

A Rare Cause of Complete Atrioventricular Block: Lyme Carditis

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Abstract Lyme disease is a tick-borne spirochete infection that may affect the heart. Cardiac manifestations include conduction disturbances and other pathologies of the heart. Disturbance of atrioventricular (AV) node conduction is the most common cardiac manifestation of Lyme disease. We report a 61-year old female, who was admitted to the emergency department with the complaints of syncope, dizziness and generalized fatigue. Physical examination revealed normal findings. The patient's electrocardiogram on admission revealed a newly diagnosed bradycardia due to third degree of AV block with 40/min ventricular rate. The patient was admitted to the coronary care unit and was placed a transvenous pacemaker. Lyme serology and Western blot were positive for *Borrelia* antibodies. The symptoms and AV block resolved completely after doxycycline therapy.

Keywords Tick, Lyme Disease, Lyme carditis, Atrioventricular Block

1. Introduction

Lyme borreliosis is a tick-borne disease that is known to affect primarily the skin, heart, nervous system, and joints. Generally, cardiac complications occur in the early disseminated phase. Disturbance of atrioventricular (AV) nodal conduction is the most common cardiac manifestation of Lyme disease. In this report, a patient with complete AV block caused by Lyme disease was presented and relevant literature also was reviewed.

2. Case Presentation

A 61-year-old woman without history of cardiovascular diseases was admitted to the emergency department with complaints of syncope, dizziness and generalized fatigue. The pulse was 40 beats per minute and blood pressure was 90/60 mmHg. There were no abnormal findings other than a slight redness in the right upper arm on physical examination. She also did not use any drugs or medication and no history of tick bite. The patient's ECG revealed third degree AV block (Figure 1).

Complete blood count and standard biochemistry tests were performed. Results were as follows: Erythrocyte

sedimentation rate 54 mm/h, Aspartate aminotransferase 104 IU/l, alanine aminotransferase 212 IU/l (Table 1). Other laboratory results were normal. There was no pathology on the chest X-ray. The patient was admitted to the coronary care unit. A temporary pacemaker was inserted.

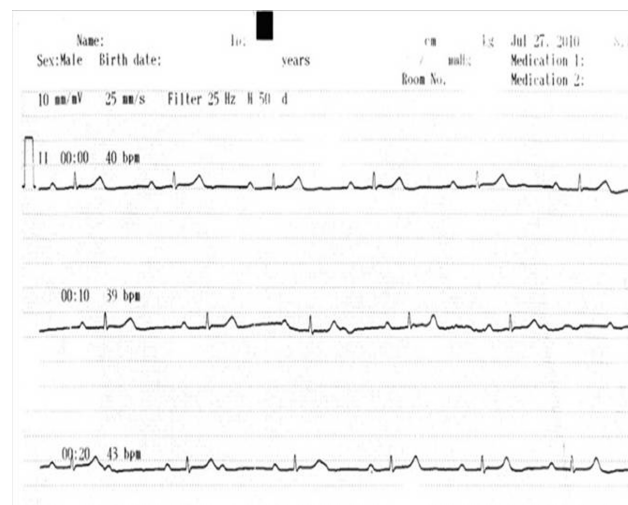


Figure 1. ECG on admission showing third degree AV block

Acute coronary syndrome was ruled out by serial ECG's and cardiac enzymes. IgM and IgG antibody levels (Novalisa ELISA Test Kits; NovaTecImmundiagnostica GmbH; Dietzenbach, Germany) for *Borrelia burgdorferi* were 3,19 IU and 4,47 IU, respectively (Table 1). The serum was collected on the next day of admission. Doxycycline 100 mg p.o. daily was started. All symptoms and AV block completely recovered within three days of antibiotic therapy.

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Pacemaker was removed. Control ECG revealed normal sinus rhythm (Figure 2).

Table 1. Laboratory results of patient

	Results	Normal values
Borrelia burgdorferi antibody IgM	3,19 IU	0,40-2,30 IU
Borrelia burgdorferi antibody IgG	2,30 IU	7,0-16,0 IU
BUN (mg/dl)	13.55	8-23
Glucose (mg/dl)	97	74-109
Urea (mg/dl)	29	13-43
Creatinine (mg/dl)	0.79	0,5-0,9
AST (IU/L)	104	5-32
ALT (IU/L)	212	5-33
Sodium (mEq/L)	139	136-145
Potassium (mEq/L)	4.56	3,5-5,1
Clor (mEq/L)	105.6	98-110
CK (IU/L)	127	26-192
CK-MB (IU/L)	9.8	3-25
Troponin (ng/ml)	<0.2	0-1
WBC	7030	5200-12400
Hemoglobin (g/dl)	12.7	12-18
HCT(%)	40.9	37-52
MCV	86.2	80-99
MCHC	34.5	33-37
Platelet ($10^3/uL$)	151	130-400
TSH(uIU/ml)	0.997	0,4-4,0
ESR (mm/h)	54	0-20

ALT: Alanine Aminotransferase, AST: Aspartate Aminotransferase, BUN: Blood urea nitrogen, CK: Creatine Kinase, CK-MB: Creatine Kinase-Myocardial Band, ESR: Erythrocyte Sedimentation Rate, HCT: Hematocrit, IgG: Immunoglobulin G, IgM: Immunoglobulin M, MCV: Mean corpuscular volume, MCHC: Mean corpuscular hemoglobin concentration, TSH: Thyroid stimulating hormone, WBC: White blood cell,

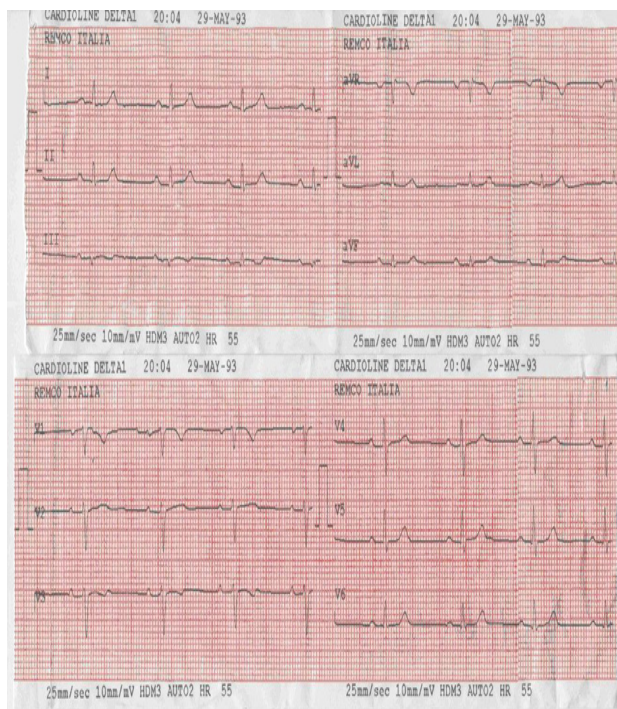


Figure 2. ECG after treatment with restored sinus rhythm

24-hour Holter monitoring also showed normal sinus rhythm without any AV block. The patient was discharged and she had no complaints at the first-month visit.

3. Discussion

Lyme Borreliosis (LB) have been reported after 1990's in Turkey and the spirochete was isolated from the tick vectors[1]. Lyme carditis is a rare manifestation of the disease. It occurs in 1.5%-10% of cases in North America and 0.5%-4% in Europe[2]. There are various symptoms of acute cardiac involvementsuch as exertional dyspnea, chest pain, palpitation and syncope with a reported rate of 4-10% in patients who have Lyme disease[3,4]. The most frequent cardiac manifestation is conduction abnormalities including transient atrioventricular (AV) heart block, junctional rhythm and asystolic pauses. Van der Linde et al.[5] reported the AV block rates as 49% for third degree, 16% for second degree and 12% for first degree in this disease. In addition, the involvement of myocardium and pericardium was reported in the course of disease[7].

There are a number of non-invasive tests such as gallium scanning and indium-labeled anti-myosin antibody scanning to evaluate the myocardial involvement in Lyme carditis[8]. Magnetic resonance imaging can also be used for diagnosing the acute carditis in positive cases[9]. In addition, cardiac biomarkers may be useful in the diagnosis of acute myocarditis and pericarditis[10]. Echocardiography has a low diagnostic value for the detect of Lyme carditis because of it reveals generally normal heart function. However, echocardiography can be used for monitoring the development of dilated cardiomyopathy[11].

On the other hand, serology is usually the first and often the only supporting diagnostic measure to be deployed, because it is relatively easy to perform with acceptable sensitivity and specificity[12]. The most frequently used serologic tests are enzyme-linked immunosorbent assay (ELISA), immunofluorescence assays and Western blotting[13]. Generally, the sensitivity of ELISA is less than 50% in acute-phase of patients with erythema migrans (EM). Sensitivity increases rapidly over time after the first week in untreated patients with EM. In addition, sensitivity is very high in patients with objective evidence of extracutaneous involvement (e.g., carditis or neuroborreliosis)[14]. Whole-cell antigen preparations lack specificity because of the presence of cross-reacting antigens of *B. burgdorferi* broadly. These include common bacterial antigens such as heat shock proteins, flagellar antigens, and others[15]. In this case we have used ELISA kits. However, the limitations of antibody tests must be appreciated. Antibody response in early LB may be weak or absent. On the other hand, a positive specific antibody response may persist for months or even years after successful treatment of the infection, so follow-up of antibody titres in patients following therapy is not a reliable approach for monitoring success of treatment.

Temporary cardiac pacing may be required almost a third of cases of Lyme carditis and complete recovery occurs in more than 90% of patients. It has been suggested that the Lyme disease affects the conduction system as a result of the direct dissemination of spirochetes into cardiac tissues, the inflammatory response associated with the infection, or

both[16].

It has been reported that antibiotic therapy in the early stages of disease prevents the later complications[17]. Patients with minor cardiac involvement (first-degree AV block with PR interval <0.3 s) could be treated orally with doxycycline, tetracycline or amoxicillin[18]. Doxycycline is preferable because of its higher efficacy in other tick borne diseases (babesiosis, ehrlichiosis, anaplasmosis) that could be co-transmitted and might aggravate the outcome[19].

Patients with more severe conduction system disturbances (first-degree AV block with a PR interval >0.3 s, second or third-degree AV block) should be hospitalized in a coronary care unit and given either intravenous ceftriaxone or high-dose intravenous penicillin G. Insertion of a temporary transvenous pacemaker could also be considered according to patients' clinic status. In the literature, permanent pacemaker was used in only one case because of refractory AV block to aggressive pharmacological therapy. In all other cases, permanent pacemakers were implanted prior to the definitive diagnosis of Lyme disease[20].

4. Conclusions

In the patients who have AV block of unknown cause, Lyme carditis may be considered as the alternative diagnosis. Early testing and initiation of antibiotic treatment is essential to prevent the later complications. Thus, early diagnosis and treatment may be avoided unnecessary implantation of a pacemaker.

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