PULMONARY VASCULAR RESISTANCE: A NOVEL METHOD OF NON-INVASIVE ESTIMATION AND ASSOCIATION WITH MORTALITY IN CRITICALLY ILL SURGICAL PATIENTS

Poster Contributions
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Background: Doppler-derived ratio of peak tricuspid regurgitant velocity (TRV, ms) to the right ventricular outflow tract time velocity integral (TVIRVOT, cm) is a reliable non-invasive method of estimating pulmonary vascular resistance (PVR). The easier to measure left ventricular outflow tract time velocity integral (TVILVOT, cm) has been presented as an alternative to TVIRVOT in patients with severe pulmonary hypertension. The correlation of TRV/TVILVOT with PVR in other populations has not been reported.

Methods: This 48-hr study enrolled 32 critically ill and/or injured mechanically ventilated adult surgical patients admitted to a Level I Trauma Centre. Serial pulmonary artery catheter (PAC) and transthoracic echocardiography (TTE) measurements were obtained on each patient every 12 hrs (total = 5 points/patient). Pearson correlation coefficients were obtained between invasive PVR and TRV/TVILVOT. The Friedman Test determined PVR trends over time. Fisher's Exact Test determined the association of PVR >2 Wood's Unit (WU) with mortality.

Results: Mean age was 49±20 years, 69% were male, and 84% were trauma patients with a mean Injury Severity Score of 24±10. Overall survival rate was 78%. Pulmonary vascular resistance from PAC and TRV/TVILVOT from TTE were related at each of 5 points in time (correlations 0.44-0.70; p < 0.02). Non-survivors had a progressive increase in PVR over time (2.97, 2.83, 2.87, 3.20, 4.37; p = 0.036) while survivors did not. At 48-hr, non-survivors more frequently had pulmonary vascular resistance >2 WU (p = 0.023). Using a TRV/TVILVOT cut-off of 0.16 to predict PVR >2 WU, the sensitivity and specificity was 75% and 61% respectively during early resuscitation compared to a sensitivity of 50% and specificity of 93% at 48-hr.

Conclusions: Doppler-derived TRV/TVILVOT correlated moderately with PVR in critically ill surgical patients requiring mechanical ventilation. Pulmonary vascular resistance progressively increased amongst non-survivors and PVR >2 WU at 48-hr was associated with mortality. By utilizing the easier to measure TVILVOT, TTE may help estimate PVR and identify critically ill patients at risk of death.