DE-ESCALATION OF SUPPLEMENTAL OXYGEN IN PATIENTS WITH CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION FOLLOWING BALLOON PULMONARY ANGIOPLASTY AT A HIGH-ALTITUDE PH CENTER

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Project Background

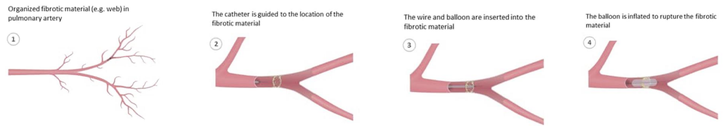
Chronic Thromboembolic Pulmonary Hypertension (CTEPH) is a progressive pulmonary vascular disease caused by persistent thromboembolic obstruction of the pulmonary arteries, resulting in increased pulmonary vascular resistance, right ventricular strain, and functional limitation. Balloon Pulmonary Angioplasty (BPA) is an established catheter-based therapy that improves pulmonary hemodynamics in patients with inoperable CTEPH or residual disease following Pulmonary Thromboendarterectomy (PTE). Many patients with CTEPH require supplemental oxygen therapy. However, data guiding de-escalation of oxygen therapy after BPA remain limited, particularly in high-altitude (>1500m) environments where hypoxemia may be accentuated.

Purpose

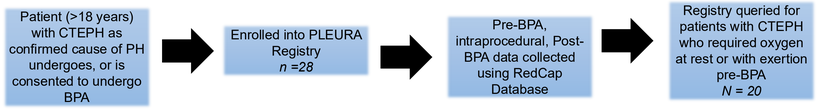
To evaluate changes in supplemental oxygen requirements and prescribed oxygen flow rate (L/min) in patients with Chronic Thromboembolic Pulmonary Hypertension following treatment with Balloon Pulmonary Angioplasty at our high-altitude pulmonary hypertension center at 1600m above sea level

Research Design

1. Adult patients were to undergo, or had undergone BPA were enrolled into the Balloon **P**u**L**monary Angioplasty for Chronic Thrombo**E**mbolic P**U**lmona**R**y Hypertension Surveill**A**nce (PLEURA) Registry



2. Registry queried for patients with CTEPH who required oxygen at rest or with exertion pre-BPA
   a) BPA performed between June 2024 - February 2026
   b) Inclusion criteria confirmed CTEPH as the cause of PH
   c) Patients underwent BPA as primary therapy or secondary treatment following PTE
   d) Pre-BPA, intraprocedural, Post-BPA data collected
   e) Target oxygen saturation >90% assessed at each clinic visit, oxygen therapy titrated to meet this threshold



3. Paired Comparisons performed between pre and post BPA measurements

Results

Intraprocedural Complications

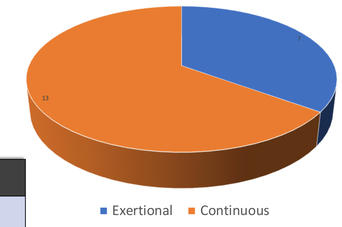
Complications	76 Total Procedures
Vessel Perforation [N, (%)]	3 (3%)
Hemoptysis [N, (%)]	1 (1%)
Thrombus Formation [N, (%)]	1 (1%)
Intraprocedural Mortality [N, (%)]	0 (0%)

Pre-BPA vs Post-BPA Outcomes

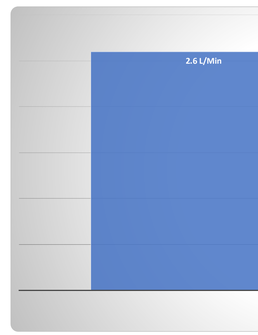
Variables (N=20)	Pre-BPA	Post-BPA
Hemodynamic Outcomes		
Mean Pulmonary Artery Pressure (mean ± SD)	34.6 ± 7.8 mmHg	30.9 ± 6.4 mmHg **(p = 0.01)**
Pulmonary Vascular Resistance (mean ± SD)	8.7 ± 18.9 wu	3.2 ± 1.4 wu (p = 0.10)
Pulmonary Artery Compliance (mean ± SD)	2.1 ± 0.7 mmHg	2.4 ± 0.8 mL/mmHg (p = 0.05)
Medication Requirements		
Guanylate Cyclase Stimulators [N, (%)]	16 (80%)	13 (67%)
Phosphodiesterase-5 Inhibitors [N, (%)]	3 (15%)	3 (15%)
Diuretic Use [N, (%)]	15 (75%)	14 (72%)
Functional Outcomes		
WHO Functional Class [N, (%)]	Class I: 2 (10%) Class II: 12 (60%) Class III: 6 (30%)	Class I: 5 (25%) Class II: 14 (70%) Class III: 1 (5%)
Average 6 Minute Walk Test Distance (mean ± SD)	361.7 ± 65.5 m	360.6 ± 87.4 m
Borg Dyspnea Score (mean ± SD)	3.2 ± 2.4	3.2 ± 2.4
Supplemental Oxygen Requirements		
Exertional Oxygen [N, (%)]	13 (65%)	11 (61%), N=18
Continuous Oxygen [N, (%)]	7 (35%)	4 (22%), N=18
Mean Prescribed Flow Rate (mean ± SD)	2.6 ± 0.8 L/min	2.0 ± 0.0 L/min, N=18 Note: 3 (17%) patients discontinued supplemental oxygen

Change in Supplemental O

Pre-BPA: Supplemental Oxygen Requirements



Mean Prescribed Flo



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At a high-altitude PH ce reduced supplemental

- fewer patients required
- prescribed flow rates de discontinued suppleme

These findings suggest B dependency, even where

Population Demographics

Variables	N = 20
Women [N, (%)]	11 (55%)
Age, y (mean ± SD)	70.3 ± 11.4
Race, White [N, (%)]	18 (90%)
Body Mass Index , kg/m^2 (mean ± SD)	33.0 ± 7.9
History of DVT [N, (%)]	10 (50%)
History of PTE [N, (%)]	7 (35%)
History known Acute PE [N, (%)]	12 (60%)
Total BPA sessions	76
Average Number of BPA sessions (mean ± SD)	2.5 ± 1.3

Table 1. y = years, DVT = Deep Vein Thrombosis, PTE = pulmonary thromboendarterectomy, PE = pulmonary embolism, BPA = Balloon Pulmonary Angioplasty

Clinical Implications

For patients with CTEPH undergoing BPA:
- Oxygen therapy burden may decrease
- Lower flow rates may reduce equipment dependence
- Treatment costs may decline
- Quality of life may improve

This effect may be particularly important at high altitude, where ambient oxygen pressure is lower

Future Direct

- Conduct larger, multi-center studies to evaluate long-term requirements after BPA
- Assess whether reductions in oxygen dependence are su altitude environments where hypoxemia may be more pro
- Identify clinical and hemodynamic predictors of successfu
- Incorporate validated quality-of-life measures to evaluate
- Evaluate how changes in oxygen therapy influence functi activity levels.
- Develop and test standardized post-BPA oxygen titration term management and improve quality of life.

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COI Disclos

The authors disclose no conflicts of inter