Temporal and Magnitude Variability in Hemodynamic Response to Catheter Directed Thrombolytics

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Background

The efficacy of catheter directed thrombolysis (CDT) for intermediate-high and high-risk pulmonary embolism (PE) has historically been defined by improvement in the right ventricular/left ventricular (RV/LV) diameter ratio[1] and reduction in pulmonary artery pressure up to 48 hours (h) post procedure. Although hemodynamics are known to improve[2,3], there is little data characterizing the hemodynamic trends during CDT administration.

Figure 1: Time to and magnitude of maximum systolic pulmonary artery pressure reduction

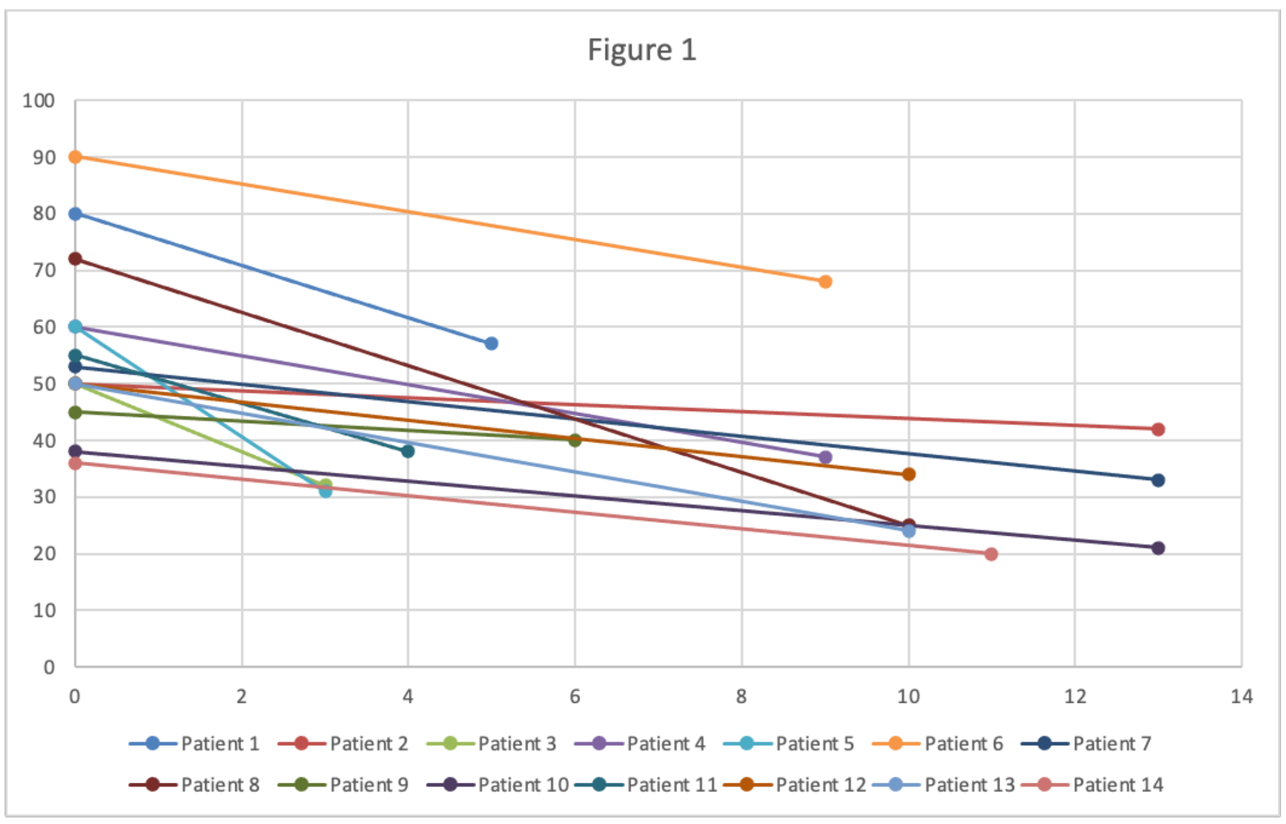
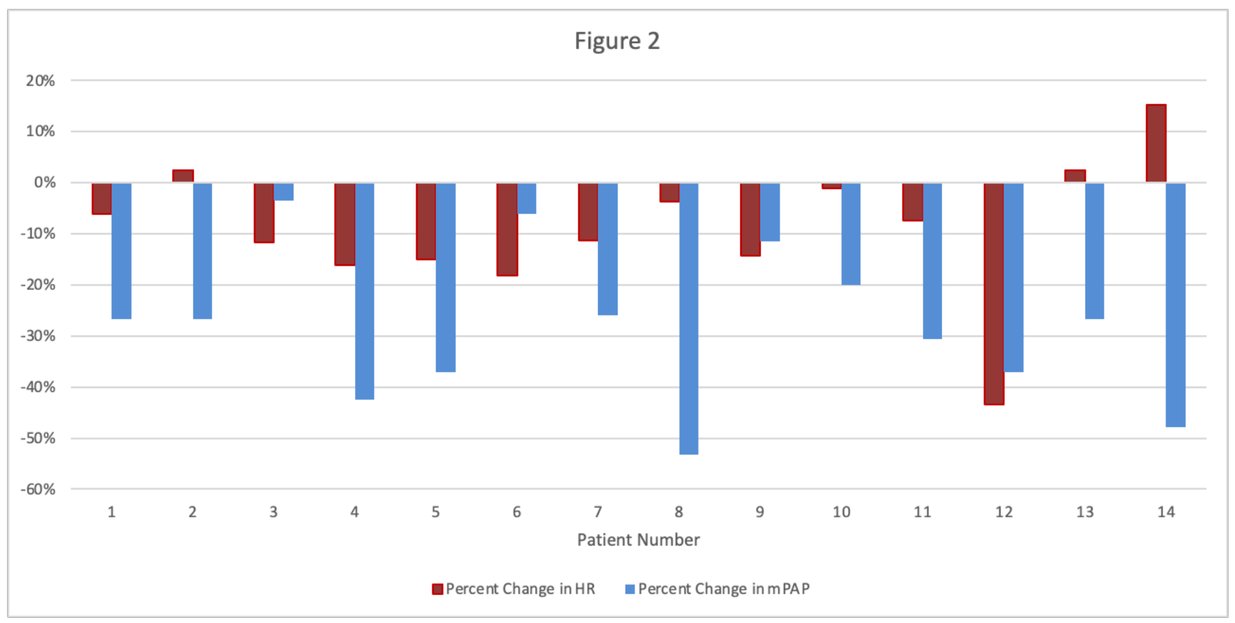


Figure 2: Percent change of mean pulmonary artery pressure throughout duration of catheter-directed therapy as compared to percent change in heart rate



Citations

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Methods

Fifteen consecutive patients presenting with acute intermediate-high risk PE who were deemed suitable CDT candidates underwent placement of thrombolytic delivery catheters alongside a pulmonary artery (i.e. Swan-Ganz) catheter. One patient was excluded from analysis due to pre-existing intracranial hemorrhage. Baseline vital signs and hemodynamic measurements were collected prior to the delivery of the thrombolytic drug. Following CDT initiation, vital signs, right atrial (RA) and pulmonary artery (PA) pressures were measured once per hour in the intensive care unit until therapy was completed. Therapy termination was triggered by hemodynamic improvement, maximum cumulative tissue plasminogen activator (tPA) dose administration, or provider discretion.

Results

The mean total tPA dose was 15.8mg (12mg - 23mg) and was infused over 12.4h (5h - 20h). Time to maximum systolic pulmonary artery pressure reduction was highly variable, ranging from 3h to 13h (Figure 1). On average, patients had a 9% reduction in heart rate (43% reduction to 15% increase), 5% increase and 9% decrease in systolic/diastolic systemic (noninvasive) blood pressure respectively (SD 21%, 23%), and 32% reduction in RA pressure (SD 88%) (Figure 2). Systolic, diastolic, and mean PA pressures were reduced by a mean 25%, 36%, and 28% (SD 13%, 20%, 15% respectively).

Conclusion

Though the current cohort is not yet powered to yield statistically significant trends, the highly variable response to CDT, both in net effect and rate to achieve maximal effect, is hypothesis-generating and warrants further exploration. Additional patient enrollment and research in this area, as well as longitudinal follow-up with this expanding cohort, may help to optimize more patient-centered and phenotypically-driven therapeutic strategies in the future.

Disclosures

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