

Case Report

Lyme carditis with isolated left bundle branch block and myocarditis successfully treated with oral doxycycline

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ABSTRACT

Lyme disease may present with a variety of cardiac manifestations ranging from first degree to third degree heart block. Cardiac involvement with Lyme disease may be asymptomatic, or symptomatic. Atrioventricular conduction abnormalities are the most common manifestation of Lyme carditis. Less common, are alternating right bundle branch block (RBBB) and left bundle branch block (LBBB). We present an interesting case of a young male whose main manifestation of Lyme carditis was isolated LBBB. He also had mild Lyme myocarditis. The patient was successfully treated with oral doxycycline, and his isolated LBBB and myocarditis rapidly resolved.

Introduction

Lyme disease is a vector-borne illness caused by the spirochete *Borrelia burgdorferi* which can affect multiple organs including the heart. The cardinal manifestation of Lyme carditis is conduction system disease usually at the level of the atrioventricular node, but other conduction system locations can be affected as well.

The diagnosis of Lyme disease requires association between a patient's historical, clinical, and laboratory data and *B burgdorferi* antibodies (elevated IgM titers) to support the diagnosis in the appropriate clinical setting, and was confirmed by IgM Western blot. Early treatment may not prevent the development of Lyme carditis. Usually, early Lyme disease is treated with oral antimicrobials but carditis treated intravenously. The clinical course of Lyme carditis is variable and reversible over time. With Lyme carditis, multiple conduction defects can be the rule. Although AV node abnormalities are most common, bundle branch blocks may alternate between right bundle branch block (RBBB) and left bundle branch block (LBBB) or may progress to complete heart block (CHB) [1–3]. We present a rare case of Lyme carditis presenting with LBBB.

Case

In the ED, he was afebrile. Physical examination was unremarkable except for a pulse of 53/min and annular macular rash located over the anterior and posterior aspect of the left chest wall. His initial EKG showed a new left bundle branch block (LBBB). (Fig. 1) His PR interval

was 120 msec (n = 120–200 msec). Laboratory results included a white blood cell (WBC) count of 9.9 K/uL (n = 3.9–11 K/uL) with 75% polymorphonuclear neutrophils (PMN) (n = 42–75%), 17% lymphocytes (n = 21–51%), and his platelet count was 304 K/uL (n = 160–392 K/uL). The erythrocyte sedimentation rate (ESR) was 21 mm/h (n < 20 mm/h), and C – reactive protein (CRP) was 49.19 mg/L (n < 0.3 mg/L). Furthermore, CPK and troponin levels were within normal limits $\times 3$. He was started on doxycycline 100 mg (PO) q12 h. There was gradual improvement of rash and the LBBB resolved during second hospital stay. A transthoracic echocardiogram (TTE) revealed normal left ventricle with an ejection fraction of 50%.

The ELISA Lyme IgM = 5.52 (n > 1.19) titer was elevated. Lyme Western blot (WB) IgM 2/3 positive bands on (P23, P39, P41) as well as IgG 8/10 positive bands (P18, P23, P28, P30, P39, P41, P45, P58) were positive. *Ehrlichia chaffeensis* (HME) and *Anaplasma phagocytophilum* (HGE) IgM and IgG titers and were negative and smears for babesiosis were also negative. He was diagnosed with Lyme carditis with isolated LBBB and he was discharged home on doxycycline 100 mg (PO) q12 h and completed 14 days of treatment.

Discussion

Lyme disease is a systemic disease caused by the spirochete *Borrelia burgdorferi* and transmitted by the *Ixodes* tick. It is the most commonly reported vector-borne disease in the United States. The disease classically is divided into three stages. Stage 1, the early localized infection, and is notable for low grade fever, headache, meningisms and often is

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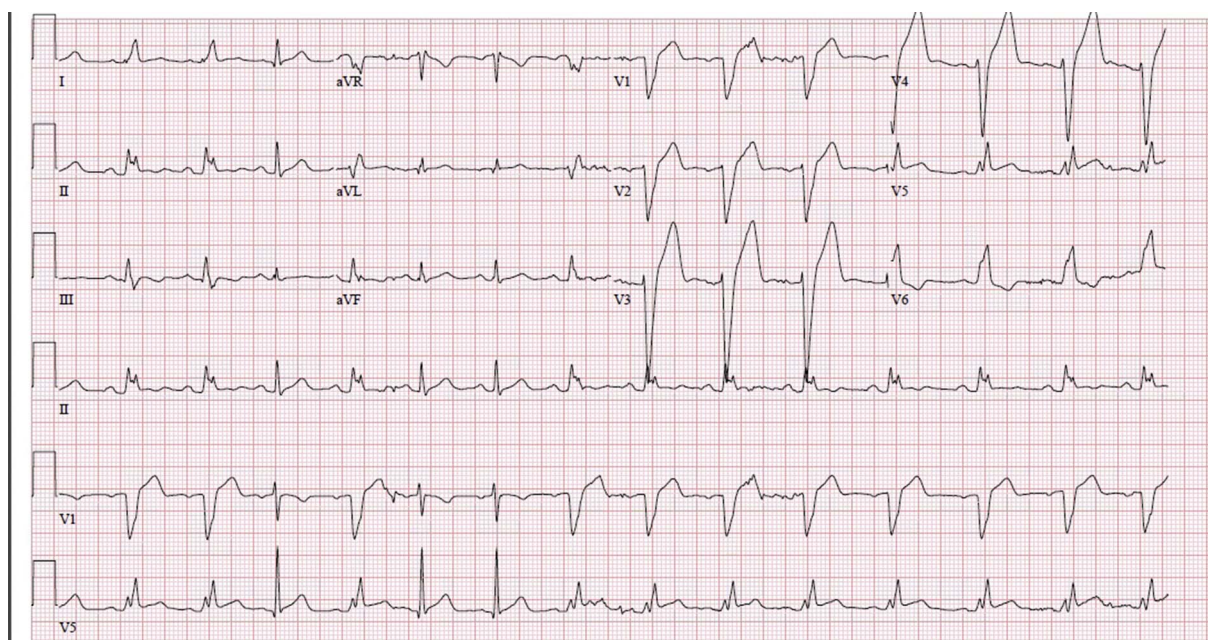


Fig. 1. EKG of a 30 year old male with Lyme carditis and isolated left bundle branch block (LBBB).

accompanied by erythema migrans (EM) rash. Stage 2, the early disseminated stage, occurs weeks to months after EM and neurological, e.g., cranial nerve abnormalities, e.g., unilateral CN 7 palsy and musculoskeletal complaints, e.g., arthralgias, mild myalgias are the features of this stage. Cardiac abnormalities, involving the conduction system and the myocardium, may manifest at this time. Stage 3 occurs several months to years after EM and is characterized by a monoarthritis or oligoarthritis of the large joints.

The first reported cases of Lyme carditis was in 1980, when Steere and colleagues described 20 North American cases. – It is estimated that between 4% – 10% of patients in the United States with untreated Lyme disease develop Lyme carditis [3]. Although there is only a slight male-to-female predominance for Lyme disease, there is a 3:1 male-to-female predominance for Lyme carditis. Lyme carditis typically occurs in the summer/fall months, with a range of 4 days to 7 months after a tick bite or EM. Patients who have cardiac involvement may be asymptomatic but common complaints include light-headedness, syncope, dyspnea, palpitations and/or chest pain. In a CDC review of 84 patients who had Lyme carditis, 69% reported palpitations, 19% had conduction abnormalities, 10% had myocarditis, and 5% had left ventricular systolic dysfunction [4]. The spectrum of disease varies with asymptomatic patients unaware of any underlying cardiac dysfunction, while others experience severe manifestations, e.g., complete/permanent heart block. The usual manifestation of Lyme carditis is self-limited conduction involvement, most commonly with variable degrees of atrioventricular conduction delays [2,5].

The conduction disturbances associated with Lyme carditis, can be variable and rapidly fluctuating. On occasion, patients may progress from having a prolonged PR interval to complete heart block within minutes, with alternating tachycardias and bradycardia as the signs most strongly suggestive of cardiac involvement. Of 875 Lyme cases reported to CDC from 1983 to 1986, 84 cases of cardiac involvement were reported, including 16 (19%) with conduction defects [4]. Experience supports the level of conduction disturbance in Lyme carditis is most commonly at the atrioventricular node, including the Wenckebach phenomena or narrow complex escape rhythms [5,6]. The lack of response of most patients to atropine administration is further suggestive of a direct effect of Lyme disease on atrioventricular node, rather than an indirect vagotonic effect.

Electrophysiologic studies performed in 19 patients from van der

Linde's series suggest that diffuse conduction system involvement in the acute phase of the disease simultaneously effecting sinoatrial node, atrium, bundle of His, bundle branches, and fascicles [7]. In another review of 52 cases by Fisher, 45 patients (87%) had documented atrioventricular block 28 of these had either complete or high-grade atrioventricular block. Of the remaining seven patients, alternation RBBB and LBBB was seen in four cases. 65% of patients in Steere's series had diffuse ST segment and T wave changes on electrocardiogram (EKG) reflective of Lyme carditis. Myocardial involvement may lead to cardiomegaly, left ventricular systolic dysfunction or congestive heart failure and is thought to be present in 10–15% of patients with Lyme carditis [7,8]. In most cases, myocardial dysfunction is mild and self-limited.

There are no good data on the reversibility of conduction abnormalities due to Lyme carditis in treated and untreated patients. Conduction abnormalities may fluctuate or progress rapidly to complete heart block requiring a temporary pacemaker [5]. Most conduction abnormalities are reversible but the time course to recovery is unpredictable. Bundle branch blocks are uncommon, but when present are of the alternating variety [9,10]. Our case was that of isolated LBBB. He also had myocarditis as evidenced from EKG changes and a markedly decreased ejection fraction for his age. Intravenous antimicrobial therapy is often used for cardiac manifestation of Lyme disease [5,11,12]. We believe this to be the first reported case of Lyme carditis with isolated LBBB and myocarditis successfully treated with oral doxycycline.

Conflict of interest

None

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