

The Role of Echocardiography in diagnostic of acute pulmonary embolism in intensive care unit “case report”.

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Abstract:

We present a case of a patient hospitalized at the intensive care unit (ICU) demonstrating the role of an echocardiogram in the diagnosis of pulmonary embolism (PE) when potential reference imaging is not feasible. A 64-year-old woman was admitted to the Emergency Department of Ibn Rochd University hospital after experiencing chest pain at home. On admission, physical examination revealed borderline hemodynamics, in the high probability of having pulmonary thromboembolism (PE), A bedside transthoracic echocardiography was carried out demonstrating aspects in favor of Acute Cor Pulmonale and a clear thrombus intra-right ventricle and intrapulmonary artery. Thrombolytic treatment was given with unfractionated heparin. After 2 weeks of treatment in the hospital, she was sent home on oral NACO therapy. Now she is under long-term follow-up by our Department of cardiology. the etiology of the EP was correctly diagnosed as it was found to be breast cancer.

Pulmonary embolism is one of the most common causes of death. For the diagnosis of acute PE, various imaging modalities have been seen as potential references however Angiography is the test of choice but echocardiography may appear to be an interesting alternative Because of its non-invasive nature, ubiquity, and ability to be performed at the bedside. The role of echocardiography in the diagnosis of acute pulmonary embolism has long been the subject of research. There is a high specificity of multiple echocardiographic signs in the suspicion of acute pulmonary embolism in the type of finding of thrombus in the right heart, McConnell's sign, paradoxical septal movement, and RV free wall hypokinesis. Even if it's performed by non-cardiologists, these echocardiography signs remain highly specific. Other signs have been reported such as the 60/60 sign, Pulmonary arterial hypertension (PAH), RV to left ventricle ratio (RV:N), the dilatation of RV end-diastolic diameter (RVEDD), abnormal or paradoxical septal motion (septal), RHT is found in about 2-4% of patients having echocardiography for acute PE. In unstable patients with suspected acute PE, early echocardiography is recommended to confirm the cause of hypotension when reference imaging is not feasible.

The below case illustrates the importance of considering TTE in the diagnosis of PE. Research may be able to better define the place of bedside echocardiography in the overall management of pulmonary embolism

Key Words: Pulmonary Embolism, Echocardiography, Emergency Department, Case report

Date of Submission: 01-02-2023

Date of Acceptance: 11-02-2023

I. Introduction

We present a case of a patient hospitalized at the intensive care unit (ICU) demonstrating the role of an echocardiogram in the diagnosis of pulmonary embolism (PE), which may be appropriate as a routine bedside test in critical care settings such as the emergency department and ICU for patients with suspected PE, especially those who cannot undergo other confirmatory tests.

II. Observation

A 64-year-old woman with no previous medical history was admitted to the Emergency Department of Ibn Rochd University hospital after experiencing chest pain at home. The patient was in normal health until she suddenly collapsed. On admission, physical examination revealed borderline hemodynamics, room air oxygen saturation at 83%, and sinus tachycardia on ECG. Meanwhile, in the high probability of having pulmonary thromboembolism (PE), A bedside transthoracic echocardiography was carried out demonstrating aspects in favor of Acute Cor Pulmonale (figure N°1 to N°8) and a clear thrombus intra-right ventricle and intrapulmonary artery (figure N°1). Thrombolytic treatment was given with unfractionated heparin. A Blood sample was taken before treatment to be used for biological testing. On evolution, after 2 weeks of treatment in the hospital, she was sent home on oral NACO therapy. The patient's long-term follow-up was now being carried out by our cardiology department. We learned that the patient had been doing well for one month after this event. Following the investigation, the etiology of the EP was correctly diagnosed as it was found to be breast cancer.

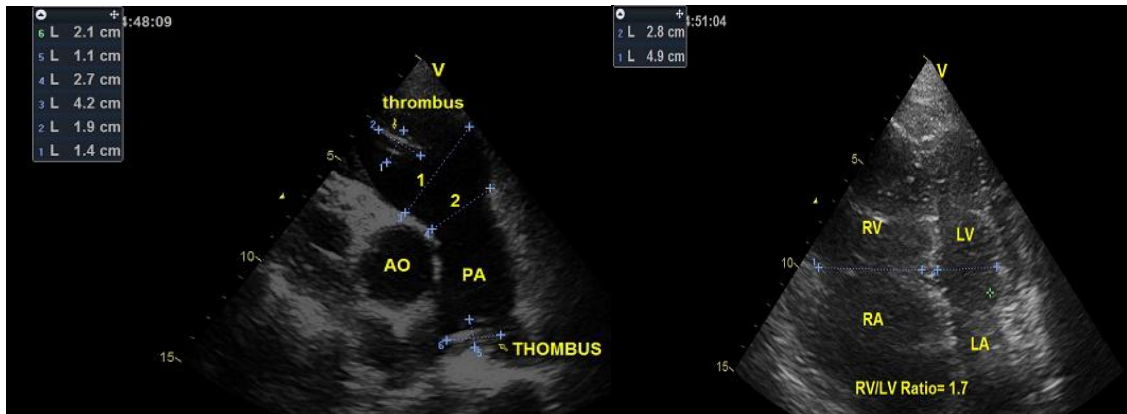


Figure N°1

Figure N°2

Figure N°1: PSAX view in echocardiography showed the presence of two thromboses, one intra-right ventricle near the infundibulum measured 21X11 mm and the second intrapulmonary artery near the bifurcation measured 19X14mm.

1: Dilatation the right ventricle infundibulum for 42 mm

2: Dilatation of the pulmonary artery for 27 mm.

Figure N°2: 4-chambers view in echocardiography showed the dilatation of the right cavities with RV/LV Ratio >1, the LV is crushing by the dilatation of the right cavities.

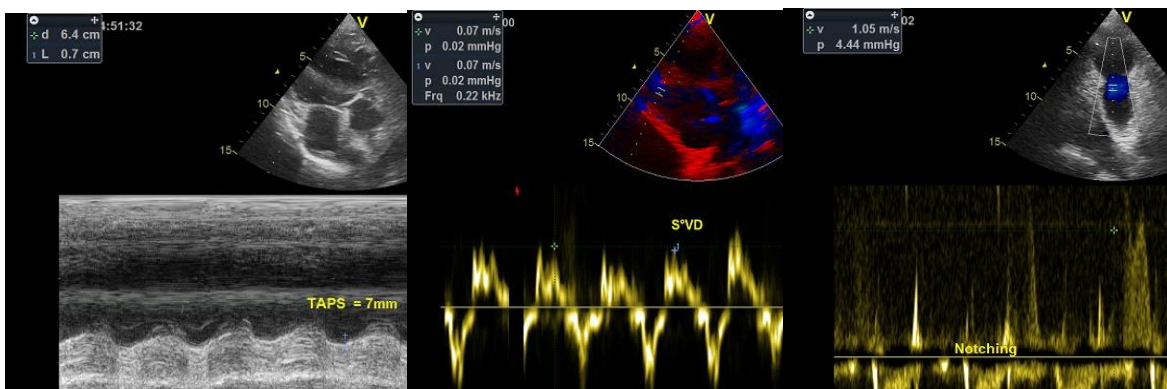


Figure N°3

Figure N°4

Figure N°5

Figure N°3: TAPSE is a longitudinal function parameter of the right ventricle acquisition by a simple TM-shot at the level of the tricuspid ring. In our case, it was TAPSE <7 mm reflects severe RV dysfunction.

Figure N°4: The peak S wave in pulsed tissue Doppler mode at the tricuspid annulus also explores the longitudinal contraction of the VD and it's about 7m/s. Peak S correlates well with cardiac MRI measurement of RV function. A peak S of less than 9.5 cm/s indicates right ventricular dysfunction.

Figure N°5: PW Doppler signal obtained in the right ventricular outflow, the spectrum shows an early peak with notching.

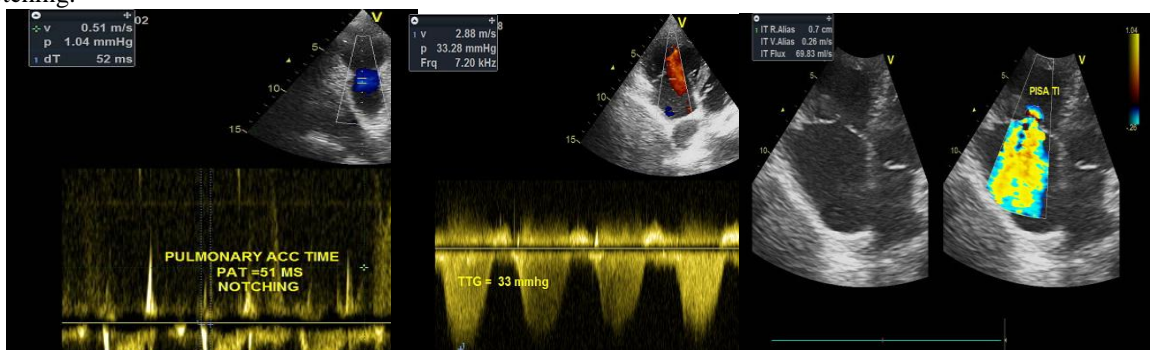


Figure N°6

Figure N°7

Figure N°8

Figure N°6: PW Doppler signal obtained in the right ventricular outflow tract, and the Pulmonary acceleration time (PVAT) is significantly shortened (52 msec).

Figure N°7: Tricuspid regurgitation jet gradient of 33 mmHg (less than of 60 mmHg), TR velocity is about 2:88 m/s (less than of 3.9 m/sec), both signs are in favor of PE.

Figure N°8: color Doppler obtained on the Tricuspid valve showed massive Tricuspid regurgitation by dilatation of the tricuspid ring suite of right cavities dilatation.

III. Discussion

Pulmonary embolism is one of the most common causes of death. However, it remains a challenging diagnosis. For the diagnosis of acute PE, various imaging modalities have been seen as potential references, including Angiography, ventilation-perfusion scanning, surgery or autopsy. However, Angiography is the test of choice [1]. However, because of its non-invasive nature, ubiquity, and ability to be performed at the bedside, echocardiography may appear to be an interesting alternative. The role of echocardiography in the diagnosis of acute pulmonary embolism has long been the subject of research [2]. However, specific echocardiographic signs of RV have the potential to improve the prognostic value beyond the existing risk models.

There is a high specificity of multiple echocardiographic signs in the suspicion of acute pulmonary embolism in the type of finding of thrombus in the right heart (Figure N°1), McConnell's sign (pronounced akinesia of the mid free wall with normal motion at the apex), paradoxical septal motion and RV free-wall hypokinesia. Even if it's performed by non-cardiologists, these echocardiography signs remain highly specific [2]. Other signs have been reported such as the 60/60 sign [3]:

- tricuspid regurgitation jet gradient of less than 60 mmHg or TR velocity less than 3.9 m/sec,
- and pulmonary flow acceleration time of <60 msec.

Other signs also on favor: Pulmonary arterial hypertension (PAH), RV to left ventricle ratio (RV/LV), the dilatation of RV end-diastolic diameter (RVEDD), abnormal or paradoxical septal motion (septal), Tricuspid regurgitation, alteration of the tricuspid annular plane systolic excursion (TAPSE), and the elevation of the RV systolic pressure (RVSP). inferior vena cava distension, RV isovolumetric acceleration, and LV end-diastolic diameter [4].

Right heart thrombus (RHT) is found in about 2-4% of patients having echocardiography for acute PE. No prospective study has assessed the true incidence among all patients with PE, but it appears to be much more common in hypotensive patients (up to 20%). The presence of a RHT clearly increases the risk of short-term mortality in acute PE, with mortality rates approaching 20% [5]. M-mode TAPSE has been proven to be a highly variable measure of RV systolic function and when it is below 15-16 mm, can independently predicted PE-related mortality. In addition, it's been shown to be a better predictor of acute PE-related mortality than the RV/LV ratio in normotensive patients [6].

In unstable patients with suspected acute PE, early echocardiography is recommended to confirm the cause of hypotension when references imaging is not feasible [7]. Based on our experience, we suggest expanding the practice of echocardiography in the emergency department in such instable patients with high suspected PE, in whom TTE could confirm the etiology of their hemodynamic instability, and with certain echocardiographic findings it could distinguish acute from chronic pressure overload and exclude RV infarction.

IV. Conclusion

The below case illustrates the importance of considering TTE in the diagnosis of PE. More Research may be able to better define the place of bedside echocardiography in the overall management of pulmonary embolism.

Ethical approval

Consent written informed consent for the publication of this manuscript was obtained from the patient. publication was approved by the ethics committee of our institution.

Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Dr.Haless kamal, et. al. "The Role of Echocardiography in diagnostic of acute pulmonary embolism in intensive care unit "case report." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 22(2), 2023, pp. 31-34.