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Association of Lyme Disease and Erythema Migrans with Atrioventricular Block

Andrej Došen, Ivana Crnojević, Davor Horvat

Department of Cardiology, General Hospital Karlovac, Croatia

Corresponding author:
Asst. Prof. Davor Horvat, MD, PhD
Department of Cardiology,
General Hospital Karlovac
47000 Karlovac, Croatia
davor.horvat@ka.t-com.hr

SUMMARY The aim of this case report is to present a patient with Lyme carditis and erythema migrans complicated with third-degree atrioventricular (AV) block and the need for pacemaker implantation. A 20-year-old patient comes to the hospital because of syncope. A few days earlier, he had chest pains with an irregular heartbeat. Upon arrival, the heart rate is 30 beats per minute. The electrocardiogram (ECG) shows AV block of the third degree with asystolic pauses. In laboratory findings, leukocytosis ($20x10^9$) and C-reactive protein (10.8 mg/L). A transcutaneous temporary external pacemaker was placed. Anamnestic information is obtained about a tick bite and migrating erythema at the site of the bite one month before arrival at the hospital. Enzyme immunoassay was positive for Borrelia burgdorferi. Ceftriaxone is introduced into the treatment. Despite therapy, the patient has persistent symptomatic AV block of the third degree with presyncope and syncope, which is why a permanent two-chamber pacemaker is implanted. He was discharged from the hospital in a cardiac stable condition. At the follow-up after one year, he was symptom-free, there was no AV block in the ECG, and 0.1% ventricular stimulation was recorded in the pacemaker's memory. We conclude that third-degree AV block caused by a tick bite, complicated by Borrelia burgdorferi infection with erythema migrans and carditis, although in most cases it passes spontaneously, sometimes, if presyncope and syncope are present, along with temporary electrostimulation of the heart, it requires permanent electrostimulation of the heart.

KEY WORDS: syncope, Borrelia burgdorferi, erythema migrans, carditis, electrostimulation of the heart

INTRODUCTION

Lyme disease with erythema migrans is the most common disease in the world transmitted by ticks. It is an infection caused by species from the family of spirochetes Borreliacae (1). Cardiac involvement occurs during the early disseminated phase of the disease, usually within a period of several weeks to several months after the onset of infection (2). The most common feature of Lyme carditis is atrioventricular (AV) conduction block, and rarely patients may have myopericarditis, endocarditis, or fatal pancarditis. Carditis has been reported as a complication of Lyme disease in 0.3-4.0% of untreated adults and shows a male to female predominance (3:1). Patients may be asymptomatic or complain of dizziness, syncope, difficulty breathing, palpitations and chest pain (3). The degree of AV block can vary from the first to the third degree, and lasts from 3 to 42 days (4,5). Diagnostics is carried out on the basis of epidemiological and clinical characteristics in combination with positive results of serological tests for Borrelia burgdorferi infection (2). When Lyme carditis is suspected, empirical treatment with antimicrobial therapy should be started immediately until the disease is evaluated (3). Patients who have syncope, dyspnea, chest pain, second-degree or third-degree AV block, or extremely prolonged PR interval (≥300 ms) should be hospitalized and monitored by cardiac telemetry, treated with intravenous antibiotics, and some of them can a

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temporary pacemaker may be needed. The prognosis of Lyme carditis among treated patients is generally good (4,5).

CASE REPORT

A 20-year-old patient came to the emergency department after briefly losing consciousness. A few days earlier, he felt chest pains, accompanied by a feeling of irregular heartbeat. There were no significant illnesses in the personal history, except that he was born prematurely. He denied the use of tobacco, alcohol and narcotic drugs and did not take any medication. Physical examination revealed a pulse of 30 beats per minute, arterial blood pressure 110/70 mmHg and body temperature 36.9°C. Electrocardiogram (ECG) showed total AV block with significant asystolic RR pauses (≥2 seconds) (Figure 1).

In laboratory findings, leukocytosis ($20x10^9$) and elevated C-reactive protein (10.8 mg/L) were verified, and other findings, including high-sensitivity troponin I, were normal. Transthoracic ultrasound of the heart measured the ejection fraction of the left ventricle of 65%. Considering the presented clinical picture and the received admission findings, the patient was placed in the coronary unit. During the further follow-up of the patient, intermittent AV block of the second to third degree with significant asystolic RR pauses was verified in the ECG monitor, so a transcutaneous temporary external heart pacemaker was placed. Subsequently, information is obtained that one month ago the patient had a tick bite in the area of the left upper leg, followed by migrating erythema at the site of the bite (Figure 2). A working diagnosis of Lyme carditis was made and an immunoenzymatic test for Borrelia burgdorferi was performed (the result that arrived later was positive). Intravenous ceftriaxone at a dose of 2 g every 24 hours was immediately introduced into the treatment. In the later course of treatment, given that the patient still had dizziness and recurrent syncope, a permanent dual-chamber cardiac pacemaker (DDDR) was implanted (Figure 3).

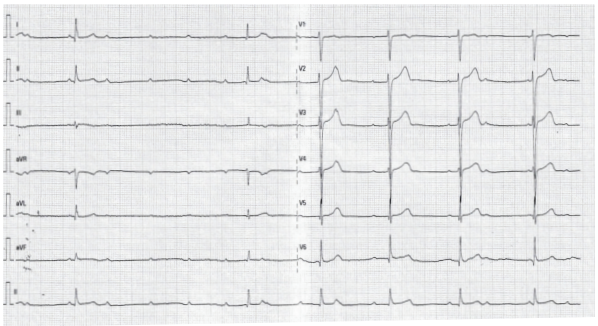

Figure 1. ECG on arrival at the hospital

After that, on the eighth day from the beginning of hospitalization, the patient is cardiac stable with 1% ventricular stimulation recorded in the memory of the electrostimulator, so he was discharged home. After a one-year follow-up, he had no symptoms, the ECG showed a normal sinus rhythm without AV conduction disturbances, and only 0.1% of ventricular stimulation was recorded in the pacemaker's memory (Figure 4).

DISCUSSION

This case report presented an acute onset, rapidly fluctuating total AV block in a patient with Lyme carditis caused by a tick bite and subsequent systemic borreliosis and the need for permanent pacemaker implantation. A review of previous reports in a similar study showed that of 105 patients with Lyme carditis, 49% of patients had third-degree AV block, 16% had second-degree AV block, and 12% had first-degree AV block (6). In another study, out of four patients with AV conduction disorder, persistent total AV block remained in one patient despite treatment with antibiotics and corticosteroids, and he was implanted with a permanent pacemaker (7). If Lyme carditis is suspected to be the cause of high-grade AV block, the Suspicious Index in Lyme Carditis (SILC) score can aid in the diagnosis. This new risk score consists of six variables represented by constitutional symptoms (2 points), history of outdoor or endemic activity (1 point), male gender (1 point), history of tick bites (3 points), age under 50 years (1 point) and the presence of pathognomonic erythema migrans (4 points). The six variables can be better remembered using the mnemonic formula "CO-STAR" (constitutional symptoms, outdoor activity/endemic area, gender, tick bite, age, rash). The score divides patients into three categories: low (0-2), medium (3-6) and high risk (7-12) (8). By reviewing the literature on the complications of Lyme borreliosis, most of the presented

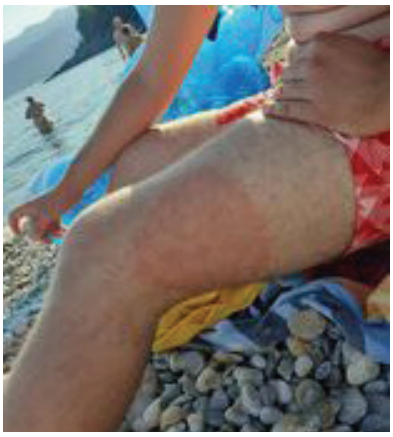

Figure 2. Erythema migrans of the left upper leg

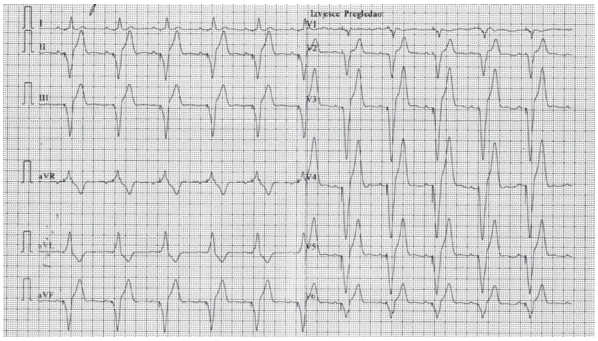

Figure 3. ECG after pacemaker implantation

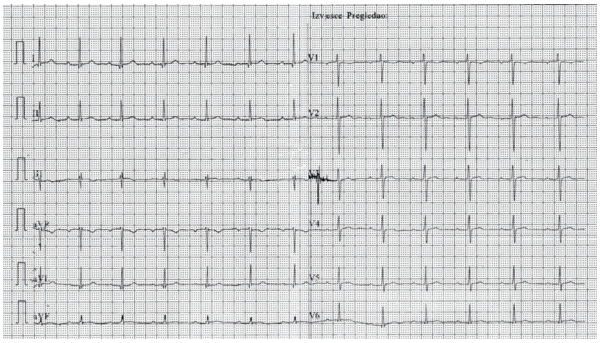

Figure 3. ECG after one-year follow-up

cases refer to second or third degree AV block. Furthermore, in most of the presented cases, AV block is resolved by the use of appropriate antimicrobial therapy (5-8). Specific treatment for Lyme disease varies depending on the stage and severity of the disease. Severe Lyme carditis, as in our case, is defined by first degree AV block with a PR interval ≥300 milliseconds, second or third degree AV block, or as symptomatic AV block and should be treated with ceftriaxone 2 g intravenously once a day for up to 28 days (9). Implantation of a permanent pacemaker is rarely necessary and is recommended only if there is no conduction at <90 beats per minute, as in our patient, or if there is no resolution of AV block by the fourteenth day of antibiotic therapy (7,8). That our case belongs to the group of rare events is also shown by another analysis, which, on a total of 103 cases of Lyme carditis, showed that the percentage of patients who needed a temporary pacemaker was 35%, the percentage of patients who needed a permanent pacemaker was only 5.7% and only one patient remained dependent on electrostimulation (9).

CONCLUSION

AV block of the second or third degree as a complication of tick bite, migrating erythema and systemic borreliosis in most cases resolves with appropriate antibiotic treatment. It is often necessary to place an external transcutaneous or endovenous temporary electrostimulator of the heart, and sometimes it is necessary to implant a permanent electrostimulator of the heart.

Early recognition of Lyme carditis as a cause of AV block of the second and third degree is crucial in the treatment of these patients, because with a timely conservative therapeutic approach, invasive methods of treatment with the implantation of temporary and permanent pacemakers can be avoided.

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