

The correlation of ESC 2016 diastolic guidelines with invasively measured left ventricular filling pressure

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Funding Acknowledgements: Type of funding sources: Public hospital(s). Main funding source(s): Al-mouwasat University Hospital, University Heart Surgery Center in Damascus, Syrian Arab Republic.

Background: left ventricular (LV) diastolic function and filling pressure assessment is a challenge. ESC 2016 diastolic guidelines handles with this issue. Validation of and comparing the correlation between this guidelines and invasively measured different waves may add a step forward in the assessment, prognosis and treatment of LV diastolic function by echo.

Purpose: this study validates of the correlation of ESC 2016 left ventricular filling pressure echo guidelines with invasively measured left ventricular end-diastolic pressure and left ventricular pre-a.

Methods: 124 patients who accepted to participate for this study underwent transthoracic echocardiography immediately before left heart catheterization. This study obtained echo parameters to assess LV filling pressure according to ESC 2016 algorithms. It also obtained left ventricular end-diastolic pressure (LVEDP) and LV pre-a waves during catheterization. It analyzed the data and compared the results.

Results: Correlations of grading system (normal, abnormal parameters 1,2 and 3 present) with LV pre-a and LVEDP waves were ($P = < 0.0001$ $r = 0.47$, $P = 0.0027$ $r = 0.41$), respectively. After excluding group of patients with only one abnormal parameter as indeterminate group, pressure assessment guidelines correlations with the presence of LV pre-a and LVEDP waves were ($P = 0.0009$ OR = 31.76, $p = 0.0170$ OR = 36.00), respectively. Means difference of LV pre-a and LVEDP waves between pressure guidelines presence and absence two groups were (LV pre-a: 12.72, 7.52, $P < 0.0001$ and LVEDP: 21.03 10.36, $P = 0.0043$), respectively. All results are summarized in (Table:1 + 2+3 + 4+5).

Conclusion: ESC 2016 guidelines pressure assessment correlated strongly with both LV pre-a and LVEDP waves which means that the higher the number of abnormal echo parameters is resulted by echo guidelines, the higher the LV pre-a or LVEDP is presented invasively. Different approaches had different diagnostic accuracy, the best specific was cutoff ≥ 2 abnormal echo parameters and the best sensitive and overall accuracy was still cutoff ≥ 2 but after excluding only one abnormal echo parameter group as indeterminate group. The difference between means between echo guidelines pressure assessment was more significant statistically in LV pre-a wave than in LVEDP.

Abstract Figure.

ESC 2016 diastolic grading system	LV pre-a		LVEDP	
	P value	r	P value	r
Normal, 1, 2, 3 or 4 abnormal parameters	< 0.0001	0.49	0.0027	0.41
Grade 1, 2, 3 and 4	0.0128	0.33	0.0786	0.26

LV: left ventricular, LVEDP: left ventricular end-diastolic pressure, ESC: European Society of Cardiology andr: Spearman correlation.

ESC 2016 pressure assessment	LV pre-a		LVEDP	
	P value	OR	P value	OR
Guidelines 3or more abnormal parameters presence	0.0291	5.35	0.1405	5.33
Guidelines 2or more abnormal parameters presence	0.0077	4.48	0.2418	2.20
Guidelines any abnormal parameters presence	0.8005	0.80	0.0269	11.67
Guidelines 2or more abnormal parameters presence after excluding only one abnormal parameter as indeterminate	0.0009	31.76	0.0170	36.00

LV: left ventricular, LVEDP: left ventricular end-diastolic pressure, ESC: European Society of Cardiology and OR: odds ratio.

Continuous variants	Pressure present Mean $\pm$ SD	Pressure absent Mean $\pm$ SD	P value
LV pre-a wave	12.72 $\pm$ 3.29	9.87 $\pm$ 5.70	0.0017
LVEDP wave	21.03 $\pm$ 6.22	18.10 $\pm$ 9.62	0.0432

LV: left ventricular, LVEDP: left ventricular end-diastolic pressure, ESC: European Society of Cardiology and SD: standard deviation.

Abstract Figure.

Table 5: diagnostic accuracy of ESC 2016 diastolic HFpEF guidelines for pressure diagnosis				
Type of approach	Sensitivity LV pre-a/ LVEDP	Specificity LV pre-a/ LVEDP	NPV LV pre-a/ LVEDP	PPV LV pre-a/ LVEDP
Diastolic dysfunction presence	0.71/ 0.97	0.26/ 0.25	0.52/ 0.80	0.44/ 0.74
2or more abnormal presence vs. normal or only one abnormal echo parameter	0.58/ 0.50	0.76/ 0.69	0.76/ 0.38	0.58/ 0.78
2or more abnormal presence vs. normal echo parameter (after excluding only one abnormal group as indeterminate)	1.00/ 0.90	0.52/ 0.80	1.00/ 0.80	0.58/ 0.90

LV: left ventricular, LVEDP: left ventricular end-diastolic pressure, ESC: European Society of Cardiology, NPV: negative predictive value and PPV: positive predicting value.