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Bail-Out Technique for Pulmonary Artery Rupture With a Covered Stent in Balloon Pulmonary Angioplasty for Chronic Thromboembolic Pulmonary Hypertension

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A 76-year-old male patient with inoperable chronic thromboembolic pulmonary hypertension was referred to our hospital for treatment with balloon pulmonary angioplasty (BPA). He was in World Health Organization functional class III and pulmonary artery pressure was 69/6 (34) mm Hg. We performed BPA in a staged fashion and at the fourth BPA session, we targeted the left upper lobe A1+2. Pulmonary angiography showed the ring-like stenotic lesion (arrowhead in **Figure 1A**), and we evaluated the lumen size of the vessel with intravascular ultrasound. We then expanded the vessel with a balloon (5.0 × 20 mm; Bandicoot RX, Kaneka Medix, Osaka, Japan) (**Figure 1B**). However, immediately after deflation of the balloon, severe hemosputum occurred. Pulmonary angiography showed extravasation of contrast medium (**Figure 1C**, Online Video 1). We recognized that a pulmonary artery rupture had occurred and tried to stop the bleeding by balloon occlusion. However, we failed and deployed a covered stent of 3.0 × 16 mm (JOSTENT GraftMaster, Abbott Vascular, Santa Clara, California) to the rupture site. We inflated the balloon (5.0 × 20 mm) inside the stent, and pulmonary angiography showed the disappearance of extravasation of contrast medium (**Figure 1D**, Online Video 2). Repeated pulmonary angiography 2 weeks later revealed no extravasation. In-stent restenosis does not occur for 2 years (**Figures 1E and 1F**, Online Video 3).

Although pulmonary artery rupture is a rare complication during BPA, it can cause lethal bleeding. Therefore, it is essential for operators of BPA to know how to handle this complication. The efficacy of coil embolization for pulmonary artery rupture was reported (1,2); however, the embolized vessel could never be reperfused. Treatment with a covered stent could maintain the perfusion of the treated artery. Although the utility of a covered stent for pulmonary artery stenosis and aneurysm has been reported (3,4), this is the first report to describe the management of pulmonary artery rupture by a covered stent.

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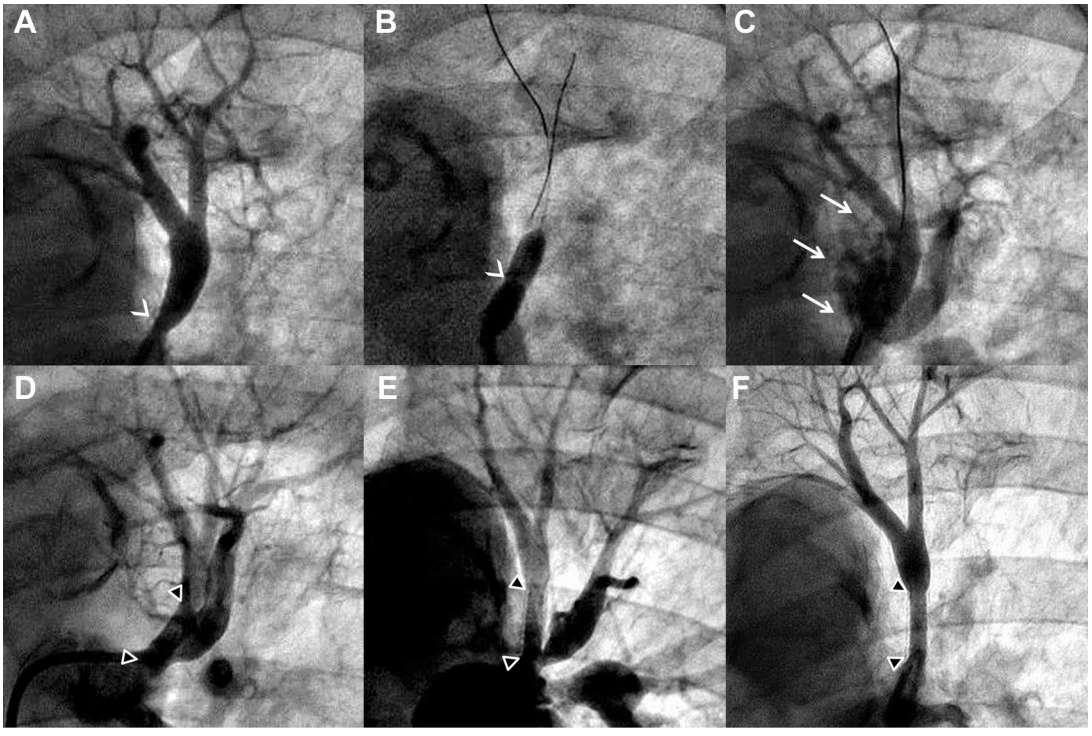
FIGURE 1 Angiography of Pulmonary Artery Rupture During BPA and Treatment With a Covered Stent



(A) Pulmonary angiography before balloon pulmonary angioplasty (BPA) shows the ring-like stenosis **(arrowhead)** of the left upper lobe A1+2. **(B)** Inflation of the 5.0-mm balloon to 8 atm does not expand the lesion completely **(arrowhead). (C)** Although inflation of the balloon to 14 atm expands the lesion completely, pulmonary angiography shows extravasation of contrast medium **(arrows)** (Online Video 1). **(D)** After sufficient expansion of the covered stent by the inflated balloon (between **triangles**), pulmonary angiography shows disappearance of extravasation of contrast medium (Online Video 2). **(E)** Pulmonary angiography at the 1-year follow-up after stenting shows patency of the stent with a slight neointimal formation without significant restenosis (between **triangles**). **(F)** Pulmonary angiography at the 2-year follow-up after stenting shows patency of the stent without significant restenosis (between **triangles**) (Online Video 3).

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KEY WORDS balloon angioplasty, complication, covered stent, pulmonary artery rupture, stenosis

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