

Country cardiograms case 54: Answer

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The electrocardiogram (ECG) shown in Figure 1 (on page 100) reveals third-degree atrioventricular (AV) block with an underlying nonconducting sinus rhythm at a rate of about 80 beats/min and a ventricular escape rhythm at a rate of 30 beats/min. The ventricular escape rhythm has a left bundle branch block morphology. The patient was transferred to the coronary care unit of the Mazankowski Alberta Heart Institute for further investigation and management.

Patients with third-degree AV block, accompanied by a slow ventricular escape rhythm, often present with symptoms that include shortness of breath, near syncope and syncope. Symptoms of

heart failure as well as angina may be worsened by the slow ventricular rate. The etiology of third-degree AV block is diverse. In the general population, the most common causes of AV block are idiopathic progressive cardiac conduction disease due to degenerative fibrosclerosis of the conduction system and ischemic heart disease.¹ However, these conditions occur predominantly in older patients. In younger patients, one should also consider hypertrophic cardiomyopathy, infiltrative processes such as amyloidosis and sarcoidosis, and myocarditis due to conditions such as rheumatic fever, viral infections, Lyme disease, systemic lupus erythematosus, bacterial endocarditis and syphilis.^{2,3} Common

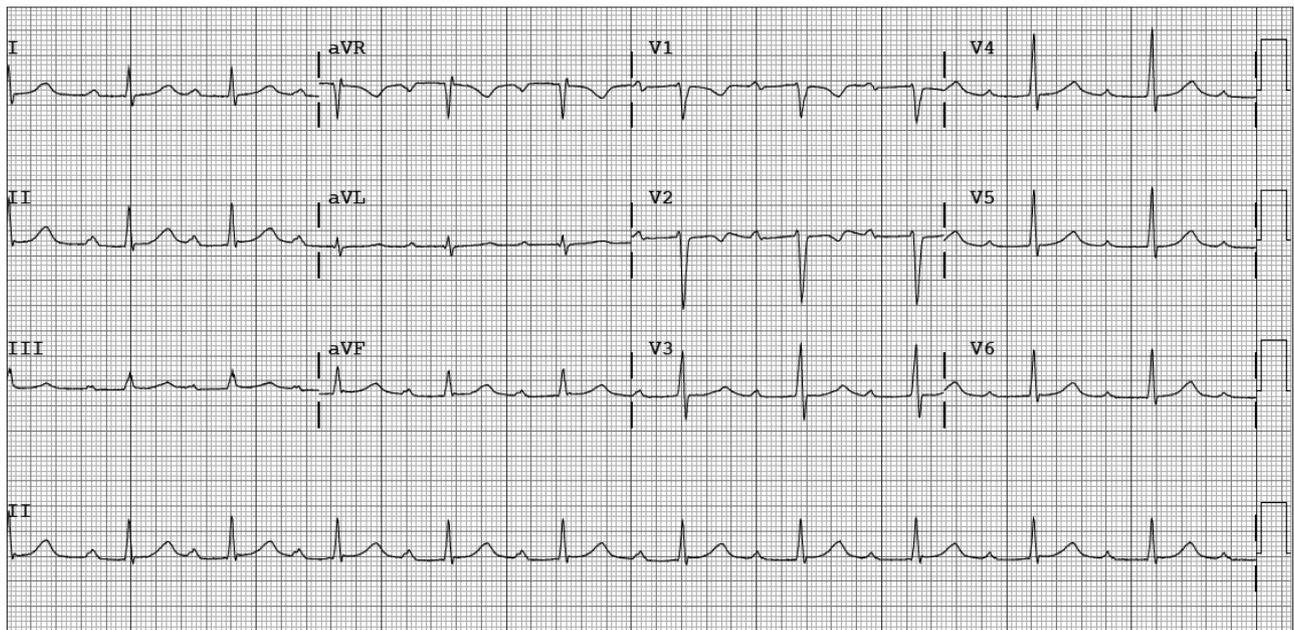


Fig. 2. Repeat electrocardiogram after several days of antibiotic treatment.

“Country cardiograms” is a regular feature of *CJRM*. We present an electrocardiogram and discuss the case in a rural context. Please submit cases to Suzanne Kingsmill, *CJRM*, 45 Overlea Blvd., P.O. Box 22015, Toronto ON M4H 1N9; cjrm@cjrm.net.

iatrogenic causes of AV block include medications, such as digitalis, β -blockers and nondihydropyridine calcium channel blockers; cardiac surgery; and catheter ablation for arrhythmia.

In our patient, it was subsequently discovered that he had recently been bitten by a tick at his primary residence in the northeastern United States. The infectious disease service was consulted and the patient was tested for *Borrelia burgdorferi* infection. Initial serology was positive for Lyme disease. Cardiac magnetic resonance imaging revealed a small area of gadolinium enhancement in the basal septum, further supporting the diagnosis. As a result, the patient was given empirical intravenous ceftriaxone for presumed Lyme carditis. Subsequent Western blot testing confirmed the diagnosis.

Lyme disease is the most common tick-borne infection in the northern hemisphere.^{4,5} It is a multi-systemic condition caused by the spirochete *B. burgdorferi*. In the United States, it is endemic in the northeastern and mid-Atlantic regions, as well as the upper midwest and northern Pacific Coast.^{4,6} In Canada, the ticks that can carry Lyme disease are found in southwestern Quebec, southern and eastern Ontario, southeastern Manitoba, New Brunswick, Nova Scotia and southern British Columbia.⁷

The clinical course of Lyme disease is typically divided into 3 stages: early localized, early disseminated and late disease. Early localized disease generally occurs after an incubation period of several days up to a month and is characterized by development of the erythema migrans rash and flu-like symptoms.⁸ The early disseminated stage occurs weeks to months after the rash first appears and is the stage during which cardiac symptoms often manifest.⁵ Finally, the late phase presentation includes arthritis and neurologic dysfunction, often months to years after the initial rash.^{8,9} The diagnosis is suspected based on the clinical presentation, supported by positive serology on enzyme-linked immunosorbent assay and confirmed through a Western blot analysis.⁸

About 4–10% of patients with Lyme disease have cardiac involvement on initial presentation.⁹ Cardiac manifestations typically occur during the early disseminated phase of the illness and consist of varying degrees of AV block, tachyarrhythmia, heart failure, myopericarditis and intraventricular conduction disturbance.^{9–11} Transient AV block is the most common cardiac manifestation.^{5,6,8–11} Electrophysiological studies suggest that the heart block usually occurs above the bundle of His, typically within the AV node. However, other levels of the

conduction system may be affected, including the sinoatrial node, intra-atrial pathways and below the bundle of His.^{9,10} Patients with first-degree AV block and a PR interval less than 300 ms are at low risk and can receive treatment as outpatients.¹² For patients presenting with first-degree AV block with a PR interval greater than 300 ms, or those with a higher degree of AV block, inpatient treatment with parenteral ceftriaxone is recommended by the Infectious Diseases Society of America.¹⁵ Most cases of Lyme carditis resolve in 1 to 2 weeks with antibiotics and do not require insertion of a permanent pacemaker.^{6,12}

Our patient was given expectant treatment, and no temporary venous pacing was required. Over several days, his conduction abnormality began to improve, initially evidenced by a narrowing of his QRS complex followed by improvement in AV nodal conduction from third-degree to first-degree heart block (Fig. 2). He was discharged in stable condition.

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For the question, see page 100.

Competing interests: None declared.