IMAGING NELLO SCOMPENSO CARDIACO: COSA C'E' DI NUOVO ?

L'ECO-DOPPLER CONVENZIONALE: E' GIA' STATO DETTO TUTTO ?

Gian Luigi Nicolosi

Pordenone

Diagnosis of heart failure

The diagnosis of HF-REF requires three conditions to be satisfied:
1. Symptoms typical of HF
2. Signs typical of HF[a]
3. Reduced LVEF
The diagnosis of HF-PEF requires four conditions to be satisfied:
1. Symptoms typical of HF
2. Signs typical of HF[a]
3. Normal or only mildly reduced LVEF and LV not dilated
4. Relevant structural heart disease (LV hypertrophy/LA enlargement) and/or diastolic dysfunction (see Section 4.1.2)

HF = heart failure; HF-PEF = heart failure with 'preserved' ejection fraction; HF-REF = heart failure and a reduced ejection fraction; LA = left atrial; LV = left ventricular; LVEF = left ventricular ejection fraction.

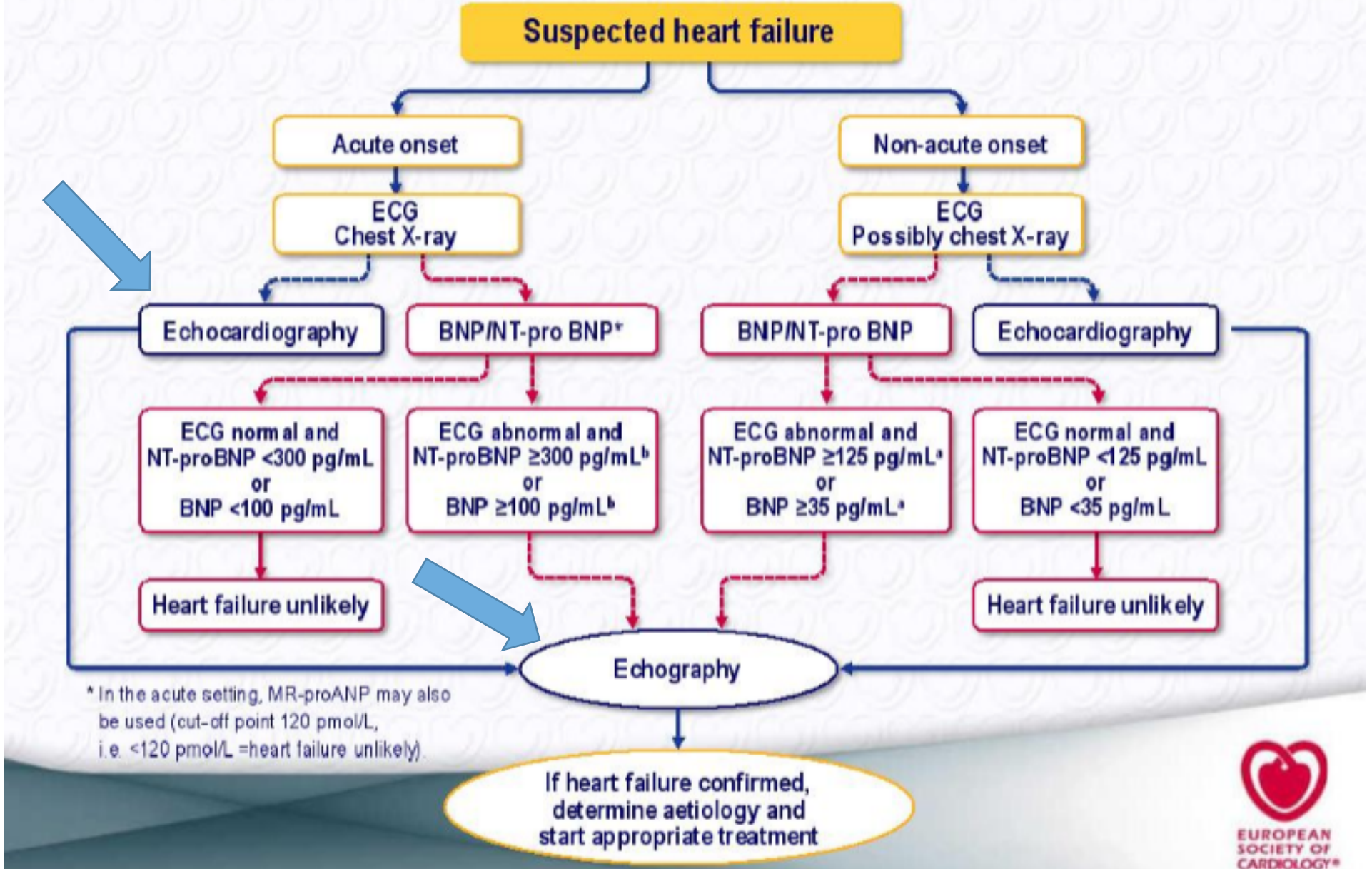
[a]Signs may not be present in the early stages of HF (especially in HF-PEF) and in patients treated with diuretics (see Section 3.6).

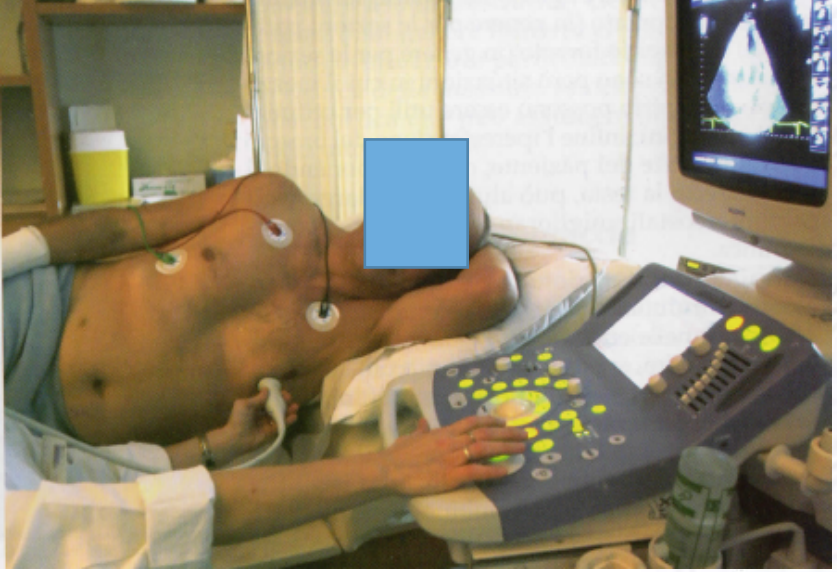
www.escardio.org/guidelines

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

EUROPEAN SOCIETY OF CARDIOLOGY®

Diagnostic flowchart for patients with suspected heart failure-showing alternative 'echocardiography first' (blue) or 'natriuretic peptide first' (red) approaches.





POSIZIONE DELL'OPERATORE

DESTRA ?

SINISTRA ?

Echocardiography

Recommendations	Class	Level
Investigations to consider in all patients		
Transthoracic echocardiography is recommended to evaluate cardiac structure and function, including diastolic function (Section 4.1.2), and to measure LVEF to make the diagnosis of HF, assist in planning and monitoring of treatment, and to obtain prognostic information.	I	C

www.escardio.org/guidelines

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

EUROPEAN SOCIETY OF CARDIOLOGY®

Focused Cardiac Ultrasound Using a Pocket-Size Device in the Emergency Room

Frederico José Neves Mancuso[1,2], Vicente Nicoliello Siqueira[1], Valdir Ambrósio Moisés[1], Aécio Flavio Teixeira Gois[2], Angelo Amato Vincenzo de Paola[1], Antonio Carlos Camargo Carvalho[1], Orlando Campos[1]

Disciplina de Cardiologia - Escola Paulista de Medicina - Universidade Federal de São Paulo (Unifesp)[1]; Disciplina de Medicina de Urgência - Escola Paulista de Medicina - Universidade Federal de São Paulo (Unifesp)[2], São Paulo, SP – Brazil.

STANDARDIZZAZIONE – FORMAZIONE – CERTIFICAZIONE ?

Abstract

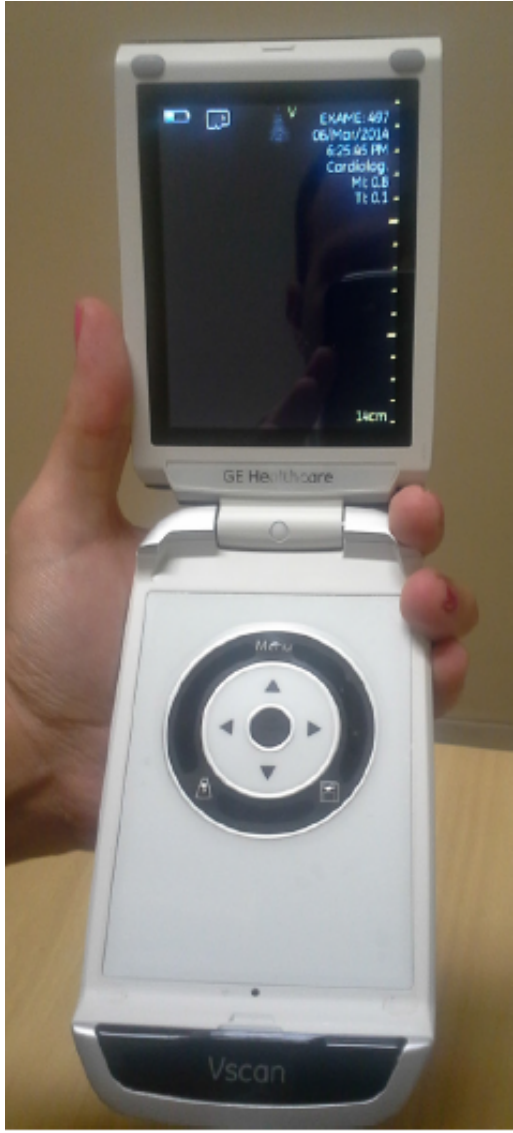
Background: Cardiovascular urgencies are frequent reasons for seeking medical care. Prompt and accurate medical diagnosis is critical to reduce the morbidity and mortality of these conditions.

Objective: To evaluate the use of a pocket-size echocardiography in addition to clinical history and physical exam in a tertiary medical emergency care.

Methods: One hundred adult patients without known cardiac or lung diseases who sought emergency care with cardiac complaints were included. Patients with ischemic changes in the electrocardiography or fever were excluded. A focused echocardiography with GE Vscan equipment was performed after the initial evaluation in the emergency room. Cardiac chambers dimensions, left and right ventricular systolic function, intracardiac flows with color, pericardium, and aorta were evaluated.

Results: The mean age was 61 ± 17 years old. The patient complaint was chest pain in 51 patients, dyspnea in 32 patients, arrhythmia to evaluate the left ventricular function in ten patients, hypotension/dizziness in five patients and edema in one patient. In 28 patients, the focused echocardiography allowed to confirm the initial diagnosis: 19 patients with heart failure, five with acute coronary syndrome, two with pulmonary embolism and two patients with cardiac tamponade. In 17 patients, the echocardiography changed the diagnosis: ten with suspicious of heart failure, two with pulmonary embolism suspicious, two with hypotension without cause, one suspicious of acute coronary syndrome, one of cardiac tamponade and one of aortic dissection.

Conclusion: The focused echocardiography with pocket-size equipment in the emergency care may allow a prompt diagnosis and, consequently, an earlier initiation of the therapy. (Arq Bras Cardiol. 2014; 103(6):530-537)



Vscan device (GE Healthcare)

Lung ultrasound and transthoracic impedance for noninvasive evaluation of pulmonary congestion in heart failure

Camilla Facchini[a], Gabriella Malfatto[a], Alessia Giglio[a], Mario Facchini[a], Gianfranco Parati[a,b] and Giovanna Branzi[a]

J Cardiovasc Med 2015, 16:000–000

Methods **We obtained 75 measures from 50 patients (72 ± 10 years, NYHA 2.4 ± 0.7, ejection fraction 31 ± 7%), 25 of them studied before and after intravenous diuretics, in**

Conclusion **The correlation between all indexes and their consensual change after improvement of the clinical status suggests that they all detect pulmonary congestion, and that using at least two indexes improves sensitivity and specificity. The choice among the methods may be determined by the patient characteristics or by the clinical setting.**

Table 3 Effects of diuretic treatment on study variables ($n = 25$ patients)

	Before	After	P (t test)
SAP (mmHg)	113 ± 16	105 ± 16	0.21
DAP (mmHg)	67 ± 11	64 ± 10	0.19
HR (b/min)	69 ± 12	66 ± 10	0.16
EF (%)	30 ± 6	31 ± 8	0.25
PAPs (mmHg)	52 ± 13	46 ± 15	<0.05
E/e'	16.1 ± 6.8	14.7 ± 7.1	0.19
Moderate to severe mitral regurgitation	17 (68%)	14 (56%)	0.17
Left ventricular end diastolic volume [LVEDV (ml)]	192 ± 29	188 ± 31	0.21
B-lines, total	53.4 ± 17.2	31.7 ± 13.5	<0.01
B-lines, right emithorax	35.5 ± 10.6	21.2 ± 8.5	<0.01
BNP (pg/ml)	1343 ± 575	902 ± 422	<0.01
TFC (1/kΩ)	51.8 ± 12.5	46.4 ± 15.3	<0.01

Functional or Structural Cardiac abnormalities related to HF-PEF

- Abnormalities of the mitral inflow pattern, tissue velocities (e'), or the E/e' ratio (Indicate degree of LV filling dysfunction and estimate filling pressures).

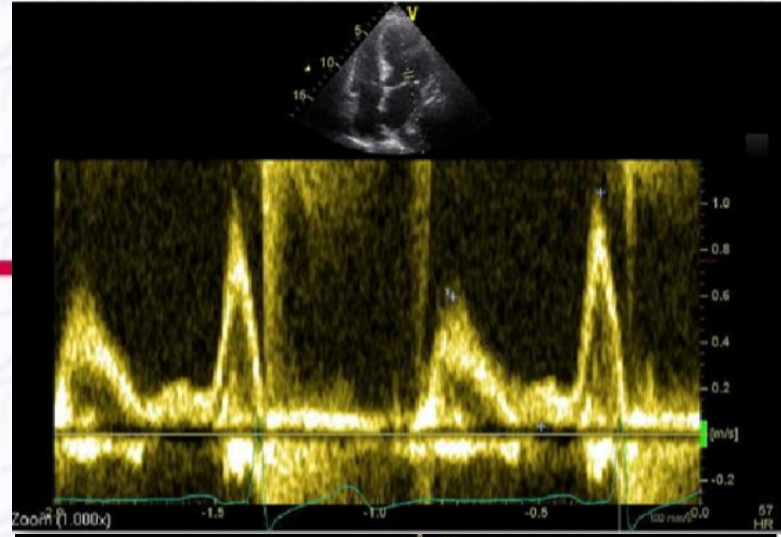
Variabilita' ?

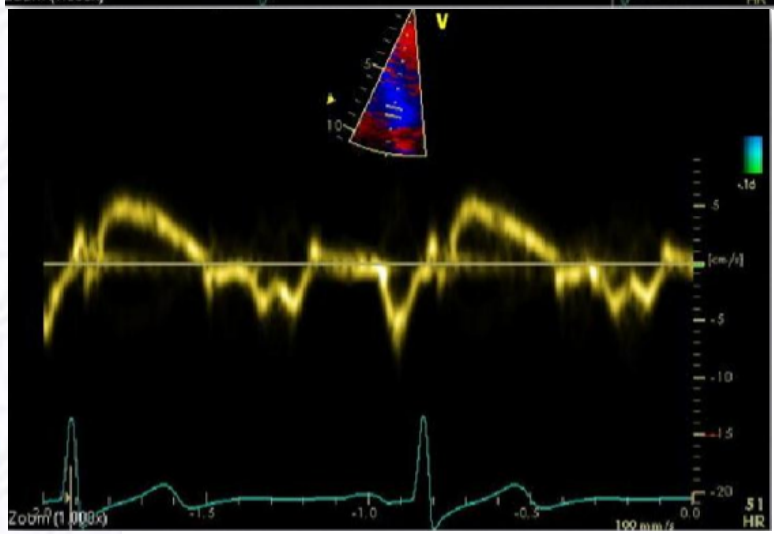
- Left atrial volume index: increased (volume >34 mL/m^2) Increased LV filling pressure (past or present) or mitral valve disease.

Riproducibilita' ? Errore cubico !

- LV mass index: increased: >95 g/m^2 in women and >115 g/m^2 in men.

Riproducibilita' ? Errore cubico !





www.escardio.org/guidelines

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

EUROPEAN SOCIETY OF CARDIOLOGY®

Tissue Doppler Imaging in Echocardiography: Value and Limitations

VARIABILITA'

Krishna K. Kadappu, MBBS, MD [a,b,c], Liza Thomas, MBBS, PhD [a]

Heart, Lung and Circulation (2014) xx, 1–10
1443-9506/04/$36.00
http://dx.doi.org/10.1016/j.hlc.2014.10.003

Table 1 Normal reference range of TDI values in healthy adults (mean ± SD).

	s'(cm/s)	e' (cm/s)	a' (cm/s)	E/e'	e'/a'
Septal velocity	8.1 ± 1.5	8.6 ± 1.9	9.5 ± 2.4	8.7 ± 2.2	1 ± 0.7
Lateral velocity	10.2 ± 2.4	12.2 ± 3	11.3 ± 2.9	6.3 ± 1.9	1.5 ± 0.6
Average septal + lateral	9.2 ± 1.7	10.4 ± 2.2	10.4 ± 2.7	7.5 ± 1.9	1.3 ± 0.7

Adapted from Chahal N.S, Lim T.K et al. Eur J Echocardiogr 2010, Garcia, M. J, Rodriguez L et al AHJ 1996, Pai R.G and Gill K.S JASE 1998.

Table 2 Normal age related values for Doppler-derived diastolic measurements.

	16-20(yrs.)	21-40 (yrs.)	41-60 (yrs.)	>61(yrs.)
Septal é (cm/s)	14.9 ± 2.4	15.5 ± 2.7	12.2 ± 2.3	10.4 ± 2.1
Septal é/á ratio	2.4	1.6 ± 0.5	1.1 ± 0.3	0.85 ± 0.2
Lateral é (cm/s)	20.6 ± 3.8	19.8 ± 2.9	16.1 ± 2.3	12.9 ± 3.5
Lateral é/á ratio	3.1	1.9 ± 0.6	1.5 ± 0.5	0.9 ± 0.4

Modified from Nagueh, S. F., C. P. Appleton, et al. 2009. Eur J Echocardiogr 10(2): 165-193.

Integrating the knowledge: strength and limitations of echo techniques to diagnose and stage heart failure with preserved ejection fraction

J Cardiovasc Med 2014, 15:85–91

Paolo Marino

Table 1 Normal values for reported indexes and their clinical implications when out of range, with sensitivity and specificity, where available

	Modality	Normal values	Clinical meaning	Sensitivity	Specificity
$T\alpha\upsilon$	invasive	<33 ms[5]	Slowed relaxation	NA	NA
Peak – d*P*/d*t*	invasive	>1864 mmHg/s[5]	Slowed relaxation	NA	NA
Transmitral flow profile	PW echo	E/A <1; E wave≤50 cm/s[3]	Possible diastolic dysfunction	0.67[55]	0.84[55]
E/*e*'	PW + TD echo	<9[15]	Possible increased filling pressure	0.83[55]	0.92[55]
Left atrial volume	2D echo	≤34 ml/sqm[3]	Possible increased ventricular stiffness	0.47[56]	0.84[56]
Left-ventricular mass	2D echo	≤122 g/sqm (♀); ≤149 g/sqm (♂)[2]	Possible increased ventricular stiffness	0.28[56]	0.99[56]
Ar–A interval	PW echo	>30 ms[24]	Increased ventricular stiffness	0.45[56]	0.90[56]
E–*e*' interval	PW + TD echo	<25 ms[27]	Slowed relaxation	NA	NA
Pulmonary systolic pressure	Invasive or CW echo	≤35 mmHg[2]	Possible increased left atrial pressure	0.83[57]	0.72[57]
E_a/E_{es}	invasive/noninvasive	<1.0[34]	Impaired ventricular/vascular coupling	NA	NA
(*E*/*e*')/left-ventricular filling volume	PW + TD + 2D echo	<0.10[39]	Impaired diastolic elastance	NA	NA
SR_{ivr}	ST	>0.25 s^{-1}[47]	Slowed relaxation	NA	NA
E/SR_E	PW + ST	<0.83[48]	Increased filling pressure	0.91[58]	0.78[58]

2D, two-dimensional; CW, continuous wave; PW, pulsed wave; ST, speckle tracking; TD, tissue Doppler.

2013 ACCF/AHA Guideline for the Management of Heart Failure

A Report of the American College of Cardiology Foundation/
American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the American College of Chest Physicians, Heart Rhythm Society and International Society for Heart and Lung Transplantation

Endorsed by the American Association of Cardiovascular and Pulmonary Rehabilitation

JACC Vol. 62, No. 16, 2013
October 15, 2013:e147–239

4.3. Asymptomatic LV Dysfunction

The prevalence of asymptomatic LV systolic or diastolic dysfunction ranges from 6% to 21% and increases with age (62–64). In the Left Ventricular Dysfunction Prevention study, participants with untreated asymptomatic LV dysfunction had a 10% risk for developing HF symptoms and an 8% risk of death or HF hospitalization annually (65). In a community-based population, asymptomatic mild LV diastolic dysfunction was seen in 21% and moderate or severe diastolic dysfunction in 7%, and both were associated with an increased risk of symptomatic HF and mortality (64).

Table 3. Definitions of HF*r*EF and HF*p*EF

Classification	EF (%)	Description
I. Heart failure with reduced ejection fraction (HF*r*EF)	≤40	Also referred to as systolic HF. Randomized controlled trials have mainly enrolled patients with HF*r*EF, and it is only in these patients that efficacious therapies have been demonstrated to date.
II. Heart failure with preserved ejection fraction (HF*p*EF)	≥50	Also referred to as diastolic HF. Several different criteria have been used to further define HF*p*EF. The diagnosis of HF*p*EF is challenging because it is largely one of excluding other potential noncardiac causes of symptoms suggestive of HF. To date, efficacious therapies have not been identified.
a. HF*p*EF, borderline	41 to 49	These patients fall into a borderline or intermediate group. Their characteristics, treatment patterns, and outcomes appear similar to those of patients with HF*p*EF.
b. HF*p*EF, improved	>40	It has been recognized that a subset of patients with HF*p*EF previously had HF*r*EF. These patients with improvement or recovery in EF may be clinically distinct from those with persistently preserved or reduced EF. Further research is needed to better characterize these patients.

EF indicates ejection fraction; HF, heart failure; HF*p*EF, heart failure with preserved ejection fraction; and HF*r*EF, heart failure with reduced ejection fraction.

Subclinical cardiac dysfunction increases the risk of stroke and dementia

The Rotterdam Study

Renée F.A.G. de Bruijn, MD, MSc*
Marileen L.P. Portegies, MD, MSc*
Maarten J.G. Leening, MD, MSc
Michiel J. Bos, MD, PhD
Albert Hofman, MD, PhD
Aad van der Lugt, MD, PhD
Wiro J. Niessen, PhD
Meike W. Vernooij, MD, PhD
Oscar H. Franco, MD, PhD
Peter J. Koudstaal, MD, PhD
M. Arfan Ikram, MD, PhD

ABSTRACT

Objective: To investigate the association between cardiac function and the risk of stroke and dementia in elderly free of clinical cardiac disease. Additionally, we investigated the relation between cardiac function and MRI markers of subclinical cerebrovascular disease.

Methods: This study was conducted within the population-based Rotterdam Study. A total of 3,291 participants (60.8% female, age-range 58–98 years) free of coronary heart disease, heart failure, atrial fibrillation, stroke, and dementia underwent echocardiography in 2002–2005 to measure cardiac function. Follow-up finished in 2012. In 2005–2006, a random subset of 577 stroke-free people without dementia underwent brain MRI on which infarcts and white matter lesion volume were assessed.

Results: During 21,785 person-years of follow-up, 164 people had a stroke and during 19,462 person-years of follow-up, 208 people developed dementia. Measures of better diastolic function, such as higher E/A ratio, were associated with a lower risk of stroke (hazard ratio [HR] 0.82; 95% confidence interval [CI] 0.69; 0.98) and dementia (HR 0.82; 95% CI 0.70; 0.96). Better systolic function, measured as higher fractional shortening, was only associated with a lower risk of stroke (HR 0.84; 95% CI 0.72; 0.98). Better diastolic function was related to a lower prevalence of silent infarcts on MRI, especially lacunar infarcts.

Conclusions: In elderly free of clinical cardiac disease, worse diastolic function is associated with clinical stroke, dementia, and silent infarcts on MRI, whereas worse systolic function is related only to clinical stroke. These findings can form the basis for future research on the utility of cardiac function as potential intervention target for prevention of neurologic diseases. *Neurology*® 2015;84:1-8

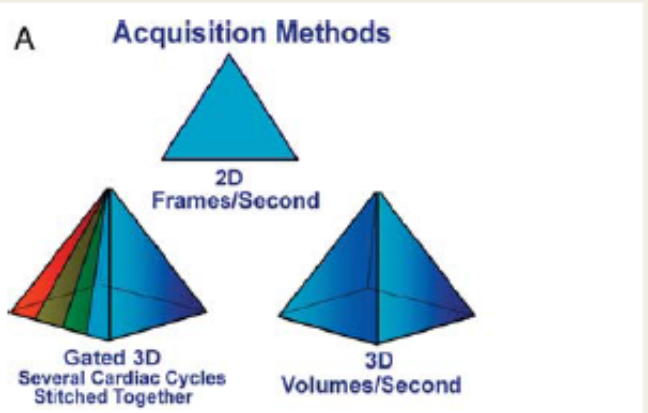
Correspondence to Dr. Ikram:

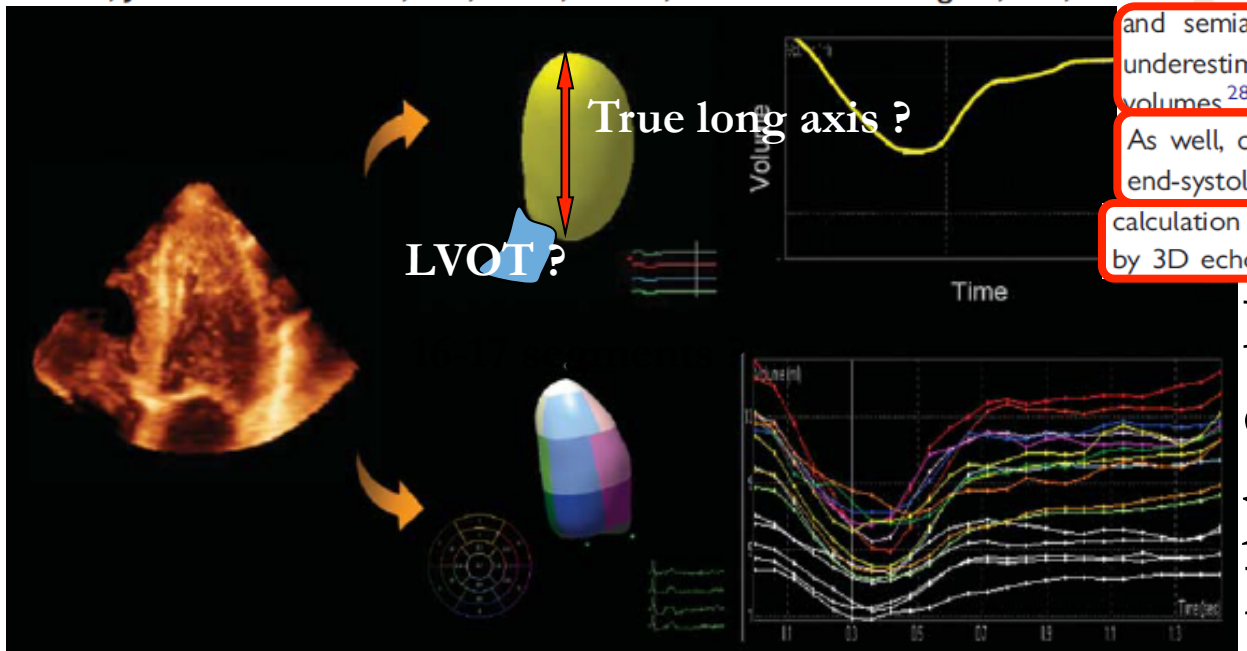
European Heart Journal – Cardiovascular Imaging (2012) 13, 1–46
doi:10.1093/ehjci/jer316

EAE/ASE RECOMMENDATIONS

EAE/ASE Recommendations for Image Acquisition and Display Using Three-Dimensional Echocardiography

Roberto M. Lang, MD, FASE*‡, Luigi P. Badano, MD, FESC†‡, Wendy Tsang, MD*, David H. Adams, MD*, Eustachio Agricola, MD†, Thomas Buck, MD, FESC†, Francesco F. Faletra, MD†, Andreas Franke, MD, FESC†, Judy Hung, MD, FASE*, Leopoldo Pérez de Isla, MD, PhD, FESC†, Otto Kamp, MD, PhD, FESC†, Jaroslaw D. Kasprzak, MD, FESC†, Patrizio Lancellotti, MD, PhD, FESC†, Thomas H. Marwick, MBBS, PhD*, Marti L. McCulloch, RDCS, FASE*, Mark J. Monaghan, PhD, FESC†, Petros Nihoyannopoulos, MD, FESC†, Natesa G. Pandian, MD*, Patricia A. Pellikka, MD, FASE*, Mauro Pepi, MD, FESC†, David A. Roberson, MD, FASE*, Stanton K. Shernan, MD, FASE*, Girish S. Shirali, MBBS, FASE*, Lissa Sugeng, MD*, Folkert J. Ten Cate, MD†, Mani A. Vannan, MBBS, FASE*, Jose Luis Zamorano, MD, FESC, FASE†, and William A. Zoghbi, MD, FASE*





and semiautomated contour detection have shown significant underestimation of 3D echocardiography–derived LV volumes.[28,31,34–49] The potential reasons for the underestimation

As well, one-beat acquisitions may not successfully capture true end-systole, because of the reduced temporal resolution. This

calculation of LV mass. Despite a slight overestimation of LV mass by 3D echocardiography in comparison with magnetic resonance

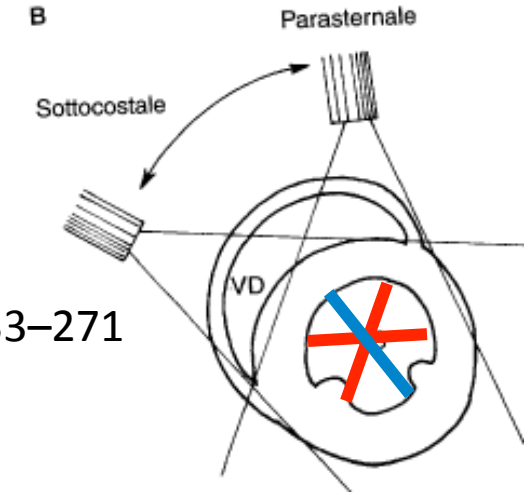
Esagerazione della dissincronia per basso frame rate Image Quality

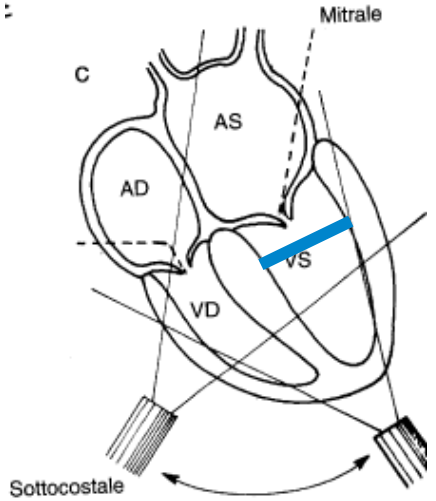
Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults: An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging

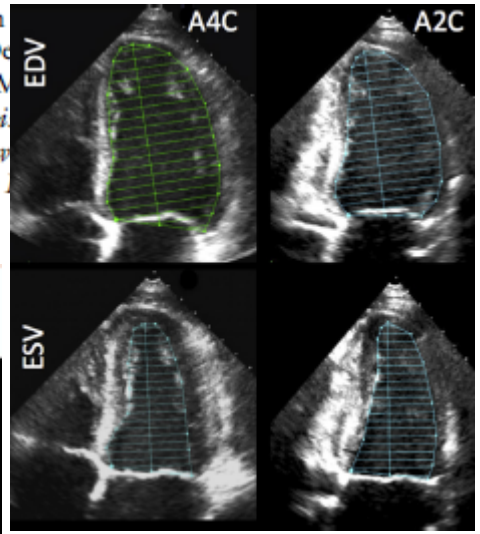
European Heart Journal – Cardiovascular Imaging (2015) 16, 233–271

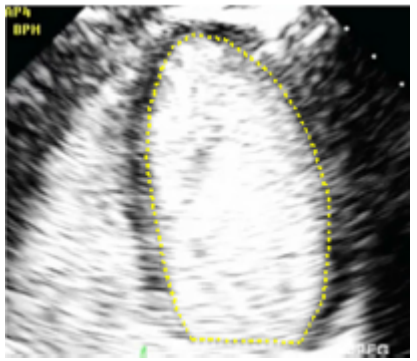
Roberto M. Lang, MD, FASE, FESC, Luigi P. Badano, MD, PhD, FESC, Victor Mor-Avi, PhD, FASE,
Jonathan Afilalo, MD, MSc, Anderson Armstrong, MD, MSc, Laura Ernande, MD, PhD,
Frank A. Flachskampf, MD, FESC, Elyse Foster, MD, FASE, Steven
Tatiana Kuznetsova, MD, PhD, Patrizio Lancellotti, MD, PhD, FESC, De
Michael H. Picard, MD, FASE, Ernst R. Rietzschel, MD, PhD, Lawrence Rudski, M
FASE, Wendy Tsang, MD, and Jens-Uwe Voigt, MD, PhD, FESC, *Chicago, Illinoi*
and Toronto, Ontario, Canada; Baltimore, Maryland; Créteil, France; Uppsala, Sw
Washington, District of Columbia; Leuven, Liège, and Ghent, Belgium;

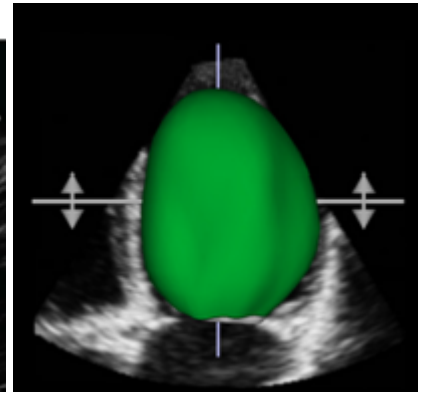
J Am Soc Echocardiogr 2015;28:1-39

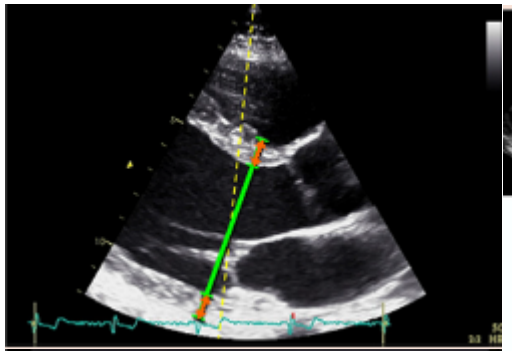


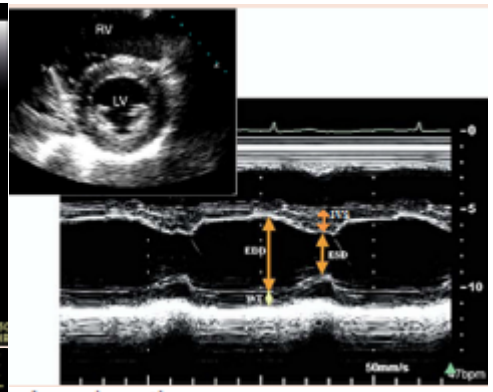


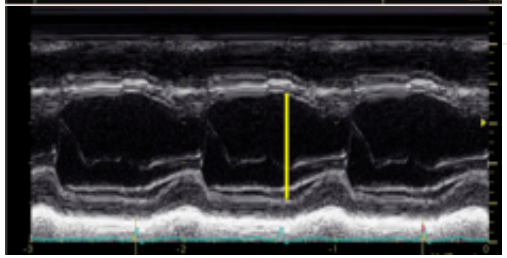




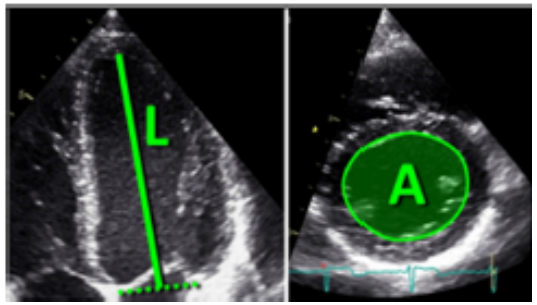


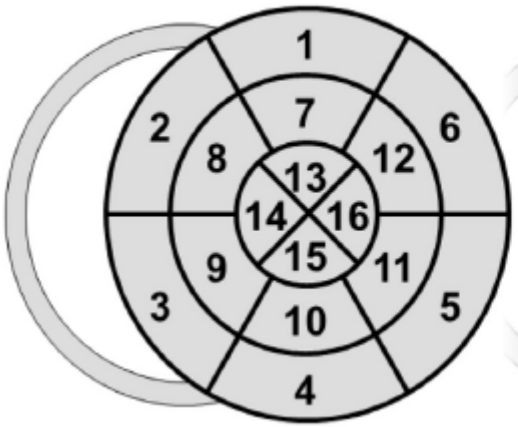


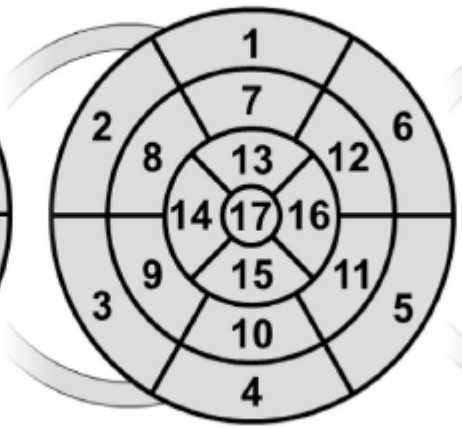


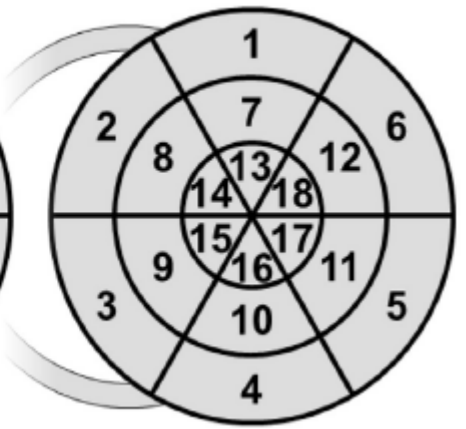


Area-length









Discordance Between Echocardiography and MRI in the Assessment of Mitral Regurgitation Severity

A Prospective Multicenter Trial

Seth Uretsky, MD,* Linda Gillam, MD, MPH,* Roberto Lang, MD,† Farooq A. Chaudhry, MD,‡
Edgar Argulian, MD, MPH,§ Azhar Supariwala, MD,§ Srinivasa Gurram, MD,§ Kavya Jain, MD,§ Marjorie Subero, MD,§
James J. Jang, MD,‖ Randy Cohen, MD,§ Steven D. Wolff, MD, PhD¶

ABSTRACT

BACKGROUND The decision to undergo mitral valve surgery is often made on the basis of echocardiographic criteria and clinical assessment. Recent changes in treatment guidelines recommending surgery in asymptomatic patients make the accurate assessment of mitral regurgitation (MR) severity even more important.

OBJECTIVES The purpose of this study was to compare echocardiography and magnetic resonance imaging (MRI) in the assessment of MR severity using the degree of left ventricular (LV) remodeling after surgery as the reference standard.

METHODS In this prospective multicenter trial, MR severity was assessed in 103 patients using both echocardiography and MRI. Thirty-eight patients subsequently had isolated mitral valve surgery, and 26 of these had an additional MRI performed 5 to 7 months after surgery. The pre-surgical estimate of regurgitant severity was correlated with the postoperative decrease in LV end-diastolic volume.

RESULTS Agreement between MRI and echocardiographic estimates of MR severity was modest in the overall cohort ($r = 0.6$; $p < 0.0001$), and there was a poorer correlation in the subset of patients sent for surgery ($r = 0.4$; $p = 0.01$). There was a strong correlation between post-surgical LV remodeling and MR severity as assessed by MRI ($r = 0.85$; $p < 0.0001$), and no correlation between post-surgical LV remodeling and MR severity as assessed by echocardiography ($r = 0.32$; $p = 0.1$).

CONCLUSIONS The data suggest that MRI is more accurate than echocardiography in assessing the severity of MR. MRI should be considered in those patients when MR severity as assessed by echocardiography is influencing important clinical decisions, such as the decision to undergo MR surgery. (J Am Coll Cardiol 2015;65:1078-88) © 2015 by the American College of Cardiology Foundation.

TABLE 2 Interobserver Variability for MRI and Echo

		MRI Reader 1			
		Mild	Moderate	Severe	Total
MRI reader 2	Mild	41	6	0	47
	Moderate	1	25	1	27
	Severe	0	0	9	9
	Total	42	31	10	83

		Echo Reader 1			
		Mild	Moderate	Severe	Total
Echo reader 2	Mild	9	7	0	16
	Moderate	5	14	15	34
	Severe	0	9	34	43
	Total	14	30	49	93

TABLE 3 Comparison of MR Severity: MRI Versus Echo

	MRI			
	Mild	Moderate	Severe	Total
Echo				
Mild	14	0	0	14
Moderate	19	10	2	31
Severe	20	25	13	58
Total	53	35	15	103

MR = mitral regurgitation; other abbreviations as in Table 2.

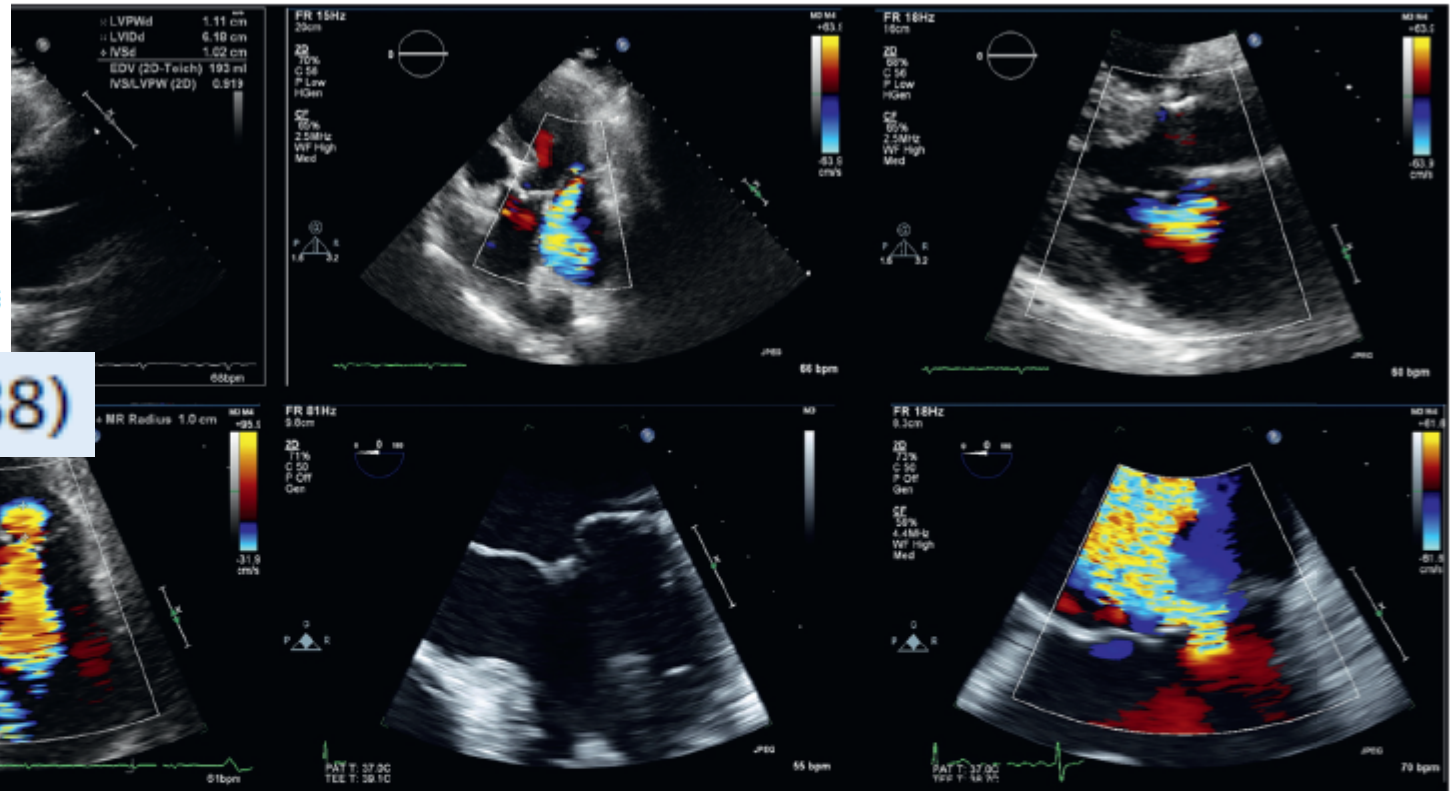
FIGURE 1 A Patient With Severe MR by Echocardiography (Regurgitant Volume = 62 ml) and Mild MR by MRI (Regurgitant Volume = 15 ml) Who Had Isolated Mitral Valve Surgery

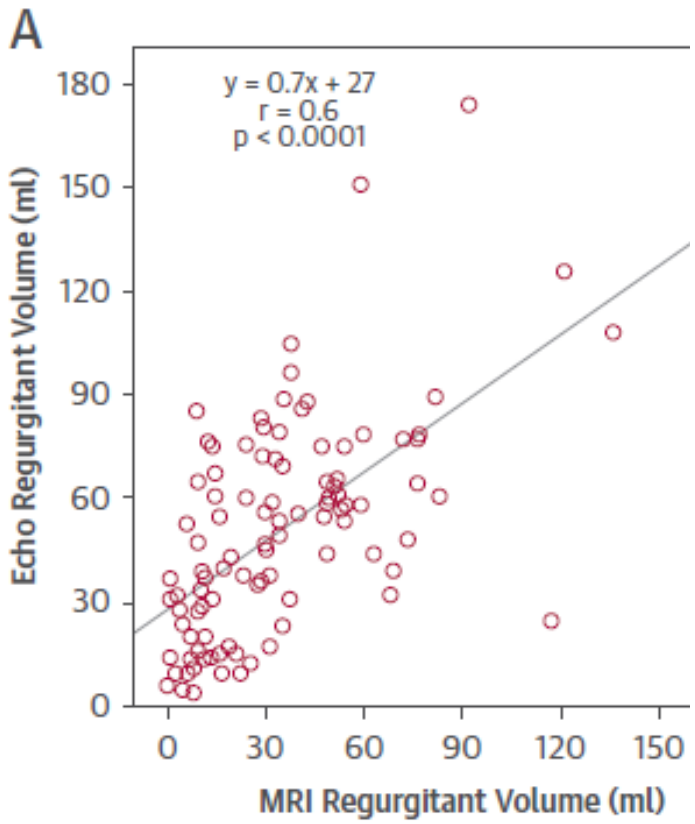
Discordance Between Echocardiography and MRI in the Assessment of Mitral Regurgitation Severity

A Prospective Multicenter Trial

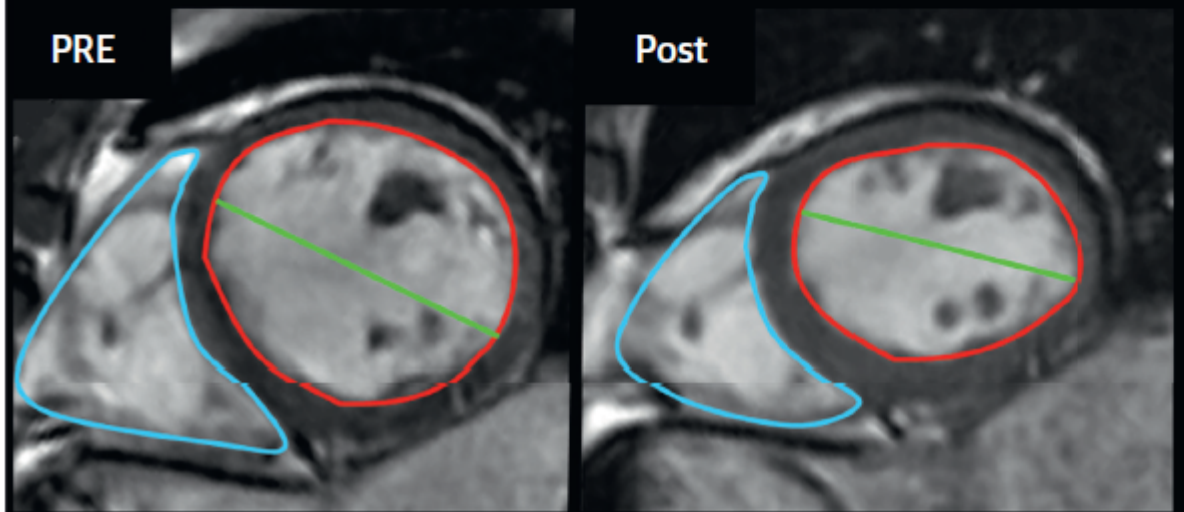
Seth Uretsky, MD,* Linda Gillam, MD, MPH,* Roberto Lang, MD,† Farooq A. Chaudhry, MD,‡
Edgar Argulian, MD, MPH,§ Azhar Supariwala, MD,§ Srinivasa Gurram, MD,§ Kavya Jain, MD,§ Marjorie Subero, MD,§
James J. Jang, MD,‖ Randy Cohen, MD,§ Steven D. Wolff, MD, PhD¶

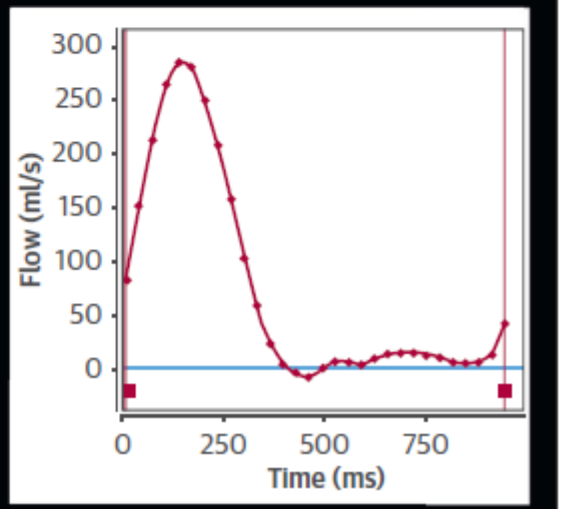
(J Am Coll Cardiol 2015;65:1078-88)





C





Heart failure with preserved ejection fraction

Clinical Medicine 2014 Vol 14, No 6: s22–s28

Authors: Pierpaolo Pellicori[A] and John GF Cleland[B]

HFPEF predominantly affects older patients and is characterised by increased left atrial pressure, especially during exercise, in the absence of LV dilatation or markedly depressed LVEF. Natriuretic peptides are the key means of detecting increases in atrial pressure due to congestion. Education and experience is required to interpret plasma concentrations effectively. Imaging reveals diverse and heterogeneous cardiac phenotypes underlying HFPEF that, in turn, may reflect diverse myocardial pathologies including hypertrophy, delayed cardiac myocyte relaxation, myocardial fibrosis and senile amyloidosis. Treatments directed at congestion (and/or hypertension), such

CIFOSCOLIOSI – FRAGILITA' – POLIFARMACO ?

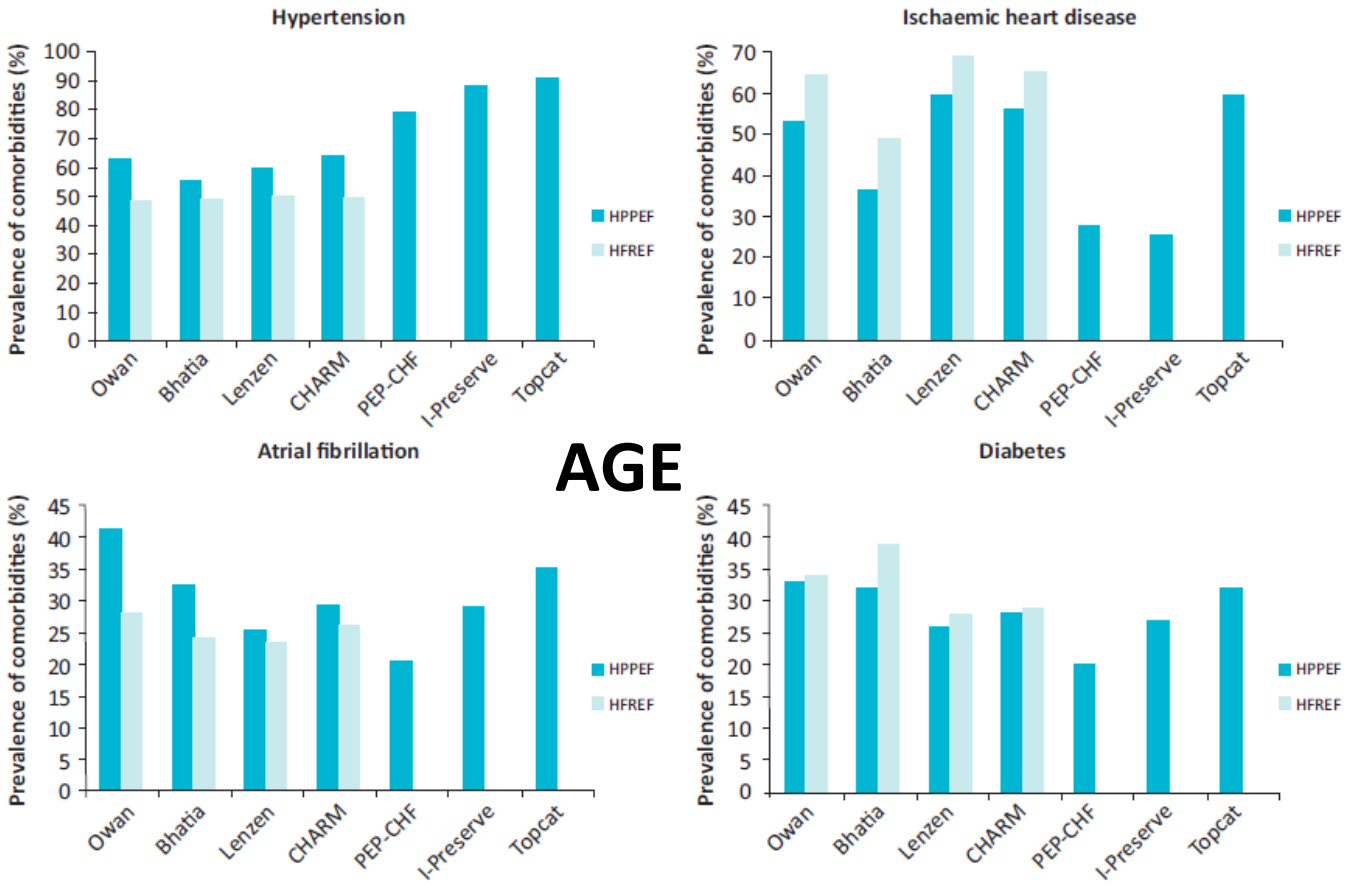


Fig 1. Prevalence of important comorbidities (atrial fibrillation, hypertension, ischaemic heart disease and diabetes) among patients with HFPEF compared with those with HFREF in observational studies and relevant clinical trials.[12–17] HFPEF = heart failure with preserved left ventricular ejection fraction; HFREF = HF with reduced ejection fraction.

Circulation. Heart failure (Online)

Left Atrial Remodeling and Function in Advanced Heart Failure With Preserved orReduced Ejection Fraction

Melenovsky V, Hwang SJ, Redfield MM, Zakeri R, Lin G, Borlaug BA

1941-3297

10.1161/CIRCHEARTFAILURE.114.001667

2015

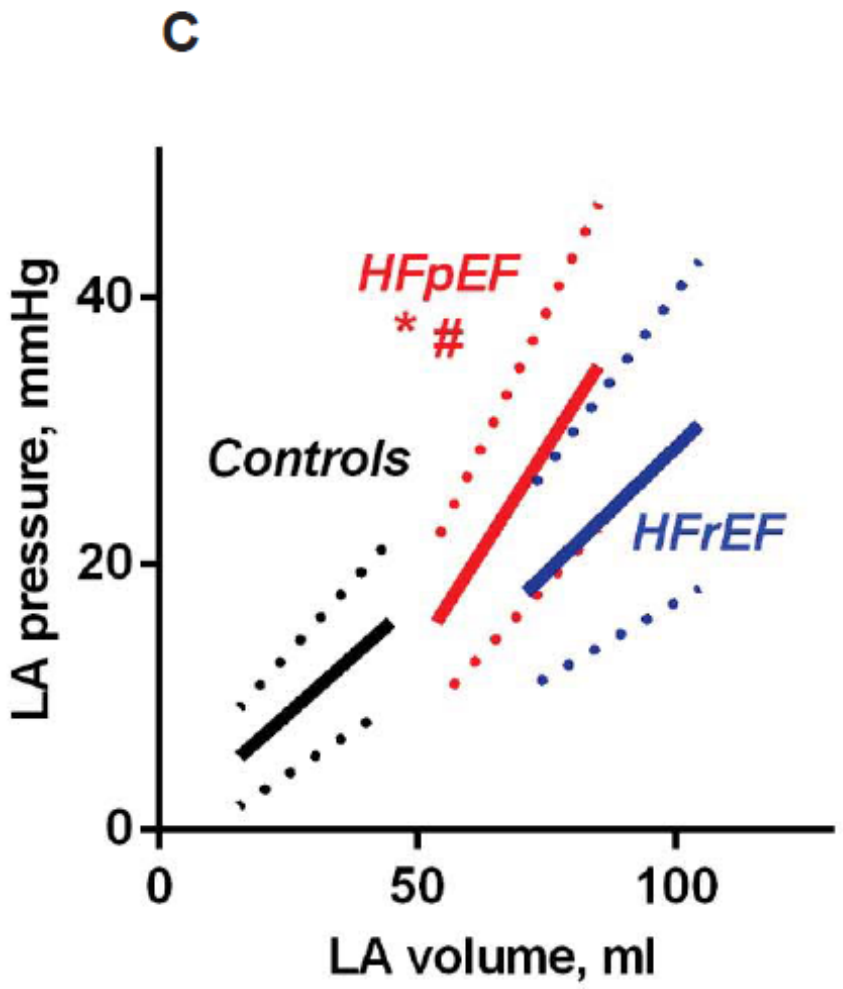


Table 2. Left atrial and left ventricular function

	Controls	HFpEF	HFrEF	p
	n = 40	n = 101	n = 97	
Left atrial function				
LA pressure mean, *mmHg*	8.1 ± 2.8	20 ± 6.1 *	20 ± 8.1 *	< 0.0001
minimum, *mmHg*	5.5 ± 3.7	16 ± 6.1*	18 ± 7.3*†	< 0.0001
A[§] and V wave, *mmHg*	12±4 / 12±5	23±8 * / 34±13 *	24±9 */ 30±12 *	< 0.0001 / < 0.0001
min-max difference, *mmHg*	7.9 ± 2.8	19 ± 10 *	13 ± 7.8 *†	< 0.0001
LA volume max, *ml*	45 ± 12	85 ± 28 *	104 ± 38 *†	< 0.0001
pre-A[§], *ml*	30 ± 10	55 ± 17 *	77 ± 29 *†	< 0.0001
min, *ml*	16 ± 6.3	54 ± 27 *	71 ± 35 *†	< 0.0001
LA volume max/BSA, $ml.m^{-2}$	23 ± 5	41 ± 12 *	50 ± 17 *†	< 0.0001
LA EF - total, %	65 ± 8.9	39 ± 17 *	35 ± 15 *†	< 0.0001
- active[§], %	48 ± 11	30 ± 14 *	22 ± 13 *†	< 0.0001
- passive[§], %	33 ± 11	26 ± 9.3 *	21 ± 10 *†	< 0.0001
LA stiffness, $mmHg.ml^{-1}$	0.30 ± 0.20	0.79 ± 0.75 *	0.48 ± 0.44 †	< 0.0001
LA function index (LAFI)	220 ± 118	60 ± 65 *	30 ± 37 *†	< 0.0001
LA wall stress max, $kdynes.cm^{-2}$	80 ± 31	294 ± 120 *	281 ± 123 *	< 0.0001
min, $kdynes.cm^{-2}$	38 ± 25	137 ± 59 *	167 ± 74 *†	< 0.0001
change, $kdynes.cm^{-2}$	41 ± 18	158 ± 92 *	113 ± 74 *†	< 0.0001

European Journal of Cardio-Thoracic Surgery (2015) 1–13
doi:10.1093/ejcts/ezu532

Dilated left atrium as a predictor of late outcome after pulmonary vein isolation concomitant with aortic valve replacement and/or coronary artery bypass grafting†

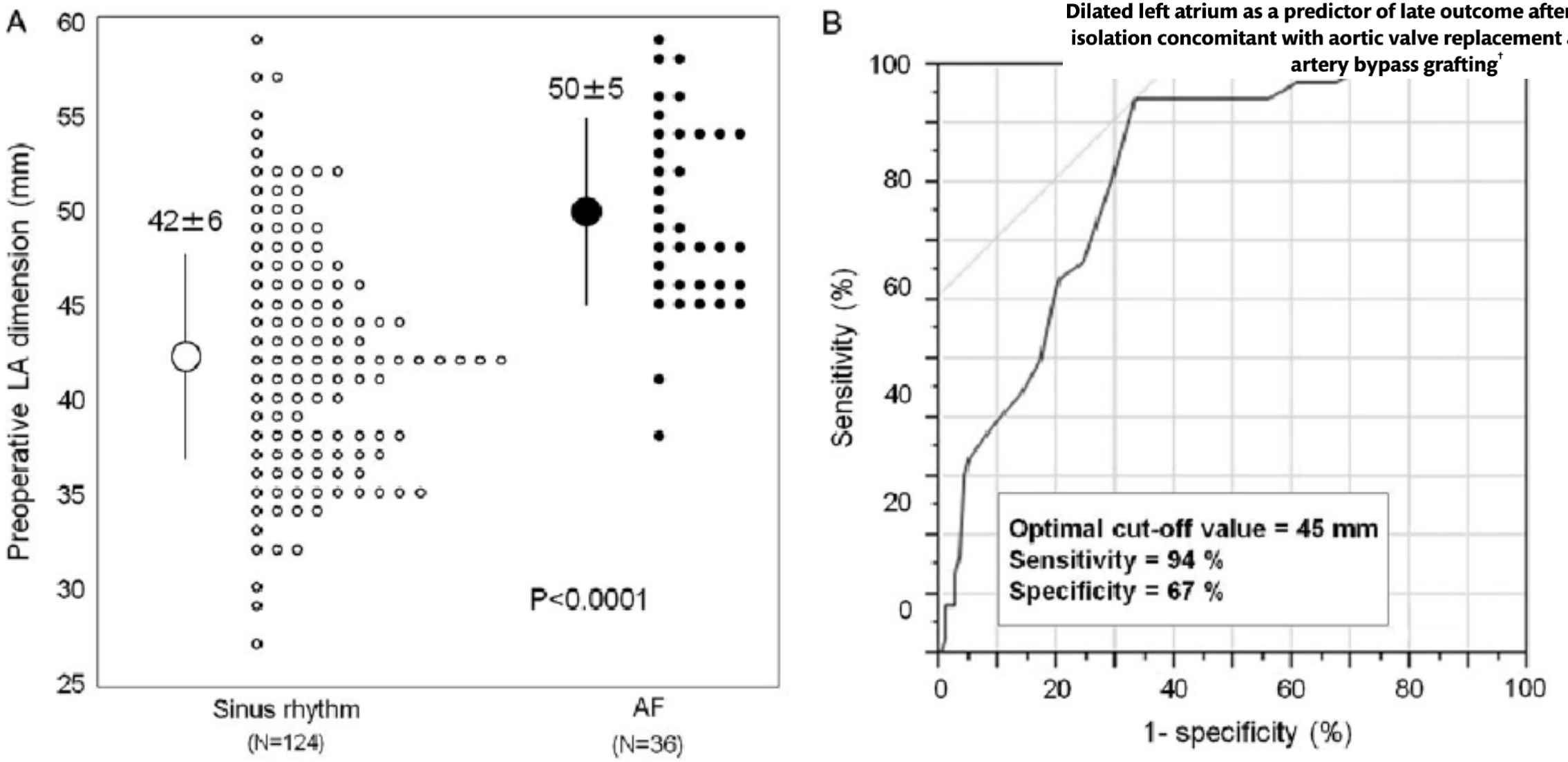
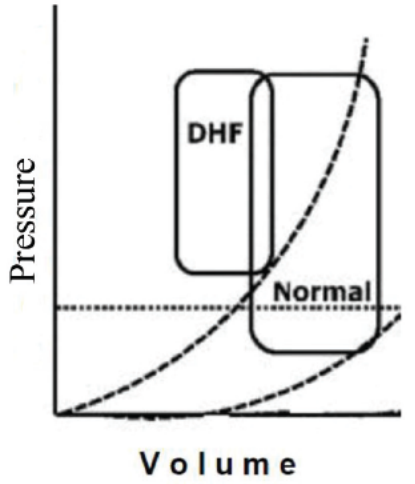


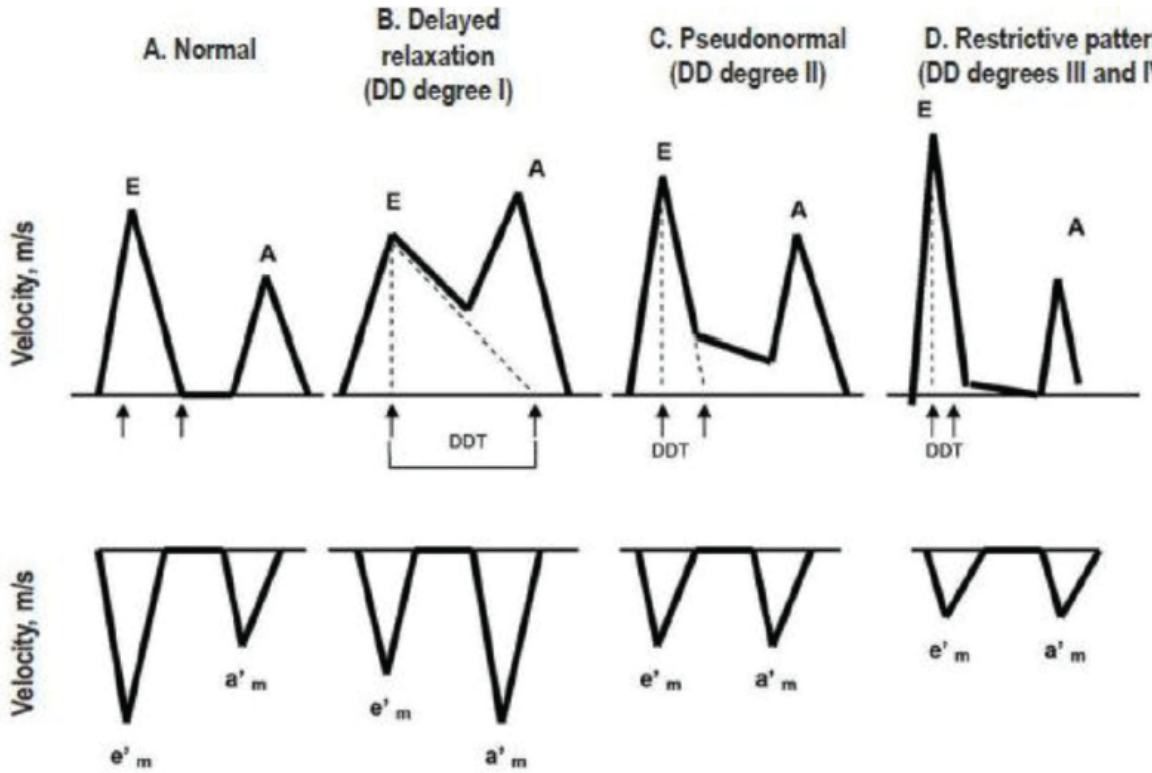
Figure 1: (**A**) Scatter plot showing preoperative LA dimension according to cardiac rhythm at 6 months after surgery. Patients with underlying AF (filled circles) showed a larger LA dimension at baseline when compared with those who recovered from AF (open circles) ($P < 0.0001$). (**B**) Receiver-operating characteristic curve (ROC) analysis demonstrating an optimal cut-off value for preoperative LA dimension of 45 mm to predict AF recurrence at 6 months after surgery, which resulted in a sensitivity of 94% and specificity of 67% with an area under the curve of 0.825. Abbreviations: see Table 1.

J Clin Med Res. 2015;7(3):137-144

Left Ventricular Diastolic Function in Hypertension: Methodological Considerations and Clinical Implications

Pasquale Palmiero[a, i], Annapaola Zito[b], Maria Maiello[a], Matteo Cameli[c], Pietro Amedeo Modesti[d], Maria Lorenza Muiesan[e], Salvatore Novo[f], Pier Sergio Saba[g], Pietro Scicchitano[b], Roberto Pedrinelli[h], Marco Matteo Ciccone[b], on behalf of the Gruppo di Studio "Ipertensione, Prevenzione e Riabilitazione" della rdiologia





AORTIC/ARTERIAL STIFFNESS

Diastolic dysfunction in the diabetic *continuum*: association with insulin resistance, metabolic syndrome and type 2 diabetes

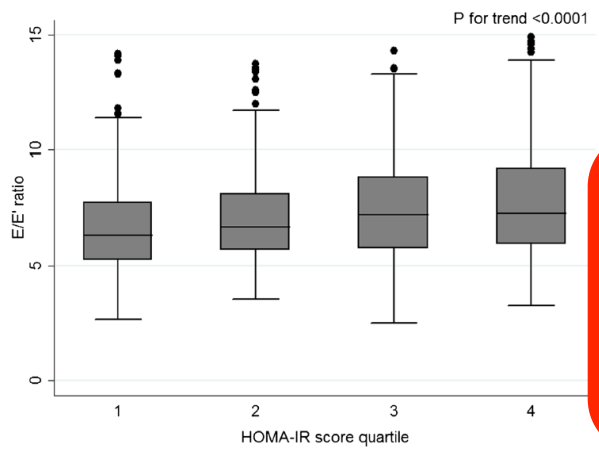
Ricardo Fontes-Carvalho[1,2,3*], Ricardo Ladeiras-Lopes[2,3], Paulo Bettencourt[4,5], Adelino Leite-Moreira[3,6] and Ana Azevedo[1,7]

Fontes-Carvalho *et al. Cardiovascular Diabetology* (2015) 14:4
DOI 10.1186/s12933-014-0168-x

Conclusions: HOMA-IR score and metabolic syndrome were independently associated with LVDD. Changes in diastolic function are already present before the onset of diabetes, being mainly associated with the state of insulin resistance.

Table 3 Crude and adjusted odds ratios for the presence of any grade of diastolic dysfunction according to quartiles of insulin resistance and metabolic syndrome status

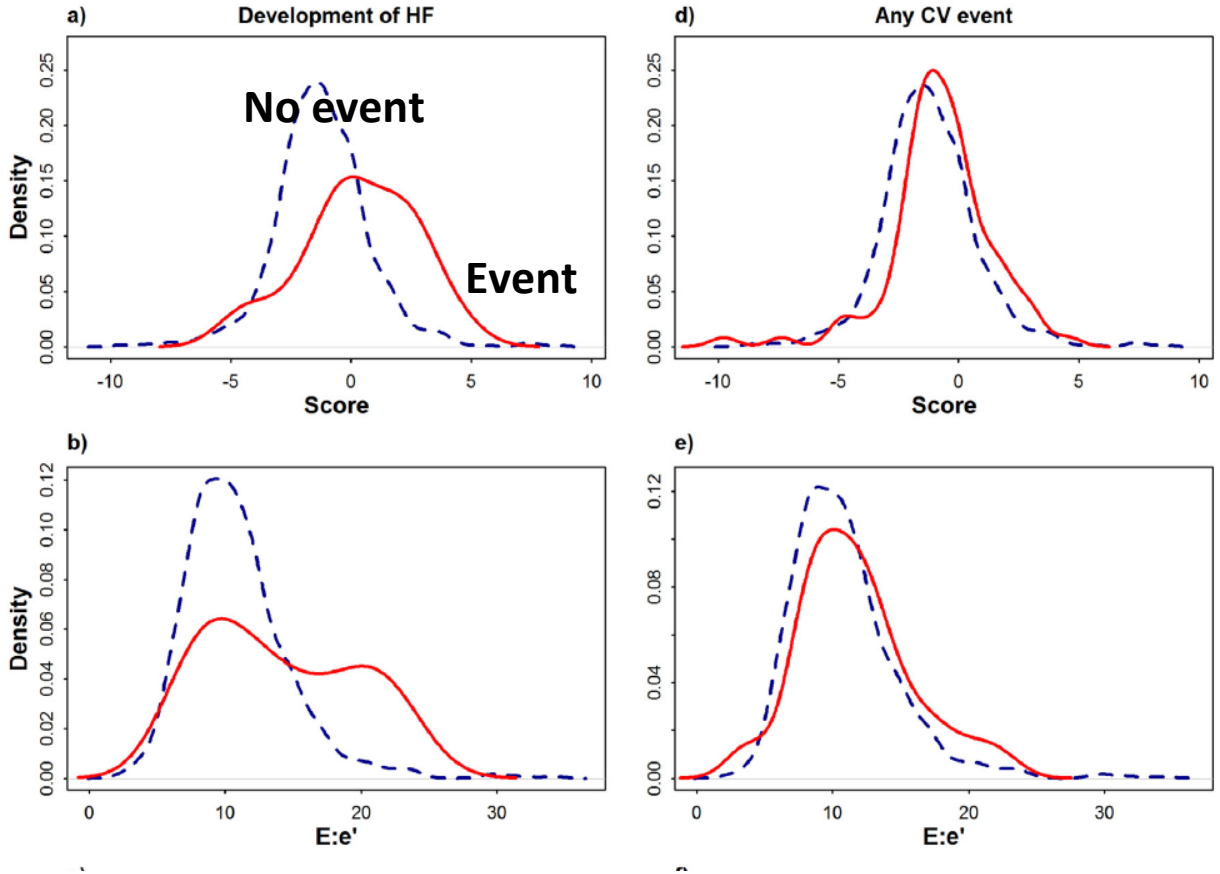
	Prevalence of LVDD n (%)	Crude OR (95% CI)	Adjusted OR* (95% CI)
Insulin resistance (HOMA-IR score)			
Quartile 1	35 (14.9%)	Reference	Reference
Quartile 2	42 (18.6%)	1.30 (0.80-2.13)	1.08 (0.63-1.86)
Quartile 3	70 (29.3%)	2.37 (1.50-3.73)	1.88 (1.12-3.14)
Quartile 4	89 (30.6%)	2.52 (1.63-3.90)	1.82 (1.09-3.03)
No Metabolic Syndrome (n = 571)	93 (16.3%)	Reference	Reference
Metabolic Syndrome without T2DM (n = 331)	108 (32.6%)	2.54 (1.85-3.50)	1.62 (1.12-2.36)
Metabolic Syndrome with T2DM (n = 123)	45 (36.6%)	3.04 (1.98-4.67)	1.78 (1.09-2.91)



T2DM: type 2 diabetes mellitus; LVDD: left ventricular diastolic dysfunction; HOMA-IR - Homeostasis Model Assessment of Insulin Resistance; OR (95% CI) – odds ratio with 95% confidence interval.
*Variables included in the model: age (continuous), sex, systolic blood pressure (continuous) and body mass index (continuous).

The development and feasibility of a composite score of echocardiographic indices that may stratify outcome in patients with diabetes mellitus

Katrina K. Poppe [a,b,*], Gillian A. Whalley [c], Robert N. Doughty [a], Mark Woodward [d], Anushka Patel [d], Clara K. Chow [d,e], Yoichiro Hirakawa [d], John Chalmers [d], Graham S. Hillis [d], Christopher M. Triggs [b]



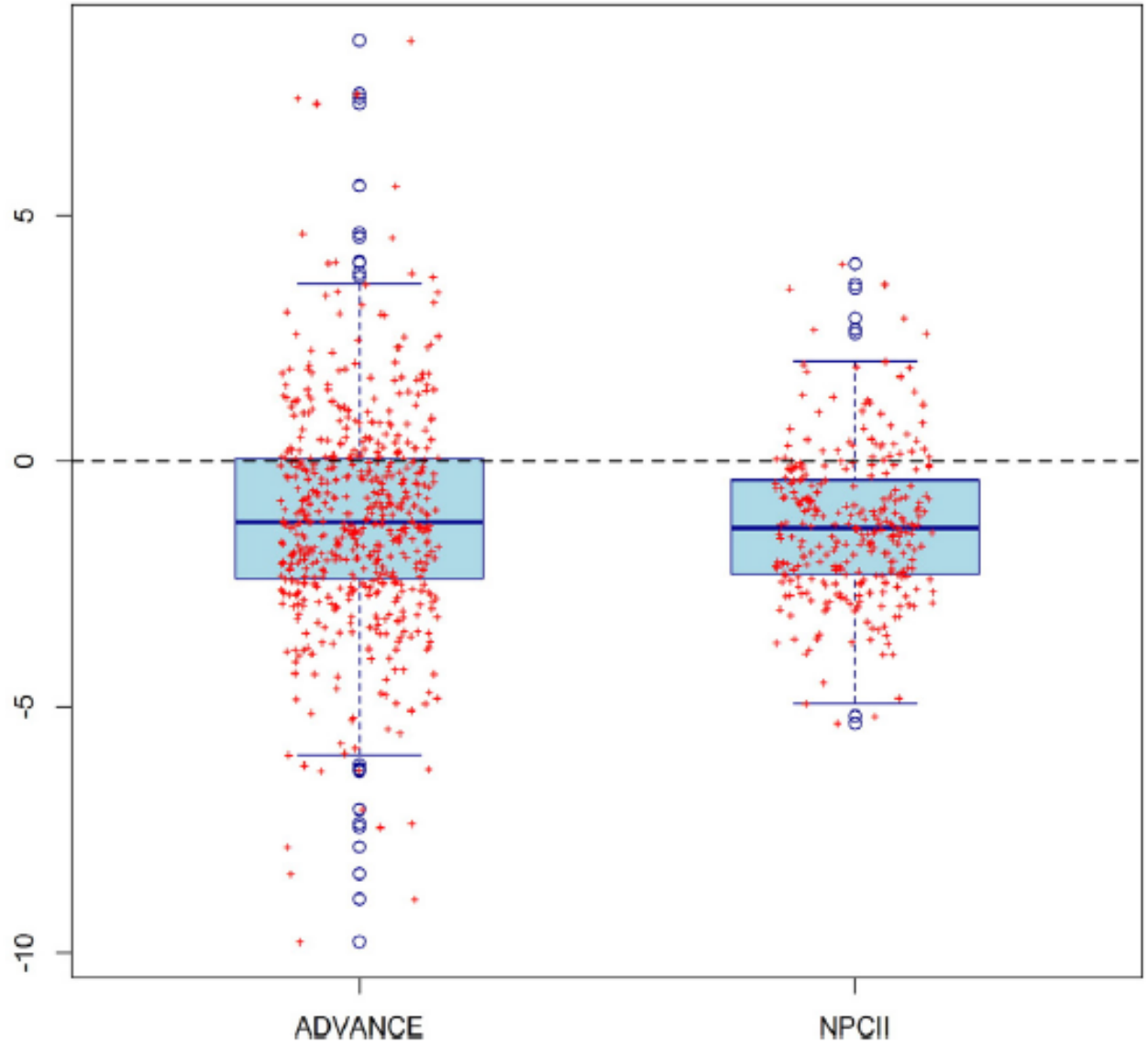


Fig. 1. Range of scores within the two cohorts. Values above the dashed line are abnormal.

International Journal of Cardiology 182 (2015) 244–249

Is mechanical dyssynchrony a therapeutic target in heart failure with preserved ejection fraction?

Aymeric Menet, MD,[a] Lorraine Greffe, MD,[a] Pierre-Vladimir Ennezat, MD, PhD,[b] François Delelis, MD,[a] Yves Guyomar, MD,[a] Anne Laure Castel, MD,[a] Aurélie Guiot, MD,[a] Pierre Graux, MD,[a] Christophe Tribouilloy, MD, PhD,[c,d] and Sylvestre Marechaux, MD, PhD[a,d] *Lille, Grenoble, and Amiens, France*

Background Previous studies have found a high frequency of mechanical dyssynchrony in patients with heart failure (HF) with preserved ejection fraction (HFpEF), hence suggesting that cardiac resynchronization therapy (CRT) may be considered in HFpEF. The present study was designed to compare the amount of mechanical dyssynchrony between HFpEF patients and (1) HF with reduced EF (HFrEF) patients with an indication for CRT (HFrEF-CRT(+)) group, (2) HFrEF patients with QRS duration <120 ms (HFrEF-QRS <120 ms) group, and (3) hypertensive controls (HTN).

Methods Electrical (ECG) and mechanical dyssynchrony (atrio-ventricular dyssynchrony, interventricular dyssynchrony, intraventricular dyssynchrony) were assessed using conventional, tissue Doppler, and Speckle Tracking strain echocardiography in 40 HFpEF patients, 40 age- and sex-matched HTN controls, 40 HFrEF-QRS <120 ms patients, and 40 HFrEF-CRT(+) patients.

Results The frequency of left bundle branch block was low in HFpEF patients (5%) and similar to HTN controls (5%, $P = 0.85$). Indices of dyssynchrony were similar between HFpEF and HTN patients or HFrEF-QRS <120 ms patients. In contrast, most indices of dyssynchrony differed between HFpEF and HFrEF-CRT(+) patients. The principal components analysis on the entire cohort of 160 patients yielded 2 homogeneous groups of patients in terms of dyssynchrony, the first comprising HFrEF-CRT(+) patients and the second comprising HTN, HFrEF-QRS <120 ms and HFpEF patients.

Conclusions Mechanical dyssynchrony in HFpEF does not differ from that of patients with HTN or patients with HFrEF and a narrow QRS. This data raises concerns regarding the role of dyssynchrony in the pathophysiology of HFpEF and thereby the potential usage of CRT in HFpEF. (Am Heart J 2014;168:909-916.e1.)

Chest

Echocardiography of Right Ventriculo-Arterial Coupling Combined toCardiopulmonary Exercise Testing to Predict Outcome in Heart Failure

Guazzi M, Naeije R, Arena R, Corra U, Ghio S, Forfia P, Rossi A, Cahalin LP, Bandera F, Temporelli P

1931-3543

10.1378/chest.14-2065

2015

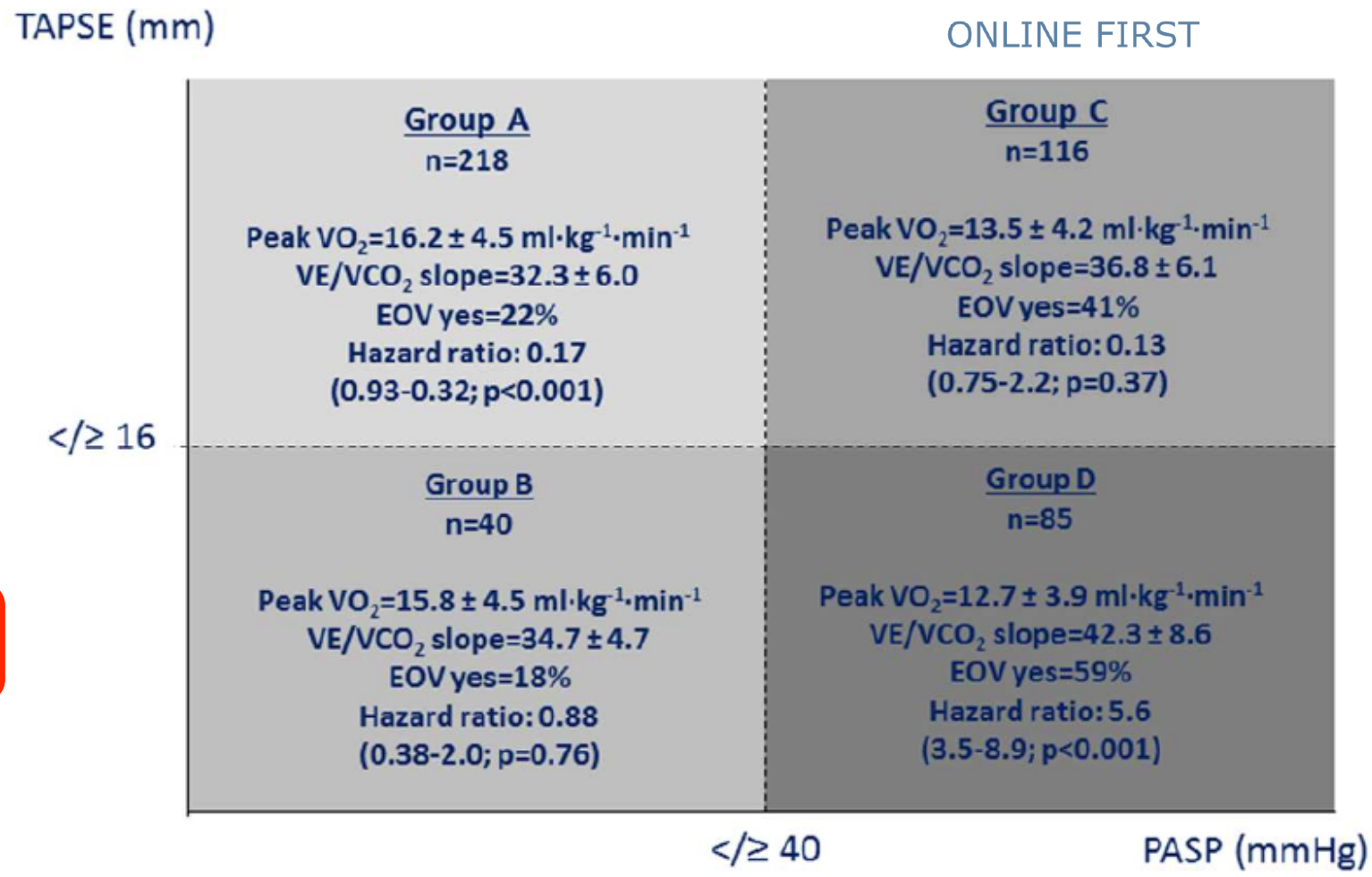
459 pazienti - 85% M - eta' media 63 anni

Table 2: Survival analysis for key clinical, tissue Doppler echocardiography and cardiopulmonary exercise testing variables

	Univariate Analysis		
	Chi-Square	Hazard Ratio	p-value
Age	2.8	1.02 (1.00-1.05)	0.09
Sex	0.52	1.28 (0.65-2.50)	0.47
HF Etiology	1.2	1.32 (0.80-2.18)	0.28
NYHA class	49.0	3.38 (2.39-4.78)	<0.001
LVEF	5.2	0.97 (0.94-1.00)	0.02
PASP	59.6	1.07 (1.05-1.09)	<0.001
TAPSE	42.3	0.81 (0.76-0.86)	<0.001
TAPSE/PASP	61.2	0.001 (0.00-0.007)	<0.001
Peak VO_2	12.6	0.90 (0.85-0.95)	0.001
VE/VCO_2 slope	37.5	1.07 (1.05-1.09)	<0.001
EOV	35.0	3.80 (2.36-6.11)	<0.001

	Multivariate Analysis	
	Chi-Square	p-value
TAPSE/PASP	61.2	<0.001

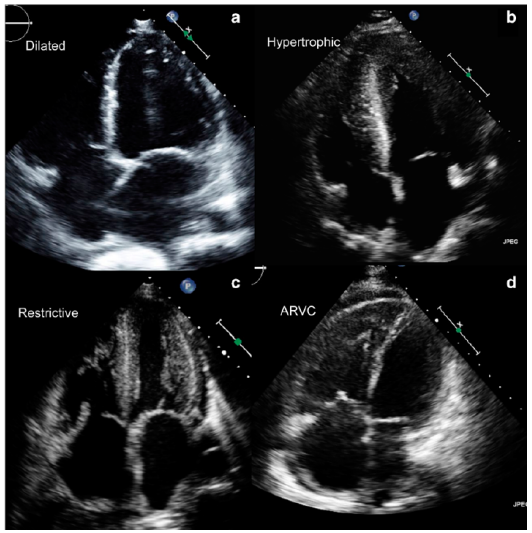
	Residual Chi-Square	p-value
NYHA	14.0	<0.001*
EOV	6.0	0.01*
Peak VO_2	1.7	0.19
LVEF	0.18	0.67
VE/VCO_2 slope	0.03	0.87



Role of Non-invasive Imaging in the Work-Up of Cardiomyopathies

Lakshmi S. Tummala · Raymond K. Young · Tania Singh · Sandeep Jani · Monvadi B. Srichai

Curr Atheroscler Rep (2015) 17:8
DOI 10.1007/s11883-014-0486-1



NON SOLO ECO… MA IMAGING CLINICALLY ORIENTED !

Signs and symptoms suggestive of cardiomyopathy

TTE for evaluation of cardiac structure and function

Structural or functional cardiac abnormality

Technically limited or no cardiac abnormality

Evaluate for ischemic or nonischemic etiology
Stress test with imaging
CCTA
CMR
Consider invasive x-ray angiography

Structural or functional cardiac abnormality

Consider additional imaging (TEE, MUGA, CMR, CCTA) if TTE technically limited

No cardiac abnormality

Evaluate for non-cardiac causes

Non-ischemic Cardiomyopathy

Ischemic Cardiomyopathy

Consider etiology based on history and imaging phenotype

Optimize medical therapy
Consider imaging for viability and prognosis

Significant ischemia and/or viability

No significant viability

Secondary causes
Hypertensive heart disease
Valvular heart disease
Congenital heart disease

DCM HCM RCM ARVC Unclassified

Revascularization

Continue optimal medical therapy

Consider additional imaging (TEE, CMR, CCT) to evaluate underlying secondary cause

Consider additional imaging (CMR, PET, SPECT,) to evaluate etiology based on history and imaging phenotype
Consider endomyocardial biopsy
Consider genetic testing/counseling

Follow-up or serial imaging to monitor disease progressdion
Consider ICD and/or CRT

Follow-up or serial imaging to monitor disease progression
Consider ICD and/or CRT

Treatment focused on underlying secondary cause

Treatment focused on underlying etiology, if known

Follow-up or serial imaging to monitor disease progression

Fig. 1 Flow diagram demonstrating use of imaging studies in the evaluation of patients with possible cardiomyopathy

Linking diagnostic recommendations to value of tests

Recommendations	Class	Level
Investigations to consider in all patients		
Transthoracic echocardiography is recommended to evaluate cardiac structure and function, including diastolic function (Section 4.1.2), and to measure LVEF to make the diagnosis of HF, assist in planning and monitoring of treatment, and to obtain prognostic information.	I	C
A 12-lead ECG is recommended to determine heart rhythm, heart rate, QRS morphology, and QRS duration, and to detect other relevant abnormalities *(Table 5)*. This information also assists in planning treatment and is of prognostic importance. A completely normal ECG makes systolic HF unlikely.	I	C
Measurement of blood chemistry (including sodium, potassium, calcium, urea/blood urea nitrogen, creatinine/estimated glomerular filtration rate, liver enzymes and bilirubin, ferritin/TIBC) and thyroid function is recommended to: (i) Evaluate patient suitability for diuretic, renin–angiotensin–aldosterone antagonist, and anti-coagulant therapy (and monitor treatment) (ii) Detect reversible/treatable causes of HF (e.g. hypocalcaemia, thyroid dysfunction) and co-morbidities (e.g. iron deficiency) (iii) Obtain prognostic information.	I	C
A complete blood count is recommended to: (i) Detect anaemia, which may be an alternative cause of the patient's symptoms and signs and may cause worsening of HF (ii) Obtain prognostic information.	I	C

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

Management of co-morbidities

- Anaemia
- Angina
- Asthma/COPD
- Cachexia
- Cancer
- Depression
- Diabetes mellitus
- Erectile dysfunction
- Gout
- Hyperlipidaemia
- Hypertension
- Iron deficiency
- Kidney dysfunction
- Obesity
- Prostatic obstruction
- Sleepdisturbance/ sleep disordered breathing

CIFOSCOLIOSI
FRAGILITA'
FARMACI
IDRATAZIONE

www.escardio.org/guidelines

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

EUROPEAN SOCIETY OF CARDIOLOGY®

Thank you !

Diagnosis of heart failure

The diagnosis of HF-REF requires three conditions to be satisfied:
1. Symptoms typical of HF
2. Signs typical of HF[a]
3. Reduced LVEF
The diagnosis of HF-PEF requires four conditions to be satisfied:
1. Symptoms typical of HF
2. Signs typical of HF[a]
3. Normal or only mildly reduced LVEF and LV not dilated
4. Relevant structural heart disease (LV hypertrophy/LA enlargement) and/or diastolic dysfunction (see Section 4.1.2)

HF = heart failure; HF-PEF = heart failure with 'preserved' ejection fraction; HF-REF = heart failure and a reduced ejection fraction; LA = left atrial; LV = left ventricular; LVEF = left ventricular ejection fraction.

[a]Signs may not be present in the early stages of HF (especially in HF-PEF) and in patients treated with diuretics (see Section 3.6).

www.escardio.org/guidelines

European Heart Journal (2012) 33, 1787–1847
European Journal of Heart Failure (2012) 14, 803–869

EUROPEAN SOCIETY OF CARDIOLOGY®

Diastolic dysfunction in the diabetic *continuum*: association with insulin resistance, metabolic syndrome and type 2 diabetes

Fontes-Carvalho *et al. Cardiovascular Diabetology* (2015) 14:4
DOI 10.1186/s12933-014-0168-x

Ricardo Fontes-Carvalho[1,2,3*], Ricardo Ladeiras-Lopes[2,3], Paulo Bettencourt[4,5], Adelino Leite-Moreira[3,6] and Ana

Table 2 Diastolic dysfunction parameters according to quartiles of insulin resistance and metabolic syndrome status

	Diastolic function parameters			
	E' velocity	E/E' ratio	E/A ratio	DT
Insulin resistance				
(HOMA-IR score)				
Quartile 1	11.3 ± 3.3	6.8 ± 2.6	1.03 ± 0.37	232.8 ± 52.8
Quartile 2	10.7 ± 2.9	7.1 ± 2.3	0.97 ± 0.28	233.2 ± 50.4
Quartile 3	10.1 ± 3.6	7.6 ± 2.7	0.92 ± 0.27	240.8 ± 69.5
Quartile 4	9.8 ± 3.0	8.1 ± 3.1	0.92 ± 0.35	245.5 ± 54.3
No Metabolic Syndrome (n = 571)	11.2 ± 3.3	6.9 ± 2.3	1.01 ± 0.32	232.3 ± 56.9
Metabolic Syndrome without T2DM (n = 331)	9.7 ± 3.1	7.8 ± 2.7	0.88 ± 0.25	248.4 ± 57.2
Metabolic Syndrome with T2DM (n = 123)	9.2 ± 2.8	9.0 ± 3.6	0.95 ± 0.46	237.9 ± 52.7
p for trend	$p < 0.001$	$p < 0.001$	$p < 0.001$	$p = 0.002$

DT - deceleration time; T2DM - type 2 diabetes mellitus; HOMA-IR - Homeostasis Model Assessment of Insulin Resistance.
Results are presented as mean ± standard deviation.

European Journal of Echocardiography (2011) 12, 857–864
doi:10.1093/ejechocard/jer157

Assessment of the American Society of Echocardiography-European Association of Echocardiography guidelines for diastolic function in patients with depressed ejection fraction: an echocardiographic and invasive haemodynamic study

Hisham Dokainish[1]*, John S. Nguyen[2], Jaromir Bobek[2], Rajiv Goswami[2], and Nasser M. Lakkis[2]

Table 2 Echocardiographic and Doppler variables

Variable	LV pre-A <15 mmHg (n = 18)	LV pre-A ≥15 mmHg (n = 44)	P-value
LV diastolic dimension (cm)	5.3 ± 0.9	5.6 ± 0.6	0.17
Left ventricular mass index (g/m^2)	112.1 ± 35.3	117.2 ± 41.2	0.70
Left atrial volume index (mL/m^2)	36.2 ± 10.2	44.8 ± 14.8	0.04
Right ventricular diastolic dimension (cm)	3.6 ± 0.6	4.1 ± 0.5	0.04
Right atrial volume index (mL/m^2)	21.9 ± 10.2	28.5 ± 7.8	0.08
Left ventricular ejection fraction (%)	33.3 ± 6.4	25.3 ± 6.2	0.009
Mitral *E* (cm/s)	70.9 ± 14.6	91.5 ± 15.3.0	0.002
Mitral *A* (cm/s)	72.5 ± 18.0	64.3 ± 17.1	0.30
Mitral *E/A*	0.9 ± 0.3	1.7 ± 0.3	0.006
Mitral deceleration time (cm/s)	224.6 ± 47.2	169.2 ± 44.9	0.001
Pulmonary artery systolic pressure (mmHg)	30.7 ± 7.2	45.0 ± 9.1	<0.001
Mitral *E/e′* septal annulus	14.9 ± 3.1	23.5 ± 5.9	0.001
Mitral *E/e′* lateral annulus	13.2 ± 3.3	18.1 ± 5.2	0.01
Mitral *E/e′* average of annuli	14.0 ± 3.2	20.8 ± 5.5	0.004

A, mitral late diastolic velocity; *E*, peak early mitral inflow velocity; *e′*, tissue Doppler peak early mitral diastolic velocity.

Quantitative Analysis of Right Ventricular (RV) Function With Echocardiography in Chronic Heart Failure With No or Mild RV Dysfunction

Comparison With Cardiac Magnetic Resonance Imaging

Enrico Vizzardi, MD, Ivano Bonadei, MD, Edoardo Sciatti, MD, Natalia Pezzali, MD, Davide Farina, MD, Antonio D'Aloia, MD, Marco Metra, MD, FESC

Table 4. Linear Regression Analysis Between Systolic Echocardiographic and Cardiac MRI Parameters

	RVEF		RVSV		RVEDV		RVESV	
Parameter	***P***	β	***P***	β	***P***	β	***P***	β
TAPSE	.001	0.546	.022	0.409	.415	−0.152	.058	−0.344
SmTDI	<.001	0.787	.018	0.423	.245	−0.215	.003	−0.516
Tissue strain	<.001	0.608	.064	0.337	.012	−0.448	<.001	−0.623
2D strain	<.001	0.769	.060	0.341	.010	−0.453	<.001	−0.723

Abbreviations are as in Table 3.

Classification of left ventricular size: diameter or volume with contrast echocardiography?

echocardiography?. *Open Heart* 2014;**1**:e000147. doi:10.1136/openhrt-2014-000147

Patrick H Gibson, Harald Becher, Jonathan B Choy

Table 1 Study population characteristics

	Total (n=2008)	Male (n=1215)	Female (n=793)	p Value
Age (years)	62 (53–72)	64 (54–73)	59 (52–70)	<0.001
Height (m)	1.70 (1.63–1.78)	1.76 (1.71–1.80)	1.62 (1.57–1.66)	<0.001
Weight (kg)	85 (73–100)	91 (80–106)	73 (64–86)	<0.001
BSA (m^2)	2.01 (1.82–2.21)	2.12 (1.97–2.29)	1.82 (1.67–1.99)	<0.001
BMI (kg/m^2)	29.0 (25.3–33.4)	29.4 (26.2–33.6)	28.0 (24.0–33.1)	<0.001
LVIDD	5.0 (4.5–5.7)	5.4 (4.8–6.0)	4.6 (4.2–5.0)	<0.001
LVIDD index	2.5 (2.2–2.9)	2.5 (2.2–2.9)	2.5 (2.3–2.9)	0.812
LVEDV	132 (103–176)	155 (121–198)	107 (89–130)	<0.001
LVEDV index	65.2 (53.0–84.6)	72.0 (57.0–94.0)	58.5 (49.3–69.7)	<0.001
LVEF	51 (35–62)	45 (32–57)	60 (45–67)	<0.001

BMI, body mass index; BSA, body surface area; LVEDV, left ventricular end-diastolic volume; LVEF, left ventricular ejection fraction; LVIDD, left ventricular internal diameter in diastole.

openheart

Classification of left ventricular size: diameter or volume with contrast echocardiography?

Open *Heart* 2014;**1**:e000147. doi:10.1136/openhrt-2014-000147

Patrick H Gibson, Harald Becher, Jonathan B Choy

Table 5 Classification of LV (normal or dilated) by different measures of LV size

	LVEDV index			
	Normal	**Dilated**	**κ**	**p Value**
LVIDD				
Normal	1225	346	0.472	<0.001
Dilated	91	346		
LVIDD index				
Normal	1297	502	0.312	<0.001
Dilated	19	190		
LVEDV				
Normal	939	47	0.580	<0.001
Dilated	377	645		

LV, left ventricular; LVEDV, LV end-diastolic volume; LVIDD, LV internal diameter in diastole.

How might this impact on clinical practice?

- LV diameter should be used with caution as a measure of cardiac size. Volumetric assessment may be more appropriate particularly in heart failure and valvular heart disease for diagnosis, clinical decision-making and assessing response to therapy.

Table II. Echocardiographic examination results

Parameter	II stage (n = 25)	III stage (n = 30)	IV stage (n = 28)	V stage/dialysis (n = 35)	Va
IVSd [mm]	13.0 (12.0–14.2)[9]	13.0 (12.0–13.2)[9]	13.0 (12.0–14.7)[9]	16.0 (15.0–17.0)	< 0.0001
IVSs [mm]	15.0 (14.7–17.0)[9]	16.0 (14.0–16.2)[9]	16.0 (14.2–17.7)[9]	18.0 (18.0–19.0)	< 0.0001
LV mass [g]	268.0 ±47.6[9]	287.8 ±70.3[9]	298.1 ±86.0[9]	432.7 ±122.4	< 0.0001
LV hypertrophy	25 (100%)	30 (100%)	28 (100%)	30 (100%)	NS
LV systolic [mm]	37.3 ±4.5[9]	41.0 ±6.2[9]	38.9 ±6.2[9]	51.2 ±8.9	< 0.0001
LV diastolic [mm]	44.7 ±4.1	48.5 ±6.7[8]	47.1 ±5.6[7]	43.1 ±8.8	0.004
LA diameter [mm]	40.4 ±2.0[5,9]	41.9 ±2.7[9]	42.3 ±3.2	44.8 ±3.1	< 0.0001
RV diameter [mm]	25.9 ±2.5[9]	26.8 ±4.0[8]	26.5 ±2.9[9]	29.9 ±2.9	< 0.0001
E/E'	6.7 ±1.5	8.9 ±2.4[1]	11.5 ±4.0[3,5]	13.5 ±5.0	< 0.0001
E/A	0.80 (0.75–0.90)	0.80 (0.70–0.90)[8]	0.80 (0.60–1.20)	0.96 (0.81–1.31)	0.007
Deceleration time [ms]	247.2 ±34.5[6]	225.6 ±43.2	197.4 ±61.0[7]	269.0 ±135.6	0.0005
Diastolic disturbances (relaxation disturbances)	24 (96.0%)	29 (96.7%)[4]	22 (78.6%)[8]	19 (54.29%)	0.005
EF%	56.0 (55.0–60.0)[1,4,9]	50.0 (50.0–55.0)[9]	50.0 (50.0–55.0)[9]	45.0 (40.0–50.0)	< 0.0001

[1]$p < 0.05$; [2]$p < 0.01$; [3]$p < 0.001$ in comparison to stage III; [4]$p < 0.05$; [5]$p < 0.01$; [6]$p < 0.001$ in comparison to stage IV; [7]$p < 0.05$; [8]$p < 0.01$; [9]$p < 0.001$ in comparison to stage V.

Heart function disturbances in chronic kidney disease – echocardiographic indices

Beata Franczyk-Skóra[1], Anna Gluba[1,2], Robert Olszewski[3], Maciej Banach[2,4], Jacek Rysz[1,2]

Arch Med Sci 2014; 10, 6: 1109–1116
DOI: 10.5114/aoms.2014.47822

Arch Med Sci 2014; 10, 6: 1109–1116
DOI: 10.5114/aoms.2014.47822

Beata Franczyk-Skóra[1], Anna Gluba[1,2], Robert Olszewski[3], Maciej Banach[2,4], Jacek Rysz[1,2]

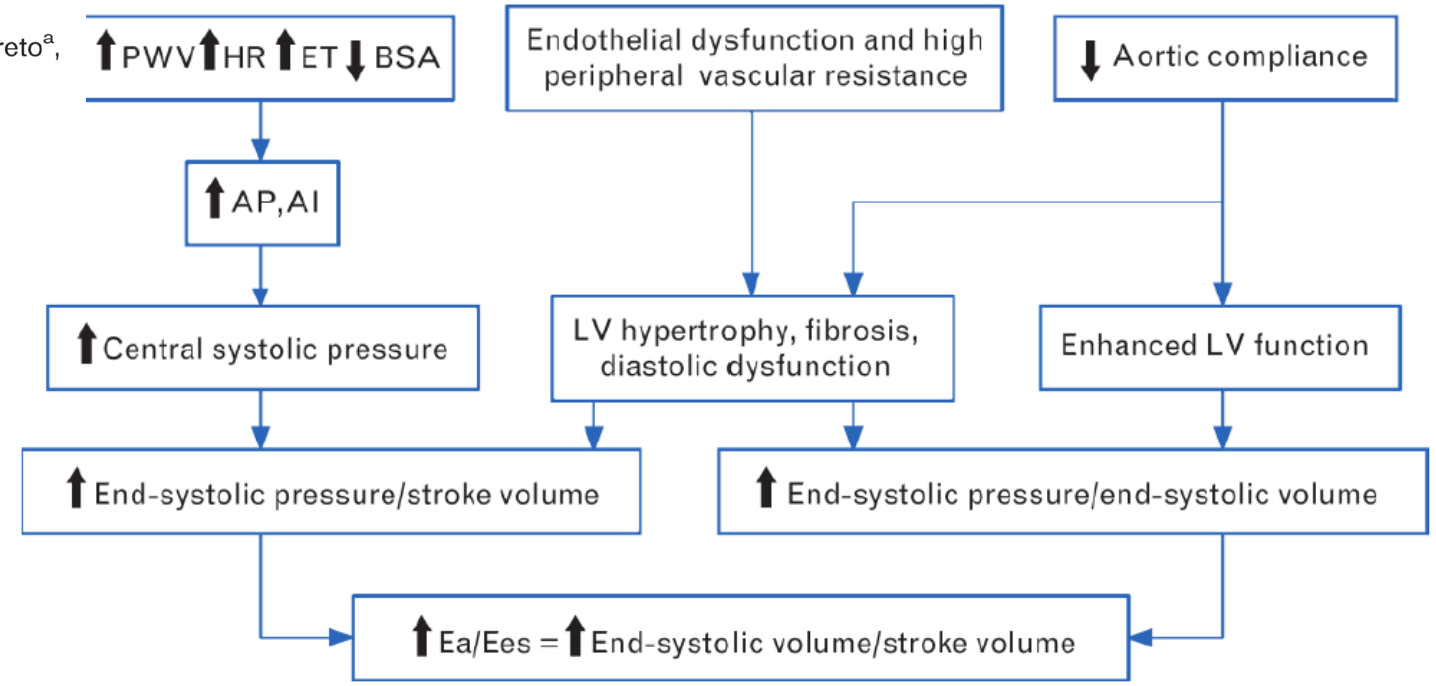
Table III. Results of comparison of echocardiographic indices before and after dialysis

Parameter	Pre-HD	Post-HD	Value of *p*
Left atrial volume VLA	34.9 ±21.1	34.4 ±20.9	NS
Right atrial volume VRA	31.4 ±19.6	30.5 ±18.0	NS
E' (LV)	9.4 ±4.0	9.0 ±4.7	NS
E/E' (LV)	13.5 ±5.0	10.2 ±4.7	0.002
E' (RV)	12.5 ±5.4	12.5 ±5.4	NS
E/E' (RV)	8.0 ±5.0	8.3 ±6.0	NS
E/A (LV)	0.8 (0.7–0.9)	0.8 (0.8–0.9)	NS
SPAP	27.0 ±17.2	27.0 ±17.2	NS

New diagnostic perspectives on heart failure with preserved ejection fraction: systolic function beyond ejection fraction

Maria Chiara Todaro[a], Bijoy K. Khandheria[b], Luca Longobardo[a], Concetta Zito[a], Maurizio Cusmà-Piccione[a], Gianluca Di Bella[a], Lilia Oreto[a], Moemen Mohammed[a], Giuseppe Oreto[a] and Scipione Carerj[a]

J Cardiovasc Med 2014, 15:000–000



Determinants of ventricular–arterial coupling increase in heart failure with preserved ejection fraction.AI, augmentation index; AP, augmentation pressure; BSA, body surface area; Ea, arterial elastance; Ees, end-systolic ventricular elastance; ET, ejection time; HR, heart rate; LV, left ventricular; PWV, pulse wave velocity.

Table 1 Grading of diastolic dysfunction according to 'Recommendations for the Evaluation of Left Ventricular Diastolic Function by Echocardiography'[13]

Diastolic dysfunction	E/A	E/A decrease after Valsava Maneuver	E wave deceleration time (msc)	S/D	Ar Vel (msc)	isovolumic relaxation time (msc)	E/e'
Mild (I)	0.8	<50%	>200	>1	<30	>100	<8 Average and lateral
Moderate (II)	0.8–1.5	>50%	150–200	<1	>30	<100	9–12 Average
Severe (III)	>2	–	<160	<1	>30	<60	>13 Average; >15 septal; >12 lateral

Ar Vel, Pulmonary A wave velocity; e', tissue Doppler septal mitral annulus; E/A, early transmitral peak velocity wave/late trans-mitral peak velocity wave; S/D, peak velocity of pulmonary systolic wave/peak velocity of pulmonary diastolic wave.

Correlations of the changes in bioptic findings with echocardiographic, clinical and laboratory parameters in patients with inflammatory cardiomyopathy

Jan Krejci · Petr Hude · Hana Poloczkova · Vita Zampachova · Radka Stepanova · Tomas Freiberger · Eva Nemcova · Lenka Spinarova

Heart Vessels
DOI 10.1007/s00380-014-0618-0

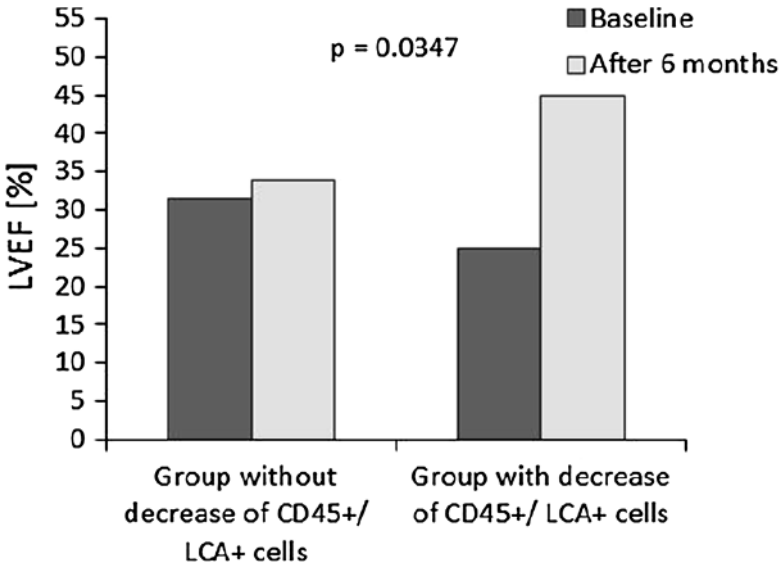


Table 3 Predictors of left ventricular systolic function improvement

Parameter (baseline)	Univariate regression		Multivariate regression	
	Odds ratio (95 % CI)	*p* value	Odds ratio (95 % CI)	*p* value
E (cm/s)	0.93 (0.89–0.98)	0.003	0.89 (0.83–0.96)	0.002
TAPSE (mm)	0.77 (0.62–0.95)	0.013	0.61 (0.43–0.86)	0.005
Symptoms duration (months)	0.72 (0.49–1.06)	0.096	ns	ns
EDV (ml)	0.99 (0.98–1.00)	0.099	ns	ns
LVEF (%)	0.92 (0.85–1.00)	0.050	ns	ns
Age (years)	1.05 (1.00–1.11)	0.056	ns	ns