthritis, reactive arthritis, and purulent arthritis (9). One of the mostly missed in the primary diagnostic process of episodic synovitis is LA. Synovitis with/ without erosion may be present in all the diseases mentioned above. In cases of LA in children,

there are two most common presentations: episodic and pauciarticular synovitis. The classic presentation may be missed with inflammatory arthritis, whereas the pauciarticular form may be confused with acute bacterial septic arthritis (10). Willis et al. described 10 cases of LA, which were diagnosed initially as bacterial septic arthritis (11). Synovial inflammation/arthritis in LD is usually nonerosive, but can be erosive with cartilage and joint destruction, especially with chronic, persistent antibiotic-refractory arthritis (12).

In diagnostically controversial cases, other methods, such as a laboratory tests, serological tests and imaging should be used. One most recently reported parameter, useful in the differential diagnosis of LA, is the ratio of synovial fluid/serum activity of exoglycosidases (13).

In our cohort of children, we found LA in 11.72% with hip effusion and 25% with knee effusion, what was confirmed with serological tests.

The most common orthopedic presentation of LB is knee effusion, and every fourth child admitted to our Department with knee effusion was diagnosed with LB. Similar results were obtained by other authors (14, 15).

Amoxicillin or doxycycline are recommended in the treatment of LA (16). For children younger than 12 years old, the recommended treatment is: amoxicillin (50mg/kg/day in 3 doses with a maximum of 500 mg per dose) or cefuroxime (30 mg/kg/day in 2 doses, with a maximum of 500 mg per dose) for 28 days. For children older than 12 years old, doxycycline may be used (in a dose of 4mg/kg/day in 2 doses, with a maximum of 100 mg per dose) for 28 days. If untreated, LA usually lasts for several weeks before resolving, reoccurs, often in a different joint (17).

All our patients with LA were treated with antibiotics: amoxicillin or cefuroxime, which were given to children younger than 12 years old. Children older than 12 were treated with doxycycline. All of our patients, except one child, responded well to antibiotics. Usually after 4 weeks of antibiotic therapy, the clinical and sonographic symptoms abated. Huppertz et al. reported a disappearance of arthritis in 77% of patients treated with 1 or 2 courses of various antibiotics (18). In our study, the percentage of positive response to treatment was 97%.

In our cohort of children with hip and knee swelling, one patient, who failed to respond to antibiotic therapy, underwent arthroscopic synovectomy. This confirmed the opinion that synovectomy is a reasonable treatment option for patients with antibiotic-insensitive refractory LA. Mc Laughlin et al. were the first to describe two patients (30-year-old man and 12-year-old boy) who did not respond to antibiotics and were effectively treated with arthroscopic synovectomy (19). Schoen et al. evaluated 20 patients who underwent arthroscopic synovectomy for recurrent LA; 16 (80%) of them had

resolution of joint inflammation during the first month after surgery (20).

Treated by us, 15-year-old boy, had no inflammation of the knee 6 months after arthroscopic synovectomy. However, the persistent inflammatory process in the knee of this boy led to hypertrophy of the synovial membrane. During arthroscopy of his knee, we found fibrin conglomerates characteristic for LA. Removal of it had good results, as in other studies. Performed synovectomy gave a good result. The six-month observation of the patient showed no recurrence of arthritis.

CONCLUSIONS

Based on our study, we conclude that LB should always be taken into consideration in the differential diagnosis of joint effusion in children, especially living in endemic areas of tick-borne diseases.

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Address for correspondence:

Anna Moniuszko

Department of Infectious Diseases and Neuroinfections,
Medical University of Białystok, Poland,
Żurawia Street 14, 15-480 Białystok

Tel.: 00 48 85 7409514

fax: 00 48 85 7409515

E-mail: annamoniuszko@op.pl