3 experienced 2 acute non–Q-wave myocardial infarctions at 2 and 7 months after starting PCSK9i and an ischemic stroke at 12 months. The same patient had been hospitalized 3 years earlier due to unstable angina, and coronary angiography revealed GVD affecting 1 vessel, which was revascularized. Additionally, from the time the patient started alirocumab 75 mg/14 d, he had been taking only ezetimibe 10 mg/d due to statin intolerance, with LDL-C levels > 100 mg/dL persisting until the third cardiovascular event. At that time, pitavastatin 1 mg/d was started; 4 months later, the patient reached the target of LDL-C < 100 mg/dL, experiencing good tolerance and no new adverse events.

In summary, this is the first series in Spain of HT recipients treated with a PCSK9i. To date, only 2 similar series have been published, one with 6 patients and a mean follow-up of 9 months[5] and another with 10 patients and a mean follow-up of 10 months.[6] Our series contributes further data with a longer follow-up (nearly 16 months).

These results indicate the potential safety and efficacy of PCSK9i for treating hypercholesterolemia in HT recipients, although larger studies with longer follow-up are needed to confirm this hypothesis and to evaluate the effects in terms of cardiovascular morbidity and mortality.

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Transthyretin Cardiac Amyloidosis Due to Homozygous Val122Ile Mutation in a Caucasian Man

Amiloidosis cardiaca por transtiretina causada por la mutación Val122Ile en homocigosis en varón de raza blanca

To the Editor:

A 57-year-old man with spinal arthropathy and treated bilateral carpal tunnel syndrome consulted for anorexia, weight loss, and occasional episodes of epigastric pain, nausea, and vomiting. Over the last year he had experienced dyspnea on exertion. The physical examination was unremarkable.

The electrocardiogram showed low voltages, and the echocardiogram depicted severe, asymmetrical left ventricular hypertrophy with septal predominance (19 mm); the left ventricular cavity size was normal, with preserved systolic function (left ventricular ejection fraction, 54%) and a pseudonormal diastolic filling pattern (Figure 1A-B).

On analytic study, performed to investigate a suspected deposit disease, blood count and biochemical findings were normal, with no proteinuria. The serum electrophoretic pattern was normal and free kappa and lambda chains tested negative. Gadolinium cardiac magnetic resonance imaging showed large areas of subendocardial enhancement in both ventricles and the left atrium, consistent with amyloidosis (Figure 1C). On scintigraphy with 99mTc-3,3-diphosphono-1,2-propanedicarboxylic acid, radiotracer deposit in the left ventricle was greater than bone intensity (Figure 1D). Amyloid was not detected in subcutaneous fat or rectal biopsies. The neurological evaluation and sensory-motor nerve conduction studies showed no abnormalities, except for bilateral median nerve involvement.

Five months later, the patient was admitted to the emergency room with acute pulmonary edema. On electrocardiography, the non-dilated left ventricle showed moderate dysfunction and (left ventricular ejection fraction, 38%) and diastolic function had a restrictive pattern. The N-terminal pro-brain natriuretic peptide fraction was 14,879 pg/mL.

Genetic study, carried out to determine whether the amyloidosis resulted from wild-type transthyretin deposit or a hereditary form of the disease, found a homozygous mutation, Val142Ile (classically, Val122Ile), in the transthyretin gene (Figure 2A). In the family evaluation (Figure 2B) there were no known black ancestors, and the deceased parents were cousins. The mother had no known cardiologic history, but the father had an unspecified cardiac condition since the age of 40 years and died suddenly at 65 years. On study of 7 of the 8 siblings, 2 homozygotes were found and all siblings were asymptomatic. Electrocardiography and echocardiography findings were normal in all, except for 1 sister who had the mutation in homozygosis and showed the following: normal electrocardiography findings, bilateral carpal tunnel syndrome,

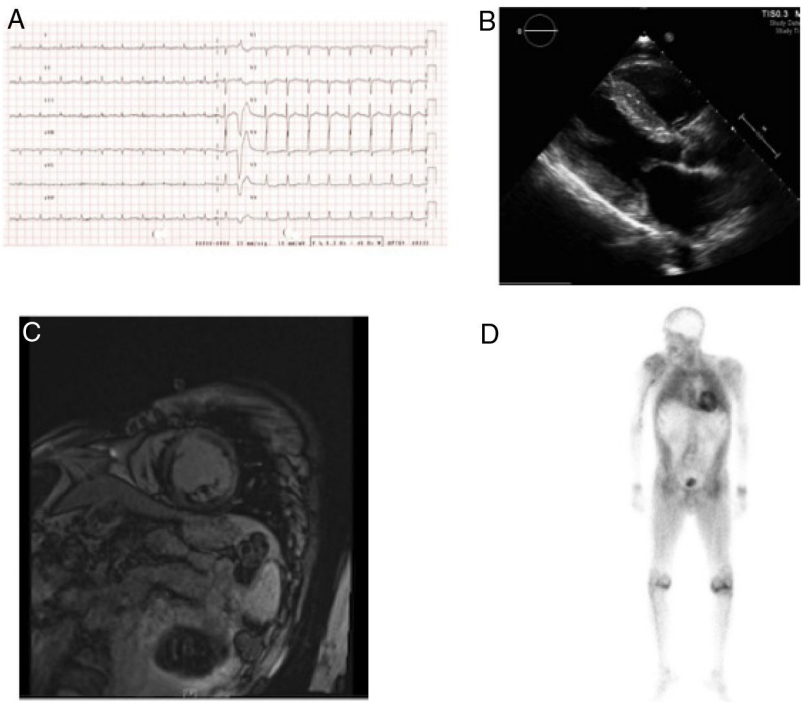

Figure 1. A, electrocardiogram showing low-voltage in the limbs. B, echocardiogram depicts left ventricular hypertrophy. C, cardiac magnetic resonance shows extensive subendocardial delayed enhancement. D, 99mTc-3,3-diphosphono-1,2-propanedicarboxylic acid scintigraphy depicts myocardial uptake greater than in bone.

moderate hypertrophy on echocardiography (septum, 14 mm), and left ventricular uptake similar to bone intensity on scintigraphy. Among the nieces and nephews, there were 8 asymptomatic carriers with no electrocardiographic or echocardiographic abnormalities.

A diagnosis of hereditary cardiac amyloidosis due to a mutation in the transthyretin gene was established, and the patient was referred to a reference center for liver and cardiac transplantation, which was carried out successfully.

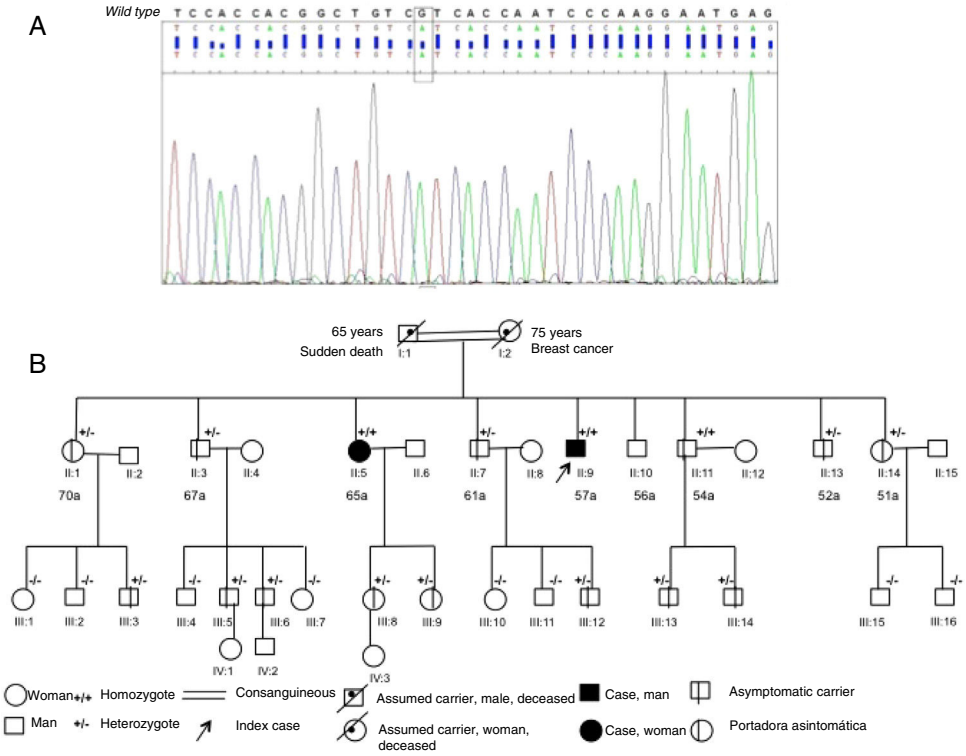

Figure 2. A, immunofluorometric spectrum of the homozygous peak in the Val142Ile position. B, family tree.

Transthyretin gene mutations, the most common cause of amyloidosis, lead to neuropathy and often, cardiac disease. Several causal mutations resulting in different phenotypes have been identified.[1]

The mutation found (Val122Ile) produces cardiac amyloidosis in persons older than 60 years with a phenotype similar to that of wild-type transthyretin amyloid, occasionally associated with carpel tunnel syndrome. Between 3% and 4% of black individuals in the United States are heterozygous carriers of this mutation,[2] which is rare in the white population. Although it is considered a rather indolent mutation with late-onset cardiomyopathy, several studies have associated it with greater morbidity and mortality than the wild-type form.[3] When the mutation is homozygous, the risk increases, and heart failure develops earlier and is more severe.[4]

Our patient showed a severe phenotype with rapid progression to heart failure, New York Heart Association functional class II/IV, left ventricular dysfunction, and considerable elevation of N-terminal pro-brain natriuretic peptide.

Genetic study was not only useful for the diagnosis of hereditary amyloidosis, it also helped to understand the rapid course of the condition, as the mutation was homozygous.

New treatments that act at several levels have been developed to detain or delay transthyretin amyloid deposit.[5] Some have proven to be effective in randomized clinical trials and have been approved by regulatory agencies. Several of these authorized drugs act by inhibiting hepatic expression of transthyretin with interfering ribonucleic acid (patisiran) or antisense oligonucleotides (inotersen). Other drugs act by stabilizing the transthyretin molecule and preventing its dissociation and deposition. This group includes tafamidis, which has been proven to reduce cardiovascular mortality and hospital admissions.[6] Other stabilizers are under development. Finally, it may be possible to eliminate amyloid deposits by antibodies directed toward transthyretin or by molecules such as doxycycline. Several trials are currently underway to evaluate these compounds.[5]

Genetic screening enabled identification of 15 carriers who require close monitoring and may benefit from the early start of these new treatments to slow the development of the disease and improve the prognosis.

An early diagnosis in our patient would have allowed initiation of effective drug treatment and avoided progression to the terminal phase requiring transplantation. Fortunately, the carriers identified, particularly the sister in an early phase of the disease, will benefit from the available treatments.

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Transcatheter Repair of Superior Sinus Venosus Atrial Septal Defect With Partial Anomalous Pulmonary Venous Drainage With the Chimney Double Stent Technique

Reparación percutánea de comunicación interauricular tipo seno venoso superior y drenaje venoso pulmonar anómalo parcial con técnica de doble stent *en chimenea*

To the Editor,

Superior sinus venosus atrial septal defect (SSV-ASD) is an uncommon abnormality of the interatrial septum that is usually accompanied by partial anomalous pulmonary venous drainage (PAPVD) of the right upper pulmonary veins into the superior vena cava (SVC). It is surgically repaired via patch closure of the defect and reconnection of the pulmonary veins to the left atrium (LA). Transcatheter closure has been recently achieved through placement of a coated stent in the SVC.[1] Here, we present the first reported case of transcatheter closure in Spain involving a modified double chimney stent technique.

This case concerns a 58-year-old patient with morbid obesity who exhibited progressive exertional dyspnea. Echocardiography showed right-cavity volume overload. Cardiac magnetic resonance imaging and computed tomography (CT) revealed SSV-ASD with PAPVD with a Qp:Qs of 2.1:1 and normal pulmonary pressure (Figure 1A–C), in addition to a persistent left SVC. Due to the comorbidity, we decided to perform transcatheter closure of the defect. A 3-dimensional cardiac model was printed from the CT images with ITK-SNAP software. The final geometry was exported as an STL file to the Meshmixer program (Autodesk Inc, United States) for modeling. A 0.8-mm outer layer was added and the model was processed by the Cura program (Ultimaker BV, the Netherlands) and sent to a 3-dimensional printer (BQ Witbox, Spain). The model was manufactured using fused deposition modeling technology with polyurethane filament.[2–4]

The procedure was simulated in vitro via implantation of 2 stents overlapping in the SVC and flaring of the proximal stent until the SSV-ASD in the roof of the right atrium (RA) was determined to be sealed. In addition, 2 introducers were inserted from the anomalous pulmonary veins through the ASD to the LA and fluoroscopy was used to verify that there was sufficient space