Tissue Plasminogen Activator: A Bridge to Cross or Not To Cross in High-Risk Pulmonary Embolism

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Introduction

- Purpose: Discuss management in a case of a patient who presented with a high-risk pulmonary embolism who suffered from a cardiac arrest en route to a mechanical thrombectomy.
- The main cornerstone for treatment of venous thromboembolism is anticoagulation. Generally, massive pulmonary embolism (categorized as high-risk PE by the European Society of Cardiology) can be treated with tissue plasminogen activator (tPA); however, recent trends have signaled towards management of high-risk PE with mechanical thrombectomy.
- Main question for discussion: should tissue plasminogen activator be used as a bridge to thrombectomy or should it only be used as definitive therapy?

Case Presentation

- A 54-year-old male with cirrhosis presented to the hospital with chest pain and dyspnea on exertion for 2 days, and an episode of syncope prior to arrival.
- Vital signs: pulse rate 110, respiratory rate 24, blood pressure 88/46 mmHg, temperature 97.9 F, and O2 saturation 90% on 5L nasal cannula.
- The patient was started on continuous infusions of norepinephrine and epinephrine to maintain a MAP >65 mmHg.
- A CTA of the chest demonstrated large bilateral pulmonary emboli with a clot noted in the right ventricle (Figure 1). A clot in transit was also noted on POCUS (Figure 2).
- While the interventional radiology suite was being prepared for thrombectomy, the patient required continued pushes of IV epinephrine to maintain his hemodynamics. As such, the decision was made to push 50mg IV alteplase.
- One hour later, the patient's vasopressor requirements stabilized and he was safely transferred to the IR suite and underwent a successful mechanical thrombectomy without life-threatening bleeding noted during vascular access. He was ultimately discharged from the hospital after a short observation period.

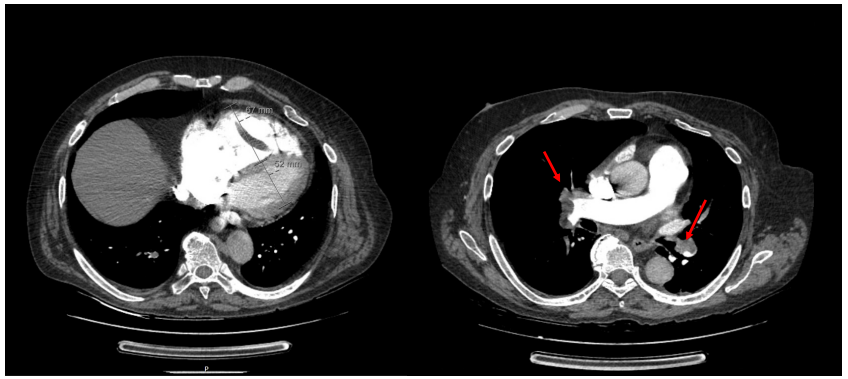

Figure 1a: Axial cross-section of a computed tomography of the chest demonstrating clot-in-transit in the right ventricle with CT evidence of right heart strain, 1b: axial cross-section highlighting acute bilateral pulmonary emboli (red arrows)

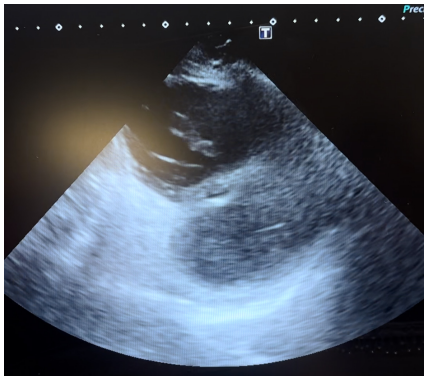

Figure 2: parasternal short axis of the heart showing dilated right ventricle with clot in transit and D-sign

Figure 3: Thrombectomy results

Discussion

- The current standard of practice for the management of massive/high-risk PE is thrombolysis
- This case centers on the possibility of utilizing tPA as a bridge to thrombectomy in a patient with high-risk/massive PE on high dose vasopressors, requiring rapidly escalating doses of vasopressive agents.
- Currently, there is no data available to support this off-label practice, but our experience highlights its potential use as a bridge to thrombectomy.
- Another consideration when using TPA is the use of full dose (100mg) or half dose (50mg) alteplase; in our case, half dose was used.
- We decided to use half dose, as the plan was to have the patient undergo thrombectomy to definitively treat all acute and chronic thrombi.
- Procedural concerns include risk of bleeding during vascular access and risk of procedural complications after receiving TPA. We recommend establishing an open discussion with interventional radiology at your respective institution.
- Final question to pose: do the benefits of undergoing thrombectomy in this case outweigh the associated risks?

Conclusions

- We report on a case of half dose TPA (50mg) IV that was safely given as a bridge to thrombectomy in a high-risk PE
- This is a unique but unstudied population that would benefit further investigation

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