Table 2
Circadian and Seasonal Distribution of Stress Cardiomyopathy in Hispanic and non-Hispanic Patients

	Hispanic (n = 23)	Non-Hispanic (n=27)	*P*
Presentation			
Diurnal (7:00 AM-7:00 PM)	10 (43.5)	21 (77.8)	
Nocturnal (7:01 AM-6:59 PM)	13 (56.5)	6 (22.2)	.02
Season			
Autumn (October-December)	5 (21.8)	10 (37.0)	
Winter (January-March)	3 (13.0)	8 (29.7)	
Spring (April-June)	3 (13.0)	5 (18.5)	
Summer (July-September)	12 (52.2)	4 (14.8)	.007

The data are expressed as no. (%).

To differentiate between Hispanic and non-Hispanic patients, we applied the ethnicity classification used in the 2010 population census of the United States. According to this system, individuals from Cuba, Puerto Rico, South America, Central America, or any other culture of Spanish origin are considered Hispanic, regardless of their race.

The event was considered to be diurnal if it occurred between 7:00 AM and 7:00 PM, and nocturnal if it occurred between 7:01 PM and 6:59 AM. The year was divided into 4 seasons based on the standards of the northern hemisphere, and events were assigned according to the month in which they occurred. The months of July to September were considered summer; October to December, autumn; January to March, winter; and April to June, spring. A P value of $<.05$ was considered significant.

There were no significant differences between the groups in symptoms at presentation, electrocardiographic abnormalities, troponin I concentrations, initial and follow-up ejection fraction, triggering events, or in-hospital mortality (Table 1).

As to the time of day and frequency in the distinct seasons, some differences were found between Hispanic and non-Hispanic patients (Table 2). Stress cardiomyopathy occurred more frequently in the summer months in Hispanic than in non-Hispanic patients. Hispanics may respond differently to high temperatures; nonetheless, other studies are needed to prove or exclude this theory.

We also found a higher incidence of stress cardiomyopathy during the night hours in Hispanic patients, which contrasts with the known incidence of acute myocardial infarction during the morning hours.[5] The clear difference with respect to the circadian peaks of myocardial infarction could hypothetically emphasize the physiopathological differences between the 2 conditions.

The prognosis is generally favorable. In-hospital mortality ranges from 1%-8%.[6] In the Hispanic group, we found a complete improvement of the ejection fraction, but slightly higher in-hospital mortality. The 2 deaths that occurred in Hispanic patients were secondary to non-cardiac causes (sepsis), which indicates that stress cardiomyopathy, in itself, is related to deteriorated health status rather than being a cause of death.

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Barth Syndrome in Adulthood: A Clinical Case

Síndrome de Barth en la edad adulta: un caso clínico

To the Editor,

Idiopathic dilated cardiomyopathy (DCM) has a genetic cause in up to 20% of cases.[1] Familial clinical screening reveals that 20%-48% of probands have affected relatives, consistent with a diagnosis of familial DCM.[1,2]

Barth syndrome is an X-linked recessive disorder caused by *tafazzin (TAZ)* gene mutations.[3] It is characterized by DCM, neutropenia and 3-methylglutaconic aciduria[4] and the life expectancy is limited during early infancy.

We report on the clinical course of a 30-year-old male with Barth syndrome and the results of genetic study of the *TAZ* gene in his relatives. To evaluate the implication of *TAZ* gene in the etiology of DCM and left ventricular non-compaction we studied the *TAZ* gene in 48 DCM and left ventricular non-compaction patients.

Our patient was first evaluated for respiratory infection in the pediatric department when he was 10 months old. Cardiomegaly, systolic dysfunction, and myopathy were diagnosed at that time. Patient developmental milestones were normal. Infancy was complicated with frequent infections. At 20 years of age, his main

complaints were fatigue and muscular claudication. His weight was 71 kg and his height 180 cm.

Cardiologically, he had never experienced syncope and presented with occasional episodes of chest pain and palpitations. A recent electrocardiogram (ECG) was essentially unremarkable (Fig. 1A), showing in sinus rhythm a slightly short PR interval (0.12 ms), and mildly high voltage QRS, in particular deep S waves in V1-V2 with ST elevation with an early repolarization pattern. QRS and QT intervals were normal. Repeated 24-h and 7 day ambulatory Holters had failed to find any arrhythmia apart from sinus tachycardia. His exercise capacity was measured on the treadmill, where he was able to exercise for only 4 min. The heart rate during the test went from 78 bpm to 188 bpm (96% of predicted), with a peak VO_2 achieved of 13.3 mL/kg/min. The test was stopped because of dyspnea. There were no ST-T changes and no arrhythmias during the cardiopulmonary test. A low dose of beta blockers was then added to chronic therapy with losartan with good tolerance and symptoms benefit.

A recent echocardiogram demonstrated mild left ventricular systolic impairment (ejection fraction was 50%) with normal end-diastolic dimension (50 mm). Magnetic resonance confirmed echocardiographic findings and showed hypertrabeculated mid and apical segments of the left ventricle meeting criteria for non-compaction. There was a line of gadolinium enhancement at the inferior-posterior wall (mid myocardium) (Fig. 1B).

Family history was remarkable for 2 male cousins who died because of heart failure (at 1 month and 2 months old) and 2 male uncles who also died in early infancy due to suspected infectious disease (Fig. 2). Hematologic and metabolic studies revealed that the patient had neutropenia, lactic acidemia, and 3-methylglutaconic aciduria; the diagnosis of Barth syndrome was suspected.

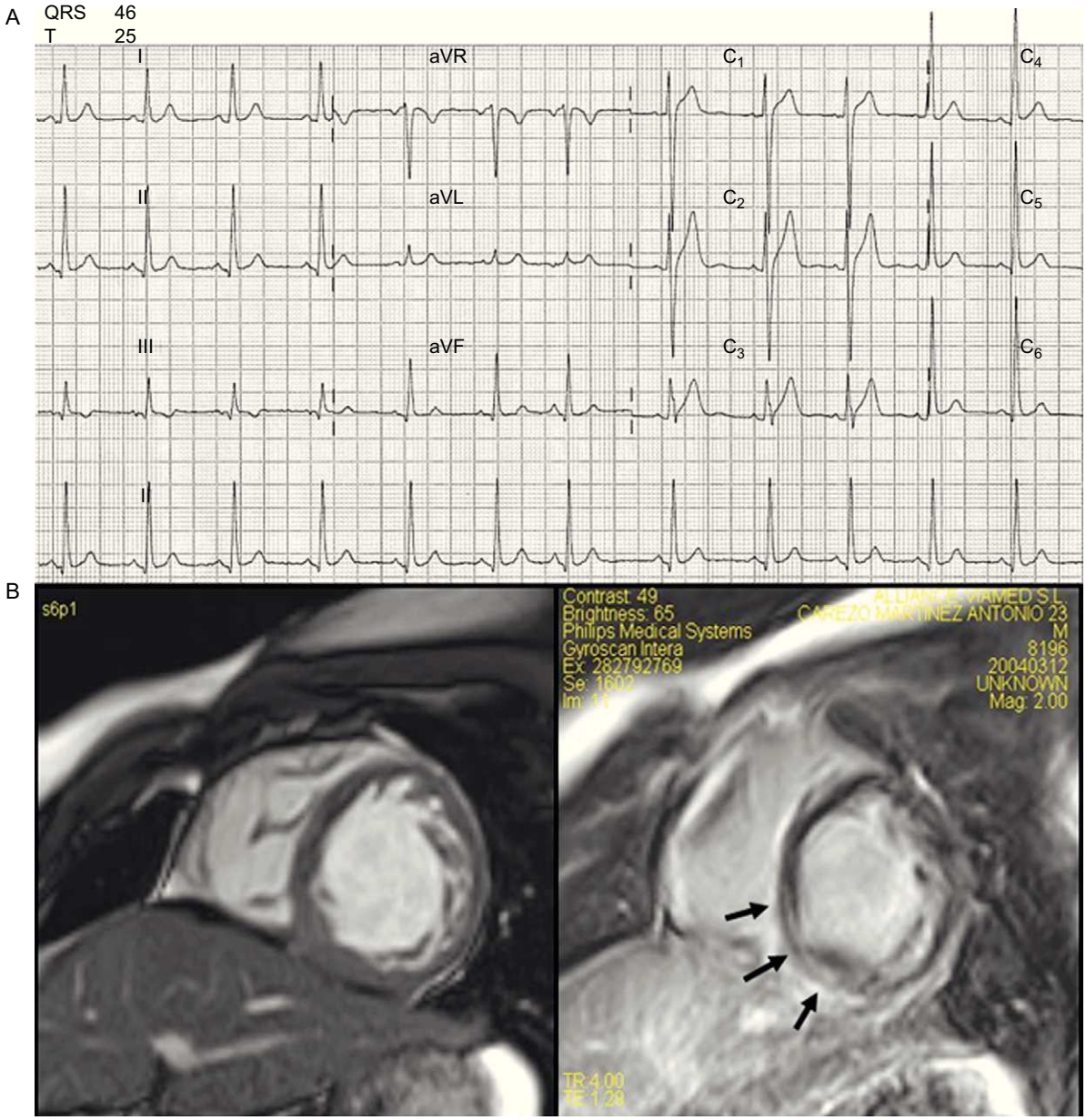

Figure 1. A: ECG from individual III.1. B: Left ventricle short axis cardiovascular magnetic resonance images from individual III.1.

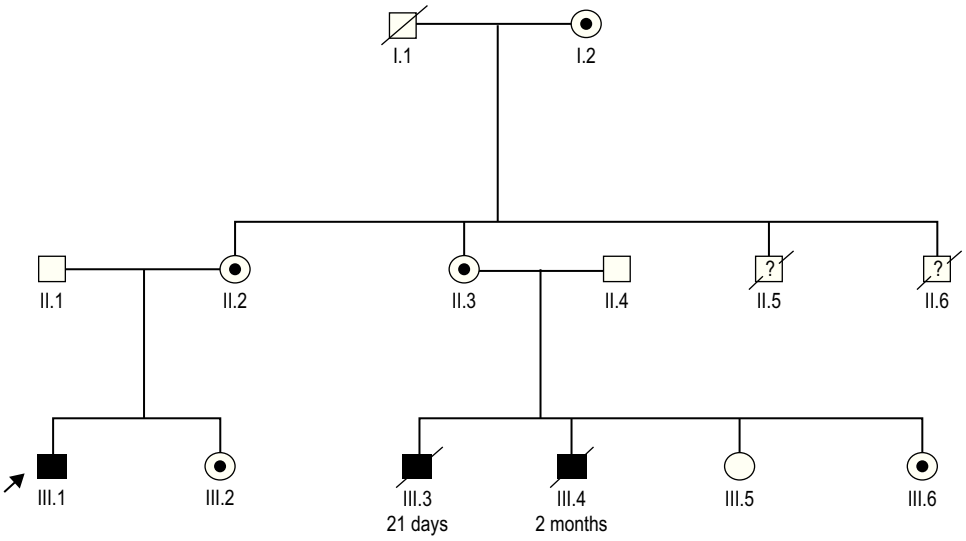

Figure 2. Family pedigree. Circle with a dot in the center indicates the unaffected female carriers. Blackened boxes denote affected males; diagonally striped boxes denote dead males.

A mutation c.280C>T (R94C)[6] in the *TAZ* gene was identified in our patient (III.1) (Fig. 2). This change was also present in the 2-month-old male cousin who died of heart failure (III.6). Samples from the other suspected affected male relatives were not available. Our patient's mother (II.2), aunt (II.3), sister (III.2), and grandmother (I.2) were all carriers of the mutation. All female carriers were evaluated and had normal cardiac examinations. The clinical spectrum in carriers of this mutation is broad; the genotype-phenotype relationship is incompletely understood with 4 infant males dying in this family from either heart failure or infectious disease. Some additional genetic or environmental factors may have played a role in the unusual course of the disease in our index patient.

Of 48 consecutive pediatric (n=17; age, range 2 days-14 years; 12 males) and adult (n=31; age, range 15-72 years; 24 males) patients with idiopathic DCM and/or left ventricular non-compaction were also evaluated. Mean left ventricular ejection fraction was 41.6%±19.7%. Twenty-two had left ventricular non-compaction (11 isolated left ventricular non-compaction). Seven were in NYHA class IV, 8 in class III, and 11 in NYHA II. There were 3 heart transplants in this group. The genetic study in these patients has failed to demonstrate mutations in the *TAZ* gene.

There is only one other similar adult Barth syndrome case (35 years old), reported by Kelley et al. (1991).[5] Repeated holters have failed to demonstrate any arrhythmia or conduction disease in our patient. Genetic diagnosis is essential for genetic counseling in this X-linked genetic disorder. Early and accurate diagnosis can help medical treatment and improve prognosis.

Despite poor prognosis of Barth syndrome during infancy, patients can survive until adulthood. We have not found *TAZ* gene mutations in our cohort of pediatric and adult patients with isolated DCM or left ventricular non-compaction, and therefore Barth's syndrome should be suspected in family histories with men who died early by DCM and in adult males with characteristic clinic data, as our case indicates that survival is possible.

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