Adrian Baranchuk, MD, Guest Blog – Lyme Carditis 2021 Update

May Awareness LDA Guest Blogger

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Lyme Carditis: Update 2021. An Evasive Diagnosis in the Time of COVID-19

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Lyme disease (LD) is a tick-borne bacterial infection caused by *Borrelia burgdorferi*. Lyme carditis (LC) is an early-disseminated manifestation of LD, most commonly manifesting as a complete "shut-down" of the electrical system (high-degree

atrioventricular block (AVB)) that can evolve rapidly over minutes, hours, or days producing severe symptoms like fainting, palpitations, shortness of breath, extreme dizziness, or sudden death (1-2).

Other cardiovascular manifestations include alterations of the "motor" of the heart (sinus node disease) (3), a disorganization of the cardiac rhythm that increases the risk of stroke (atrial fibrillation) (2), lesion in the distal cables of the heart (bundle branch blocks) (4), and different degrees of inflammation of the layers of the cardiac walls (myocarditis, pericarditis, and endocarditis) (2). Some of these manifestations could be so severe that a total dysfunction of the cardiac function occurs in a matter of hours, and the patient may die even if admitted to the best ICU in the world.

The initial symptoms of LD can be mistaken by other common infections or allergic reactions. Delayed diagnosis is one of the most important risk factors to serious LD presentations including LC in all its forms. The good news is that prompt diagnosis and appropriate antibiotic therapy links to a much better prognosis. In addition, we now know that when appropriately treated with antibiotics according to guidelines (2); there is no evidence of residual disease in the heart (5).

Most conduction abnormalities caused by LC resolve with appropriate antibiotic therapy (2).

The current COVID-19 pandemic is posing a new challenge in the diagnosis of LD. There are lots of overlapping symptoms such as: fever, malaise, generalized pain, lack of energy, etc. During these times, one would advise on ruling out COVID-19 first before embarking on any other test. However, what could we recommend in terms of confirming or ruling out LD, specifically during these challenging times?

Learning how to recognize the many presentations of LD from a clinical point of view has been published several times. It is especially important to ask about outdoor activities, history of tick bites, tick removal and dermatological rashes (remember that the classic “bull eye” is only present in about 40% of cases). Extensive dermatologic examination may be necessary. Residence in an endemic region for LD is essential for risk stratification, as these recommendations should be encouraged in all ED and family doctor offices in areas of high prevalence.

Once the diagnosis is suspected, specific interrogation should be directed to cardiovascular symptoms such as: dizziness, palpitations, fainting or near fainting, chest pain and shortness of breath. If the patient recognizes any of these symptoms, along with any other factors suggesting LD, a 12-lead ECG (the simple and unexpensive electrocardiogram) should be performed (2). Any evidence of electrical disturbance should prompt admission in hospital for a course of IV antibiotics while waiting the results of serological tests.

On the other hand, in patients presenting with unexpected high-degree AV block, clinical suspicion for LC can be assessed using the validated risk score called **SILC** (Suspicious Index in Lyme carditis) (6) where the acronym **COSTAR** (**C**onstitutional symptoms, **O**utdoor activities/endemic region, **S**ex male, **T**ick bite, **A**ge > 50, **R**ash) may help in determining the risk of presenting early disseminated LC.

In summary, use your clinical tools to suspect LD in the context of COVID-19 pandemic, order serological tests when appropriate, and remember to check for cardiovascular complications with a history, physical, and ECG. If evidence of LC, admit the patient to hospital with continuous cardiac monitoring and appropriate IV antibiotics. Decision for permanent pacemaker implantation should wait until completion of antibiotics as heart block in LC is often reversible. Most patients maintain normal rhythm on long-term follow-up.

Avoiding unnecessary implants is crucial as most of these patients are young and active individuals.

References

1. Wan D, Blakely C, Branscombe P, Suarez-Fuster L, Glover B, Baranchuk A. Lyme Carditis and High-degree Atrioventricular Block. Am J Cardiol 2018; 26(5): 233-239
2. Yeung C, Baranchuk A. Diagnosis and Treatment of Lyme Carditis. J Am Coll Cardiol 2019; 73(6): 717-726
3. Gazendam N, Yeung C, Baranchuk A. Lyme carditis presenting as sick sinus syndrome. J Electrocardiol 2020; 59: 65-67
4. Maxwell N, Dryer M, Baranchuk A, Vinocur M. Phase 4 Block of the Right Bundle Branch Suggesting His-Purkinje System Involvement in Lyme Carditis. HeartRhythm Case Reports. 2020; 7(2): 112-116
5. Wang C, Baranchuk A. Long-term evolution of patients treated for early disseminated Lyme carditis. Third prize at the ICE 2021 (International Congress on Electrocardiology)
6. Besant G, Wan D, Yeung C, Blakely C, Branscombe P, Suarez-Fuster L, Redfearn D, Simpson C, Abdollah H, Glover B, Baranchuk A. Suspicious Index in Lyme Carditis (SILC): Systematic Review and Proposed New Risk Score. Clin Cardiol 2018; 41(12):1611-1616

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