Clinical follow-up (median: 4; maximum: 8.3 years) showed that at 1-, 3- and 5-year survival was 99%, 99% and 95%, freedom from reoperation was 98%, 97%, and 95% and, finally, freedom from mitral replacement was 99%, 98%, and 98%, respectively. Echocardiographic follow-up (median: 3 years; maximum: 8.3 years) showed a freedom from recurrent MR (moderate-or-more) after 1, 3 and 5 years of 96%, 90%, and 89%, respectively. During follow-up, 10 patients underwent reoperation (range: 1 month to 7 years), in all cases for recurrent severe MR (due to disease progression in 60%). In 6 of these patients (60%), the mitral valve was re-repaired successfully. There were no reoperations for mitral stenosis or endocarditis and there were no differences in follow-up duration between groups.

Our data show that surgical repair of MR due to leaflet prolapse can be safely accomplished in most patients in a referral center. In contrast to most published series, which analyze patients undergoing repair excluding patients selected for other treatments, our cohort was defined by the valve dysfunction regardless of the procedure planned or performed.

Regarding the approach, thoracoscopic MIMVS was performed in 64% of patients, with increasing frequency over time. MIMVS provided excellent results, with decreased length of hospital stay (7 vs 8 days; $P < .01$), intensive care unit stay (1 vs 1 day; $P < .01$) and mechanical ventilation (median 0 vs 6 h; $P < .001$), although the procedure required longer cardiopulmonary bypass (+30 min; $P < .01$) and aortic cross-clamp duration (+19 min; $P < .01$). Blood loss was reduced after MIMVS, as shown by the higher hemoglobin level after surgery (11 vs 10 mg/dL; $P < .01$). MIMVS had no negative impact on repair quality, despite being offered to all types of patients regardless of repair complexity. Mid-term outcomes were similar with both approaches and freedom from valve replacement at 5 years was higher after MIMVS (100% vs 95%; $P < .01$). The main limitation of this study comparing the 2 approaches is the risk of selection bias due to its retrospective nature. To account for this, we performed a propensity score matching (79 matched-pairs), which confirmed that all these differences, with the exception of total hospital stay, remained significant (data not shown).

Since we are currently recommending early surgery to younger, asymptomatic patients, there is growing demand to achieve excellent long-lasting results, with the lowest possible risk and surgical aggression. As shown in this study, equivalent or even superior results can be obtained with MIMVS in expert centers.[5] This highlights the importance of publishing institutional results of surgical repair, making this key information available to cardiologists and patients to help them make the best decisions about options and timing of intervention.[6]

Mitral repair of severe MR due to leaflet prolapse can be accomplished with very good results (97.8% repair rate and 0.87% mortality). MIMVS can be offered to most patients without compromising outcomes and providing a faster recovery. Results up to 8 years after the procedure suggest excellent durability, regardless of the approach. Extended follow-up is required to establish long-term results.

María Ascaso,[a] Elena Sandoval,[a] Eduard Quintana,[a] Bàrbara Vidal,[b,c] Manuel Castellà,[a] and Daniel Pereda[a,c,*]

[a]*Servicio de Cirugía Cardiovascular, Instituto Clínico Cardiovascular, Hospital Clínic de Barcelona, Barcelona, Spain*
[b]*Servicio de Cardiología, Instituto Clínico Cardiovascular, Hospital Clínic de Barcelona, Barcelona, Spain*
[c]*Centro de Investigación Biomédica en Red de Enfermedades Cardiovasculares (CIBERCV), Spain*

* Corresponding author:
E-mail address: dpereda@clinic.cat (D. Pereda).

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Prognostic value of right ventricular function in light-chain cardiac amyloidosis treated with bortezomib

Valor pronóstico de la función del ventrículo derecho en pacientes con amiloidosis cardiaca por cadenas ligeras tratados con bortezomib

To the Editor,

Amyloid light-chain (AL) amyloidosis is the most common form of cardiac amyloidosis; it is caused by hematological disorders. Cardiac involvement is observed in over 70% of patients at diagnosis and is a marker of poor prognosis.[1] Current treatment options are chemotherapy with bortezomib, hematopoietic stem cell transplant, and heart transplant.[2]

Two-dimensional strain echocardiography is the diagnostic[3] and prognostic technique of choice,[4] and right ventricle (RV) parameters in particular provide important information.[5,6]

We investigated the prognostic value of echocardiographic parameters in patients with AL cardiac amyloidosis treated with bortezomib following the detection of cardiac involvement. Prognostic markers would enable the prompt institution of alternative treatments in patients expected to respond poorly to bortezomib and also avoid the use of futile treatment.

AL cardiac amyloidosis was diagnosed by endomyocardial biopsy using standard stains, including immunohistochemical staining with specific kappa and lambda light-chain antibodies. None of the patients underwent spectrophotometry. The primary outcome was death or heart transplant.

We prospectively included 47 patients with AL cardiac amyloidosis, all bortezomib-naïve at the time of echocardiography. Eight patients were excluded because they died before receiving the first cycle of bortezomib. Fifteen patients (38.5%) experienced a

Table 1
Patient characteristics, univariate analysis of primary events (death or heart transplant) in patients with amyloid light-chain cardiac amyloidosis, and multivariate analysis

Baseline characteristics and univariate analysis[a]	All patients (N = 39)	Univariate analysis, HR (95%CI)	P[a]
Age, y	62 ± 9	1.0 (0.9-1.02)	.2
Male, %	58.9	2.2 (0.8-6.4)	.5
NYHA ≥ III, %	66.6	3.4 (0.8-15.2)	.08
NT-proBNP ≥ 8.500, %	92.3	3.8 (1.2-11.9)	.03
Troponin, mg/dL	0.3 ± 0.3	1.3 (0.3-6.8)	.9
LVEF, %	48.7 ± 11.9	0.9 (0.8-1.0)	.01
Septal thickness, mm	17.6 ± 3.9	0.9 (0.8-1.1)	.7
Increased filling pressures, %	82.1	3.4 (0.4-25.7)	.1
Moderate to severe pericardial effusion, %	48.7	4.5 (1.4-14.9)	.01
TAPSE, mm	15.5 ± 4.0	0.9 (0.8-1.0)	.51
S' (cm/s)	10.0 ± 2.7	0.8 (0.6-1.0)	.25
FAC, %	33.3 ± 8.8	0.9 (0.9-1.0)	.15
PSP	43.4 ± 11.8	1.0 (0.9-1.1)	.41
LVLGS, %	−12.4 ± 2.7	1.4 (1.1-1.8)	.01
LV apical ratio	1.1 ± 0.2	4.3 (0.6-28.0)	.18
RVFWLS, %	−13.9 ± 3.4	1.7 (1.3-2.1)	< .001
Apical ratio	1.1 ± 0.2	8.2 (0.7-93.1)	.04
Multivariate analysis[b]			
RVFWLS, %		1.5 (1.3-1.8)	< .001

95%CI, 95% confidence interval; FAC; fractional area change; HR, hazard ratio; LV, left ventricular; LVEF, left ventricular ejection fraction; LVLGS, left ventricular longitudinal global strain; NT-proBNP, N-terminal pro-brain natriuretic peptid; NYHA, New York Heart Association; PSP, pulmonary systolic pressure; RV, right ventricular; RVLS, right ventricular longitudinal strain; TAPSE, tricuspid annular plane systolic excursion.
Values are expressed as HR (95%CI) unless otherwise indicated.
[a] *P* values: survivors versus nonsurvivors.
[b] Foward stepwise inclusion of NT-proBNP, moderate to severe pericardial effusion, LVEF, LVLGS, and RVFWLS. RVFWLS accounted for the predictive power of the model.

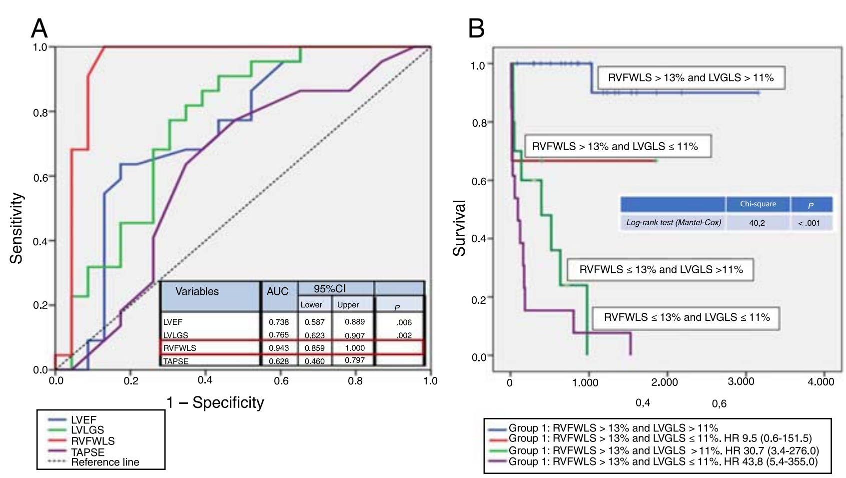

Figure 1. A, ROC curves showing AUC for LVEF, TAPSE, LVLGS, and RVFWLS. B, Kaplan-Meier survival curves for the combination of LVLGS and RVFWLS using the ROC curve cutoff points. AUC, area under the curve; LVEF, left ventricular ejection fraction; LVLGS, left ventricular longitudinal global strain; ROC, receiver operating characteristic; RVFWLS, right ventricular free-wall longitudinal strain; TAPSE, tricuspid annular plane systolic excursion.

primary event (11 [73.3%] died and 4 [26.7%] underwent a heart transplant) during a median follow-up of 697 (interquartile range, 183-1233) days. There were no losses to follow-up. The patients' characteristics are summarized in table 1.

All the RV systolic function parameters were reduced. Tricuspid annular plane systolic excursion (TAPSE) showed slightly decreased values, but the differences were not significant. RV longitudinal strain (LS) was reduced in all patients and 59.5% had RV free-wall LS (RVFWLS) of less than 13%. The results of the univariate analysis are shown in table 1.

As shown by the receiver operator characteristic (ROC) curves in figure 1A, the parameters with the best sensitivity and specificity for predicting the primary outcomes were left ventricular global longitudinal strain (LVGLS), left ventricular ejection fraction (LVEF), and, in particular, RVFWLS, which had an area under the curve of 0.94 (95% confidence interval, 0.86-1.00).

The patients were divided into 4 groups according to the ROC cutoff values for RVFWLS and LVGLS:

- Group 1: RVFWLS > 13% and LVGLS > 11%
- Group 2: RVFWLS > 13% and LVGLS ≤ 11%
- Group 3: RVFWLS ≤ 13% and LVGLS > 11%
- Group 4: RVFWLS ≤ 13% and LVGLS ≤ 11%

The survival curves for each of the groups are shown in figure 1B. Patients in group 1 (RVFWLS > 13% and LVGLS > 11%) had a 5-year survival rate of more than 90%. By contrast, all the patients in groups 3 and 4 (the 2 groups with RVFWLS ≤ 13%) died within 5 years of being diagnosed with AL cardiac amyloidosis.

Hazard ratios (HRs) were calculated to estimate the effect of strain alterations on each of the ventricles (RVFWLS and LVGLS) for group 1 (figure 1B).

Based on the results of the univariate analysis, RVFWLS appears to be the 2-dimensional strain parameter that provides the greatest prognostic information in patients with AL cardiac amyloidosis, although concomitant LVGLS alteration provided a more accurate stratification of the groups with the best prognosis.

Statistically significant and clinically relevant variables with the highest HRs were entered into a Cox regression model using forward stepwise selection. As shown in table 1, the only covariate positively associated with the occurrence of a primary event in the model featuring N-terminal pro-brain natriuretic peptide, moderate to severe pericardial effusion, RVFWLS, LVEF, and LVGLS was RVFWLS, with an HR of 1.51 (95% confidence interval, 1.29-1.76).

In conclusion, RVFWLS is the best prognostic marker for patients with AL cardiac amyloidosis who are candidates for bortezomib chemotherapy. Concomitant LVGLS alteration increases the risk of an unfavorable outcome. Patients with RVFWLS of less than 13% and LVGLS of less than 11% do not respond well to bortezomib and may benefit from an early heart transplant if they show good hematologic response.

Alejandro Durante-López,[a] Vanessa Moñivas Palomero,[b] Mario Torres Sanabria,[a] Jorge Vázquez López-Ibor,[c] Javier Segovia Cubero,[c] and Susana Mingo Santos[b,*]

[a]*Sección de Cuidados Agudos Cardiovasculares, Hospital Universitario 12 de Octubre, Madrid, Spain*
[b]*Sección de Imagen Cardiaca, Hospital Universitario Puerta de Hierro-Majadahonda, Majadahonda, Madrid, Spain*
[c]*Sección de Insuficiencia Cardiaca Avanzada y Trasplante Cardiaco, Hospital Universitario Puerta de Hierro-Majadahonda, Majadahonda, Madrid, Spain*

* Corresponding author:
E-mail address: susana.mingo.sm@gmail.com (S. Mingo Santos).

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Outpatient ablation for atrial fibrillation

Ablación ambulatoria de fibrilación auricular

To the Editor,

Catheter ablation is very effective for symptom control in atrial fibrillation (AF).[1] Because of the high volume of procedures performed, strategies are required to optimize allocated resources. In this letter we present the results of the first day-case program for AF catheter ablation in Spain.

We prospectively analyzed all elective AF catheter ablation procedures performed over 2 consecutive years, using a conventional strategy (n = 100), from April 1, 2018 to March 31, 2019, and using an early-discharge strategy (n = 123), from April 1, 2019 to March 31, 2020.

The patient flowchart for each strategy is shown in figure 1. Patients who were receiving oral anticoagulant treatment (n = 182, of whom 11 were taking acenocoumarol) omitted it on the morning of the procedure. Independently of the treatment discharge strategy, the catheter ablation itself was carried out using the same method, following current recommendations. Conscious sedation with dexmedetomidine was given as a continuous infusion[2] and a figure-of-eight suture was used for hemostasis.[3] In the conventional strategy, patients were admitted to hospital following the procedure. In the early-discharge strategy, they were discharged before 8 pm on the same day, provided there were no complications; if complications occurred, per protocol, they were admitted. Patients who had early discharge were contacted at 48 hours and 10 days after the procedure.

The primary efficacy objective was to determine the proportion of patients in the early-discharge strategy who were discharged on the same day having spent less than 12 hours in hospital. The primary safety objective was to determine the need for emergency department care in the 10 days after discharge (ED-10), presumably related to the procedure. The secondary objective was to perform an economic analysis comparing the 2 strategies. The estimated saving was calculated as the mean difference in cost per procedure in day-hospital care, days of hospital stay, and ED-10. The prices used were taken from the public prices for health care services from 3 public health boards in Spain.

Continuous variables with normal distribution are described as mean ± standard deviation, and categorical variables as absolute number and percentage. Comparison of categorical variables was performed with the chi-square test. Comparison of 2 continuous variables with normal distribution was performed with Student *t* test. Logarithmic ranges were used to compare the ED-10 cumulative incidence. A *P* value < .05 was considered statistically significant.

Table 1 shows the patient characteristics, immediate outcomes, and procedural complications, which were similar for the 2 strategies. In the early-discharge strategy, in 111 (90%) of 123 procedures, the patient was discharged within 12 hours