



Lyme Borreliosis as Cause of Myocarditis: A Case Report and a Review of the Literature

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ARTICLE INFO	ABSTRACT
Published Online: 22 December 2021	lyme borreliosis (LB) is the most common tick-born disease in the Northern Hemisphere. During early disseminated Lyme disease, cardiac manifestation can occur. including acute conduction disorders, atrioventricular block, acute myopericarditis or left ventricular dysfunction and rarely cardiomegaly or fatal pericarditis. We report a case of a patient with isolated Lyme myocarditis manifested by acute heart failure with atrial fibrillation and review of the literature on the subject. The interested of this case report is to show the need to acquire the reflex to think about a lyme carditis when patients in endemic areas come to attention with cardiovasculair symtoms, even in the absence of others concurerenr clinical manifestations of early lyme disease.
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INTRODUCTION

Cardiac involvement occurs in 8-10% of Lyme disease cases. The severity of this condition and its clinical repercussions vary, ranging from minor and asymptomatic conduction disturbances to life-threatening arrhythmias or severe heart failure.

The diagnosis of Lyme disease should be made in the presence of any acute cardiac disorder occurring in a young subject, especially since there is an infectious syndrome in a compatible epidemiological context.

CASE REPORT

A 58 year old patient, with no medical history or cardiovascular risk factors, admitted to the infectious disease department for a rash like blue purplish erythematous annular macules on the extension face of the lower limbs, which appeared for a week in a feverish context.

Laboratory tests revealed a moderate inflammatory syndrome with an initial infectious assessment (ECBU, chest X-ray, blood cultures and PCR of SARS-COV2) was negative.

Two days later, the patient developed acute dyspnea and respiratory distress, on clinical examination, we note a tachycardia at 100 bpm, desaturation at 90% in ambient air, and signs of left heart failure.

Initial electrocardiogram (EKG) demonstrated a sinus tachycardia without repolarization disorders.

A trans-thoracic echocardiogram (TTE) shows a normal sized heart chambers, hypokinesia of the inferolateral wall with moderate left ventricular dysfunction estimated at 35% in SBP, no significant valve disease and no pericardial effusion (Figure 1), requiring transfer to intensive care, an oxygenotherapy and dépléting treatment. was initiated with a favorable evolution.

Cardiac biomarkers level was raised, a diagnostic of myocardial infraction was suspected. Catheter angiography did not demonstrate significant coronary artery disease, Telemetry monitoring shows a transition to atrial fibrillation at 140 bpm, requiring urgent pharmacological reduction with amiodarone (Figure2)

So cardiac magnetic resonance (MRI) was performed, late gadolinium enhancement (LGE) images revealed subacute intraparietal myocarditis of the septum and basal segments of the basal walls of the lateral and inferior walls, basal hypokinesia of the lateral and inferior walls, normal size of left ventricle, LVEF at 35%. (Figure 3)

A careful infectious history of the patient indicates the notion of a walk in the forest with a tick bite in the preceding month.

Lyme disease was considered. The diagnosis of Lyme disease was confirmed by ELISA and western blot. with high level of IgM and IgG antibodies

The patient was put on a conventional treatment of heart failure with Beta blockers and angiotensin-converting enzyme inhibitors, combined with IV antibiotic therapy with

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ceftriaxone 2 g / 24h for 7 days, and, methylprednisolone 1000 mg daily for 3 days,.

He was transitioned to oral doxycycline and discharged home to complete 28 day course of antibiotics.

1 month again, resolution of symptoms and, normalization of the inflammatory syndrome and cardiac enzymes, control ECG holter was normal, Repeat echocardiography demonstrated an improvement of LVEF at 45%.

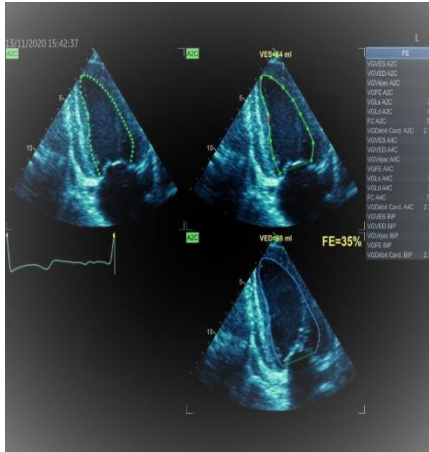


Figure 1 : TTE showing left ventricle dysfunction

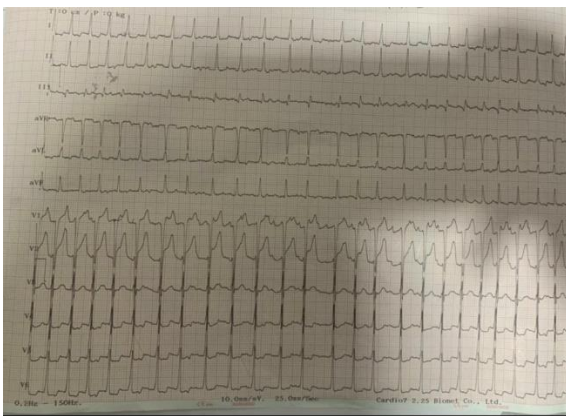


Figure 2 : EKG demonstrating atrial Fibrillation at 130bpm

A)



B)

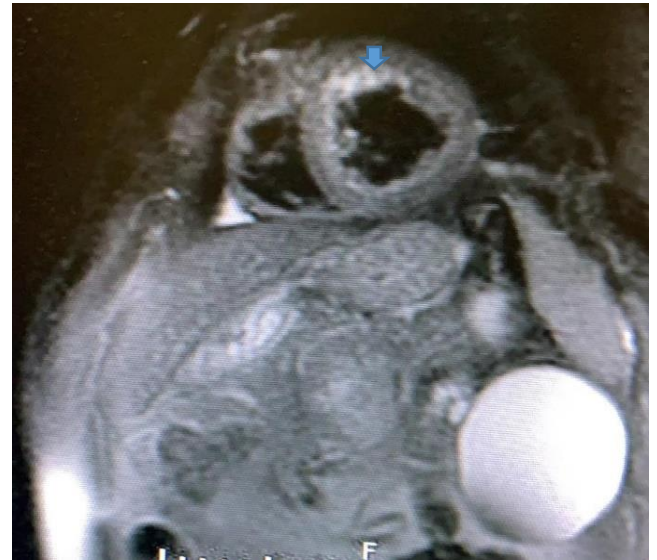


Figure 3: Cardiovascular magnetic resonance images showing late gadolinium enhanced images, with a small area of epicardial hyperenhancement médiopariétal of the side and bottom wall on the 4-chamber view (A) as well as on the short-axis view (B).

SÉROLOGIE DE LA BORRELIOSÉ DE LYME			
Prélèvement : 05.10.2021 Sérum 08h 50			
Ac anti-B. burgdorferi IgG	Positif 144,2 UA/mL	Seuil : 10 UA/mL	(12.09.19 : 8,0)
	< 10 UA/mL	: Recherche négative	
	De 10 à <= 15 UA/mL	: Taux limite	
	> 15 UA/mL	: Recherche positive	
Réactif : LIAISON® Borrelia IgG DiaSorin			
Changement de réactifs depuis le 07.12.2020.			
Ac anti-B. burgdorferi IgM	Positif 142,0 UR/mL	Seuil : 16 UR/mL	(12.09.19 : 9,0)
	< 16 UR/mL	: Recherche négative	

Figure 4 : serological test showing a high level of IgG et IgM antibodies

DISCUSSION

Our patient presented with acute heart failure with atrial fibrillation, and after investigation, Lyme disease was diagnosed.

Lyme disease also known as Lyme borreliosis is a zoonosis transmitted by the bite of a tick of the genus *Ixodes*, and caused by several species of *Borrelia*: *B. burgdorferi*, *B. garinii* and *B. afzelii* [1-2]

The tick must remain attached to human skin for at least 24 to 48 hours in order to transmit the infection. The incubation period ranges from 3 to 32 days, during which time the organism can be found in cultures of bodily fluids [3]

When *Borrelia* spirochetes infiltrate the cardiac tissue, the disease is called Lyme carditis. The spirochetes cause transmural inflammation, necrosis and fibrosis. An autoimmune reaction against myocardial tissue may also play a role in Lyme carditis.

The bacteria involved can reach all heart structures, the myocardium, the conduction system, connective tissue including the pericardium and endocardium, as well as blood vessels. Tissue damage is the consequence of the immune response and the inflammatory process triggered [4]

Lyme carditis is a rare manifestation, occurring in 1.5%–10% of cases in North America and 0.5%–4% in Europe [4]. Whereas there is no sex predisposition for Lyme disease, Lyme carditis has been reported to have a 3:1 male: female ratio [5,6].

Cardiac manifestations of Lyme disease occurs in the secondary phase, usually a few weeks to months after transmission (on average 21 days). Most often the involvement at this phase is multi-organism, but the heart may be the only organ involved in this secondary phase [7]

The most common manifestation of Lyme carditis is fluctuating degrees of atrioventricular block and rarely arrhythmias, myocarditis, with or without pericardial involvement, left ventricular dysfunction and cardiomegaly

A United States Center of Disease Control surveillance study of Lyme disease reported cardiac findings of: palpitations (6.6%), conduction abnormalities (1.8%), myocarditis (0.9%), cardiac dysfunction (0.5%), and pericarditis (0.2%) [8,9]

However, in a small proportion of patients, dilated cardiomyopathy may occur. In addition, deaths from Lyme carditis have been reported [10]

The atrioventricular node appears to be the most vulnerable part of the conduction system in Lyme carditis. Thus, in the majority of cases the level of atrioventricular block is located above the bundle of His, consequently producing, in the event of an escape rhythm, fine QRS complexes.

Conductive disorders generally progress to spontaneous regression in less than a week, rarely it can persist or become

permanent, requiring the use of a pacemaker implantation, temporary or permanent [11-12]

Arrhythmias appear to be rare, one case of complete arrhythmia by atrial fibrillation and one case of ventricular tachycardia have been reported in the literature [13]

The pathogenesis of Lyme carditis is uncertain. The injury appears to be related to a pathologic immune response to infection. In a post-mortem study of Lyme carditis, cardiac myocyte necrosis was minimal, but lymphocytic infiltrates were noted, including T cells and plasma cells [14]. Spirochetes were also identified in the cardiac interstitium in association with collagen fibers, co-localized with decorin, a proteoglycan associated with collagen fibrils.

The severity of myopericardial involvement ranges from silent involvement to severe forms with acute heart failure on myocardial involvement or tamponade on pericardial involvement. Often Lyme carditis is subclinical, revealed by nonspecific repolarization disorders (T wave flattening or inversion, ST shift). [15-16] About a third of the reported cases present a moderate left ventricular dysfunction which can be global or segmental.

Signs and symptoms of Lyme myopericarditis have rarely been found to mimic acute coronary syndrome, with ECG ST segment elevations and elevated peripheral blood cardiac biomarkers; in such cases, echocardiography has shown diffuse ventricular hypokinesis rather than the focal wall motion abnormalities expected with an acute coronary syndrome [17].

Lyme disease is not thought to be a cause of severe congestive heart failure, although cases of acute heart failure have been reported [18] Among children, cases of fulminant myocarditis leading to cardiogenic shock requiring extracorporeal membrane oxygenation have been published. In the few cases of death attributable to Lyme carditis, extensive myocardial inflammation has been found at autopsy.

The diagnosis of Lyme carditis is notoriously challenging, and is based on the combination of clinical presentation, signs of Lyme disease (tick bite, erythema migrans) and laboratory findings. Diagnostic tests include ELISA, immunofluorescence assay and Western blot [19]. A seroconversion or a substantial rise in binding activity, intensity or number of reactive bands in ELISA or immunofluorescence assay in two consecutive sera establishes the diagnosis of Lyme borreliosis, but negative serology does not exclude it [20]

It is important to acquire an electrocardiogram in every case of suspected Lyme disease, and an echocardiogram should be performed if there are symptoms of heart failure or poor clinical course. Magnetic resonance (MRI) is an additional tool in the assessment of myocardial involvement, and may reveal late enhancement with gadolinium. This technique

would also confirm the complete recovery of the myocardium [21].

Finally, the endomyocardial biopsy can confirm the cardiac damage of the LB by revealing in the histopathologic study an endocardial lymphoplasmacyte infiltrate or myocardial.[22]

The treatment of choice is with antibiotics, oral antibiotic therapy for 14 to 21 days is recommended in mild cases. For more serious cases requiring hospitalization, initial intravenous treatment is recommended, with the possibility of replacing it with oral treatment once the severity criteria have been corrected, for a total duration of 21 to 28 days [23]

Doxycycline, amoxicillin, cefuroxime (oral) and ceftriaxone (parenteral) are the preferred agents,

Steroids do not appear to shorten the time course of Lyme carditis and are not routinely recommended, however the use of short corticosteroid therapy have been reported in severe forms with a strong inflammatory component

Prognosis seems to be favorable with adequate therapy, although late complications such as dilated cardiomyopathy may occur [24]

CONCLUSION

Cardiac involvement in the course of borreliosis is relatively rare. It is estimated that it concerns about 0.5-10% of patients with Lyme disease. The diagnosis of Lyme carditis is based on the combination of clinical presentation, signs of Lyme disease (e.g., tick bite, erythema migrans) and laboratory findings. • Cardiovascular magnetic resonance imaging has become the primary tool for noninvasive assessment of myocardial inflammation in patients with suspected myocarditis and can be supportive for the diagnosis of Lyme carditis.

The basic method of treatment Lyme carditis are antibiotics. The clinical course is usually benign. In most cases a complete recovery is observed. Lyme carditis remains a real diagnostic and therapeutic challenge for clinicians.

We aim through our case report to shed light on this cardiovascular complication, which can inaugurate symptomatology and therefore mask its initial etiology being the Lyme disease.

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