

Echocardiography in the diagnosis of pulmonary hypertension after acute pulmonary embolism – gold standard or merely standard?

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5th European Spring School on the Science and Practice of Venous Thromboembolism. Krete 2021

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Abstract:

Introduction: Symptomatic pulmonary embolism (PE) survivors should be screened with subsequent imaging diagnosis. Echocardiography is recommended as the first step. Its main contribution is to estimate the probability of the presence of pulmonary hypertension (PH). Patients with low probability should be followed up with echocardiography, whereas those with a higher level of probability, RHC may be considered.

Material and Methods: We analyzed data of consecutive 555 symptomatic PE survivors, who completed at least 6 months of anticoagulation. All patients were submitted to transthoracic echocardiography and underwent diagnostic workup which included lung scintigraphy, pulmonary functional tests, cardiopulmonary exercise test and chest CT, RHC and coronary angiography when appropriate.

Results: Eventually, out of 555 symptomatic PE survivors (325 F, aged 66 ± 16 yrs) chronic thromboembolic pulmonary hypertension (CTEPH) was diagnosed in 36 cases, chronic thromboembolic disease (CTED) in 22 pts. Follow up echocardiographic examination aimed to assign a level of probability of PH and to detect alternative potential cases of functional impairment.

High echocardiographic probability of PH was detected in 69 of 555 PE functionally impaired survivors, intermediate in 111 and low probability in 375 subjects.

In group of high probability CTEPH was final diagnosis only in 25 cases (25/69). Eventually others patients with high probability of PH were diagnosed with heart failure with reduced ejection fraction (HFrHF) (4 subjects), 1 patient suffered from valvular heart disease and HFrEF, isolated diastolic left ventricular dysfunction was found in 13 cases, valvular heart disease in 6 subjects and in 6 of them CTED was diagnosed; coronary artery disease, chronic obstructive pulmonary disease, arrhythmia was found in 14 others.

Table 1. Echocardiographic probability of pulmonary hypertension according ESC 2015 guidelines in 555 PE survivors with functional impairment

echocardiographic probability of PH	symptomatic PE survivors N / %	CTEPH N / %	CTED N / %
High (N)	69 / 12%	25 / 69%	6 / 27%
Intermediate (N)	111 / 20%	9 / 25%	5 / 23%
Low (N)	375 / 68%	2 / 6%	11 / 50%
Total:	555 / 100%	36 / 100%	22 / 100%

PH - pulmonary hypertension, CTEPH chronic thromboembolic pulmonary hypertension, CTED - chronic thromboembolic disease, PE – pulmonary embolism

Table 2. Diagnostic value of echocardiographic PH probability in the diagnosis of CTEPH.

	CTEPH			
	PPV	NPV	SENS	Spec
High PH echo probability	71,4%	90,7%	36,2%	97,7%
Intermediate or high PH echo probability	97,1%	69,2%	19%	99,7%

Conclusion: Although majority of patients diagnosed with CTEPH presented high echocardiographic PH probability, nine subjects showed intermediate echocardiographic PH probability. Of note two cases of mild CTEPH were diagnosed with low echocardiographic probability. Current ESC guidelines underline the role of echocardiography for the assessment of PH probability, while it has a limited value in the diagnosis of specific cause leading to PH.