

Do General Practitioners Recognize Cases of Lyme Borreliosis in the Netherlands?

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To assess knowledge and recognition of Lyme borreliosis, two photographs of erythema migrans and two written cases of Lyme borreliosis were presented to 51 local general practitioners. The photographs and cases were tested, among 10 other dermatological and rheumatic cases, using 2 different formats: open-ended questions, prompting for the most likely diagnosis, and multiple-probability estimate questions. Each case served as its own "golden" standard, but cases were also presented to a panel of "experts," 13 dermatologists and 23 rheumatologists. In the open-ended questions, the two photographs of erythema migrans were recognized by 16 and 45% of the general practitioners and by 92 and 54% of the dermatologists. In the multiple-probability estimates, 14 and 14% of the general practitioners and 77% and 46% of the dermatologists rated these two photographs as highly probable for erythema migrans. The first case of Lyme borreliosis was correctly diagnosed by 55% of the general practitioners and 96% of the rheumatologists in the open-ended questions. In the multiple-probability estimates, 61% of the general practitioners and 87% of the rheumatologists rated this case as highly probable for Lyme borreliosis. The second case of Lyme borreliosis was never recognized in the open-ended questions, whereas only two general practitioners rated Lyme borreliosis as highly probable in the multiple-probability estimates. General practitioners, as well as dermatologists and rheumatologists, had difficulties recognizing Lyme borreliosis. Better instruction and education in recognizing the manifestations of Lyme borreliosis seems indicated.

KEY WORDS: Lyme borreliosis, Erythema migrans, Lyme arthritis, Education, General practitioners

INTRODUCTION

Lyme borreliosis, a tick-borne spirochetal infection, frequently begins with a characteristic skin lesion, erythema migrans, and is often followed by systemic manifestations involving the heart, nervous system, skin, or the joints (1-6).

Recognition and knowledge of the early dermatologic (especially erythema migrans) cardiac, neurologic, and rheumatic manifestations of the disease and adequate antibiotic treatment of these symptoms are important to prevent later stages of the disease such as chronic arthritis, chronic neurological disorders as encephalopathy and polyneuropathy, and acrodermatitis chronica atrophicans (7-10). One should be aware of the fact that erythema migrans lesions may fade within 3 to 4 weeks, even in untreated patients, and other manifestations of the disease, like arthritis, may occur only months later. One may be unaware of the relationship between subsequent signs and symptoms. Lyme borreliosis may also present itself without preceding skin lesions, for instance, as arthritis of the knee.

In the Netherlands, general practitioners are the first port of call for virtually all patients. As a result, they are probably the first ones to see patients with the early signs and symptoms of Lyme borreliosis. Due to the low incidence of this disease in the Netherlands, they will not frequently encounter patients with Lyme borreliosis (11). However, knowledge of Lyme borreliosis, clinical suspicion and recognition of manifestations, and appropriate and timely antibiotic treatment will decrease the burden of illness. At

early stages of the disease (for example erythema migrans), clinical history and physical examination are the most important tools to detect Lyme borreliosis for general practitioners, since antibodies to *Borrelia burgdorferi* only become positive after 6 to 8 weeks (12).

Data of the whole spectrum of Lyme borreliosis have only become available since the first publication by Steere et al. in 1977 (13). The first publications of the early manifestations of the disease in Dutch literature date from 1987 and 1988 (14-18). The general practitioner may have gained his or her knowledge of Lyme borreliosis from medical journals rather than from medical textbooks. The chance that general practitioners have gained experience with Lyme borreliosis from patients is estimated as being low not only due to the low incidence of the disease but probably also due to low suspicion of the occurrence of Lyme borreliosis in the Netherlands.

In this study, we have presented two photographs of erythema migrans and two written case histories of Lyme borreliosis to general practitioners, to assess their knowledge and suspicion of Lyme borreliosis. We also assessed whether the general practitioners had access at all to the articles published about Lyme borreliosis in the Dutch and English literature.

METHODS

This study was undertaken as a part of a study to assess knowledge of general practitioners about rheumatic diseases and was carried out before discussions on a rheumatic post-graduate training program were started. Ten colored photographs of skin lesions that may occur in relation to rheumatic diseases and 10 written case descriptions of pa-

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tients with rheumatic diseases were presented to the general practitioners. The ultimate purpose of the study was to install post-graduate training, which fits the specific needs of the participants. Participation in the study was supported by the board of the Post-Graduate Education Committee of the local organization of general practitioners. The entire evaluation program lasted 45 minutes for each participant.

Participants

In November 1991, a random sample of 58 (73%) of all 79 local general practitioners were invited to participate in the study. A total of 51 general practitioners agreed to cooperate (a response rate of 88%). Seven refused to cooperate, mostly due to lack of time. All participating practitioners were visited in their office by one investigator (AB).

The two photographs of erythema migrans and the two case histories of Lyme borreliosis were also presented to a panel of experts in dermatology and rheumatology, to compare the answers of the general practitioners with their answers. The two photographs of erythema migrans were, therefore, also presented to 13 dermatologists (three from private practice and 10 from an academic setting) during a meeting of the Dutch Society of Dermatology. The two cases of Lyme borreliosis were also presented to 23 rheumatologists (14 from private practice and nine from an academic setting) attending a scientific meeting of the Dutch Society of Rheumatology.

Questions

The photographs of erythema migrans and the cases of Lyme disease were presented in two different formats. The first was an open-ended question, prompting for the most likely diagnosis. The second was a so-called multiple-probability estimate consisting of several (eight) possible diagnoses, for each of which the participant had to rate the probability on a seven points scale (range: highly improbable to highly probable) (20). The questions were presented in these two different formats to assess a possible discrepancy in the answers. It is possible that a participant does not consider Lyme borreliosis spontaneously in the open-ended question. However, when a list of differential diagnoses is provided, including Lyme borreliosis, he or she may implicate this diagnosis into his considerations. This way of presentation does not, of course, reflect the situation as it is in real practice. However, it might give us an idea whether the illness Lyme borreliosis is known by the participants at all.

Photographs of erythema migrans

Two colored photographs (13 × 18 cm) from erythema migrans were placed in plastic binders and presented to the general practitioners (pictures 1 and 2). The two photographs were from patients diagnosed as having erythema migrans by two dermatologists. Both patients developed erythema migrans within 2 weeks of a tick bite. A differential diagnosis was composed for both cases by two dermatologists from the Department of Dermatology of the University Hospital Maastricht. Each dermatologist composed a differential diagnosis for both photographs. The eight diagnoses mentioned the most were used for the definite differential diagnosis used in the study.

Cases of Lyme borreliosis

The clinical cases of Lyme borreliosis were derived from real patients and compiled by one of the investigators (AB).

Two different cases were presented. The first case of Lyme borreliosis was a so-called classical case with a bite, skin lesion, atria-ventricular block, and arthritis. The second case was a patient with recurrent arthritis of the knee without any other symptoms of Lyme borreliosis (see Appendix 1 for detailed case descriptions). We felt that Lyme borreliosis should be part of the differential diagnosis for the second case, because arthritis of the knee is the most frequent symptom of Lyme disease and because most patients do not remember any tick bites or even erythema migrans. The patient we described had a recurrent attack of arthritis of the knee. The first attack lasted 8 weeks; the second attack also lasted several weeks. Attacks of arthritis due to Lyme borreliosis are usually short with a median duration of 1 week. However, longer attacks have been described, especially during the 2d and 3d year of the illness (13,19). Episodes of arthritis are often separated by months or even years of complete remission (4).

A differential diagnosis was composed by one of the investigators (AB) and three rheumatologists from the Department of Rheumatology of the University Hospital Maastricht. Each of these four rheumatologists composed a differential diagnosis for each case description in the same way as described for the dermatologists.

Presentation

The photographs were presented to the general practitioners and dermatologists by two of the investigators (AB and MR) without any specific comment. First, the photographs were presented with the open-ended question. The diagnoses for each photograph were written on separate sheets. Second, the same photographs were presented with the multiple-probability estimates. The differential diagnoses for the multiple-probability estimate questions were presented on separate sheets. The participants were not allowed to read back or to correct answers already given to the open-ended questions after they had seen the differential diagnoses in the multiple-probability questions.

The two cases were presented to the participating general practitioners and rheumatologists using a computer interface specially developed for testing (21). First, the two cases were presented linked to the open-ended question. Second, the same cases were presented but were then linked to the multiple-probability estimate. It was not possible to return to a previous screen or correct answers already given to the open-ended questions after a participant had seen the differential diagnosis given in the multiple-probability estimate questions. The answers to all questions were immediately filed in the computer.

Scoring

Since all cases and photographs were derived from real patients, each photograph or case served as its own "golden" standard. Answers to the open-ended questions were considered correct when the participants mentioned either erythema migrans or Lyme borreliosis within the first three answers. In the multiple-probability ratings, rates 6 and 7 were considered highly probable, rates 3, 4, and 5 were probable, and rates 1 and 2 were highly improbable.

Medical journals

At the end of the test, a list of 17 Dutch and 10 English medical journals of supposedly easy access to general practitioners was presented. The instruction for this list was to rate how frequently these journals were read by the general

TABLE 1
Presence of Correct Answers Given to Two Photographs of Erythema Migrans and the Two Cases of Lyme Borreliosis in the Open-Ended Questions by the General Practitioners, Dermatologists, and Rheumatologists

	Dermatologists		General Practitioners		Rheumatologists	
	N = 13		N = 51		N = 23	
	N	%	N	%	N	%
Photo 1	12	92.3	8	15.6		
Photo 2	7	53.8	23	45		
Case 1			28	54.9	22	95.7
Case 2			0	0	1	4.3

practitioners on a scale from 1 (never) to 5 (every issue). The number of published articles about Lyme borreliosis (period 1983 to 1991) was known for each journal.

Statistics

Counts of correct answers were calculated for each group; variance and means were compared to each other. For categorical data, an X^2 test was used to test for significant differences between groups. A probability value $p < 0.05$ was considered statistically significant.

RESULTS

In Table 1, the results of the correct answers to the open-ended questions linked to the photographs of erythema migrans and the two cases of Lyme borreliosis are presented.

Only eight general practitioners (15.6%) recognized the first photograph as erythema migrans compared to 12 of the dermatologists (92.3%) ($p < 0.001$). There was no significant difference between the general practitioners and the dermatologists when recognizing the second photograph as erythema migrans. Forty five percent of the general practitioners gave the correct answer compared to 53.8% of the dermatologists.

A variety of diagnoses was suggested by both general practitioners and dermatologists for the two photographs. Diagnoses mentioned the most were contact allergy (6 times), mycosis (4 times), discoid lupus erythematosus (4 times), erythema annulare centrifugum (2 times), and epizoonosis (27 times). All other diagnoses were mentioned only once.

Twenty eight general practitioners (54.9%) recognized the first case as Lyme borreliosis. None of the general practitioners mentioned Lyme borreliosis as a possible diagnosis for the second case. Strikingly, only one rheumatologist mentioned Lyme borreliosis.

Again, a variety of diagnoses was mentioned for the two cases by the general practitioners and the rheumatologists. The diagnoses mentioned for the first case by the general practitioners were rheumatic fever (8 times), reactive arthritis (6 times), septic arthritis (3 times), endocarditis (3 times), gout (3 times), postinfectious arthritis (3 times), viral infection (1 time), erysipelas (1 time), and arthritis of unknown etiology (2 times). In the second case, gout was considered the most likely diagnosis by 24 general practitioners (47.1%) and by 10 rheumatologists (43.5%). Fourteen general practitioners (27.5%) mentioned arthritis of unknown etiology as a diagnosis. Other diagnoses made by the rheumatologists in this case were reactive arthritis (26.1%) and ankylosing spondylitis (17.4%).

In Tables 2 and 3, the results of the probabilities awarded

to the multiple-probability estimate questions are presented. It is remarkable that only seven general practitioners (13.7%) rated the second photograph of erythema migrans as highly probable, whereas 23 of them (45%) mentioned erythema migrans in their answers to the open-ended questions. Listing of erythema migrans in the differential diagnosis probably confused the general practitioners; 35 of them even rated erythema migrans as highly improbable. There were no remarkable differences between the open-ended questions and the multiple-probability estimate questions regarding the two cases of Lyme borreliosis. Only two general practitioners rated Lyme borreliosis as highly probable in the second case. So, concerning the second case of Lyme borreliosis, listing Lyme borreliosis in the differential diagnosis could not even lure the rheumatologists to consider Lyme borreliosis!

Two general practitioners correctly diagnosed both photographs of erythema migrans; however, they did not recognize the first case. Two general practitioners recognized photograph 1 but did not recognize case 1. Seven general practitioners recognized photograph 2 but did not recognize case 1 as Lyme borreliosis. Twenty-eight general practitioners (54.9%) suggested Lyme borreliosis in their differential diagnosis to case 1. Only three of these 28 correctly diagnosed both photographs of erythema migrans. Six diagnosed photograph 1, and 13 diagnosed photograph 2. As stated before, none of the general practitioners recognized case 2 as Lyme borreliosis.

Eight Dutch medical journals were read regularly by more than 50% of the general practitioners. Articles about Lyme borreliosis appeared in five of these eight journals in 1987 to 1991 (14-18, 22-36). One journal published an article about Lyme borreliosis, which included the first photograph of erythema migrans just 1 month before the study was started (11). The other journals were read by less than 12% of the general practitioners.

DISCUSSION

As part of a study assessing knowledge of rheumatic diseases of general practitioners, we evaluated the recognition and knowledge of Lyme borreliosis.

Most of the general practitioners did not recognize the photographs of erythema migrans. On the other hand, the second photograph of erythema migrans was only recognized by 54% of the dermatologists. When patients with erythema migrans are not recognized as having Lyme borreliosis, they will probably not be treated with appropriate antibiotics. This will then increase the risk of the development of later stages of Lyme borreliosis. Despite the fact that several papers about Lyme borreliosis have been published in the Dutch literature and also in journals commonly read by general practitioners, it is clear that more information about the different manifestations of erythema migrans should be given to both general practitioners and dermatologists. Most of these articles focus on the entire spectrum of the disease.

A typical case of Lyme borreliosis with almost all clinical features of the disease was easily recognized by more than 50% of the general practitioners and most rheumatologists. However, a case of Lyme borreliosis with recurrent arthritis of the knee, without other preceding signs and symptoms, was not diagnosed either by rheumatologists or by general practitioners. Recurrent arthritis attacks, especially of the knee, are a common feature of Lyme borreliosis and should be recognized by rheumatologists at all events (4, 37).

TABLE 2
Probability Ratings in the Multiple-Probability Estimate Questions to Two Photographs of Erythema Migrans Presented to General Practitioners and Dermatologists

	General Practitioners (n = 51)						Dermatologists (n = 13)					
	Highly Probable		Probable		Highly Improbable		Highly Probable		Probable		Highly Improbable	
	N	%	N	%	N	%	N	%	N	%	N	%
Photo 1	7	13.7	10	19.6	34	66.7	10	76.9	3	23.1	0	0
Photo 2	7	13.7	9	17.6	35	68.6	6	46.2	6	46.2	1	7.6

TABLE 3
Probability Ratings in the Multiple-Probability Estimate Questions to Two Cases of Lyme Borreliosis Presented to General Practitioners and Rheumatologists

	General Practitioners (n = 51)						Rheumatologists (n = 23)					
	Highly Probable		Probable		Highly Improbable		Highly Probable		Probable		Highly Improbable	
	N	%	N	%	N	%	N	%	N	%	N	%
Case 1	31	60.7	7	13.7	13	25.5	20	86.9	0	0	3	13
Case 2	2	3.9	4	7.8	45	88.2	0	0	4	17.4	19	82.6

We presented the photographs of erythema migrans and the two cases of Lyme borreliosis also with a differential diagnosis to assess whether Lyme borreliosis is a diagnosis considered by the general practitioners at all. Presentation of the multiple-probability estimate questions had a negative influence on the answers of the general practitioners concerning the two photographs of erythema migrans. Rheumatologists did not even rate Lyme arthritis as probable or highly probable in their differential diagnosis for the second case. One might carefully conclude, relying on the results of this study, that a diagnosis of Lyme borreliosis will be overlooked not only by the general practitioners but also by the dermatologists and the rheumatologists.

Although physicians consistently report, for the purpose of gathering knowledge for later use, that reading, primarily of medical journals, is their predominant source of information; publication of several articles about Lyme borreliosis in the Dutch literature apparently did not influence the results of this study (38). This is probably due to lack of direct knowledge and low suspicion of Lyme borreliosis, but it is probably also due to the low chance of encountering a patient with Lyme borreliosis. It is not said that the results of this study will be applicable to all general practitioners (or dermatologists and rheumatologists) or to general practitioners in parts of the country where the chance of encountering patients with Lyme disease will be higher. Although ticks, infected with *Borrelia burgdorferi*, have been found in all parts of the country and people who have been bitten by ticks are at risk everywhere, one might assume that in certain areas with a high infection rate of ticks, general practitioners more often encounter patients with Lyme disease, which will increase their suspicion (31).

The use of standardized (simulated) patients with different stages of Lyme borreliosis would have been the best way to evaluate the real performance of the general practitioners but appeared impracticable (39). Regarding the photographs of erythema migrans, the procedure of observing a patient's cutaneous problem directly and providing a questionnaire to gather accompanying symptoms and to palpate the skin lesion is of course a better assessment procedure. We presented the photographs of erythema mi-

grans without any comment, because about half the patient with erythema migrans do not remember a tick bite and sometimes only notice their skin lesion by accident. Frequently, there are no additional supportive data from the clinical history. The cases of Lyme borreliosis were presented as written cases. A possible criticism of this method is that hypothetical case scenarios may include selected aspects of clinical reality while neglecting others and that physicians may not respond in the same way to hypothetical scenarios as they do to real ones. We tried to avoid this criticism by deriving our cases from real patients. A study by Rethans and van Boven suggested no significant difference in the overall score for written case simulations and the use of standardized real patients (39). Written performance testing may still supply valid information and will be used in assessment situations (40).

Is it necessary for general practitioners to have knowledge of Lyme borreliosis at all regarding the low incidence of the disease in the Netherlands? There are several reasons to suppose so. As stated before, the disease, especially erythema migrans, is easily treated with antibiotics by general practitioners. Timely treatment with antibiotics prevents the later stages of the disease and reduce the burden of illness substantially. There is also increasing awareness of Lyme borreliosis not only in the medical press but in the lay press. Overdiagnosis of Lyme disease has been described recently (41-43). Knowledge of the natural history and suspicion of the signs and symptoms of Lyme borreliosis will not only provide for adequate treatment of patients that do have Lyme disease but will also prevent that the patients without the symptoms described in the reports about the natural history of untreated Lyme disease are unnecessarily exposed to prolonged treatment with antibiotics. Too often, patients with only vague symptoms of nonspecific fatigue and arthralgia or myalgia are unnecessarily treated with antibiotics, even with antibiotics intravenously (41-44). We stress that we do not want to suggest that general practitioners consider erythema migrans in the differential diagnosis of every "red" skin lesion or Lyme arthritis for every patient with arthritis and start antibiotic treatment without a considered judgement. The possibility of a tick bite, visits to tick-infested areas, t-

currence of an expanding skin lesion after a possible bite, populations at risk as hunters, and the clinical history of a patient are all important tools for the diagnosis of Lyme borreliosis (45).

In summary, based on this study, better education aimed at recognition of the (early) manifestations of Lyme borreliosis and especially erythema migrans is necessary for general practitioners as well as for rheumatologists and dermatologists in the Netherlands.

APPENDIX 1

Case 1

A 35-year-old male nurse from a wooded area visits your practice complaining about a warm, swollen right knee he has had for a couple of days. In fact, he already complained about his knee during a short stay in the coronary care unit. He was admitted because of acute dizziness. The diagnosis was second-degree atria-ventricular block, which came into remission spontaneously. You prescribed him some acetaminophen some weeks before this admission because of flulike complaints with slight fever, chills, and lymphadenopathy. He remembered some sort of bite with redness on his right leg, which had been visible during a couple of weeks after this bite.

At physical examination, there is a warm, heavily swollen knee with severe limitation of movements.

Open-ended question: What is (are) your most likely diagnosis (diagnoses)?

Multiple-probability estimate question: How would you rate the probability of each of the following diagnoses on a scale from 1 (highly improbable) to 7 (highly probable)?

- Viral arthritis
- Rheumatic fever
- Reactive arthritis
- Gout
- Lyme borreliosis
- Septic arthritis
- Systemic Lupus Erythematosus
- Rheumatoid arthritis

Case 2

A 47-year-old pilot visits your practice complaining about a warm, swollen left knee, which has lasted several weeks already. He does not complain about any pain. Flexion is severely limited. He has used some NSAIDs without any result.

Last year he had the same problem. The arthritis lasted at that time for 8 weeks. Due to his job, he travels around the whole world. After long-distance flights, he has some lower back pain. He takes a drink now and then to fall asleep.

Open-ended question: What is (are) your most likely diagnosis (diagnoses)?

Multiple-probability estimate question: How would you rate the probability of each of the following diagnoses on a scale from 1 (highly improbable) to 7 (highly probable)?

- Rheumatoid arthritis
- Reiter's syndrome
- Gout
- Spondylitis ankylopoetica
- Lyme borreliosis
- Osteoarthritis
- Meniscal tear
- Gonococcal arthritis

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