

To intervene or not to intervene? Catheter-directed mechanical thrombectomy in intermediate-high risk pulmonary embolism with fragmentation of a saddle thrombus

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A 71-year-old man presented to a remote hospital with sudden dyspnea. He had a history of pulmonary embolism (PE) 20 years earlier provoked by a long flight. Physical examination revealed blood pressure (BP) 148/90 mm Hg, heart rate (HR) 94 bpm, and oxygen saturation (SaO₂) 90%. Laboratory tests showed elevated troponin I level of 0.653 ng/ml (reference range <0.001 ng/ml) and N-terminal brain natriuretic peptide (NT-proBNP) level of 3258 ng/ml (reference range <125 ng/ml). Computed tomography pulmonary angiography (CTPA) demonstrated a saddle embolism (SE) straddling the pulmonary trunk bifurcation extending bilaterally into the main and lobar arteries (LAs), with a preserved contrast flow in the segmental branches and increased right ventricular to left ventricular (RV/LV) ratio of 1.4 (Figure 1A). Intermediate-high risk (IHR) PE was diagnosed and a low-molecular-weight heparin in a weight-adjusted dose was initiated. The patient was consulted by the PE Response Team (PERT) and transferred to a PERT center. During the next two days of hospitalization, the patient's clinical condition significantly improved with RV/LV ratio reduction (45 mm/42 mm = 1.01) and a drop in NT-proBNP to 949 pg/ml, and troponin I to 0.098 ng/ml. Unfortunately, on the third day, the patient suddenly deteriorated with recurrent presyncope, and tachycardia up to 130 bpm, but without overt hypotension (BP, 100/65 mm Hg). Repeated CTPA demonstrated fragmentation of the SE with occlusion of the lobar and segmental arteries, especially on the left side with RV failure progression

(RV/LV ratio increased to 1.5) (Figure 1B, C). The PERT qualified the patient for rescue catheter-directed mechanical thrombectomy (CDMT). Initially, selective pulmonary angiography was performed revealing bilateral LAs occlusion by central clots (Figure 1D). Subsequently, a CAT12 Lightning 12 system (Penumbra, Alameda, CA, US) was inserted into the LAs via common femoral vein access, and repeated aspirations with separator-wire-facilitated thrombi fragmentation were performed. The procedure resulted in significant bilateral thrombus clearance and flow improvement in the LAs (Figure 1E), with a total blood loss of 250 ml and no complications. The patient's hemodynamics improved rapidly; pulmonary artery pressures decreased from 62/12/35 (systolic/diastolic/mean) to 39/10/21 mm Hg, respectively, HR dropped to 82 bpm, and BP increased to 140/90 mm Hg. Next day after the procedure, RV function normalized with RV/LV ratio of 40 mm/43 mm = 0.9 (Figure 1F), NT-proBNP level of 819 pg/ml, and troponin I level of 0.06 ng/ml. The patient was discharged on day 8 in good general condition on apixaban at a dose of 5 mg twice a day.

Saddle thrombus is not included in classic risk stratification scores in PE [1]. However, recent observations indicated that the prognosis in patients with SE may be significantly worse, with in-hospital mortality up to 9.2% despite initial classification of most patients as intermediate-to-low risk [2]. The finding of SE or high thrombus burden should be considered among other risk factors when

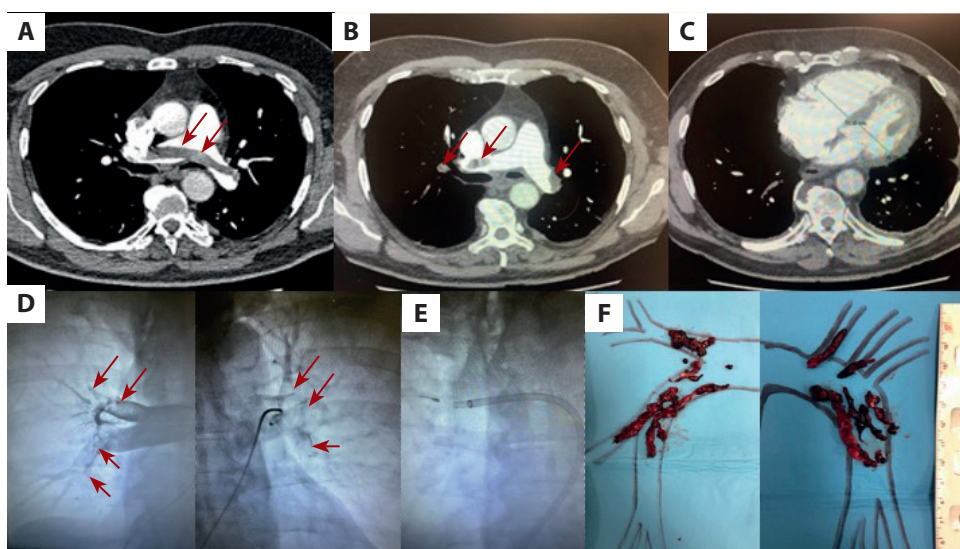


Figure 1. **A.** Computed tomography pulmonary angiography (CTPA) demonstrating a saddle embolus (SE) (red arrows) straddling the pulmonary trunk bifurcation extending bilaterally into the main and lobar arteries but with preserved contrast flow in the segmental branches. **B.** CTPA demonstrated fragmentation of the SE with occlusion of the lobar and segmental arteries (red arrows). **C.** Catheter-directed mechanical thrombectomy — a right ventricle to left ventricle (RV/LV) ratio increased to 1.5 **D.** Pulmonary angiography revealing bilateral lobar arteries occlusion by central clots (red arrows). **E.** CAT12 Lightning 12 system with separator wire in the right pulmonary artery. **F.** An image of the clots removed from the right and left pulmonary arteries

planning the treatment of acute PE patients. It may favor a more aggressive approach, including faster utilization of catheter-directed therapies despite the fact the patient is at “intermediate” risk and looks hemodynamically stable [3]. In this context, contemporary large-bore aspiration catheters seem to be a breakthrough in the treatment of patients with PE [4].

Article information

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