Lyme Disease Requires Early Clinical Diagnosis

Slow development of antibodies may yield negative lab result.

By Anthony E. Di Marco, DO

Lyme disease is a potentially multisytem disease that can be easily treated in its early stages, but can be quite difficult to treat if left to progress to its later stages. Lyme disease is caused by the tick-borne spirochete borrelia burgdorferi and was originally described in 1975 when evaluating a supposed outbreak of juvenile rheumatoid arthritis in and around Lyme, Connecticut on the east bank of the Connecticut River.

The clinical features can be divided into three phases:

- early localized
- early disseminated
- neurologic and cardiac disease and late disease or rheumatologic disease

The difficulty of treatment directly relates to which stage the patient is in.

It is imperative that the family physician recognize and make a clinical diagnosis to treat Lyme disease in its early stages, often before any useful laboratory testing is available. Laboratory testing is often used for confirmation purposes and to exclude other disease processes.

Treatment in the early stage and in the majority of cases is a course of inexpensive antibiotics for an average of three weeks. In the late disease, intravenous antibiotics are often required for a two-to-four-week period. Family physicians should not only recognize and treat Lyme disease in its early stages but should also stress prevention of the disease, particularly in endemic areas.

Prevention can include everything from tick bite prevention precautions to inoculation with the current vaccine that is available. The family physician is on the front line of diagnosi8ng the treating Lyme disease because, left to its own progression, this disease can and will cause permanent morbidity.

Epidemiology

Lyme disease has been reported in the United States, Europe and Asia. Within the United States it has been reported in 45 states although 90 percent of the cases reported occurred in eight states: New York, New Jersey, Connecticut, Pennsylvania, Rhode Island, Massachusetts, Wisconsin and Minnesota.

The distribution of Lyme disease within these eight states varies depending on the landscape. Lyme disease will occur predominantly in those areas that harbor the vertebrate hosts of the deer ticks.

There are two vectors or tick species which carry Lyme disease in the United States, Ixodes scapularis in the northeast and Midwest and Ixodes pacificus in the west. Ixodes pacificus is also the vector in Europe and Asia.

Early Localized Disease

Erythema migrans is the most common presentation of early-localized disease. It is an erythematosus rash that can occur anywhere from one to thirty days after a tick bite with a median of seven days.

The rash is usually found in or near the axilla or beltline area since ticks prefer warm and moist places to feed. It consists of an erythematosus area that can migrate and get larger.

Often as it migrates the center of the rash will clear causing the look of the classic bull's eye rash.

Only 30 percent of patients with Erythema migrans remember being bitten by a tick. Erythema migrans occurs in approximately 75 to 80 percent of all diagnosed cases of Lyme disease. The absence of the Erythema migrans rash should never lead to the conclusion that the patient does not have Lyme disease.

Patients with early-localized disease can present with a variety of vague and common symptoms include malaise, fatigue, headaches, myalgias and arthralgias. Generalized lymphadenopathy and organomegaly can sometimes be discovered on physical examination.

Early diagnosis and treatment by the family physician, with antibiotic therapy at this point, in the vast majority of cases will prevent the progression and later consequences of Lyme disease.

Early Disseminated Disease – Neurologic and Cardiac Disease

Early disseminated disease can occur anywhere from days to months after the initial tick bite with the two most common manifestations being neurologic and cardiac.

Approximately 10 percent of patients with untreated Lyme disease will develop cardiac manifestations which include heart block of any degree or combination of degrees, mild to moderate myopericarditis and rarely chronic cardiomyopathy and persistent heart block.

Neurologic damage also occurs in approximately 10 percent of patients with untreated Lyme disease. Manifestations include cranial nerve palsies, lymphocytic meningitis and radiculoneuritis.

The earliest possible treatment by the family physician can quickly resolve and stifle the progression of both the cardiac and neurologic manifestations of the early-disseminated disease. The absence of treatment leads to the progression and sometimes permanent manifestations of Lyme disease.

Late Disease – Rheumatologic Disease

Late disease can occur months to years after the initial tick bite and includes musculoskeletal manifestations such as polyarthralgia, migratory polyarthritis and intermittent or chronic oligoarticular arthritis. Late disease can also be manifested by tertiary neuroborreliosis that consists of a progressive encephalomyelopathy, polyneuritis and mental or psychiatric changes.

The musculoskeletal manifestation of the late disease often mimic juvenile rheumatoid arthritis as first described in the many cases of Lyme arthritis in Lyme, Connecticut. Fibromyalgia has been reported to occur after successful treatment of Lyme disease but it is unclear as to whether it developed during the illness or afterward.

There is no evidence to suggest that the fibromyalgia is indicative of a current infection. To the contrary, it does not respond to antibiotic therapy. This can present problems to the family physician because often the patient will believe that the symptoms of the fibromyalgia mean that they still have Lyme disease. This will test not only the clinical skills of the family physician but also their educational skills.

Laboratory Testing
The Lyme disease diagnosis is a clinical and not a laboratory diagnosis. Laboratory findings should be used for the purpose of confirming the diagnosis not for making it.

Laboratory testing is divided into two parts, the ELISA test and the western blot test. Cultures of Borrelia burgdorferi and the urine antigen test are very unreliable and therefore are not commonly used. The ELSIA test measures the body's antibody response to the infection by Borrelia burgdorferi.

In the first four to six weeks of Lyme disease, there may be little to no detectable antibodies in the serum. A negative ELSIA test requires no further laboratory testing. It is possible to get clinical symptoms of Lyme disease within this four-to six-week window and that is why treatment is primarily a clinical decision.

A positive ELISA test requires a confirmatory western blot test. The western blot test will differentiate between IgM antibodies, which are the first antibodies to be made to fight an infection and IgG antibodies which appear several weeks later and will stay around long after the IgM antibodies are gone.

Measuring antibodies with either test is severely limited if antibiotics are used early on. Since IgG antibodies remain present, laboratory testing is not good for determining the success of treatment.

Diagnosis
As stated previously, it cannot be emphasized enough that the diagnosis of Lyme disease is a clinical diagnosis and that laboratory testing is to be utilized more for the confirmation of Lyme disease than for the diagnosis of Lyme disease.

Patients with early Lyme disease of less than a month, usually have not yet developed any serum antibodies and therefore will test negative. If the family physician believes clinically that this patient has Lyme disease then the physician should go ahead and treat it.

The untreated patient will usually test positive after four to six weeks of Lyme disease so a good history will often determine if a laboratory test is necessary. A positive ELISA test will automatically be confirmed with a western blot. If the IgM and IgG are both negative then the patient probably does not have Lyme disease and treatment, if any, is to be determined by clinical presentations.

If the IgM is positive but the IgG is negative then the patient has very early Lyme disease. If the IgM is negative but the IgG is positive, then the patient most likely had Lyme disease in the past but does not have it acutely.

Again, clinical correlation is necessary to determine if any treatment is necessary. If both the IgM and IgG are positive the patient most likely has Lyme disease and should be treated.

Most importantly, if the family physician truly believes that the patient has Lyme disease then the physician should treat that patient regardless of any laboratory findings.

Since the earlier the treatment the most successful the Lyme disease treatment is, family physicians should not hesitate to use the clinical skills taught to them in medical school and residency to initiate treatment with confidence. Family physicians do not need to rely on any particular laboratory test to make treatment decisions.

Treatment

Emphasis should always be placed on early treatment of Lyme disease because early antibiotic treatment is usually curative. Early intervention and prompt therapy also usually prevent progression to later features. Treatment regimens for each stage of Lyme disease are given in Table 1.

Failure or lack of response to the appropriate antibiotic therapy should prompt the family physician to re-evaluate the Lyme disease diagnosis.

There are other antibiotic therapies that can be employed because of the patient's history of allergies to the antibiotics in the above table. They work as well but not better than the most commonly used antibiotics.

As long as it's caught early on, the cost of treatment does not have to be high. Several of the most commonly used antibiotics in the above table are some of the most inexpensive antibiotics. The cost rises proportionally in both dollars and morbidity if Lyme disease is not treated in its early stages.

Prevention

The best way to combat Lyme disease is to not acquire it in the first place. How aggressive your precautions are should depend on how endemic an area you live in. Tick checks should be

performed on all family members including the household pets to remove the ticks before they are able to bite. Light clothes should be worn so that ticks are more visible, cuffs should be tucked into the socks to prevent tick access to the skin and a proper repellent such as DEET (N,N-diethyl-m-toluamide) can be used.

There is a Lyme vaccine currently on the market that is made from a recombinant outer surface protein of B. burgdorferi. The antibodies produced in response to this vaccine destroy the spirochetes in the gut of the engorged tick before they can be transmitted to the human host. This is important because the antibodies produced by humans in response to Lyme disease are not protective and therefore do not prevent disease reoccurrence. The emphasis of the vaccine is to destroy the spirochetes in the tick, and therefore prevent the transmission of Lyme disease to the human host.

The vaccine is given in three doses given at zero, one and twelve months. The vaccine was 67 percent effective in preventing symptomatic disease and one hundred percent effective in preventing asymptomatic disease after three injections. The vaccine is generally well tolerated and effective although there is no long-term data at this point.

Conclusion

The family physician plays a vital role in the diagnosis and treatment of Lyme disease. Family physicians are truly on the front line, especially in endemic areas, because the diagnosis is primarily a clinical diagnosis with laboratory testing used for confirmation only. A family physician's early diagnosis and treatment can prevent a great deal of morbidity, cost and suffering to their patients.

Patients will usually present first to their family physician. If the diagnosis of Lyme disease is missed at this point, it usually will not be made until much later and the patient may be in a later stage of the disease. Family physicians need to remember that there are three main rules with concern to Lyme disease: early detection, early treatment, and prevention from re-infection.

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