

Cardiac Amyloidosis with Dynamic Subaortic Obstruction

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SUMMARY

Primary amyloidosis is a systemic infiltrative disease that compromises the heart and represents an important cause of restrictive cardiomyopathy.

We describe the case of a patient with heart failure secondary to an infiltrative cardiomyopathy with amyloid deposition and dynamic left ventricular outflow tract obstruction.

The hematological diagnosis was light chain multiple myeloma with presence of amyloidosis in two extracardiac tissues. The echocardiogram revealed substantial wall thickening with significant dynamic subaortic obstruction; the magnetic resonance imaging showed a pattern suggestive of amyloid infiltration. An endomyocardial biopsy confirmed the diagnosis of cardiac amyloidosis. This is the first case of this atypical presentation of cardiac amyloidosis reported in our country.

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Key words >

Amyloidosis - Cardiomyopathy, Hypertrophic - Heart Failure- Diagnosis – Endocardial Biopsy

Abbreviations >

ECG	Electrocardiogram	Cardiac MRI	Resonancia magnética cardíaca
LVH	Left Ventricle Hypertrophy	LV:	Left ventricle
HF	Heart failure		

BACKGROUND

Amyloidosis is an infiltrating disease that affects the heart and represents an important cause of restrictive cardiomyopathy. In light-chain amyloidosis, cardiac involvement occurs in up to 50% of the cases and its isolated affectation is rare. The most frequent clinical manifestation is right heart failure, although it may also appear with left failure due to diastolic or systolic dysfunction with low cardiac output syndrome. (1) Amyloidosis cardiac diagnosis is based on the integration of data from the medical history and electrocardiographic, echocardiographic and cardiac magnetic resonance (CMR) findings. Differential diagnosis is generally created with non-obstructive hypertrophic cardiomyopathy, with other forms of infiltrating cardiomyopathies and with constrictive pericarditis. (2) Sometimes an endomyocardial biopsy is necessary in order to obtain a definitive diagnosis and so decide a specific treatment. (3)

CLINICAL CASE

The publication of this case is the first communication in the country of this atypical form of cardiac amyloidosis.

A female patient aged 54, with no risk factors or personal antecedents of cardiovascular disease and

with haematological diagnosis of multiple myeloma due to light-chain. She enters the hospital with decompensated heart failure (HF), so she received treatment with intravenous diuretics.

The electrocardiogram showed sinus rhythm with no signs of left ventricular hypertrophy (LVH), with no acute ischemic changes and absence of microvoltage (Figure 1). Due to the hematologic disease and the presence of HF, a kidney and a duodenum biopsy were performed, both with positive result for the diagnosis of light-chain amyloidosis. Doppler echocardiogram showed left ventricle preserved diameters and systolic function, with concentric hypertrophy, pseudonormal left ventricular filling pattern, biatrial dilatation and mild mitral regurgitation, and systolic anterior movement of the anterior valve and dynamic obstruction of the LV outflow tract with a subaortic gradient of 60 mmHg (after Valsalva manoeuvre) (Figure 2). The CMR showed compatible findings with amyloid infiltration with diffuse delayed enhancement subendocardial gadolinium and a notable reduction of the blood pool signal when eliminating the normal myocardium signal (Figure 3).

Endomyocardial biopsy of the right ventricle with thioflavin gave the diagnosis of cardiac amyloidosis (Figure 4).

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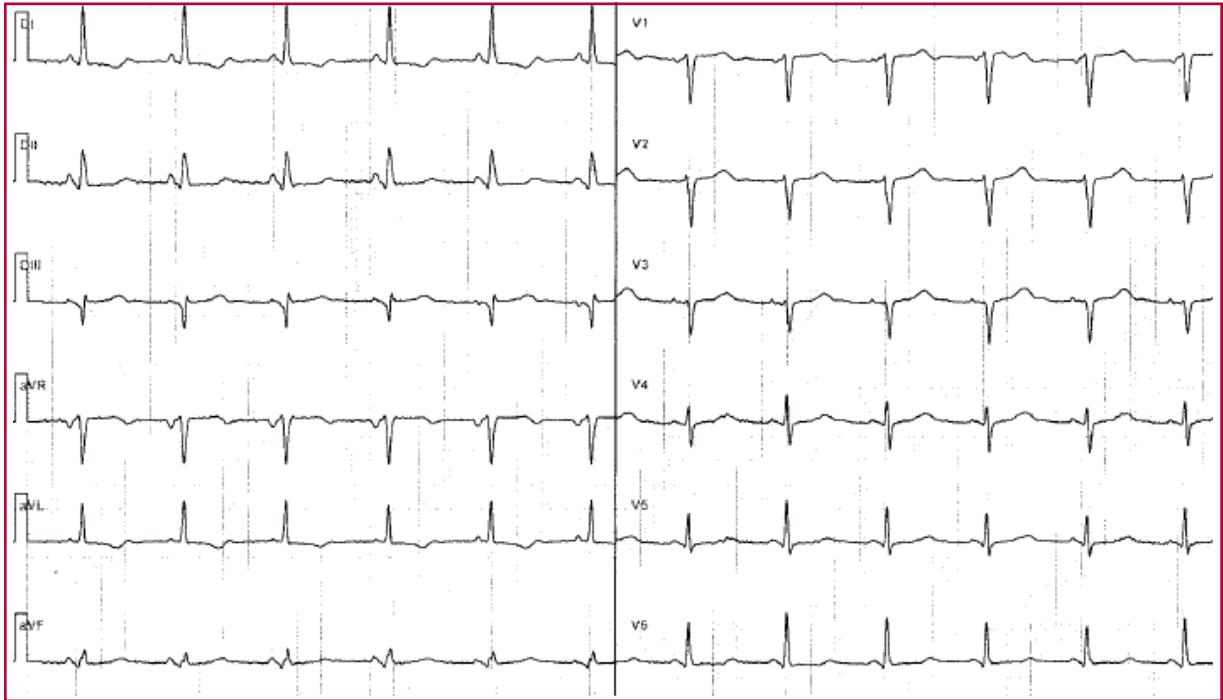


Fig. 1. Admission electrocardiogram with bad progression of R in precordial leads and absence of microvoltage.

The patient left the hospital and in the outpatient monitoring changes in the value of subaortic gradient were found. From the hematologic point of view she was treated with dexamethasone, bortezomib and cyclophosphamide, with excellent response.

DISCUSSION

Infiltrative cardiomyopathy with amyloid deposition is a disease of bad prognosis with a survival less than a year in patients with no treatment. (1)

Cardiac amyloidosis diagnosis is based on the integration of data from the medical history and electrocardiographic, echocardiographic and CMR findings. (2) The most frequent clinical manifestation is right heart failure, although it may also appear with left failure due to diastolic or systolic dysfunction with low cardiac output syndrome. (1) Two-dimensional echocardiogram can show left and right ventricle increased wall thickness, dilatation of both atria, infiltration of atrioventricular valves, infiltration of interatrial septum and pericardial effusion. (4) Regarding myocardial hyperrefringency, the interventricular septum mottled pattern can be seen in other causes of LVH. Although some studies demonstrated a relatively elevated specificity (71-81%), we must emphasize that it was a very selected population as they were patients with high suspicion of amyloidosis. (5, 6) Sensitivity of this pattern is very low (26-36%). (6-8)

Performing a transmitral Doppler, the degree of diastolic dysfunction can be determined; in more advanced cases restrictive filling pattern is common. (9) Pulsed tissue Doppler at lateral and septal wall

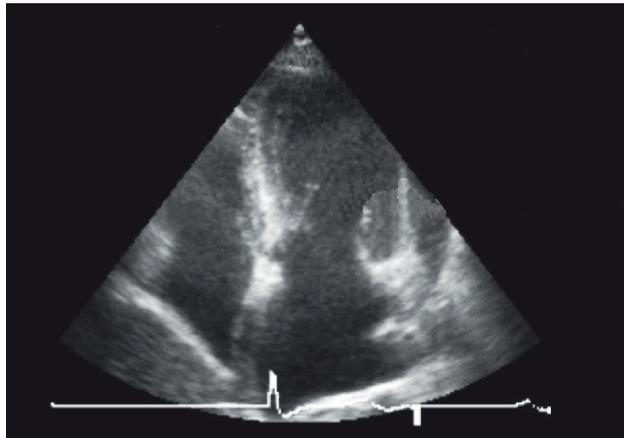


Fig. 2. Admission echocardiogram. In addition to those described findings, we can see absence of interventricular septum mottled characteristic of this disease. Mild pericardial effusion is also observed.

level may be useful as it shows the presence of low velocities and in that way allows differentiating this entity from constrictive pericarditis. (10) Those new techniques of strain and strain rate are more sensitive and can see an alteration of the longitudinal myocardial contraction before a decrease in the shortening fraction can be appreciated. (11)

Late gadolinium uptake through CMR precedes morphological changes of wall thickness increase in a significant proportion of the patients, so it may be a very sensitive method of cardiac infiltration. (12) The pattern of transmural or diffuse subendocardial

Fig. 3. Cardiac magnetic resonance. **A.** Images of cine resonance at the end of the diastole at basal (A1), middle (A2) and apical (A3) level. **B.** Images of cine resonance at the end of systole at basal (B1), middle (B2) and apical (B3) level. It can be seen that the systolic function of left ventricle is preserved. **C.** Images of late enhancement with gadolinium. Subendocardial diffuse enhancement that becomes transmural at the level of inferior septum with prominent cancellation of the blood pool signal can be observed.

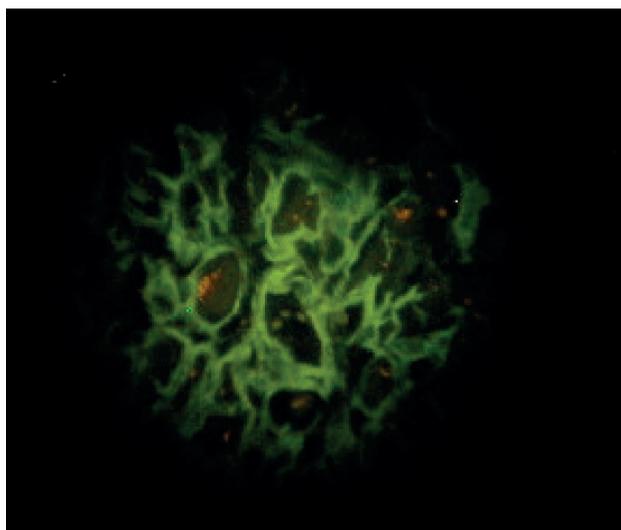
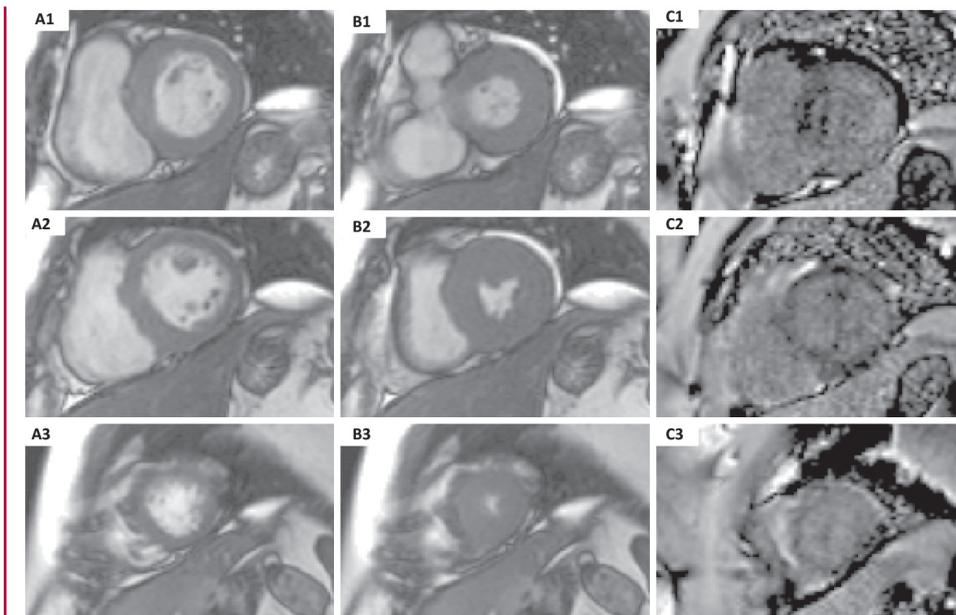


Fig. 4. Staining with thioflavin (400x). Perimyocytic amyloid deposits can be observed.

uptake has been associated with a greater deposit of amyloid in the interstitium. (12)

In this patient in particular, the differential diagnosis with obstructive hypertrophic cardiomyopathy or the coexistence of both diseases was considered. The endomyocardial biopsy determined the diagnosis of cardiac amyloidosis, although interventricular septum was not performed (most confident site for the diagnosis of hypertrophic cardiomyopathy).

In several communications of cases an atypical form of cardiac amyloidosis characterized by subaortic dynamic obstruction was described. (13-15) In these cases it is believed that the amyloid deposit is regional, different from the diffuse affection classically described. In this way, contractile function is normal and conditions for the generation of a subaortic

gradient are created. It is important to mention that these patients do not show microvoltage in the ECG.

This presentation alerts us about the possibility of mimetism among these cardiomyopathies and the need to perform an endomyocardial biopsy in selected cases, as it is established in the ACC/AHA guidelines. (3)

RESUMEN

Amiloidosis cardíaca con obstrucción dinámica subaórtica

La amiloidosis es una enfermedad infiltrativa sistémica que compromete el corazón y representa una causa importante de miocardiopatía restrictiva. En esta presentación se describe el caso de una paciente con insuficiencia cardíaca (IC) secundaria a miocardiopatía infiltrativa por depósito amiloide y obstrucción dinámica del tracto de salida del ventrículo izquierdo. El diagnóstico hematológico fue de mieloma múltiple por cadenas livianas y se demostró amiloidosis en dos tejidos extracardíacos. El ecocardiograma reveló aumento de los espesores parietales con obstrucción dinámica subaórtica significativa y la resonancia cardíaca mostró un patrón compatible con infiltración amiloide. La biopsia endomiocárdica confirmó la amiloidosis cardíaca. La publicación de este caso constituye la primera comunicación en nuestro país de esta forma de presentación atípica de amiloidosis cardíaca.

Palabras clave >

Amiloidosis - Cardiomiopatía hipertrófica - Insuficiencia cardíaca - Diagnóstico - Biopsia endomiocárdica

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