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Letter to the Editor

Thrombolysis for pulmonary embolism cardiac arrest after large hemispheric stroke: The lesser of two evils?



To the Editor:

Pulmonary embolism (PE) is a recognized cause of cardiac arrest with an unfavorable prognosis.¹ Although its incidence after ischemic strokes is not well known, PE cardiac arrest is likely a common cause of early deaths in these patients, particularly those with large hemispheric strokes.² Systemic thrombolysis is recommended by the European Resuscitation Council and the American Heart Association in patients with massive or submassive PE and deteriorating hemodynamics as it can increase the chance of survival by reducing the embolic burden.^{3,4} After major strokes, however, the use of thrombolytic therapy is not straightforward and must be carefully considered because of the risk for hemorrhagic transformation of the ischemic infarct or surgical bleeding from a decompressive craniectomy, should it be required.

When treating patients with major hemispheric strokes and PE cardiac arrest, clinicians should consider alternatives to systemic thrombolysis, outlined in Fig. 1. Mechanical thrombectomy and catheter-directed delivery of thrombolytic agents to the pulmonary artery can be considered and are reported to improve the pulmonary arterial pressure and systemic hemodynamics, as well as the right ventricular function.^{5–7} However, it requires catheterization equipment and a skilled multidisciplinary team that may not be readily available to all clinicians. Importantly, the patient must be stable enough to tolerate transfer to an angiography suite for fluoroscopic guided insertion of the catheter and its advancement into the affected artery. Hence, for most patients with PE cardiac arrest who fail to achieve a stable return of spontaneous circulation, systemic thrombolysis remains the only available treatment to reduce the embolic burden and improve the chance of survival.

Systemic thrombolysis is generally considered contraindicated after surgical procedures, including a decompressive hemicraniectomy. However, in a study of 134 postoperative patients requiring

intravenous thrombolysis for ischemic stroke the authors reported only a 7% incidence of surgical site hemorrhage, of whom only 3% were serious.⁸ A 2019 case report of PE after liver transplantation confirmed a sudden and pronounced bleeding with thrombolysis but confirmed a rapid stabilization of patient's hemodynamics with blood transfusion. The authors recommend consideration of systemic thrombolysis in these patients as a life-saving treatment.⁹ Similarly, Lampert and associates report systemic thrombolysis for submassive PE in a patient who had undergone a craniotomy for resection of a frontal lobe glioma multiforme.¹⁰ The patient's hemodynamics improved within 3 hours after thrombolytic treatment, but she sustained a 3 × 1.4 cm hemorrhage within the resection cavity. She was discharged later without new neurological deficits, supporting the notion that hemodynamic benefits of systemic thrombolysis may outweigh the risk of surgical hemorrhage or intracerebral hemorrhage.

In summary, a post-stroke, post-craniotomy patient with PE cardiac arrest may be considered for systemic thrombolysis as a life-saving treatment if alternative treatment options are not readily available. The risk of death from refractory cardiac arrest must be carefully weighed against the risk of death or disability from intracerebral hemorrhage and surgical bleeding. Larger studies are needed to establish the efficacy of thrombolysis in this subgroup of patients and the incidence and severity of hemorrhagic complications.

Author contribution

SE: Literature review, preparation of the figure and manuscript.

SK: Literature review, preparation of the manuscript.

AN: Literature review, preparation of the figure and manuscript.

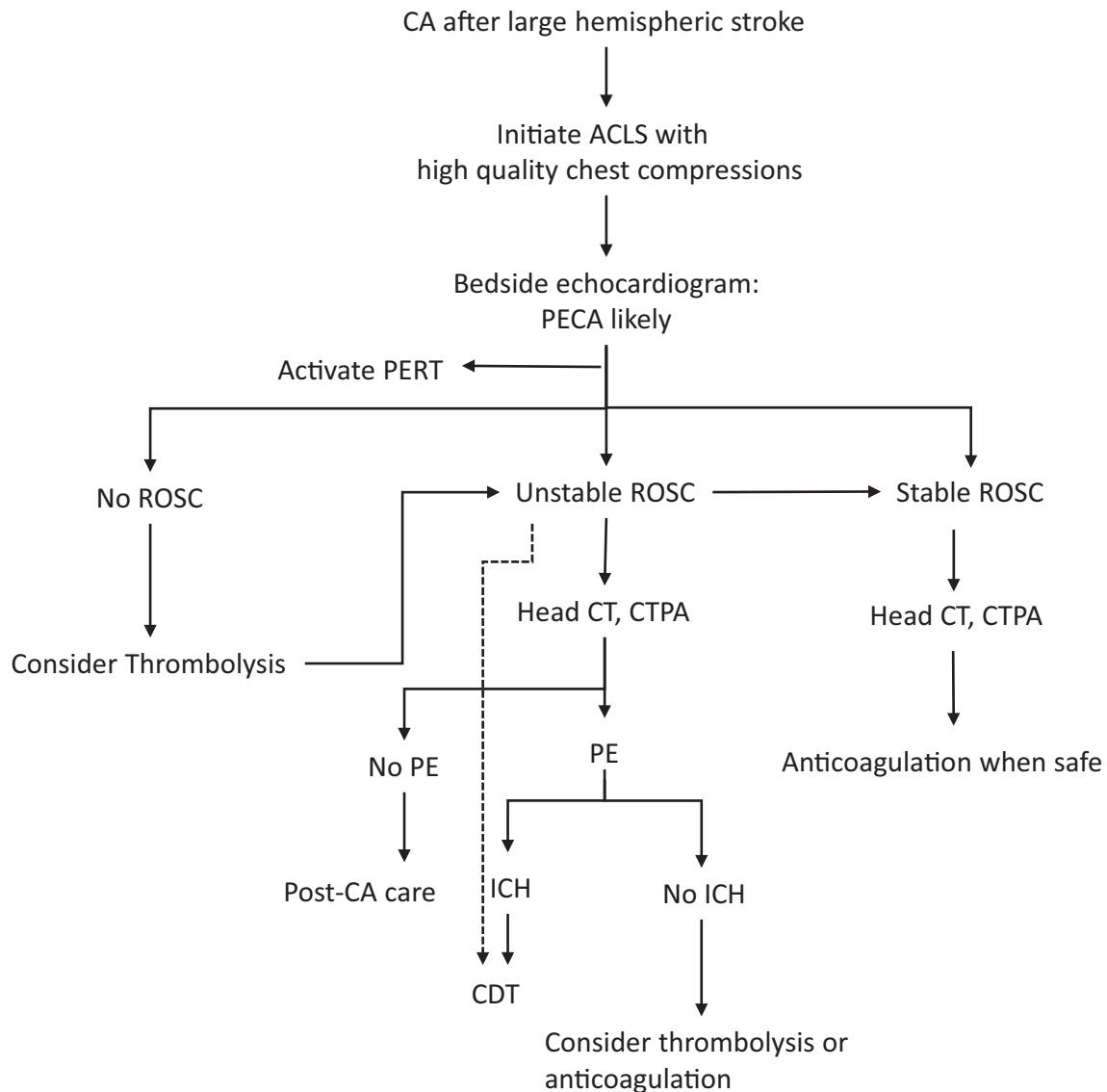


Fig. 1 – Suggested approach to patients with PE cardiac arrest after a large hemispheric stroke. CA: Cardiac arrest; ACLS: Advanced cardiac life support; PECA: Pulmonary embolism cardiac arrest; PERT: Pulmonary embolism response team; ROSC: Return of Spontaneous Circulation; CT: Computed tomography; CTPA: Computed tomographic pulmonary angiography; ICH: Intracerebral hemorrhage; CDT: Catheter directed therapy.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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