



A tick beat in the electrocardiogram: Persistent third degree block as only manifestation of Lyme disease

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ABSTRACT

Lyme disease is the most common tick-borne illness in North America. A 23-year-old female presented to our emergency department with a chief complaint of sudden dyspnea and chest pain. An electrocardiogram revealed a third degree heart block. She was a resident of the Northeast region of Mexico and referred a recent travel to an endemic area for *Borrelia burgdorferi* in the center of Mexico in the past weeks. Lyme carditis was diagnosed after enzyme linked immunosorbent assay for IgM antibodies against *B. burgdorferi* was reported positive and corroborated by a confirmatory immunoblot analysis. Persistent AV block was the only manifestation in our patient, a presentation scarcely reported in literature.

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Introduction

Third degree heart block is a disorder of the cardiac conduction system, characterized by a complete dissociation of the atrial and ventricular activity. The incidence of this cardiac manifestation increases with advancing age and is uncommon in young population [1]. We present the case of a young healthy woman who arrived to our emergency department with this cardiac conduction disturbance.

Case

A 23-year-old female presented to the emergency department with a chief complaint of sudden dyspnea and chest pain. Her medical history was unremarkable. She reported a syncopal episode 4 days before presentation. On initial examination she appeared dyspneic and anxious, her temperature was 98.0 °F; blood pressure 130/70 mm Hg, heart rate 32 bpm, respiratory rate was 26 bpm, and oxygen saturation of 99% at room air. There were no other relevant findings on examination. An ECG was immediately taken and a third degree heart block was identified (Fig. 1). Due to the symptomatic bradyarrhythmia a temporary transvenous pacemaker was placed without complications.

Her complete blood count showed an increased white blood cell count of 12.4×10^9 . Cardiac troponins, thyroid hormones and

electrolytes were within the normal ranges. Upon further interrogation patient denied prior use of any medication, and had no other relevant signs or symptoms of other possible causes of heart block, like sarcoidosis. At that time, the patient was a current resident of Nuevo Leon, Mexico and, she referred a recent travel to an endemic area of *B. burgdorferi* in the center of Mexico in the past 4 weeks. Antinuclear, anti-Ro, anti-*Tripanozoma cruzi* antibodies were negative. A transthoracic echocardiogram was performed and no structural or functional abnormalities were found. She denied any previous tick bite or erythema migrans. However, given her exposition to an endemic area for *B. burgdorferi* and the presence of a high degree AV block of unknown etiology, we decided to test for Lyme disease (LD), and start empiric treatment with IV ceftriaxone. An enzyme linked immunosorbent assay for IgM antibodies against *B. burgdorferi* was reported positive and later this exam was corroborated by a positive immunoblot analysis. Despite having completed a 21 day course of IV ceftriaxone, the patient remained dependent of cardiac pacing, so a permanent pacemaker was placed, she was discharged for ambulatory follow-up, after 3 months AV block was still unresolved.

Discussion

Lyme disease is the most common tick-borne illness in North America. In Mexico, a recent study revealed a seroprevalence of *B. burgdorferi* of 3.4% in Mexico City and 6.2% on the Northeast region of the country [2]. For the Northeast region of Mexico, seroprevalence was of 3.91% for Nuevo Leon, 6% for Coahuila and 14% for Tamaulipas [2]. This finding has led to consider Mexico as an endemic area for LD,

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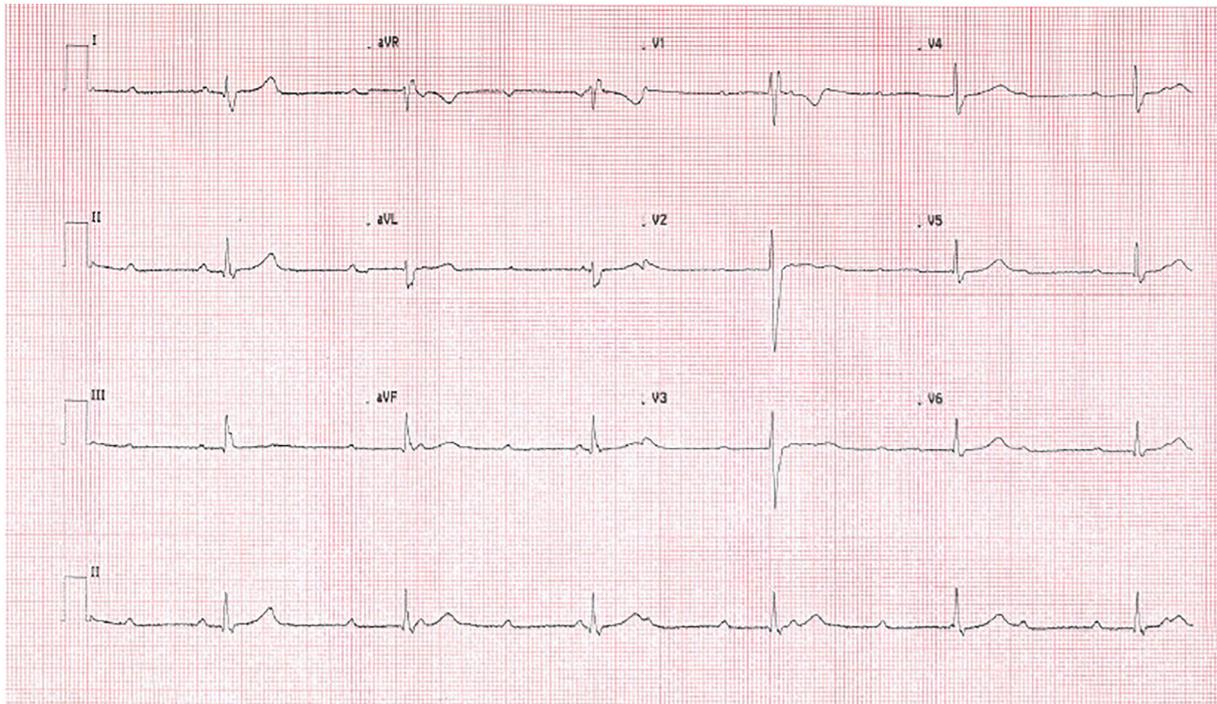


Fig. 1. Third degree atrioventricular block in a 23 years old female with a diagnosis of Lyme carditis.

particularly in the aforementioned regions, and urge the medical community to consider the diagnosis, particularly in young patients with high degree AV block without an apparent cause [3].

Through its stages, LD can present with multi-systemic manifestations including dermatological, articular, neurological, cardiac and constitutional signs and symptoms [4]. Lyme carditis (LC) is rare, only present in <1% of the cases. The most frequent cardiac feature of LC is intermittent and variable degree AV block, with the most severe form being a complete AV block, which usually occurs within one month after the onset of infection [5]. Remarkably, there are many other causes of AV block in young patients; sarcoidosis and amyloidosis, both infiltrative diseases, must be in the differential diagnosis [1]. Echocardiography is the non-invasive method of choice for the diagnosis of cardiac amyloidosis, and it typically shows a “sparkling” or “snow storm” appearance with an increase in left, right and septal wall thickness, bi-atrial dilatation, valve thickening and pericardial effusion [6]. Sarcoidosis presents with pulmonary involvement in almost 90% of patients, with hilar lymphadenopathy and interstitial lung disease being the classic findings; skin, eyes and joints are also frequently affected [7]. Symptomatic cardiac involvement in sarcoidosis is less common, reported in 5% of patients with pulmonary/systemic involvement, and can present with conduction abnormalities, ventricular arrhythmias and heart failure [8]. Although, performing a cardiovascular magnetic resonance (CMR) is indicated in young patients with unexplained advanced AV block, given the dependence of temporal pacing in our patient, we were unable to test for myocardial affection with CMR. Of note, our patient only complaint was syncope and dyspnea, she was otherwise completely asymptomatic, had no clinical signs suspicious of an infiltrative disorder, chest X-ray was completely normal, and echocardiogram showed no data of an infiltrative cardiomyopathy.

The Suspicious Index in Lyme Carditis (SILC) is a diagnostic tool intended to evaluate the likelihood that a patient's heart block is caused by Lyme disease (Table 1) [9]. In a review of 84 cases of Lyme carditis, 57.1% of the total cases had high SILC scores, 35.7% had medium SILC scores and 7.1% had low SILC scores [10]. Our patient was <50 years old and presented with constitutional symptoms (syncope), SILC score

gives 1 and 2 point for each item, respectively, which placed her at an intermediate risk.

Most cases of AV block related to LD are transient and resolve with antibiotics, for this reason it is important to consider LC in the differential diagnosis, mainly in young patients, as early initiation of IV ceftriaxone can avoid placement of a permanent pacemaker. Although blocks are commonly transient, temporary pacing may sometimes be required, this can lead to immobilization and prolonged length of stay. Recently, Wang and colleagues [11] proposed the use of temporary–permanent pacing as a better option to manage third degree heart block in LC in order to maintain better stability for more days and to allow early mobilization of the patient.

In the case of our patient, it is hard to know the exact timing of exposure to the tick bite, however, syncope (the initial manifestation), presented 4 days before presentation, and IV antibiotics were started 2 days after her arrival to our hospital, so delay in antibiotics administration can hardly explain the persistent AV block. To the best of our knowledge, there are only 2 other cases in literature describing a non-resolving AV block caused by Lyme carditis [12,13]. Other remarkably feature is the fact that persistent AV block was the only manifestation in our patient, a presentation which is scarcely reported in literature. In conclusion, clinicians must be aware of reversible causes of heart blocks in young patients, and also to its uncommon presentations, since permanent cardiac pacing could be required.

Table 1

Clinical characteristics of the Suspicious Index in Lyme Carditis (SILC) score. SILC score assign a patient into a low (0–2), intermediate (3–6), or high (7–12) index of suspicious of Lyme carditis.

Patient's characteristics	Score
Age < 50 years	1
Male	1
Outdoor activity/endemic area	1
Constitutional symptoms ^a	2
Tick bite	3
Erythema migrans	4

^a Malaise, fever, arthralgias, dyspnea, presyncope and syncope.

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None.

Declaration of interest

None.

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