CASE REPORT

Temporary decrease in heart rate in Lyme carditis during treatment with antibiotics

Edwin P Dam, Dries R Jonker, Jan C A Hoorntje

Abstract

Lyme disease is a recognised cause of atrioventricular block. In most cases the conduction disturbances are reversed by treatment with antibiotics. A 44 year old man with third degree atrioventricular block in Lyme carditis had a temporary decrease in heart rate during resolution of the heart block two days after treatment with antibiotics was started.

(Heart 1996;76:289-290)

Keywords: Lyme carditis; atrioventricular block

Lyme disease is a systemic illness characterised by a pathognomonic rash, with associated fever, myalgias, arthralgias, headache, fatigue, and lymphadenopathy. The disease is caused by the spirochete *Borrelia burgdorferi* which is transmitted by tick bites. Without antibiotic treatment further complications can develop. The complication of carditis occurs in 1.5% and 10% of cases.¹⁻³ Lyme carditis usually presents as transient myocarditis with varying degrees of atrioventricular block. Usually it begins three to six weeks after the

initial illness. The block generally resolves completely with antibiotic treatment. We describe a patient in whom the course of the atrioventricular conduction disturbance was remarkable.

Case report

One of the authors (DRJ), a 44 year old male anaesthesiologist, had consulted a doctor with complaints of progressive tiredness and stiffness in both thighs two days before he was admitted to hospital. Recently he had found that some of his inguinal lymph glands were enlarged. He recalled erythema on his left leg five weeks before. He did not remember being bitten by an insect, but he often participates in outdoor activities. He had no other symptoms of systemic illness and no palpitation, chest pain, or syncope.

A physical examination was unremarkable except from the enlarged inguinal lymph glands and cannon waves in the jugular veins. His pulse rate was 48 beats/min. The haematological and biochemical values were normal. The electrocardiogram showed a third degree atrioventricular block with a nodal escape rhythm of 48 beats/min (figure part a). A chest

Development of the atrioventricular conduction disorder. At first presentation a third degree atrioventricular block was seen (a). Two days later the patient was admitted with a lower pulse rate and more symptoms. None the less, a second degree atrioventricular block was seen (b). This figure also shows the phenomenon known as ventriculophasic sinus arrhythmia. The arrows indicate the sinus P waves, the numbers represent hundredths of a second. Note the alternating length of the PP interval with and without a QRS complex (b). Further resolution is seen in the next days, with normal sinus rhythm after ten days (c and d).

Department of Cardiology, De Weezenlanden Hospital, Zwolle, The Netherlands
E P Dam
D R Jonker
J C A Hoorntje

Correspondence to:
Dr J C A Hoorntje,
Department of Cardiology,
De Weezenlanden Hospital,
Groot Weezenland 20, 8011
JW Zwolle,
The Netherlands.

Accepted for publication
14 March 1996

x ray was normal. Cross sectional echocardiography showed no abnormalities. A presumptive diagnosis of Lyme carditis was made and treatment with oral doxycycline (100 mg twice a day) was started. Two days later patient was admitted to the cardiological ward because exertional dyspnea and lightheadedness had developed and his pulse rate had fallen to only 30 beats/min. He supposed that this indicated a worsening of the Lyme carditis. The electrocardiogram now showed a 2:1 second degree atrioventricular block with a rhythm of 30 beats/min (figure part b). Serological tests (ELISA) for *Borrelia burgdorferi* were positive and the antibiotic treatment was changed to intravenous ceftriaxone (2g daily for two weeks). Continuous monitoring in the next days showed a further resolution of the block (figure part c). Five days after he first presented he was discharged. Treatment with ceftriaxone was continued. After 10 days he was in normal sinus rhythm (figure part d).

Discussion

Atrioventricular block (AV block) has been described several times in patients with Lyme disease.^{1,2,4} Our patient had a third degree AV block at first presentation. Because no symptoms were attributed to the arrhythmia there seemed no reason for immediate admission to hospital.

Two days after the first consultation he was admitted to hospital because of worsening symptoms and a suspected increase in the carditis leading to a lower escape rhythm. However, the electrocardiogram showed a second degree AV block resulting in a lower heart rate which in fact reflected an improvement in the conduction abnormality. This paradox of healing required clinical observation.

When AV block is seen in Lyme carditis, temporary transvenous pacing may be indicated. Indications are progression of AV block with haemodynamic instability or the coexistent development of bundle branch block. In our case there was decrease in heart rate with resolution of the AV block. Although our colleague had other symptoms, there was no haemodynamic instability and there was improvement in the electrocardiogram. We decided to wait for further resolution during antibiotic treatment. Indeed after two more days patient was in sinus rhythm with first degree AV block of 50 beats/min.

With adequate and early treatment complete heart block rarely persists more than a week. Permanent complete heart block is very rare.^{2,4} The diagnosis of Lyme disease is not always obvious and its recognition is important if unnecessary implantation of a permanent pacemaker is to be avoided.

Interestingly during the second degree AV block in our patient the PP interval that included the QRS complex was shorter than the PP interval that did not (figure part b). The P waves had the same configuration (so it was not a sinus rhythm with coupled blocked atrial extrasystoles). This electrocardiographic phenomenon is known as ventriculophasic sinus arrhythmia.⁵ It occurs more in third degree AV block (was probably also present in our patient (figure part a)), and is not well understood. It has been postulated that ventricular contraction induces transient increases in the sinus rate via the sympathetic nervous system. Ventriculophasic sinus arrhythmia in itself is of no significance.⁶

In the first phase of the disease, when erythema chronicum migrans is present, treatment with oral tetracycline is usually sufficient. In the second or early disseminated phase, in which the heart is affected, intravenous ceftriaxone is more effective because of the better tissue penetration (this is also required when the central nervous system is affected). In our case the third degree heart block resolved within 48 hours of the antibiotic treatment starting. The temporary decrease in heart rate, however, shows that this does not mean an immediate clinical improvement too.

We thank Dr C J Russchen, who also treated our patient, for carefully reviewing the paper.

- 1 Rubin DA, Sorbera C, Nikitin P, McAllister A, Wormser GP, Nadelman RB. Prospective evaluation of heart block complicating early Lyme disease. *PACE* 1992;15:252-5.
- 2 McAlister HF, Klementowicz PT, Andrews C, Fisher JD, Feld M, Furman S. Lyme carditis: an important cause of reversible heart block. *Ann Intern Med* 1989;110:339-45.
- 3 van der Linde MR, Crijns HJGM, de Koning J, Hoogkamp-Korstanje JAA, de Graaf JJ, Piers DA, et al. Range of atrioventricular conduction disturbances in Lyme borreliosis: a report of four cases and review of other published reports. *Br Heart J* 1990;63:162-8.
- 4 Almohammad A, Wright DJM. Lyme carditis. *Eur J C P E* 1993;2:158-63.
- 5 Chung EK. Electrocardiography: practical applications with vectorial principles. 2nd ed. Hagerstown: Harper and Row, 1980:148-9.
- 6 Rowlands DJ. Understanding the electrocardiogram: Section 3: Rhythm abnormalities. Manchester, 1987:503-4.