

Introduction

Pulmonary thromboendarterectomy (PTE) is the standard treatment of Chronic Thromboembolic Pulmonary Hypertension (CTEPH).

Reperfusion lung injury (RPLI) is a common post-operative complication of PTE.

Risk factors and long-term outcomes for RPLI following PTE are not well understood.

Severe pulmonary hypertension (PH) before PTE and residual PH after PTE are associated with RPLI.

Identify patient factors predicting higher risk for RPLI. Investigate changes in short-term and long-term outcomes associated with RPLI.

Methods

A retrospective chart review was conducted on patients who underwent PTE at Northwestern Memorial Hospital from 2016-2024.

RPLI was defined as radiographic infiltrates in the region of endarterectomized tissue and new oxygen requirement (saturation <88%) within 48-72 hours following PTE without alternative explanation (i.e. PNA, bleeding, atelectasis).



Significant risk factors and outcomes associated with RPLI were identified with multivariable linear and logistic regression comparing PTE patients with and without post-operative RPLI.

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Reperfusion lung injury after pulmonary thromboendarterectomy: Risk factors and outcomes

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Figure 1. Perioperative risk factors for RPLI. Higher pre-operative pulmonary vascular resistance (PVR), right atrial pressure (RAP), and mean pulmonary arterial pressure (mPAP) were associated with increased odds of RPLI. Higher pre-operative cardiac output (CO) was associated with reduced odds of RPLI. Procedural differences associated with RPLI included longer cross-clamp and total circulatory arrest time.

Associated Complications	OR (95% CI)	p-value
Unplanned reoperation within 30 days	7.22 (1.96, 26.6)	0.002
Hospital/ventilator- associated pneumonia	5.57 (1.65, 18.6)	0.005

Table 1. Perioperative outcomes associated with RPLI.





Vari	able	OR (95% CI)	p-value
Non Milc TR (e, Trivial, I, Moderate Reference)		
Seve	ere TR	4.85 (1.39, 16.7)	0.012

Table 2. Patients with severe tricuspid regurgitation (TR) had

 increased for developing RPLI after PTE than patients with mild, moderate, or no TR.

Figure 2. (A) The RPLI group had longer ICU stays (+8.5 days), longer mechanical ventilatory support duration (+8.7 days), (B) higher POD1 mPAP (+8.5 mmHg), 3-month follow-up mPAP (+8.9 mmHg), (C) and 3 month follow-up PVR (+2.4 WU) relative to the non-RPLI group.

ρ	1-year survival	3-year survival
	95%	95%
RPLI	97%	95%

Table 3. Survival at 1 and 3 years was 95% in the RPLI group compared to 97% and 95% in the non-RPLI group, respectively.

Conclusions

- CTEPH patients with high pre-operative PVR, high mPAP, and severe TR seem to be at increased risk of RPLI following PTE. Preserved pre-operative CO/CI appears to be protective.
- RPLI is associated with unplanned reoperation, pneumonia, increased ICU stays and increased time on mechanical ventilation.
- RPLI and residual PH at 3-month follow-up are correlated. However, further studies are required to clarify the direction and nature of this relationship.
- Survival rates were not significantly different between groups.

Limitations

Previous studies have shown that RPLI and post-operative pneumonia are often found simultaneously following PTE. This overlap suggests that these complications may not be independent of one another, potentially confounding the interpretation of outcomes.