

EDITORIAL COMMENT

Impella RP as Rescue Measure for Pulmonary Embolism With Hemodynamic Compromise*



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In this issue of *JACC: Case Reports*, Taha et al. (1) report the case of an 83-year-old woman who presented with bilateral pulmonary embolism (PE). Initially, the patient was hemodynamically stable with evidence of right ventricular (RV) strain on echocardiography and computed tomography (CT) imaging. Conservative management with heparin infusion was commenced. The patient then developed hemodynamic instability and underwent ultrasound-assisted catheter-directed thrombolysis, with no benefit. The decision was made to use mechanical circulatory support, and an Impella RP device (Abiomed, Danvers, Massachusetts) was deployed; this resulted in rapid hemodynamic improvement.

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PE is a common and often fatal problem. In the United States, the incidence of PE is estimated to be 115 cases per 100,000 population causing up to 300,000 deaths per year (2). The incidence increases 10-fold in octogenarians (2). With increasing longevity across the world, PE in the elderly will continue to be a challenge to health care providers.

In recently published comprehensive guidelines for PE management, the European Society of Cardiology and the European Respiratory Society recommend a risk-adjusted management algorithm, taking into consideration clinical severity, RV dysfunction, and other comorbidities (3). In these guidelines, thrombolysis is the recommended first-line therapy in

high-risk PE (hemodynamic instability, combined with PE confirmation on computed tomography-pulmonary angiogram [CT-PA] and/or evidence of RV dysfunction on echocardiography) or intermediate risk (RV dysfunction with elevated cardiac troponin levels) if there is a subsequent hemodynamic deterioration, as in the presented case (1). Intermediate-risk elderly patients with PE, however, experience more major bleeding after thrombolysis (4), rendering it an unattractive option in this cohort.

The European Society of Cardiology/European Respiratory Society guidelines (3) recommend other options when thrombolysis is not possible, including surgical thrombectomy or catheter-directed thrombolysis (CDT) as used here (1). Small studies of CDT in intermediate-risk PE showed good results with a small risk of major bleeding (5,6). A propensity score-matched analysis of CDT compared with systemic thrombolysis revealed better outcomes and less risk of bleeding (7), suggesting that it could be a viable alternative in the elderly. Surgical thrombectomy, on the other hand, requires cardiopulmonary bypass with significant risk in the older age group.

Mechanical circulatory support (MCS), specifically extracorporeal membrane oxygenation, is recommended as rescue therapy when all other options have failed (3), despite its significant risk of complications, including major bleeding. Impella RP is mentioned in the guidelines as another possible mode of MCS without explicit recommendation. Traditionally, MCS has been denied to the elderly due to the higher risk of complications. In this case, the team used the Impella RP with good outcome (1).

Impella RP is a microaxial pump inserted percutaneously to provide RV support by draining blood from the inferior vena cava and returning it in the pulmonary artery. It can provide >4 l/min flow for as long as 14 days. In acute RV failure, Impella RP improves

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hemodynamic performance and allows time for the right ventricle to recover from a variety of insults, with a good safety profile (8,9) and no reported major bleeding events (10). Also, the successful use of Impella RP in conjunction with other treatment modalities in high-risk PE has been reported in various case series (11-13). Impella RP is developing into a good RV support device with a potential role in the management of PE with hemodynamic compromise.

The case presented here (1) highlights multiple issues in the management of PE in the elderly:

1. PE can progress from mild respiratory symptoms to hemodynamic instability despite treatment.
2. Adequate anticoagulation and systemic thrombolysis pose a higher risk of major bleeding compared with CDT.
3. Impella RP could be beneficial in refractory cases as a bridge to RV recovery while other

strategies are implemented to reduce thrombus burden.

4. Further research is needed to explore new options in the management of high-risk PE (i.e., conventional treatment combined with MCS), and systemic thrombolysis versus CDT warrants further studies to examine the benefits and safety profile in various age groups.
5. Finally, it is a good reminder of an increasing aging population and the need to factor in the additional challenges associated with age, including higher rates of complications, in future research.

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