

Females had a significant higher proportion of prevented SD compared to males (44.5% vs 27.8%,  $p=0.004$ ). Unexpectedly, prevented SD cases were significantly older than non-prevented ones (mean age 48.7 vs 40.4 years,  $p<0.001$ ).

**Conclusion:** In 2 out of 3 cases of SD/CA this is the mode of presentation. Young age, male gender and hypertrophic cardiomyopathy are associated with a lower chance of prevented SD. There is no clear improvement in the proportion of prevented SD cases over time.

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##### Clinical course and significance of hypertrophic cardiomyopathy without left ventricular hypertrophy

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**Background:** Although common among families with hypertrophic cardiomyopathy (HCM), the clinical course and outcome of relatives with sarcomere mutations judged to be disease causing, but without left ventricular hypertrophy (LVH), is largely unresolved.

**Objective:** To determine the clinical features and natural history of genotype positive (+) –LVH negative (–) HCM.

**Methods:** Prospective analysis of G+LVH- individuals followed at 4 international referral centers for HCM. Participants were  $\geq 12$  years old at first evaluation and carried a pathogenic/likely pathogenic sarcomere variant considered to cause HCM in their family.

**Results:** Two-hundred and three individuals were identified from 158 HCM families. Age at first evaluation was  $32\pm 11$  years and 147 (72%) were  $< 40$  years; 61% were female. Initially, each patient showed normal LV thickness and cavity dimensions with preserved systolic function. Maximal LV wall thickness was  $9\pm 2$ mm.

Over follow-up of  $6\pm 2$  years, no adverse cardiovascular events such as death, heart failure, or cardiac symptoms occurred among the 203 patients; 182 (90%) remained without LVH, including 37 (20%)  $\geq 50$  years of age (including 5%  $\geq 60$  years, range to 69). Twenty-one patients (10%) converted to clinically evident HCM with LVH (maximum wall thickness  $\geq 13$ mm range to 17mm) at  $35\pm 15$  years of age (range 7 to 62 years). Of the 21 patients who developed LVH, 8 (38%) were  $> 40$  years old; rate of conversion was 0.3%/year, and similar across all age groups ( $p=0.76$ ). 12-lead ECGs were abnormal in 10 patients (48%) at the time LV thickness was normal. Multivariate analysis showed pathologic Q waves to be an independent predictor for development of LVH (HR 2.1, 95% CI: 1.3–5.1,  $p=0.01$ ).

**Conclusions:** G+LVH- patients demonstrated exceedingly low risk for mortality, morbidity, and HCM-related complications. Phenotypic conversion to HCM was uncommon, often preceded (4-years) by abnormal ECG patterns, with a large proportion of patients remaining free of LVH at relatively advanced ages, implying that many gene carriers may not develop HCM during their lifetime.

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##### Prognostic value of progressive decrease in left ventricular wall thickness for the evaluation of sudden cardiac death risk in patients with hypertrophic cardiomyopathy

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**Aims:** The Sudden Cardiac Death (SCD) risk prediction model in Hypertrophic Cardiomyopathy (HCM) proposed by the 2014 ESC guidelines (HCM Risk-SCD) represents an improvement compared with previous approaches. However, controversy persists on this topic among opinion leaders, especially in relation to the magnitude of wall thickness of the left ventricle (LV) and risk of SCD. In this sense, some patients with HCM present cardiac remodeling and progressive decrease in LV wall thickness (DLVWT) during follow-up. The objective of this study was to evaluate the value of the DLVWT to identify HCM patients at risk of SCD.

**Methods:** This retrospective observational study included 946 consecutive HCM patients followed between March 1993 and December 2017. After exclusions (surgical myectomy, alcohol septal ablation,  $< 16$  years of age, metabolic diseases & syndromes; patients with an implantable cardioverter defibrillator (ICD) for secondary prevention of SCD, initial LVEF  $< 50\%$ , and patients with  $< 5$  year of follow-up, or who were lost to follow-up) 456 patients remained.

We defined DLVWT as the reduction between maximum LV wall thickness measured at initial echocardiography and the measurement at follow-up control.

The primary endpoint was the combined event of SCD and appropriate ICD shock (considered as an equivalent to SCD).

**Results:** 128 (28%) patients had DLVWT. During a mean follow-up period of 5.17 years, 22 patients (4.8%) died suddenly or had an appropriate ICD shock. Patients with DLVWT had a statistically significant increase in the primary endpoint (OR 10.6 95% CI: 3.3–45,  $p<0.05$ ) driven by an increase in ICD appropriate shocks (OR 36.6, 95% CI: 5.4– $> 50$ ,  $p<0.05$ ). There was a non significant increase in the rate of SCD in this group (OR 3.48, 95% CI: 0.58–24,  $p=0.1$ ). Af-

ter a subgroup analysis according to HCM Risk-SCD we found that DLVWT was associated with a higher rate of the combined event in both the high and intermediate risk groups (OR 14, 95% CI: 1.72– $> 50$ ,  $p<0.05$ ; and OR 11, 95% CI: 1.7– $> 50$ ,  $p<0.05$  respectively) but not in the low risk group.

**Conclusions:** Progressive DLVWT in HCM patients is associated with an increased number of events (mainly appropriate ICD shock) during follow-up. A tendency for increase in SCD can be explored but not confirmed, probably due to limitations in our sample size and number of events. Subgroup analysis reveals that DLVWT is a useful aid not only in the high risk group but also in the intermediate risk population which could be further explored. DLVWT is a simple follow-up tool that can be used to assess the risk of patients, added to the already established risk stratification models.

## DO CARDIAC PATIENTS NEED PSYCHOSOCIAL THERAPY?

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##### Music therapy in patients with hypertension and early post-infarction angina; 15-year experience of the MUSIC study

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The purpose of this study was to evaluate the effectiveness of music therapy for reduction of anxiety and pain in patients with hypertension (HT) and early post-infarction angina (EPA). Most studies have shown that EPA implies an unfavorable long-term prognosis among patients with acute myocardial infarction (AMI). Unrelieved anxiety can produce an increase in sympathetic nervous system activity leading to an increase in cardiac workload.

**Material and methods:** From February 2002, the effectiveness of music in reducing anxiety and pain during EPA attacks was tested using a two-group pretest-posttest experimental design with 310 patients with HT and EPA. Patients were randomly assigned to receive 30 min of sedative music (N=155) or treatment as usual (N=155). Anxiety, pain sensation, and pain distress were measured with visual analogue scales at start of chest pain episodes and 30 min later.

**Results:** Repeated measures MANOVA indicated significant group differences in anxiety, pain sensation, and pain distress from pretest to posttest ( $p=0.0116$ ). Post hoc dependent t-tests and univariate repeated measures ANOVA ( $p=0.0148$ ) indicated that in the sedative music, anxiety, pain sensation, and pain distress all decreased significantly ( $p=0.0108$ ), while in the treatment as usual group, no significant differences occurred. Independent t-tests indicated significantly less posttest anxiety, pain sensation, and pain distress in the sedative music group than in treatment as usual groups ( $p=0.0242$ ).

**Conclusion:** Sedative music was more effective than treatment as usual in decreasing anxiety and pain in patients with HT and EPA. Patients with HT should have beneficial of using sedative music as an adjuvant to medication during EPA episodes.

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##### The effects of preventive counseling on psychological status of patients with paroxysmal atrial fibrillation after catheter ablation

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**Background:** At present there are limited data about psychological status of patients (pts) with paroxysmal atrial fibrillation (AF) after catheter ablation (CA).

**Purpose:** To assess the impact of preventive counseling on psychological status of pts after CA performed for paroxysmal AF.

**Methods:** This is a prospective randomized controlled study with 2 parallel groups of pts with paroxysmal AF after CA (radiofrequency or cryoablation). Pts were randomized into 2 groups in 1:1 ratio. During hospitalization for CA pts from both groups received single-session preventive counseling with focus on their individual cardiovascular risk factors profile. After discharge pts from Intervention group received remote preventive counseling via text messaging (e-mail or sms) every two weeks for the first 3 months after enrollment (a total of 6 sessions). Control group received usual care. All pts underwent stress, anxiety and depression assessment using Visual analog scale (VAS) for stress, Hospital Anxiety and Depression Scale (HADS) for anxiety and depression and State-Trait Anxiety Inventory (STAI) for anxiety at baseline and 12 months after CA.

**Results:** A total of 62 pts aged 37 to 72 years were enrolled (mean age  $57.8\pm 9.65$  years, 55% men). The groups were well balanced according to demographic and clinical features. At 1 year of follow-up there was a significant reduction of both average stress level and the proportion of pts with high level of stress ( $\geq 5$  VAS

points) in the intervention group vs. control ( $p < 0.05$ ). Pts from the intervention group displayed a significant decrease in anxiety as measured by both questionnaires vs. control (all  $p < 0.05$ ) but the depression scores remained unchanged.

#### The effects of preventive counseling

	Intervention group		Control group		Differences between groups at 12 months
	Baseline	After 12 months	Baseline	After 12 months	
Stress, VAS points, mean $\pm$ SD*	5.1 $\pm$ 1.9	3.4 $\pm$ 1.8	6.3 $\pm$ 1.5	5.1 $\pm$ 1.7	$p < 0.05$
High level of stress, %	60.1	23.3	70.2	60.2	$p < 0.05$
Anxiety ( $\geq 8$ points HADS-A), %	33.3	3.3	45.1	35.3	$p < 0.05$
Depression ( $\geq 8$ points HADS-D), %	6.7	6.6	23.3	20.2	n/s
State anxiety, mean $\pm$ SD	27.9 $\pm$ 8.4	19.2 $\pm$ 4.6	28.9 $\pm$ 14.5	23.6 $\pm$ 6.1	$p < 0.05$
Trait anxiety, mean $\pm$ SD	45.5 $\pm$ 7.9	40.7 $\pm$ 7.8	45.4 $\pm$ 11.3	42.8 $\pm$ 8.4	n/s

SD: standard deviation.

**Conclusions:** Preventive counseling followed by remote 3 months support via text messaging reduced the level of stress as measured by VAS and anxiety as measured by HADS and STAI questionnaires.

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### Effects of two different preventive counselling programs on selected psychosocial risk factors and quality of life in coronary patients with abdominal obesity

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**Background:** Patients (pts) education has a potential to improve psychological status and quality of life (QoL) in coronary heart disease (CHD).

**Purpose:** To assess the impact of 2 preventive counselling programs on psychosocial risk factors (RFs) and QoL in CHD pts with abdominal obesity after hospitalization.

**Methods:** A prospective randomized parallel-group study in hospitalized nonsurgical pts with confirmed stable CHD. Most hospitalizations were due to elective percutaneous coronary intervention. Pts were randomized (1:1:1) into 3 groups. Before discharge, Groups 1 and 2 received comprehensive counselling with focus on diet followed by remote counselling by phone (Group 1) or via text messages (Group 2). Remote counselling was delivered weekly (Months 1–3) and then monthly (Months 4–6). Group 3 received standard advice only. The Hospital anxiety and depression scale (HADS), a 10-point visual analogue scale (VAS) for stress and HeartQoL for QoL were used.

**Results:** A total of 75 pts (mean age $\pm$ SD, 57.79 $\pm$ 6.26 years, men, 82.6%) were enrolled. The Table presents the psychosocial RFs and QoL at baseline and at 12 months. At 1 year, significant improvements of stress level and QoL vs control were seen in both intervention groups. There was also a significant reduction of anxiety in Group 1 (phone). In Group 2 (e-mail or sms) the proportion of anxious pts didn't increase vs control ( $p < 0.05$ ).

Table 1

	Group 1 (n=25)	Group 2 (n=25)	Group 3 (control) (n=25)	P for change from baseline	
				Group 1 vs 3	Group 2 vs 3
Pts with anxiety symptoms (HADS-A $\geq 8$ ), %					
Baseline	52	32	36		
At 12 months	17	32	42	<0.05	<0.05
Pts with depressive symptoms (HADS-D $\geq 8$ ), %					
Baseline	28	16	32		
At 12 months	17	24	25	n/s	n/s
Stress level, VAS points, mean $\pm$ SD					
Baseline	7.12 $\pm$ 1.88	6.16 $\pm$ 2.10	6.44 $\pm$ 2.16		
At 12 months	3.58 $\pm$ 1.89	4.46 $\pm$ 2.28	4.83 $\pm$ 2.62	<0.05	<0.05
HeartQoL global score, mean $\pm$ SD					
Baseline	1.61 $\pm$ 0.58	1.97 $\pm$ 0.47	2.01 $\pm$ 0.47		
At 12 months	2.61 $\pm$ 0.64	2.46 $\pm$ 0.65	2.08 $\pm$ 0.93	<0.01	<0.01

**Conclusion:** Pre-discharge preventive counselling with subsequent remote support resulted in significant positive changes of selected psychosocial RFs and QoL which were more pronounced in the phone support group.

## ECHOCARDIOGRAPHIC ASSESSMENT OF THE RIGHT HEART

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### A novel echo-doppler approach for quantitative estimation of pulmonary artery wedge pressure and pulmonary vascular resistances

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**Background:** Non-invasive echocardiographic assessment of pulmonary hemo-

dynamics is pivotal in patients with heart failure and pulmonary hypertension (PH), but usually based on qualitative measurements.

**Objectives:** To evaluate diagnostic accuracy of a quantitative approach for echocardiographic estimation of pulmonary arterial wedge pressure (PAWP) and pulmonary vascular resistance (PVR) in patients with different hemodynamic profiles.

**Methods:** We analyzed 688 consecutive patients (371 males; 68.5 $\pm$ 11.6 years old) referred to right heart catheterization (RHC) from the department of cardiology and pneumology. All patients underwent echocardiography within 24 hours before RHC. Multiple linear regression analysis of echocardiographic parameters was then performed to predict RHC-derived PAWP and PVR in the first 200 patients (derivation group). The model was then tested in the following 488 patients (validation group).

**Results:** PH was established in 404 patients (58.7%): 134 (33.2%) had pre-capillary PH, 216 (53.5%) had post-capillary PH, and 54 (13.3%) had combined PH. Linear regression analysis estimating PAWP and PVR in derivation group (n=200) included tricuspid regurgitation maximal velocity, mitral E/e' ratio, left ventricle ejection fraction, right ventricle fractional area change, inferior vena cava diameter and left atrial volume index ( $R^2=0.7$ ;  $p < 0.001$ ), independently of mitral regurgitation grade and biochemical variable (NT-proBNP, hs-cTnT). Model prediction of elevated PAWP ( $>15$  mmHg) in the validation group (n=488) showed a higher diagnostic accuracy (AUC=0.95, 93% sensitivity and 88% specificity) as compared to 2016 ASE/EACVI recommendations (65% sensitivity and 80% specificity,  $p < 0.001$ ). Likewise, a highly accurate estimation of elevated PVR ( $>3$  Wood Units) was obtained by the model (AUC=0.95, 86% sensitivity, 94% specificity). Bland-Altman analysis demonstrated satisfactory limits of agreement for PAWP and PVR estimation between RHC and echocardiography.

**Conclusions:** Echo-derived PAWP and PVR quantitative estimation is feasible and reliable in different hemodynamic profiles. This novel algorithm significantly improves the diagnostic accuracy of echocardiography in the estimation of cardiopulmonary hemodynamics, making it a promising tool to tailor decision making and follow-up in different clinical settings.

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### Right atrial strain as a predictor of high pulmonary systolic pressure

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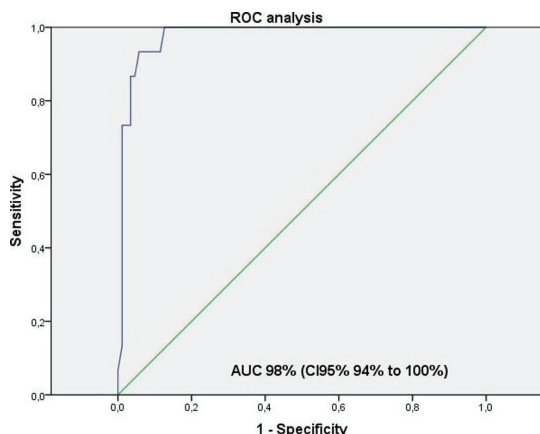
**Purpose:** The aim of this study was to evaluate the ability of right atrial (RA) strain to predict high pulmonary systolic pressure (PSP).

**Methods:** 102 patients with sinus rhythm and adequate TR to estimate PSP were prospectively enrolled. TAPSE, tricuspid annular systolic velocity (VAT), right ventricular (RV) diameter and color tissue Doppler were recorded. RA volume from the apical four-chamber view was calculated. Mean maximum lateral RA strain was obtained during the reservoir period by speckle tracking. RA strain was compared between patients with estimated PSP  $\leq 37$  mmHg vs. patients with PSP  $>37$  mmHg using t test. Pearson's correlation test was used, calculating its confidential interval with bootstrap resampling technique. Quadratic R2 coefficient was obtained. A multivariate analysis was performed including most relevant variables. ROC curve was constructed to obtain the optimal cut off value, specificity and sensibility; results were expressed as area under the curve (AUC), with CI95%. A  $p < 0.01$  value was considered statistically significant.

#### Multivariate analysis

	Odds Ratio	CI 95%	P-Value
RV diameter	1.48	1.02–2.15	0.04
Ee'	1.04	0.76–1.42	0.77
RA Strain	1.16	1.05–1.28	<0.01
TAPSE	0.90	0.67–1.21	0.5
RV tissue velocity	1.21	0.87–1.69	0.24
RA Vol Index	0.95	0.85–1.05	0.36

RV: right ventricle. RA: right atrium. TAPSE: tricuspid annular plane systolic excursion.



ROC analysis of RA strain.