

IMAGES IN INTERVENTION

Carlino-Like Technique for Retrograde Recanalization of Chronic Thromboembolic Pulmonary Artery Occlusion



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A 40-year-old patient with chronic thromboembolic pulmonary hypertension (CTEPH) underwent balloon pulmonary angioplasty. A pulmonary angiogram showed RA8 segmental occlusion with an ambiguous proximal cap (**Figures 1A to 1C**). Selective angiography of the RA10 segmental artery revealed collateral channels to the distal vascular bed of the RA8 artery.

Like in a coronary vasculature, we used the retrograde approach to reach the distal cap of the occlusion through intersegmental arteries. We passed the collateral channel with hydrophilic wire (Fielder, Asahi Intecc), and then we introduced a microcatheter (Corsair PV, Asahi Intecc) into the distal portion of the RA8 artery (**Videos 1 and 2**). We performed several attempts to penetrate the occlusion with different wires (Fielder, Gaia2-3, and Command, Asahi Intecc), which were unsuccessful because of subintimal wire passage. The microcatheter was introduced into the distal cap of the occlusion. We performed hydrodynamic recanalization via forced contrast media injection (**Figure 1**). This technique was very similar to that originally described for the coronary arteries (**Videos 3 to 5, Figures 1D to 1H**).¹

This maneuver helped us identify the clear route of the pulmonary vessel. Then, a microcatheter was advanced close to the proximal cap, and after that, a

Miracle 12 wire (Asahi Intecc) passed through the occlusion. We forwarded the microcatheter into the pulmonary lower lobe artery and exchanged the wire to RG3 (Asahi Intecc), which was externalized with consequent angioplasty using balloon catheters (5 × 20 mm and 7 × 20 mm). The antegrade flow was restored (**Videos 6 to 10, Figures 1I to 1M**). The mean pulmonary pressure decreased from 33 mm Hg to 26 mm Hg after balloon pulmonary angioplasty.

Previous reports demonstrated the feasibility of the retrograde approach in the recanalization of pulmonary occlusion in CTEPH patients.² However, this is the first description of the use of a Carlino-like technique to facilitate retrograde recanalization of CTEPH occlusive lesions.

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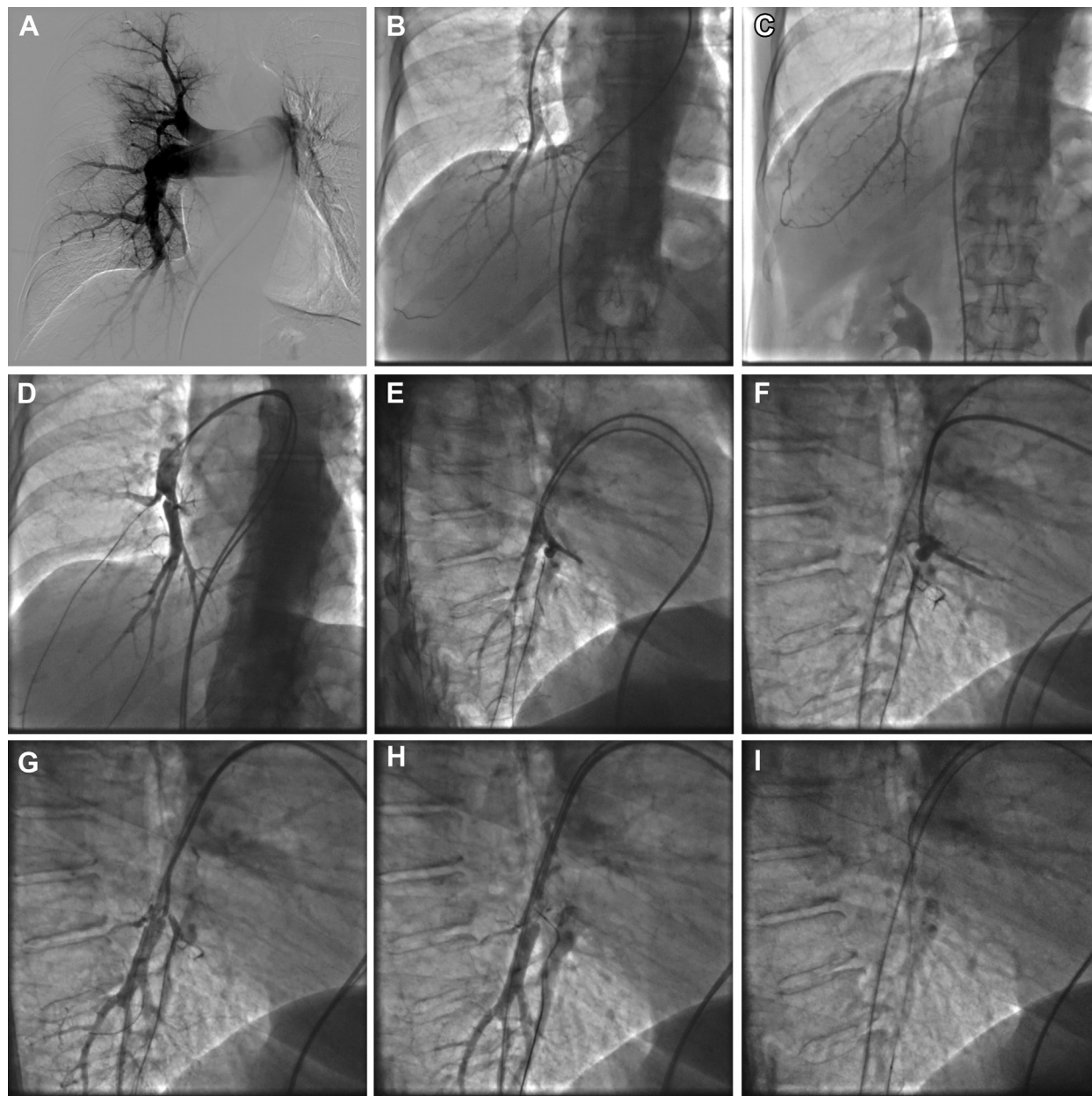
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The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

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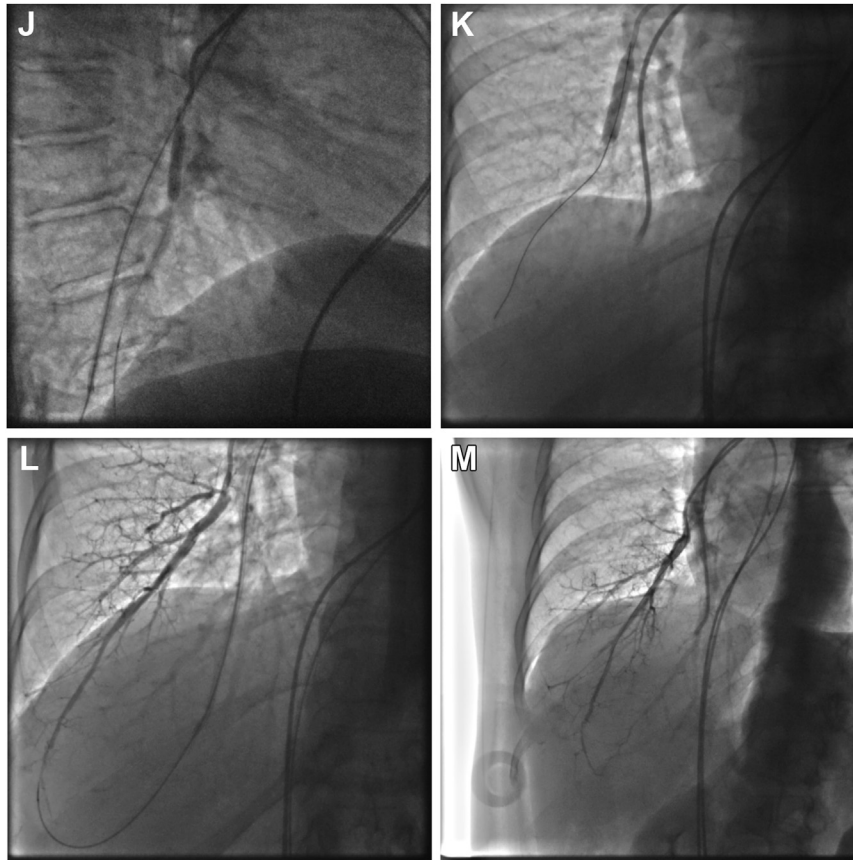
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FIGURE 1 Facilitating Chronic Thromboembolic Pulmonary Hypertension Lesion Recanalization With the Carlino-Like Technique

(A) The initial pulmonary angiogram. (B and C) The A10 angiogram and collateral surfing. (D to H) A Carlino-like injection into the subintimal space and the identification of the clear pathway to the proximal cap. (I to K) Externalization and ballooning. (L and M) The final angiogram.

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FIGURE 1 continued**REFERENCES**

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APPENDIX For supplemental videos, please see the online version of this paper.