

Mechanics around mechanical thrombectomy: a case report emphasizing the value of right ventricular pressure-volume analysis

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Although the treatment of pulmonary embolism developed fundamentally during the last years, our understanding about the pathophysiology of the disease and the effect of treatment did not progress significantly.

Here we provide a case report, where a 48-year-old, severe obese woman was admitted to traumatology because of a syncope-associated cranial trauma (no intracranial bleeding was shown). Additional pulmonological examination revealed chronic obstructive pulmonary disease (COPD). Three days later, the patient was admitted to emergency medicine department due to persistent dyspnea and tachycardia. Pulmonary CTA showed massive bilateral (saddle) pulmonary embolism with right ventricular strain and laboratory tests revealed cardiac biomarker positivity.

According to the morphology on the pulmonary CTA (saddle-like thrombus), high clinical score values (NEWS2:6, CPES:4), positive biomarkers (NT-proBNP: 6246 ng/l, hsTroponinT: 19 ng/l), abnormal right ventricular (RV) parameters, the patient was categorized as C3R (AHA/ACC) and bilateral mechanical thrombectomy was carried out by computer-assisted vacuum thrombectomy system using femoral vein access. Additionally, pressure-volume analysis was carried out before and after the intervention.

Preprocedural echocardiography (poor acoustic window) revealed significant RV strain (diastolic D-sign, severe tricuspid regurgitation, estimated pulmonary artery pressure (PAP):55 mmHg) and - except of improved TAPSE - could not show significant improvement (persistent D-sign, PAP:58 mmHg, similar RV size). On the other hand, pressure-volume analysis revealed markedly improved EDV (pre vs. post: 144.0 vs. 119.2 ml) and LVEF (31.9% vs. 36.8%). Not only the volume values, but the contractility indexed by ESPVR (0.62 vs. 0.83 mmHg/ml), active relaxation indexed by Tau (48.5 vs. 36.0 ms) and RV-PA coupling (0.47 vs. 0.59) were considerably improved.

RV pressure-volume analysis might be a valuable method to characterize pulmonary embolism pathology and to reflect thrombectomy-associated improvement in RV mechanics in detail.

Pre- and postprocedural pressure-volume loops

