

Case Report

A rare cause of complete atrioventricular block: Lyme carditis

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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 AV block. The ventricular heart rate was 40/min. The patient was admitted to the coronary care unit. Lyme serology and Western blot were positive for *Borrelia* antibodies. This patient, acutely developed third-degree atrioventricular block that was treated with placement of a transvenous pacemaker. The symptoms and AV block resolved completely after doxycycline therapy.

Key words: Tick, lyme disease, lyme carditis, atrioventricular block.

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. Other cardiac diseases associated with Lyme borreliosis are cardiomyopathy, congestive heart failure, myocarditis, pericarditis, atrial and ventricular tachycardia, and degenerative cardiac valvular disease.

CASE PRESENTATION

A 61-year-old woman without history of cardiovascular diseases was admitted to the emergency department with the complaints of syncope, dizziness and generalized

fatigue. The patient denied fever, chills, sweats or neck stiffness. She did not report angina pectoris, palpitations or dyspnea. She did not use any drugs or medication and no history of tick bite. She had no risk factors for coronary artery disease. On examination she was comfortable at rest. Her pulse was 40 beats per min and her blood pressure was 90/60 mmHg. There was a slight redness in the right upper arm. All other systems were normal. The patient's ECG revealed third degree AV block (Figure 1). Her full 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. Acute coronary syndrome was ruled out by serial ECG's and cardiac enzymes. IgM and IgG antibody levels (Novalisa ELISA Test Kits; NovaTec Immundiagnostica GmbH; Dietzenbach, Germany) for *Borrelia burgdorferi* were 3.19 IU and 4.47 IU, respectively (Table 1). The serum

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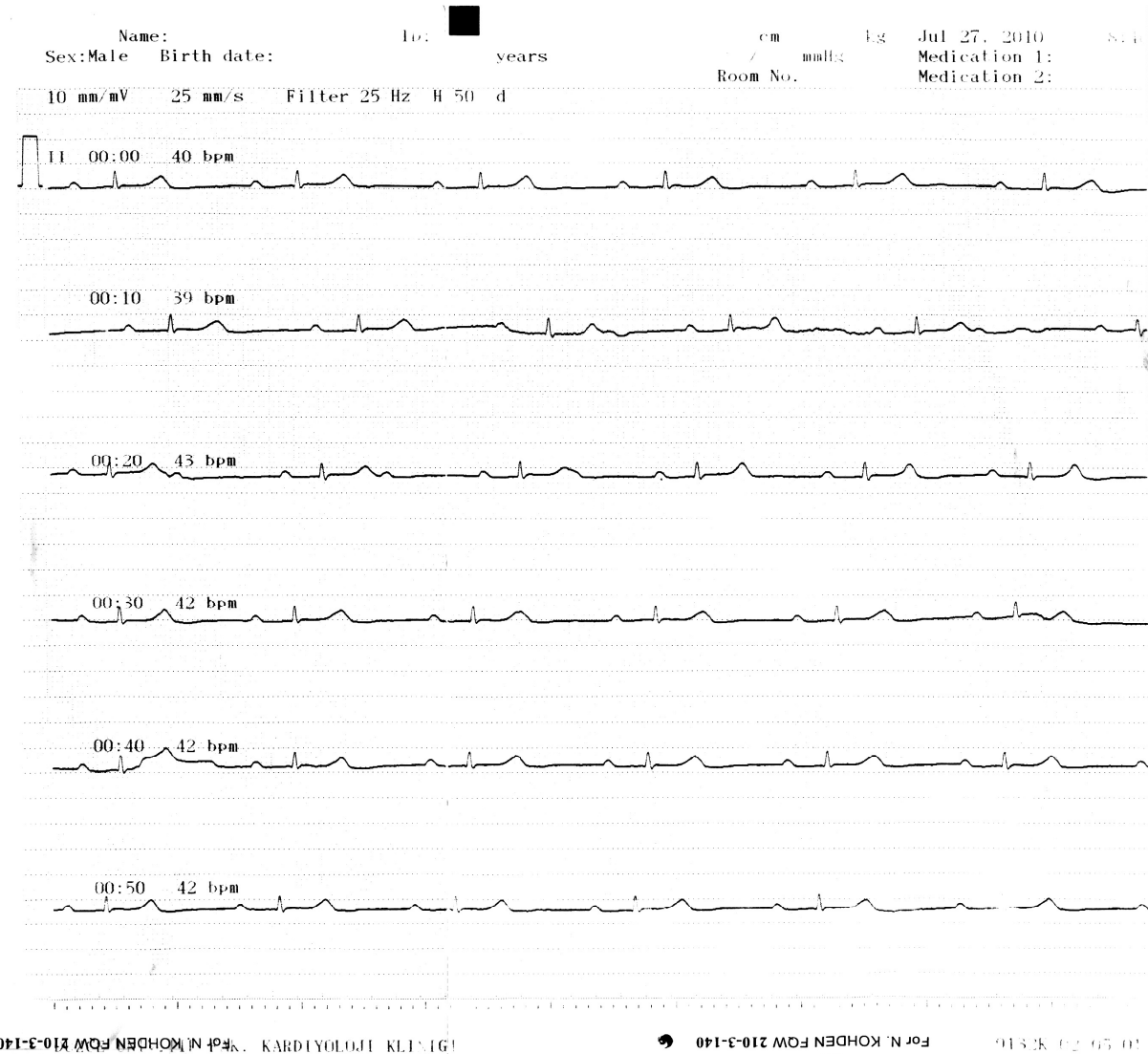


Figure 1. ECG on admission showing third degree AV block.

was collected on the next day of admission. Doxycycline 100 mg p.o. daily was started. Her symptoms and AV block were recovered completely within 3 days of antibiotic therapy and the pacemaker was removed. Control ECG revealed normal sinus rhythm (Figure 2). Twenty-four 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.

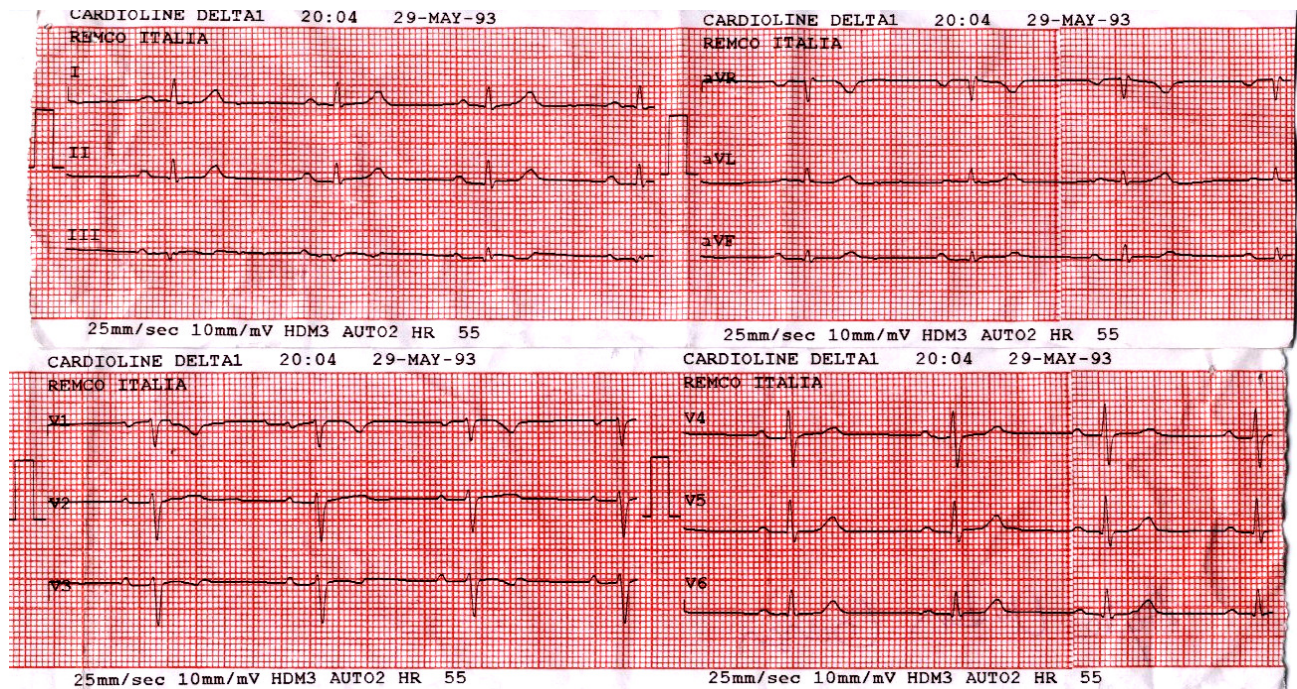
DISCUSSION

Lyme borreliosis (LB) have been reported after the 1990's in Turkey and the spirochete was isolated from the tick vectors (Polat et al., 2010). Lyme carditis is a rare manifestation of the disease. It occurs in 1.5 to 10% of cases in North America and 0.5 to 4% in Europe. Cardiac

manifestations have been reported to occur in the early phase of the illness and the most frequent cardiac symptom is AV block (Vasiljevic et al., 1996). However, AV block is not specific to Lyme carditis and coronary artery disease, medications that cause AV delay, mad honey intoxication, connective tissue diseases, hypothyroidism, and structural heart diseases should be taken into account in the differential diagnosis. For a diagnosis of LB to be considered, the patient must have been exposed to the risk of tick bite. A history of documented tick bite is not essential because many tick bites go unnoticed (Stanek et al., 2011). 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 (Aguero-Rosenfeld et al., 2005). The most frequent assays used are enzyme-linked immunosorbent assay (ELISA), immunofluorescence assays and Western

Table 1. Test results.

Laboratory 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	13.55 mg/dl	8-23
Glucose	97 mg/dl	74-109
Urea	29 mg/dl	13-43
Creatinine	0.79 mg/dl	0.5-0.9
AST	104 IU/L	5-32
ALT	212 IU/L	5-33
Na	139 mEq/L	136-145
K	4.56 mEq/L	3.5-5.1
Cl	105.6 mEq/L	98-110
CK	127 IU/L	26-192
CK-MB	9.8 IU/L	3-25
Troponin	<0.2 ng/ml	0-1
WBC	7030	5200-12400
Hemoglobin	12.7 g/dl	12-18
HCT	40.9%	37-52
MCV	86.2	80-99
MCHC	34.5	33-37
Platelet	151×10 ³ /ul	130-400
TSH	0.997 uIU/ml	0.4-4.0
Total Cholesterol	183 mg/dl	120-200
HDL-Cholesterol	46 mg/dl	45-65
LDL Cholesterol	120.2 mg/dl	100-129
Triglyceride	84 mg/dl	40-150
Erythrocyte sedimentation rate	54 mm/h	0-20

**Figure 2.** ECG after treatment with restored sinus rhythm.

blotting (Tugwell et al., 1997). The sensitivity of ELISA is in general less than 50% in acute-phase late of patients with erythema migrans (EM) of a duration of less than 1 week. Sensitivity increases rapidly over time after the first week in untreated patients with EM. Sensitivity is also high in patients with EM who are symptomatic or who have multiple EMs. Sensitivity is very high in patients with objective evidence of extracutaneous involvement (e.g., carditis or neuroborreliosis) (Dressler et al., 1993).

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 (Bruckbauer et al., 1992; Coleman and Benach, 1992; Engstrom et al., 1995; Fawcett PT et al., 1992). 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 in up to a third of cases of Lyme carditis and complete recovery occurs in more than 90% of patients. It has been suggested that the mechanism by which Lyme disease affects the conduction system is the result of the direct dissemination of spirochetes into cardiac tissues, the inflammatory response associated with the infection, or both (Barthold et al., 1991). Antibiotic therapy in the early stages of the disease has been reported to prevent or ameliorate later complications (Barthold et al., 1991). Patients with minor cardiac involvement (first-degree AV block with PR interval <0.3 s) could be treated orally with doxycycline, tetracycline, or amoxicillin (Luft et al., 1989).

Administration of 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 (Chen et al., 1994). 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 may be necessary according to the needs of each specific case as in our case. According to the literature data, permanent pacing was required in only one case of AV block refractory to aggressive pharmacological therapy. In all other cases where permanent pacemakers were inserted, this was done prior to the definitive diagnosis of Lyme disease (McAlister et al., 1989).

CONCLUSION

The patients with AV block of unknown origin Lyme carditis should be considered in the differential diagnosis. Early testing and initiation of antibiotic treatment is essential to prevent or ameliorate later complications and to improve the ultimate outcome. In Lyme carditis that is diagnosed and treated on time, unnecessary implantation of a pacemaker can be avoided as in the case reported here.

REFERENCES

- Aguero-Rosenfeld ME, Wang G, Schwartz I, Wormser GP (2005). Diagnosis of Lyme borreliosis. *Clin. Microbiol. Rev.*, 18: 484-509
- Barthold SW, Persing DH, Armstrong AL, Peebles RA (1991). Kinetics of *Borrelia burgdorferi* dissemination and evolution of disease after intradermal inoculation of mice. *Am. J. Pathol.*, 139: 263-273.
- Bruckbauer HR, Preac-Mursic V, Fuchs R, Wilske B (1992). Cross-reactive proteins of *Borrelia burgdorferi*. *Eur. J. Clin. Microbiol. Infect. Dis.*, 11: 224-232.
- Coleman JL, Benach JL (1992). Characterization of antigenic determinants of *Borrelia burgdorferi* shared by other bacteria. *J. Infect. Dis.*, 165: 658-666.
- Dressler F, Whalen JA, Reinhardt BN, Steere AC (1993). Western blotting in the serodiagnosis of Lyme disease. *J. Infect. Dis.*, 167: 392-400.
- Engstrom SM, Shoop E, Johnson RC (1995). Immunoblot interpretation criteria for serodiagnosis of early Lyme disease. *J. Clin. Microbiol.*, 33: 419-427.
- Fawcett PT, Gibney KM, Rose CD, Dubbs SB, Doughty RA (1992). Frequency and specificity of antibodies that crossreact with *Borrelia burgdorferi* antigens. *J. Rheumatol.*, 19: 582-587.
- Chen SM, Dumler S, Bakken JS, Walker DH (1994). Identification of a granulocytotropic ehrlichia species as the etiologic agent of human disease. *J. Clin. Microbiol.*, 32: 589-595.
- Luft BJ, Goveric PD, Halperin JJ, Volkman DJ, Dattwyler RJ (1989). A perspective on the treatment of Lyme borreliosis. *Rev. Infect. Dis.*, 6: 1518-1525.
- McAlister HF, Klementowicz PT, Andrews C, Fisher JD, Feld M, Furman S (1989). Lyme carditis: an important cause of reversible heart block. *Ann. Intern. Med.*, 110: 339-345.
- Polat E, Turhan V, Aslan M, Müsellim B, Onem Y, Ertuğrul B (2010). First report of three culture confirmed human lyme cases in turkey. *Mikrobiyol. Bul.*, 44:133-139.
- Stanek G, Fingerle V, Hunfeld KP, Jaulhac B, Kaiser R, Krause A, Kristoferitsch W, O'Connell S, Ornstein K, Strle F, Gray J (2011). Lyme borreliosis: Clinical case definitions for diagnosis and management in Europe. *Clin. Microbiol. Infect.*, 17: 69-79
- Tugwell P, Dennis DT, Weinstein A, Wells G, Shea B, Nichol G, Hayward R, Lightfoot R, Baker P, Steere AC (1997). Laboratory evaluation in the diagnosis of Lyme disease. *Ann. Intern. Med.*, 127: 1109-1123.
- Vasiljevic Z, Dimitrovic R, Naumovic Z, Ostojic M, Radosavljevic M, Karadzic A, Prostran M, Colic M (1996). Common form of Lyme Borreliosis carditis-complete heart block with syncope: Report on 3 cases. *Cardiology*, 87: 76-8.