Abstract

The aim of this study was to report the clinical, serological and epidemiological features of a homogeneous cohort of patients with various forms of Lyme borreliosis, based on recent European case-definition guidelines. Complete clinical and epidemiological reports were requested from the patients’ physicians for case definition. Enzyme immunoassay IgG and IgM screening tests were performed. A total of 170 patients (141 adults and 29 children) with the following forms of Lyme borreliosis were included between 1989 and 1997: erythema migrans alone \( n = 38 \), early neuroborreliosis \( n = 76 \), arthritis \( n = 34 \), acrodermatitis chronica atrophicans \( n = 12 \), carditis \( n = 2 \), lymphocytoma \( n = 3 \), chronic neuroborreliosis \( n = 2 \), and miscellaneous disorders \( n = 3 \). On the basis of the occurrence and course of the full spectrum of complicated forms of Lyme borreliosis, the specificity of the clinical and biological presentation of the complicated forms (age, ratio of children/adults, sex ratio, incubation period, time to diagnosis, and serological profiles) was demonstrated, as was the absence of overlap between the clinical presentations. Using these data, an alternative scheme for the natural history of Lyme borreliosis is suggested.

Introduction

Lyme borreliosis (LB) was first described in Europe as isolated cases in 1883 [1–3] and was first reported in the USA in 1977 [4]. In 1987, it was suggested that there are differences between European and North American forms of LB in terms of clinical features [5]. European experts have only recently proposed guidelines that define features for the diagnosis of clinical forms in Europe [6]. Several species of *Borrelia burgdorferi* sensu lato have been described [7, 8], and they differ in geographic distribution [9]. The wide variety of pathogenic *Borrelia burgdorferi* sensu lato species in Europe may account for the different clinical manifestations of LB. Although the various forms of LB have been described extensively in Europe, the complete clinical spectrum and the distribution of the various forms have rarely been studied, and even then only in cross-sectional studies [10–12].

The aim of this study was to describe in a cohort of patients the distribution of the clinical forms of LB, the clinical features of each form, and the natural history of the disease, using recent European guidelines.

Patients and Methods

**Study Site.** Patients were recruited from various wards of a public hospital in Paris, France. All patients lived in Paris or the surrounding region, a large urban area of more than 10,000,000 inhabitants. Paris is surrounded by 35 forests, with a biotope favourable for LB dissemination [13]. Consecutive in- and out-patients, adults or children, with suspected LB were included in the study, conducted from 1989 to 1997.

**Criteria for Inclusion.** Each case was evaluated at the time of diagnosis and during follow-up, and patients were included only
Results are expressed as the ratio of the optical density (OD) of the sample/OD of the threshold.

Data Recorded. For each case of suspected LB, clinical and epidemiological data were recorded using a questionnaire filled in by the patient’s physician: data collected included sex, age, profession, and retrospective evidence of a tick bite. The natural history of the disease was monitored by determining the following dates: (i) the date of onset of the clinical form that led to consultation, (ii) the date of exposure (tick bite or forest walk), and (iii) the date of diagnosis. These three dates allowed us to define the incubation period, defined as the time between contamination and clinical presentation, and the time to diagnosis, defined as the time between the onset of the clinical form and diagnosis. Antibiotic treatment and outcome were also recorded.

We then analysed the clinical, serological, and epidemiological data for these forms of LB. Results are expressed as means ± standard deviation (SD).

Data were processed with the Filemaker Pro 4.0 (Claris Corporation, USA) database. Statistical analysis was performed with Stat View II (Abacus Concept, USA) using the chi-square test for qualitative variables and Wilcoxon’s test or ANOVA for quantitative variables.

Results

This study included 170 cases of confirmed LB. The mean age of the patients was 44.2 ± 19.9 years (range, 4–77 years), and the age distribution was bimodal (Figure 1), with an age of 17 years used as the cut-off for the paediatric groups. Patients over the age of 17 were considered adults. Thus, 29 cases were paediatric cases and 141 were adult cases of LB. The sex ratio was 45 females/55 males. The mean duration of follow-up was 30 weeks. Outpatients accounted for approximately 10% of all cases, and these patients were treated by the dermatology department.

The distribution of clinical forms was as follows: erythema migrans alone (38 cases), acrodermatitis chronica atrophicans (12 cases), borreial lymphocytoma (3 cases), early neuroborreliosis (76 cases), arthritis (34 cases), chronic neuroborreliosis (2 cases), Lyme carditis (2 cases), and miscellaneous (3 cases). The three miscellaneous cases did not strictly satisfy the European criteria, but the diagnosis of LB was confirmed by physicians and microbiologists on the basis of clinical and biological data. Acrodermatitis...