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IMAGES IN INTERVENTION

Retrograde Approach in Balloon Pulmonary Angioplasty

Useful Novel Strategy for Chronic Total Occlusion Lesions in Pulmonary Arteries

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A 61-year-old man with chronic thromboembolic pulmonary hypertension underwent balloon pulmonary angioplasty (BPA) (1-3). Antegrade approach for a chronic total occlusion (CTO) lesion in an inside subsegmental branch of the left A9 pulmonary artery (A9b branch) was attempted (**Figure 1A**), but the hydrophilic and hard guidewire (tip load: 10 gf, Chevalier PL-X, Cordis, Tokyo, Japan) could not pass through this CTO lesion. Hence, another tight lesion in an outside subsegmental branch of the left A9 pulmonary artery (A9a branch) was treated (**Figure 1B**).

Four months later, angiography revealed well-developed collaterals (**Figure 1C**, Online Video 1). Because a retrograde approach in percutaneous coronary intervention can be successful in some cases of coronary CTO lesions (4), we attempted the retrograde approach in BPA through these collaterals. A hydrophilic guidewire (tip load: 0.7 gf, SION, Asahi Intecc, Aichi, Japan) supported by a microcatheter (Corsair PV, Asahi Intecc) was advanced into the distal area of the A9a branch and passed through collaterals to the distal area of the target CTO lesion. The hydrophilic and intermediate guidewire (tip load: 3 gf, Gladius, Asahi Intecc) passed into the target lesion (**Figure 1D**, Online Video 2). An over-the-wire balloon catheter (Amphirion Plus 2.0 × 14-mm, Medtronic, Tokyo, Japan) was then inserted by the retrograde approach and dilated in the target lesion (**Figure 1E**). The guidewire was again passed through the lesion by the antegrade approach for additional balloon dilation, and finally angiography revealed good antegrade flow through the target lesion (**Figure 1F**). Mean pulmonary arterial pressure was 35 mm Hg at baseline and improved to 28 mm Hg after BPA in this CTO lesion.

This suggests that the retrograde approach in BPA could be used in similar cases where the antegrade approach is difficult and good collaterals can be visualized by angiography.

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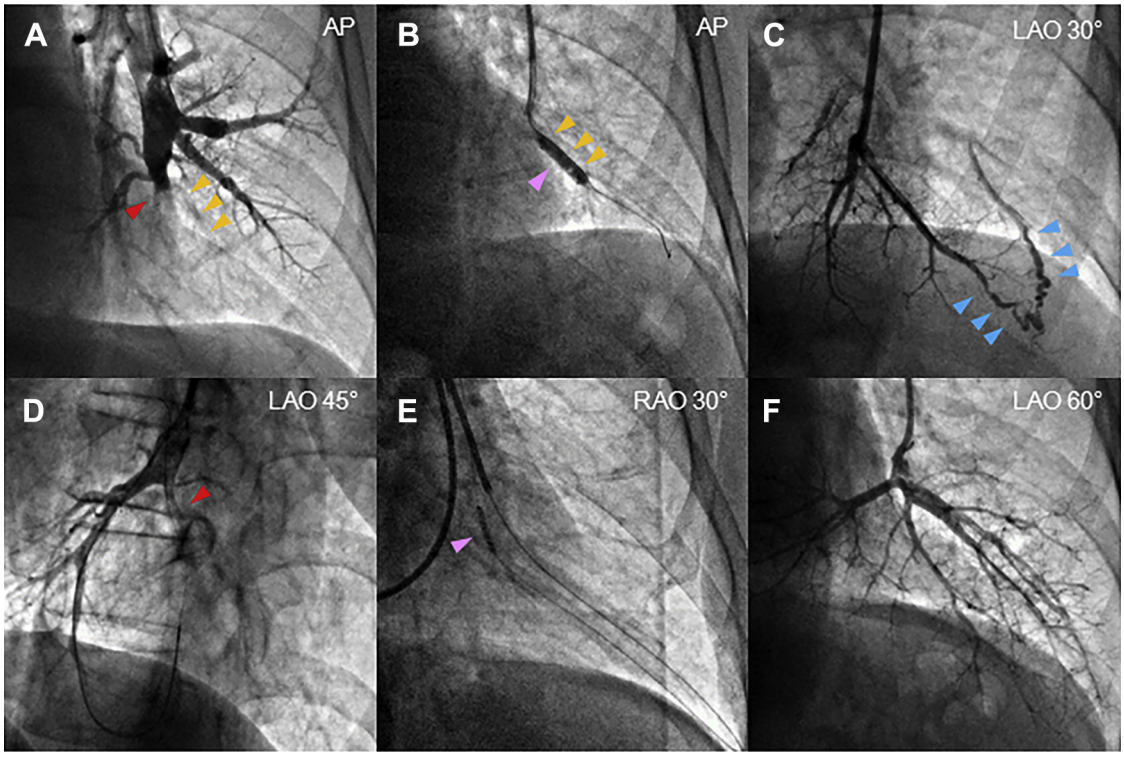
FIGURE 1 Angiography Images Before and During BPA



Angiography was performed on a 61-year-old man with chronic thromboembolic pulmonary hypertension. Images from the first balloon pulmonary angioplasty (BPA) session show a chronic total occlusion (CTO) lesion in an inside subsegmental branch of the left A9 pulmonary artery (A9b branch) **(A)** and balloon dilation for another stenotic lesion in an outside subsegmental branch of the left A9 pulmonary artery (A9a branch) **(B)**. Images from the next BPA session, 4 months later, show flows of the A9a branch and well-developed collaterals shot by the guiding catheter (Online Video 1) **(C)**, successful passing of the guidewire into the target CTO lesion in the A9b branch by the retrograde approach (Online Video 2) **(D)**, over-the-wire balloon dilation in the CTO lesion **(E)**, and good antegrade flow of the A9b branch **(F)**. **Red arrowheads** indicate the positions of the CTO lesion in the A9b branch, **orange arrowheads** indicate the positions of the A9a branch, **blue arrowheads** indicate collaterals from peripherals of the A9a branch to the distal area of CTO lesion in A9b branch, and **pink arrowheads** indicate balloon catheters. AP = anteroposterior view; LAO = left anterior oblique view; RAO = right anterior oblique view.

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KEY WORDS balloon pulmonary angioplasty, chronic thromboembolic pulmonary hypertension, chronic total occlusion, retrograde approach

APPENDIX For supplemental videos and their legends, please see the online version of this article.