

The impact of pulmonary arterial compliance, stroke volume and pulmonary vascular resistance on survival in patients with chronic thromboembolic pulmonary hypertension

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Rationale: Right ventricular (RV) afterload leads to RV failure and death in patients with pulmonary hypertension (PH). RV afterload is commonly defined by pulmonary vascular resistance (PVR), which reflects the arterial load to a steady flow. However, a complete description of RV afterload should also include pulsatility. The purpose of this study was to quantify RV afterload in patients with chronic thromboembolic pulmonary hypertension (CTEPH) undergoing pulmonary endarterectomy (PEA). We sought to define the impact of pulmonary arterial compliance (PAC), stroke volume (SV), and PVR on persistent/recurrent PH and long-term survival in CTEPH.

Methods: We monitored PAC, SV and PVR in 110 patients who underwent PEA. The data were determined at baseline, postoperative (immediate: within 3 days after PEA) and 1 year after PEA.

PAC was calculated by $SV/\text{pulmonary artery pulse pressure}$. The impact of these parameters on survival/freedom of lung transplantation and persistent pulmonary hypertension were analyzed by Cox proportional hazard models, and T-tests.

Furthermore we analysed survival using logistic regression models. P values were adjusted from multiple testing by Bonferroni correction.

Results: PAC and PVR changed significantly from baseline to immediate postoperative ($+1,4 \pm 1.6$ mL/mmHg, $-396,2 \pm 334,4$ dynes.cm⁻¹.s⁻⁵, $p < 0.001$ i.e.), showing no changes between immediate and 1-year follow-up. SV increased statistically significant from baseline to 1 year ($+10,1 \pm 16.9$ mL, $p < 0.001$), while it did not change immediately postoperative from baseline. Neither PAC, nor SV, nor PVR at baseline showed any influence on persistent/recurrent PH or long-term survival.

PVR, SV and PAC assessed immediately postoperatively had a significant influence on persistent/recurrent PH ($p < 0.0001$, $p = 0.02$, $p < 0,01$). Immediate postoperative PVR had a significant influence on long-term survival ($p < 0.001$).

Logistic regression model revealed immediate postoperative PVR as predictive of 1 year- ($p = 0.001$), 3 year- ($p = 0.01$) and 5-year persistent/recurrent PH and survival ($p = 0.002$).

Conclusions: Pulmonary arterial compliance, stroke volume and PVR assessed immediately after PEA are predictive of persistent/recurrent PH, however PVR was the only predictor of long-term survival in CTEPH patients undergoing PEA.

