CASE REPORT

Hint of Lyme, an uncommon cause of syncope

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SUMMARY

A 20-year-old Caucasian male patient presented after a single episode of syncope. His heart rate was 40 beats per minute. ECG showed new onset complete heart block. A temporary pacer was placed. He had a macular rash on the body from past 2 weeks and was diagnosed with contact dermatitis. Erythema migrans was considered as differential for rash. Lyme titre was ordered and found to be positive. After antibiotic therapy and observation on telemetry, his heart block resolved. He was subsequently discharged and a follow-up ECG revealed persistent normal sinus rhythm.

BACKGROUND

Lyme disease is a systemic disease with varied presentations. Lyme carditis should be considered in the differential diagnosis in patients presenting with syncope and new onset heart block. Prompt recognition will facilitate early diagnosis and appropriate management with avoidance of unnecessary permanent pacemaker placement.

The incidence of Lyme disease in the USA has increased considerably,¹ from 9908 cases in 1992 to 19 931 cases in 2006.² Lyme carditis is a feature of early disseminated Lyme disease. It most commonly presents with palpitations and very rarely with syncope.³ One series found erythema migrans in 67%, joint complaints in 51%, and early neurological sequelae in 27% of patients who had Lyme carditis. We report a case of a 20-year-old male student presenting with syncope, who was diagnosed with Lyme carditis.

CASE PRESENTATION

A 20-year-old Caucasian male patient presented to an outpatient physician's office after a single episode of unwitnessed, non-exertional syncope which lasted for about 5 min. The patient reported that he was standing up from a sitting position before the syncopal episode. He reported of persistent light-headedness after the episode. No antecedent history to support a concern for seizures was obtained. The patient had no medical history and was not on any prescription medications or over the counter supplements. He denied any alcohol intake, smoking or recreational/illicit drug misuse. On physical examination, he had a heart rate in the 40 s but the examination was otherwise unremarkable. Subsequently, an ECG was obtained in the office which is shown below (figure 1A). On finding a presumed new onset complete heart block the patient was referred for admission and urgent consultation with cardiology. No prior ECGs were available for comparison. However, his heart rates on previous office visits were within normal limits.

On further questioning, the patient reported that he developed a rash 2 weeks prior. The rash started as a macular patch over the left knee (with some central clearing), another similar patch over the dorsum of the right hand and spread to the face. It was initially diagnosed as contact dermatitis. He had been an avid outdoorsman and was in the woods frequently. However, he did not recall a tick bite. He denied any recent joint pains, confusion, behavioural changes or constitutional symptoms.

INVESTIGATIONS

Given his history of recent rash, extensive outdoor activity and the finding of complete heart block, Lyme carditis was considered high in the differential diagnosis. Lyme serologies were collected. He was admitted to the hospital and started on intravenous ceftriaxone. The patient continued to have persistent bradycardia (heart rate 40–50 s) with complete heart block. He was intermittently symptomatic with bouts of light-headedness and near syncope. A temporary transvenous pacemaker was placed. The transthoracic echocardiogram did not show any structural or valvular abnormalities. Over the next 4 days he developed a junctional escape rhythm (figure 1B). The patient's Lyme disease antibody screen enzyme immunoassay (EIA) was found to be positive. A subsequent western blot test was positive for 8 of 10 bands of IgG and all three IgM bands for specific antibody to *Borrelia burgdorferi*, confirming the diagnosis.

DIFFERENTIAL DIAGNOSIS

Given the patient's young age, the differential diagnosis for his presentation included congenital heart disease, increased physiological vagal tone, idiopathic progressive cardiac conduction disease, ischaemic heart disease, cardiomyopathies (such as hypertrophic obstructive cardiomyopathy, amyloidosis, sarcoidosis) and myocarditis (such as inflammatory and infectious myocarditis). However, due to his lack of comorbid conditions and general good health, acquired diseases with abrupt onset and systemic diseases with an insidious course were felt to be more likely.

At the time of presentation, systemic rheumatological disorders were considered. Specifically, serologies including antinuclear antibodies, rheumatoid factor, Ss-A and Ss-B antibodies were negative. Moreover, the patient did not manifest any systemic signs of rheumatological disease.

Congenital cardiac conduction abnormalities were felt to be less likely given the patient's age at manifestation of symptoms and the transient nature of his heart block. Also, normal sinus rhythm was restored after antibiotic treatment, further supporting this fact.

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Figure 1 (A) Complete heart block. (B) Junctional escape rhythm. (C) Sinus rhythm with sinus arrhythmia.

Structural heart disease was excluded by normal findings on echocardiography.

Infiltrative processes such as sarcoidosis and amyloidosis were not definitively ruled out as no biopsy was performed. However, in the absence of any extra-cardiac findings of these diseases and given the patient's recovery following antibiotic therapy, an invasive evaluation such as endomyocardial biopsy was felt to pose an unjustifiable risk with no significant benefit in guiding further treatment.

In the absence of significant risk factors, anginal symptoms and characteristic changes on ECG, underlying cardiac ischaemia appeared unlikely.

The ideal non-invasive modality to evaluate this patient for infiltrative processes would have been a cardiac MRI. This imaging modality is emerging as an extremely effective tool in diagnosing a wide range of cardiac pathologies. However, due to the unavailability of this modality at our facility during the patient's presentation, further evaluation was not possible.

TREATMENT

The patient was continued on ceftriaxone. Given his persistent rhythm abnormality, a possibility of permanent pacemaker implantation was considered. However, on day 5 of his admission, he spontaneously converted to normal sinus rhythm (with sinus arrhythmia). His ECG showed no other abnormalities (figure 1C). He was further monitored on telemetry over the next few days. Subsequently, the transvenous pacer was discontinued and the patient was discharged home to complete the 4-week course of intravenous antibiotics.

OUTCOME AND FOLLOW-UP

The patient was followed up postdischarge and at 1 year. He was doing well with a normal cardiac examination. Repeat ECG shows normal sinus rhythm and no conduction abnormality.

DISCUSSION

Lyme carditis usually occurs 1–2 months after the onset of Lyme disease. The most common manifestation of Lyme carditis is varying degrees of atrioventricular (AV) conduction block. The conduction blocks may be transient or persistent and may evolve or devolve over minutes to days.⁴ The patients at highest risk for progression to complete AV block are those with a PR interval greater than 300 ms. Patients with higher degrees of AV block are more likely to be symptomatic. The most common symptoms are palpitations and very rarely syncope.

Electrophysiological literature suggests that conduction delay usually occurs above the bundle of His, often within the AV node.⁵ However, heart block can occur at different levels within the conducting system. Sinoatrial (SA) node dysfunction (manifested as SA nodal block), abnormal nodal recovery time, intra-atrial block, fascicular and bundle branch block have all been described.⁶ A diagnosis of Lyme carditis is made on the basis of an ELISA and confirmatory western blot analysis revealing seropositivity for Lyme disease.⁷

There are no randomised trials that have studied the optimal treatment of Lyme carditis. Patients with symptoms (eg, syncope, dyspnoea or chest pain), second or third degree AV block, or first-degree AV block with a markedly prolonged PR interval (≥ 300 ms) require hospitalisation for close monitoring with cardiac telemetry and intravenous antibiotics.⁸ The drug of choice is ceftriaxone (2 g intravenously once daily in adults). The total duration of therapy is 21–28 days. There are no data to support the superiority of intravenous antibiotics over oral antibiotics in this setting. Overall, the prognosis of Lyme carditis is favourable. Patients generally respond well to antibiotic therapy. The high-degree AV blocks usually devolve to lesser degree blocks and eventually resolve completely. This resolution usually takes 1–6 weeks.⁹ Permanent pacing is not considered in these patients given the potential reversibility of the heart block. However, recent reports suggest that untreated Lyme carditis could potentially result in sudden cardiac death.

Learning points

- ▶ Consider Lyme carditis in the differential diagnosis in young patients with syncope and heart block, particularly in endemic areas.
- ▶ Lyme carditis with associated heart block is a potentially reversible condition.
- ▶ Patients may not always manifest with typical symptoms of early Lyme disease.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Steere AC. Lyme disease: a growing threat to urban populations. *Proc Natl Acad Sci USA* 1994;91:2378.
- 2 Bacon RM, Kugeler KJ, Mead PS; Centers for Disease Control and Prevention (CDC). Surveillance for Lyme disease—United States, 1992–2006. *MMWR Surveill Summ* 2008;57:1–9.
- 3 Ciesielski CA, Markowitz LE, Horsley R, et al. Lyme disease surveillance in the United States, 1983–1986. *Rev Infect Dis* 1989;11(Suppl 6):S1435.
- 4 Steere AC, Batsford WP, Weinberg M, et al. Lyme carditis: cardiac abnormalities of Lyme disease. *Ann Intern Med* 1980;93:8–16.
- 5 McAlister HF, Klementowicz PT, Andrews C, et al. Lyme carditis: an important cause of reversible heart block. *Ann Intern Med* 1989;110:339–45.
- 6 van der Linde MR, Crijns HJ, Lie KI. Transient complete AV block in Lyme disease. Electrophysiologic observations. *Chest* 1989;96:219–21.
- 7 Steere AC, McHugh G, Damle N, et al. Prospective study of serologic tests for Lyme disease. *Clin Infect Dis* 2008;47:188–95.
- 8 Wormser GP, Dattwyler RJ, Shapiro ED, et al. The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: clinical practice guidelines by the Infectious Diseases Society of America. *Clin Infect Dis* 2006;43:1089–134.
- 9 Fish AE, Pride YB, Pinto DS. Lyme carditis. *Infect Dis Clin North Am* 2008;22:275–88.

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