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# Ultrasonography on Detection of Massive Pulmonary Embolism as Cause of Cardiac Arrest

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## Commentary

Massive pulmonary embolism (MPE), defined as an acute Pulmonary Embolism (PE) with sustained hypotension, is estimated to occur in only 5% of cases of PE [1,2]. Of these 5% of cases, 10% to 20% of patients present with cardiac arrest, with a mortality rate of 65-90% [3,4]. The guidelines of the European Society of Cardiology and the American Heart Association, on cardiopulmonary resuscitation, indicate the benefits of employing cardiopulmonary thrombolytic therapy if the patient is assumed to have a high-risk patient presenting with shock or cardiac arrest [1,5,6].

In cases where the cause of cardiac arrest is PE, the use of thrombolysis and surgical or mechanical thrombectomy are considered reasonable treatment options [6]. However, it is difficult to correctly evaluate and select patients with PE as the one cause of cardiac arrest in real time [7]. There is no consensus as to the criteria (risk factors, signs and symptoms) which constitute a high-risk PE candidate for thrombolysis [6]. Yet, it is suggested that ultrasonography can provide support for medical emergencies, as this has proven to be a critical tool with which to identify the reversible causes of circulatory collapse, allowing physicians to make decisions in real time [6].

An emergency ultrasonography focused on the heart (FOCUS) is very useful to diagnose a massive PE in high-risk patients, and can also be very useful to guide management decisions. Although its usefulness has not been well established in cardiac arrest situations, it can be considered if a qualified professional is present and its use does not interfere with standard cardiopulmonary resuscitation [4,6]. The echocardiographic parameters describe a right ventricular overload whose signs are: growth of the ventricle and right atrium, hypokinesia of the free wall of the right ventricle (McConnell's sign), flattening and paradoxical movement of the interventricular septum, with the left ventricle presenting in the form of a 'D' [4]. These signs are associated with an increase in the risk of mortality (up to two times higher).

In our experience, the use of bed-side ultrasonography with shock or cardiac arrest patients, has led to more accurate diagnosis and rapid decision of treatment for probable reversible causes of pulseless electrical activity, such as PE. Currently, we are driving an ambi-directional cardiac arrest registry in the emergency department and hope to describe the utility of ultrasound and survival of patients with PE, before and after its implementation.

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