Clinical impact of residual pulmonary hypertension based on revised criteria after balloon pulmonary angioplasty

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Background: Balloon pulmonary angioplasty (BPA) improves haemodynamics, exercise capacity, and prognosis in patients with inoperable chronic thromboembolic pulmonary hypertension (CTEPH). However, the treatment goal of BPA is not well established. The European Society of Cardiology guidelines published in 2022 revised the diagnosis of pulmonary hypertension from resting mean pulmonary arterial pressure (mPAP) ≥25 mmHg to mPAP >20 mmHg because mild elevation of pulmonary hypertension has decreased exercise capacity and worsened the prognosis. The clinical impact of normalization in resting pulmonary hypertension after balloon pulmonary angioplasty is not investigated.

Purpose: The purpose of this study is to clarify the clinical impact of mPAP normalization after BPA as a treatment goal in patients with CTEPH.

Methods: We retrospectively reviewed consecutive 236 CTEPH patients (68 [55,75] yrs., Male 52 (22%)) who completed BPA procedures from July 2009 to December 2020 and had haemodynamics evaluation after the procedures and had mPAP <30 mm Hg after BPA. We extracted two groups with mPAP <20 mmHg (Non-PH group) and 21 ≤ mPAP <30 mmHg (Residual-PH group) after BPA.

Results: The median follow-up period from the final BPA session was 38 [22,61] months. In both the Non-PH and Residual-PH groups, BPA significantly improved mPAP (37 [29,43] to 18 [16,19] mmHg, P<0.01 and 38 [34,45] to 23 [22,26], P<0.01, respectively) and cardiac index (CI) (2.15 [1.86,2.63] to 2.39 [2.11,2.80] L/min/m², P<0.01 and 2.25 [1.87,2.63] to 2.50 [2.23,2.88] L/min/m², P<0.01, respectively). There were no significant differences in CI after BPA between the Non-PH and Residual-PH groups. The 6-minute walk distance (6MWD) after BPA was shorter in the Residual-PH group than in the Non-PH group (435m and 480m, P<0.01). However, the estimated 5-year survival in the Non-PH and Residual-PH groups was comparable (96.3% and 99.1%, P=0.23, Figure 1). Patients in the Residual-PH group showed significantly shorter 6MWD and higher mPAP before BPA, and required more procedures (P<0.01, 0.02, 0.03, respectively). Additional multivariate logistic regression analysis revealed that shorter 6MWD before BPA was a significant predictor of residual PH (odds ratio=1.03, P=0.04).

Conclusions: The Residual-PH group had lower exercise capacity than the Non-PH group, although the prognosis in the Residual-PH group was similar to that in the Non-PH group.

Figure 1