

## BALLOON PULMONARY ANGIOPLASTY FOR CHRONIC THROMBOEMBOLIC PULMONARY HYPERTENSION

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**Objective:** Chronic thromboembolic pulmonary hypertension (CTEPH) has poor prognosis. Although pulmonary thromboendarterectomy improves the prognosis of CTEPH, patients with peripheral type CTEPH are not always candidates for this curative surgery. Although several drugs are used to manage these patients, clinical outcome of the medical therapy is unsatisfactory. Therefore we hypothesized that balloon pulmonary angioplasty (BPA) would be a safe and effective treatment for patients with peripheral type CTEPH.

**Methods:** Forty-eight patients with CTEPH (mean age  $62.6 \pm 11.2$  years, 38 to 82 years) underwent BPA. Written informed consent was obtained from each patient before the procedure. Our indications of BPA are as follows: peripheral type CTEPH, WHO functional class III or IV despite full medical treatment, and without multiple organ failure. WHO functional class, brain natriuretic peptide (BNP), six-minute walk distance (6MWD), hemodynamic parameters (systolic pulmonary artery pressure (PAP) and mean PAP) were evaluated.

**Results:** Patients underwent BPA repeatedly (2.4 (range, 1 to 6) procedures and 6.8 (range, 4 to 22) dilatations). None of the patients died because of BPA. All patients developed reperfusion pulmonary edema after BPA and mechanical ventilation was required in 3 patients. Pulmonary artery perforation occurred in 4 patients and emergency transcatheter embolization with coils prevented fatal bleeding. The averaged WHO functional class improved from 3.3 to 2.1 ( $P=0.011$ ) and BNP levels decreased from  $312.6 \pm 271.2$  to  $47.5 \pm 77.6$  pg/ml ( $P<0.001$ ). 6MWD improved from 191 to 292 m ( $P<0.005$ ). Systolic and mean PAP significantly decreased after BPA (from  $88.1 \pm 15.9$  to  $50.2 \pm 11.9$  and from  $49.2 \pm 8.9$  to  $28.8 \pm 7.1$  mmHg ( $P<0.001$ ), respectively). Twenty out of 48 patients have been followed up for more than one year after initial BPA. All of them are alive and 10 patients underwent right heart catheterization at one year after initial BPA. In these patients, mean PAP was  $25.3 \pm 3.7$  mmHg after BPA and  $26.1 \pm 5.7$  mmHg at follow up ( $P>0.05$ ). The improvement of hemodynamics was maintained over a year.

**Conclusions:** BPA could improve hemodynamics and clinical status of patients with peripheral type CTEPH who received full medication. BPA would be an effective therapeutic option in these patients who have otherwise no proven treatment.