



Diagnosing Lyme Carditis Presenting with Complete Heart Block

Padmaraj Samarendra* and Saloni Kapoor

¹Division of Cardiology, Pittsburgh V.A. Medical Center, University of Pittsburgh Medical Center, USA

²Division of Internal Medicine, UPMC Presbyterian, Medicine and, VA Medical Center, University of Pittsburgh, USA

Abstract

Diagnosing self-limited conduction abnormality of Lyme carditis in absence of pathognomonic skin rash or history of tick bite is challenging but necessary to avoid placement of pacemaker particularly in young patients. High degree of clinical suspicion, rapidly progressing conduction block and prompt response to antibiotics, may help in diagnosis.

Keywords: Lyme carditis; Complete heart block; Lyme disease; Conduction abnormality

Learning Objectives

1. To be able to recognize Lyme disease presenting with isolated cardiac manifestation.
2. To be able to make a differential diagnosis for causes of rapidly progressive conduction
3. Abnormality and heart block particularly in a young patient.
4. Recognition of common ECG features of the conduction block caused by Lyme carditis.

Diagnosing Lyme Carditis Presenting Solely with Complete Heart Block

Lyme disease is an uncommon cause of carditis, which manifests most often with conduction abnormalities. Lyme carditis presenting with an isolated complete heart block, without characteristic skin lesion, constitutional symptoms and other manifestations of the disease, is difficult to diagnose. Diagnosis becomes even more difficult in absence of a history of tick bite, in a patient with risk factors for other causes of heart block such as coronary artery disease, degenerative disease or infiltrative myocardial diseases.

Recognition, however is critical because heart block due to Lyme carditis is mostly reversible [1,2] and a correct diagnosis avoids the need for permanent pacemaker placement and the long-term complications that come with it.

We present the case of a male, presenting with first degree heart block, which progressed to complete heart block within hours and resolved promptly after receiving antibiotic to treat Lyme disease.

A 66 years old male without prior cardiovascular issues, presented in the first week of August with generalized body ache. The clinical examination including skin examination and routine blood investigation were unremarkable then. An ECG had shown sinus rhythm, normal PR interval and a pre-existing RBBB.

He returned in early September complaining of light headedness, dizziness and breathlessness upon exertion for 6 to 7 days. A week earlier he had complained of fatigue and feeling unwell.

He was a Pittsburgh native, with Schizophrenia and depression but no hypertension or diabetes. He was not on any medication causing heart block. The clinical examination at this time, showed a regular pulse of 89/mt and BP 134/92 mmHg, temperature 98°F and respiratory rate 18/mt with O₂ saturation of 94% on room air. The cardiac, pulmonary, neurological and abdominal examinations were unremarkable. No skin lesion or joint abnormality was present, except for trace ankle edema bilaterally.

A chest X-ray, routine blood investigations that included Troponin-I were within normal limits although ESR 53, CRP 3 were elevated. Drug screen was unremarkable.

OPEN ACCESS

*Correspondence:

Padmaraj Samarendra, Division of Cardiology, Pittsburgh V.A. Medical Center, University of Pittsburgh Medical Center, Pittsburgh, USA, Tel: +1-412-3606191; +1-412-3606176; Fax: +1-412-3606904;

E-mail: Padmaraj.samarendra@VA.Gov

Received Date: 08 Apr 2020

Accepted Date: 04 May 2020

Published Date: 07 May 2020

Citation:

Samarendra P, Kapoor S. Diagnosing Lyme Carditis Presenting with Complete Heart Block. *Clin Case Rep Int.* 2020; 4: 1155.

Copyright © 2020 Padmaraj Samarendra. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

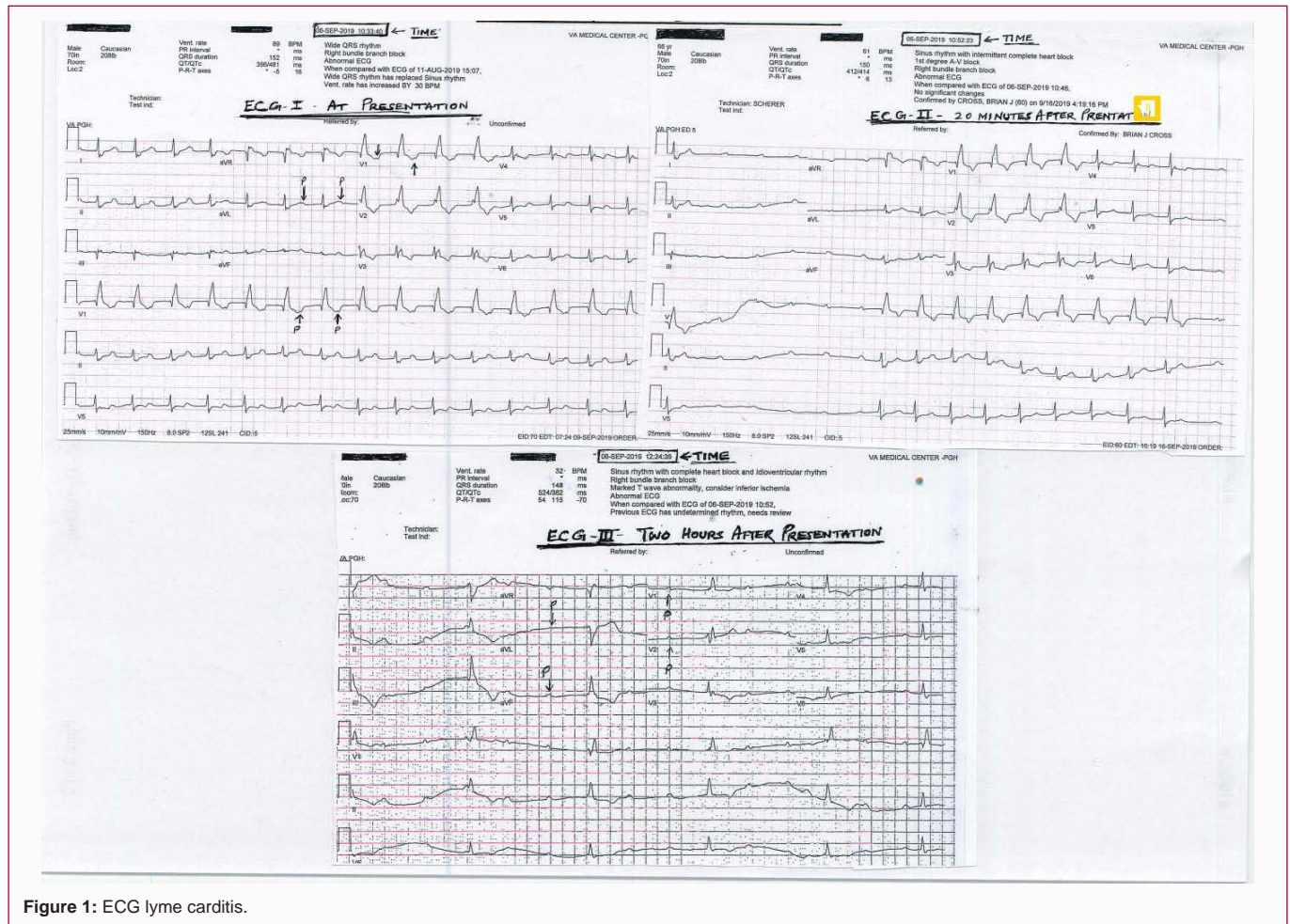


Figure 1: ECG Lyme carditis.

An initial ECG showed a new prolongation of PR interval to 320 m sec with pre-existing RBBB. An ECG repeated due to non-conducted P waves seen on monitor, showed several non-conducted P waves, without evidence of acute ischemic injury, which progressed to a complete heart block, with idioventricular rhythm at 32 bpm, and persistent RBBB in minutes on subsequent ECGs (Figure 1). An echocardiogram showed normal valvular and systolic functions.

Further questioning in view of rapidly progressing heart block in absence of sign symptoms of acute myocardial or systemic disease revealed that the patient had been bitten by a tick in late May, while walking his dog “in woods”. However, he never noticed any skin lesion.

Considering the possibility of Lyme carditis, 2 gm of ceftriaxone was given intravenously, and pacemaker placement was deferred as the patient remained hemodynamically stable. Approximately three hours after the antibiotic, sinus rhythm was restored, and PR shortened to 230 m sec (Figure 2). Later patient’s Lyme serology, with western blot yielded a positive result for both IgG and IgM along with Borrelia specific band.

Patient was treated with IV ceftriaxone for 3 days and then discharged on oral Doxycyclin 100 mg twice a day for a total of 21 days of treatment. Two week of cardiac monitoring following discharge showed progressively decreasing PR interval, but persistent first-degree heart block without any arrhythmia. The ECG returned to the baseline with pre-existing RBBB and normal P-R interval in

approximately six weeks.

Lyme disease caused by *Borrelia* species is a systemic disease. The median age of infected patients in US has a bimodal distribution, with peaks at 5 to 9 years and 44 to 59 years [3]. Heart is involved in 4% to 10% patients during early disseminated phase of the disease [2]. Although involvement of all cardiac structure is possible, valvular affection is rare; a supra-Hisian A-V nodal involvement is most common and varying degrees of conduction blocks, the most common presenting feature. Additionally, pericarditis, diffuse myocarditis, coronary artery aneurysm, small vessel vasculitis, and even sudden cardiac deaths have been rarely reported [3,4]. Myocardial involvement and presentation with congestive heart failure has been reported in 10% to 15% patients with Lyme carditis [2,5], however in most cases left ventricular dysfunction is mild and self-limiting [6,7].

Immunological reaction to direct invasion of cardiac tissues by the spirochete evokes inflammatory response. On histopathology, a linear perivascular and interstitial lymphoplasmacytic infiltrate in a “roadmap” or “band like” pattern often involving all cardiac layers is seen [3].

Cardiac manifestations appear from weeks to months after onset of infection typically occurs between June and December which correlates with a delay from infection to presentation, as the nymph from vector Ixodes generally arises in May-June. Lyme carditis is three times more common in males. Common complains of cardiac involvement include light-headedness, palpitation, syncope, dyspnea

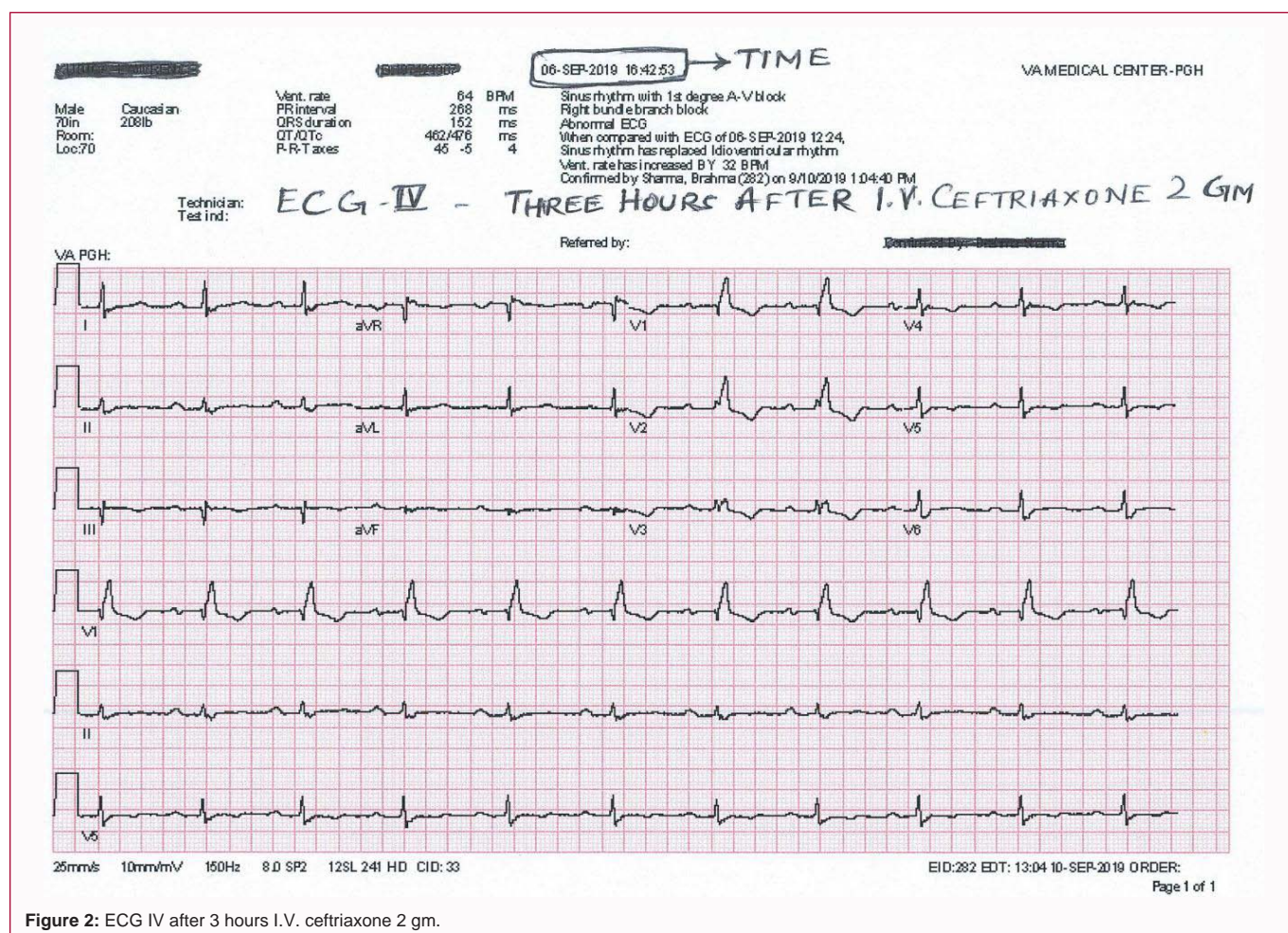


Figure 2: ECG IV after 3 hours I.V. ceftriaxone 2 gm.

and chest pain [3]. In a review of 84 Lyme Carditis patients by the CDC, most common complaint was palpitation (69%) while only 5% had signs and symptoms of left ventricular dysfunction [8].

Cardiac manifestations of early disseminated Lyme disease usually accompany other clinical features of the disease. The first case series reported the presence of erythema migrans (75%), joint involvement (65%), and neurological symptoms (35%) in patient presenting with Lyme Carditis [7].

Another case series reported erythema migrans in 67%, joint complains 51% and early neurological manifestations in 27%. Electrophysiological studies of patients showed diffuse conduction system involvement with prolonged A-H and H-V intervals. Intra-atrial conduction time was prolonged also. There was lack of response to Atropine in most patients, perhaps indicating direct inflammatory involvement of the A-V node, rather than a vagotonic effect, as the cause of the block. Temporary pacing was required in only 35% patients in this series [5].

The presentation of Lyme disease solely with a complete heart block, where patient could not recollect a tick bite, has been reported earlier [9]. Diagnosis is implicated by rapidly progression of the conduction abnormality to a higher degree block in minutes to hours, when initial ECG shows PR interval >300 m sec [7].

Rapidly progressive conduction abnormality, apart from an acute ischemic event, may also occur in acute myocarditis, such as Giant cell or Rheumatic carditis where symptoms of myocardial

ischemia or diffuse involvement of myocardium, causing heart failure predominates the clinical presentation. Atrioventricular block as a presenting manifestation has also been reported with cardiac sarcoidosis, a granulomatous inflammatory myocarditis and Giant cell myocarditis. Another tick born disease; Rocky Mountain Spotted Fever commonly causes conduction abnormality but again symptoms of fulminant heart failure from extensive myocardial involvement usually are the presenting feature.

Isolated Complete heart block without overt symptoms of heart failure in Lyme carditis can be explained by the pattern of pathology seen in mice with experimental Lyme carditis [10] and also reported in autopsies [2]. The inflammation involved the connective tissues at the base of the heart and basal interventricular septum, close to A-V node most severely, while involvement of the myocardium was only mild. A focal myocarditis in the atrioventricular region seen on MRI with late gadolinium enhancement in acute Lyme carditis was reported also [4].

Peeters et al. at 1990 International conference on Lyme borreliosis in Sweden, suggested that Lyme carditis may be an unrecognized and hidden cause of complete heart block, based on their finding of anti-burgdorferi antibody in pacemaker treated patients compared to controls. Sero-positive patients also showed more resolution of their heart block on treatment with antibiotics to treat Lyme disease.

Evidence for Lyme infection, in a patient presenting with heart block should be sought, routinely, particularly in endemic areas, and during summer months. Diagnosis should be strongly suspected in

case of a rapid fluctuation and progression of atrioventricular block, without clinical evidence of myocardial disease.

References

1. Forrester JD, Mead P. Third degree heart block associated with Lyme carditis review of published cases. *Clin Infect Dis*. 2014;59(7):996-1000.
2. McAlister HF, Klementowicz PT, Andrews C, Fisher JD, Feld M, Furman S. Lyme Carditis: An important cause of reversible heart block. *Ann Intern Med*. 1989;110(5):339-45.
3. Fish AE, Pride YB, Pinto DS. Lyme Carditis. *Infect Dis Clin North Am*. 2008;22(2):275-88.
4. Naik M, Kim D, O'Brien F, Axel L, Srichai MB. Images in cardiovascular medicine. Lyme Carditis. *Circulation*. 2008;118(18):1881-4.
5. Van der Linde MR. Lyme Carditis: Clinical characteristics of 105 cases. *Scand J Infect Dis Suppl*. 1991;77:81-4.
6. Horowitz HW, Belkin RN. Acute myo-pericarditis resulting from Lyme disease. *Am Heart J*. 1995;130(1):176-8.
7. Steere AC, Batsford WP, Weinberg M, Alexander J, Berger HJ, Wolfson S, et al. Lyme Carditis Cardiac Abnormalities of Lyme Disease. *Ann Intern Med*. 1980;93(1):8-16.
8. Ciesielski CA, Markowitz LE, Horsley R, Hightower AW, Russell H, Broome CV. Lyme Disease Surveillance of Lyme Disease in the United States, 1983-1986. *Rev Infect Dis*. 1989;11(Suppl 6):S1435-41.
9. Kimball SA, Janson PA, LaRaia PJ. Complete heart block as the sole presentation of Lyme disease. *Arch Intern Med*. 1989;149(8):1897-8.
10. Saba S, VanderBrink BA, Perides G, Glickstein LJ, Link MS, Homoud MK, et al. Cardiac Conduction Abnormalities in a Mouse Model of Lyme Borreliosis. *J Interv Card Electrophysiol*. 2001;5(2):137-43.