

Safety of Pulmonary Embolism Treatment with Ultrasound Assisted Catheter-Directed Thrombolysis (EKOS) in Neurointensive Care Patients at Risk for Hemorrhagic Complications

Kircher CE^{1,2}, Bonomo J^{1,2}, Ferioli S^{1,3}

¹University of Cincinnati (UC) Gardner Neuroscience Institute, ²UC Department of Emergency Medicine, Division of Critical Care, ³UC Department of Neurology

UNIVERSITY OF CINCINNATI GARDNER NEUROSCIENCE INSTITUTE

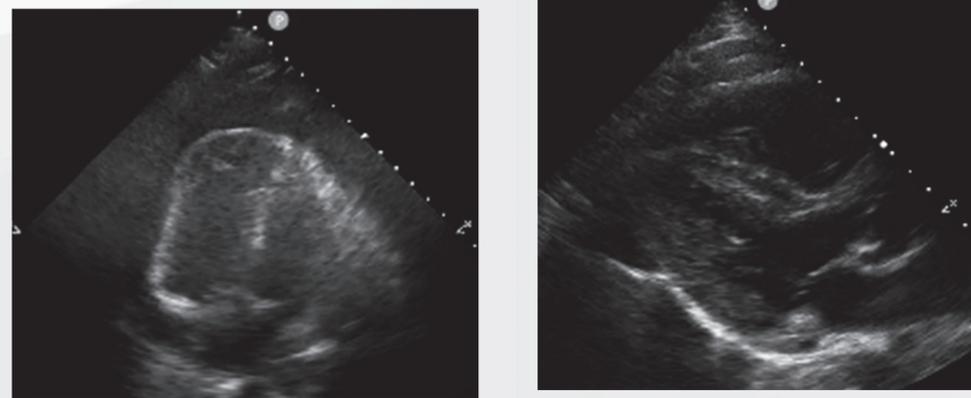
Introduction

Acute massive pulmonary embolism (PE) is a life-threatening complication in neurointensive care patients who carry many risk factors including immobility and/or recent surgery. These patients are often at high risk for intracranial hemorrhagic complications from systemic anticoagulation or thrombolysis, limiting therapeutic interventions. Local catheter-directed thrombolysis (EKOS) represents a possible alternative to systemic thrombolysis in neurointensive care patients with massive and submassive PE.

Methods

We report two cases of massive and submassive PE in neurointensive care patients treated with ultrasound-assisted catheter directed thrombolysis (EKOS) at the University of Cincinnati Neuroscience Intensive Care Unit (NSICU).

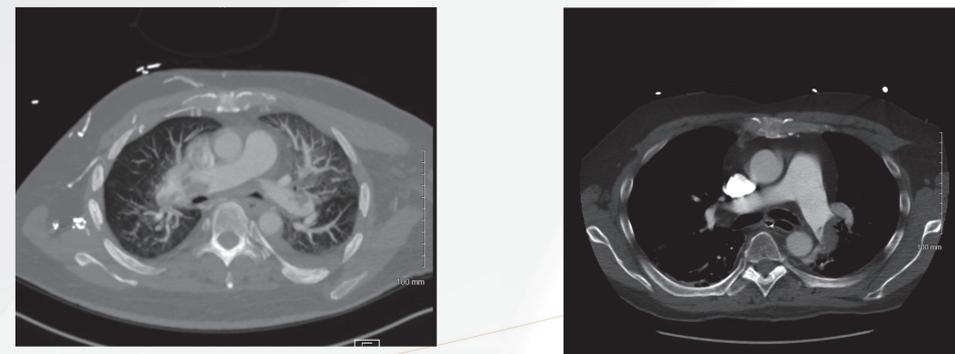
▼ **Figure 1: Representative point of care transthoracic echocardiogram images demonstrating acute right heart strain due to PE.**



▼ **Figure 2: Representative noncontrast head CT slices demonstrating intracranial pathology prior to EKOS therapy**



▼ **Figure 3: Representative CTPA slices demonstrating pulmonary embolus burden prior to EKOS therapy**



Results

Patient 1: A 58 year-old male with history of traumatic subdural hemorrhage (SDH) status post surgical evacuation returned two weeks post-op with acute onset respiratory failure and tachycardia. A pulmonary artery-gated CT (CTPA) showed bilateral PEs with extension into right main pulmonary artery and right ventricular dilation. CT head showed residual subdural hematoma (SDH). He underwent catheter-directed thrombolysis to the right main pulmonary artery using 8 mg catheter-directed tPA and ultra-low dose heparin infusion (goal PTT 40-60) with rapid resolution of hypoxia and tachycardia. Repeated CT head demonstrated stable residual SDH.

Patient 2: A 62 year-old male with history of glioblastoma status post temporal lobectomy presented in cardiac arrest from home. Return of spontaneous circulation was obtained after resuscitation with inotropes and mechanical ventilation. CT head demonstrated a left temporal lobe intracerebral hemorrhage and fluid collection within the tumor bed. CTPA demonstrated multiple lobar PEs with right heart strain, confirmed via transthoracic echo. He underwent catheter-directed thrombolysis to bilateral main pulmonary arteries using 14 mg catheter-directed tPA and ultra-low dose heparin infusion with rapid hemodynamic improvement and was extubated the next day.

Conclusions

No hemorrhagic complications were observed in either patient treated with ultrasound-assisted catheter-directed thrombolysis. No long-term sequelae of PE were identified in either patient. Further research is warranted to characterize complication rates and long-term cardiopulmonary outcomes.

QR code for Online
Supplemental Images

