ple was placed on the tricuspid annulus and Tei index was defined as the ratio of isovolumic time divided by ejection time. Three groups were obtained. A "normal RV function" group (RVFS > 35% and Sa > 10 cm/s), an RV dysfunction group with one abnormal criterion (RVFS < 35% or Sa < 10 cm/s) and the last group defined by 2 abnormal criteria (RVFS < 35% and Sa < 10 cm/s).

Results. — According to the normal reference values of RVFS and Sa we found 218 patients with normal RV and 49 failing RV (18% of the population): 10 patients (4%) had "RV dysfunction" based on Sa < 10 cm/s, 29 patients (11%) had only RVFS < 35% while 17 patients (6%) fulfilled both criteria. Mean Tei index was 0.447 ± 0.01 in the normal RV function group, 0.558 ± 0.05 in the RV dysfunction group defined by 1 criterion, and 0.679 ± 0.07 in the RV dysfunction group defined by 2 criteria (all P < 0.05).

Conclusions. — Applying recent guidelines (RVFS < 35% or Sa < 10 cm/s) in a systematic way appears as the most accurate way of diagnosing RV dysfunction. Furthermore, our data using the RV Tei index suggest that the presence of two pathological criteria is associated with more severe RV dysfunction than when only one pathological criterion is present.

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Phenotype of patients with pulmonary hypertension as a complication of dilated cardiomyopathy

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Background. — Because pulmonary hypertension (PH) seriously worsens prognosis of patients with EF < 35%, new drugs are currently being tested to improve hemodynamic and outcomes. The purpose of this work is to establish the prevalence and determinants of PH in an echo core lab.

Methods. — Between 01/01/2009 and 31/12/2009, all patients scanned in our echo core lab were divided into 2 groups on the basis of EF and then dichotomized based on the tricuspid regurgitation velocity (TRV > 3 m/s, i.e. high prevalence of PH). In the subset group of patients with EF < 35%, we randomly selected 97 patients for left ventricular systolic and diastolic function measurement, mitral regurgitation quantification, left atrial volume calculation as well as TRV and right ventricular function assessment.

Results. — From 5658 echocardiography studies, 731 patients (13%) had EF < 35%. Among these 731 patients, TRV was undetectable in 34%, < 3 m/s in 38% and > 3 m/s in 28% of patients. Of the 97 patients carefully investigated, left atrial area (p < 0.0001), E velocity (p < 0.0001), A velocity (p = 0.0004), E/A ratio (p < 0.0001), S longitudinal velocity at mitral valve level (p = 0.007), E/E' ratio (p = 0.0001), mitral regurgitation severity (p < 0.0001) and left ventricular pre-ejection time (p = 0.0002) were univariately but not independently correlated to TRV. Left ventricular dimensions and EF were not correlated to TRV. From multiple regression analysis, the 2 residual determinants of TRV were left atrial area (p = 0.02) and mitral regurgitation severity (p = 0.02).

Conclusion. — Pulmonary hypertension is prevalent in patients with EF < 35%. Both mitral regurgitation severity and left atrial dilatation were the strongest determinants of pulmonary hypertension. They should be considered in the future for specific therapeutic approach.

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2D speckle tracking analysis of right atrium in patients with pulmonary hypertension


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Purpose. — Right atrial (RA) strain (e, %) analysis by two-dimensional speckle tracking (2DST) may represent a new tool to evaluate RA function. The aim of our study was to analyze RA e in a population of patients with idiopathic or associated pulmonary arterial hypertension (PAH) and to correlate its value with other echocardiographic parameters of RA and right ventricular function.

Methods. — Twenty-five subjects (age = 49.4 years; gr1 = 12 healthy, gr2 = 13 with PAH) underwent a complete echocardiography with estimation of systolic pulmonary artery pressure by maximal tricuspid regurgitation (TR max) velocity, measurements of RA surface, TAPSE, RV myocardial performance index (RV MPI) and maximal S velocity in the basal RV free wall (S max) with pulsed DTI. We used 2DST to measure Ra e from cine loops centered on the RA free wall. The cycle reference point was set at the beginning of the P wave, which enabled the measurement of peak negative e (neg e), representative of RA contractile function, and peak positive e (pos e), corresponding to RA conduit function. As the software automatically divided the walls in 3 different segments, we used the mean of those 3 values for analysis. RA total strain was calculated as the sum of absolute values of pos e + neg e and is considered as representative of RA reservoir function. All measurements were averaged on at least 3 consecutive cycles. Spearman’s correlations coefficients between RA e values and other echocardiographic parameters were calculated. Results: There was no significant difference for neg e (gr1 = −23.75 ± 11.24 vs gr2 = −20.22 ± 5.93, P = 0.331) between both groups, but pos e and tot e were significantly different (pos e: gr1 = 31.99 ± 17.22 vs gr2 = 17.45 ± 11.19, P = 0.019; tot e: gr1 = 55.74 ± 11.09; vs gr2 = 37.67 ± 14.13; P = 0.002), as were also TR max, TAPSE, RV MPI, S max and RA surface. There were no correlation between neg e and any other echocardiographic parameter. Both pos e and tot e were significantly correlated with TR max (respectively r = 0.585, P < 0.004; r = 0.725, P < 0.001), TAPSE (respectively r = −0.530, P = 0.006; r = −0.660, P < 0.001), S max (respectively r = −0.535, P < 0.006; r = −0.663, P = 0.001) and RA surface (respectively r = 0.352, P = 0.08; r = 0.504, P < 0.01).

Conclusions. — The 2DST derived strain is a new tool for RA function assessment. RA conduit and reservoir functions are impaired in patients with PAH but contractile function remains preserved. This is probably an adaptative phenomenon of RA to increased RV preload and decreased RV function induced by PAH as suggested by the correlation of RA strain with TR max, RA area and other echocardiographic parameters of RV function.

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