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Editorial

# The Identification and Management of Unsuspected Hemodynamically Unstable Pulmonary Embolism: The Need for Structured Multidisciplinary Teams

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*See article by Leis et al., page 940.e1–940.e3 of this issue.*

The management of pulmonary embolism (PE) has evolved over several decades, with improvements in clinical outcomes and the efficiency of service delivery. Many centres have advocated for and now deliver a highly coordinated regional service with direct access to specialized care, thus avoiding the inherent delays associated with a multistep referral chain.[1] Despite improvements in the management of lower-risk PE, submassive (with right ventricular dysfunction and elevated cardiac biomarkers) and massive (with persistent hypotension) PE continue to be associated with significant morbidity and mortality.[2]

In this issue of the *Canadian Journal of Cardiology*, Leis and colleagues describe an uncommon but important presentation to the cardiac catheterization laboratory.[3] In this case, the patient was taken to the catheterization lab for suspected acute coronary syndrome. Cardiac arrest ensued, and echocardiography showed severe right ventricular failure, prompting suspicion of acute PE and administration of tissue plasminogen activator (tPA). Pulmonary angiography confirmed large PEs and suction thrombectomy was successfully performed. The authors suggest that this case underscores the unique benefit of the catheterization lab in making diagnoses and implementing advanced therapies.

Conventional pulmonary angiography, which can be performed in the catheterization lab or interventional radiology suite, is the historic gold standard for evaluation of pulmonary embolic disease. The ventilation-perfusion scan is valuable in the evaluation of acute PE and is the recommended test to rule out chronic thromboembolic disease.[4] However, technological improvements in computed tomography pulmonary angiography over the past 2 decades have allowed this diagnostic modality to supersede the ventilation-perfusion scan and pulmonary angiography as the most widely used method of diagnosing and evaluating PE. Nevertheless, when the initial working diagnosis is acute coronary disease and a patient is unstable, the use of conventional pulmonary angiography in the catheterization lab, as shown in this case, might be preferred. Several cautions should be raised with the use of pulmonary angiography in this context. First, there is limited training in performance of the procedure during an interventional cardiology training program. This concern speaks to the importance of multidisciplinary input in the evaluation and management of such cases. Second (although not in this case), awaiting pulmonary angiography might potentially delay essential therapy pending definitive diagnosis in an unstable patient. In many cases, clinical evidence of instability (such as hypotension and tachycardia), which might be supplemented by echocardiac findings of right ventricular dysfunction, is often sufficient to warrant consideration of thrombolysis in the unstable patient and such therapy might not need to be delayed for further imaging including pulmonary angiography.[2,5,6]

The management of a hemodynamically unstable patient who presents with acute PE is an evolving area of expertise with emerging evidence. Therapeutic interventions now also include low-dose catheter-guided thrombolysis, mechanical intervention (aspiration, fragmentation, or debulking of thrombus) and surgical thrombectomy/embolectomy.[7] Although supportive evidence for these alternate interventions remains limited, pulmonary angiography can play a role in the context of such interventions.[8,9]

As acknowledged by the authors, the use of a suction thrombectomy device, such as the Angiojet (Boston Scientific, Burlington, MA), is not the first-line approach because of lack of evidence, and the concurrent use of systemic thrombolysis is associated with significant bleeding risk.[10] Nonetheless, this case underscores the critical nature of such presentations and

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the benefit provided by rapid coordinated assessment from a multidisciplinary team with experience in the management of hemodynamically unstable acute PE, as suggested by the authors.

The development of such PE response teams (PERTs) has evolved over the past decade and they are now established in > 40 centres in the United States.[11] Furthermore, national collaborative efforts have led to the establishment of the PERT Consortium in the United States to advance clinical care and research for submassive and massive PE. Such a PERT would ideally include specialists that could include critical care medicine, hematology (thrombosis), surgery, diagnostic/interventional radiology, and cardiology with the purpose of providing expeditious assessment and the initiation of appropriate therapy.[12] The PERT model would fit well within the Canadian medical system and the critical care specialist might be the ideal candidate to quarterback a PERT in Canada. Such a model, although difficult to staff in smaller centres, might be reasonable to consider in larger Canadian centres.

The authors are to be commended for their aggressive multimodality approach to this massive PE case, resulting in a favourable outcome. Although just a single case, this report underscores the need for organized, proactive care of this life-threatening condition.

## Disclosures

The authors have no conflicts of interest to disclose.

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