CLINICAL IMAGE

Prolonged catheter balloon inflation for the treatment of hemoptysis complicating balloon pulmonary angioplasty

Grzegorz Kopeć, Jakub Stępniewski, Wojciech Magoń, Marcin Waligóra, Piotr Podolec

Department of Cardiac and Vascular Disease, Jagiellonian University Medical College, John Paul II Hospital, Kraków, Poland

Balloon pulmonary angioplasty (BPA) is a percutaneous method for the treatment of patients with chronic thromboembolic pulmonary hypertension (CTEPH) who are not eligible for surgical pulmonary endarterectomy.[1] It significantly improves hemodynamic parameters and exercise capacity of treated patients but requires dilation of several vessels during repeated sessions. The most frequent and potentially life-threatening complication of BPA is reperfusion lung edema,[2] which can usually be prevented by using a catheter balloon (CB) of the size adapted to the vessel diameter and by limiting the number of lesions treated during a single session.[3-5]

A 59-year-old woman with CTEPH diagnosed in October 2012 and treated with sildenafil and subcutaneous treprostinil was admitted for the fourth session of BPA. We aimed to recanalize a totally occluded artery to segment 9 of the right lower lobe (FIGURE 1A and 1B). Initial dilation with semicompliant CB (2.0/20 mm) at the site of the occlusion was performed without complications. As only partial restoration of perfusion was achieved (FIGURE 1C), we decided to redilate the lesion with a CB of a larger diameter (4.5 mm) adapted to the vessel size (6.9 × 7.1 mm) as assessed by intravascular ultrasound. Shortly after CB deflation, the patient started to cough and expectorate bloody sputum, and arterial oxygen saturation ($SatO_2$) decreased from 100% to 92% despite oxygen supplementation. Immediate inflation of the same CB to 2 atm at the site of the lesion was applied for 10 minutes to temporarily stop the flow to the treated segment (FIGURE 1D). This resulted in alleviation of cough and stabilization of arterial $SatO_2$. Protamine sulfate was injected intravenously to reverse the effects of heparin. Selective angiography showed no signs of vessel rupture or dissection. (FIGURE 1E). Due to recurrence of cough, prolonged CB inflation was repeated twice, for 10 and 5 minutes, respectively. Eventually, after cough subsided and arterial $SatO_2$ rose to 98%, the procedure was terminated.

High-resolution computed tomography (HRCT) revealed a wedge-shaped area of consolidations consistent with lung injury (FIGURE 1G). The patient was recommended a 24-hour rest with continued O_2 supplementation. HRCT on the third postprocedural day showed regression of the lung injury (FIGURE 1H), and the patient was discharged home. At 1-month follow-up, a significant improvement of hemodynamic parameters and symptoms was observed. Mean pulmonary artery pressure decreased by 15 mmHg (from 57 to 42 mmHg), pulmonary vascular resistance by 5 Wood units (WU) (from 14 to 9 WU), and cardiac index increased by 0.5 l/min/m^2 (from 1.8 to 2.3 l/min/m^2). The World Health Organization Functional Class decreased from class III to II. Selective angiography showed persistent patency of the treated vessel with excellent perfusion within the segment (FIGURE 1F). HRCT revealed complete resolution of previous abnormalities (FIGURE 1I).

Due to the risk of potentially life-threatening complications, patients considered for BPA should be referred only to centers with experience in this procedure, where appropriate preventive and treatment protocols can be implemented to provide good outcome. In case of symptomatic reperfusion lung edema, urgent prolonged CB inflation in the artery of the affected segment may minimize lung injury and resolve acute hemoptysis.

REFERENCES

1 Kurzyna M, Darocha S, Koteja A, et al. Balloon pulmonary angioplasty for chronic thromboembolic pulmonary hypertension. Postepy Kardiol Interwencyjnej. 2015; 11: 1-4.

2 Mizoguchi H, Ogawa A, Munemasa M, et al. Refined balloon pulmonary angioplasty for inoperable patients with chronic thromboembolic pulmonary hypertension. Circ Cardiovasc Interv. 2012; 5: 748-755.

Correspondence to: Grzegorz Kopeć, MD, PhD, Klinika Chorób Serca i Naczyń, Uniwersytet Jagielloński, Collegium Medicum, Krakowski Szpital Specjalistyczny im. Jana Pawła II, ul. Prądnicka 80, 31-202 Kraków, Poland, phone: +48 12 614 22 87, e-mail: grzegorzkrakow1@gmail.com

Received: January 9, 2017.
Revision accepted: January 31, 2017.
Published online: February 28, 2017.
Conflict of interests: none declared.
Pol Arch Intern Med. 2017; 127 (2): 129-130
doi:10.20452/pamw.3955

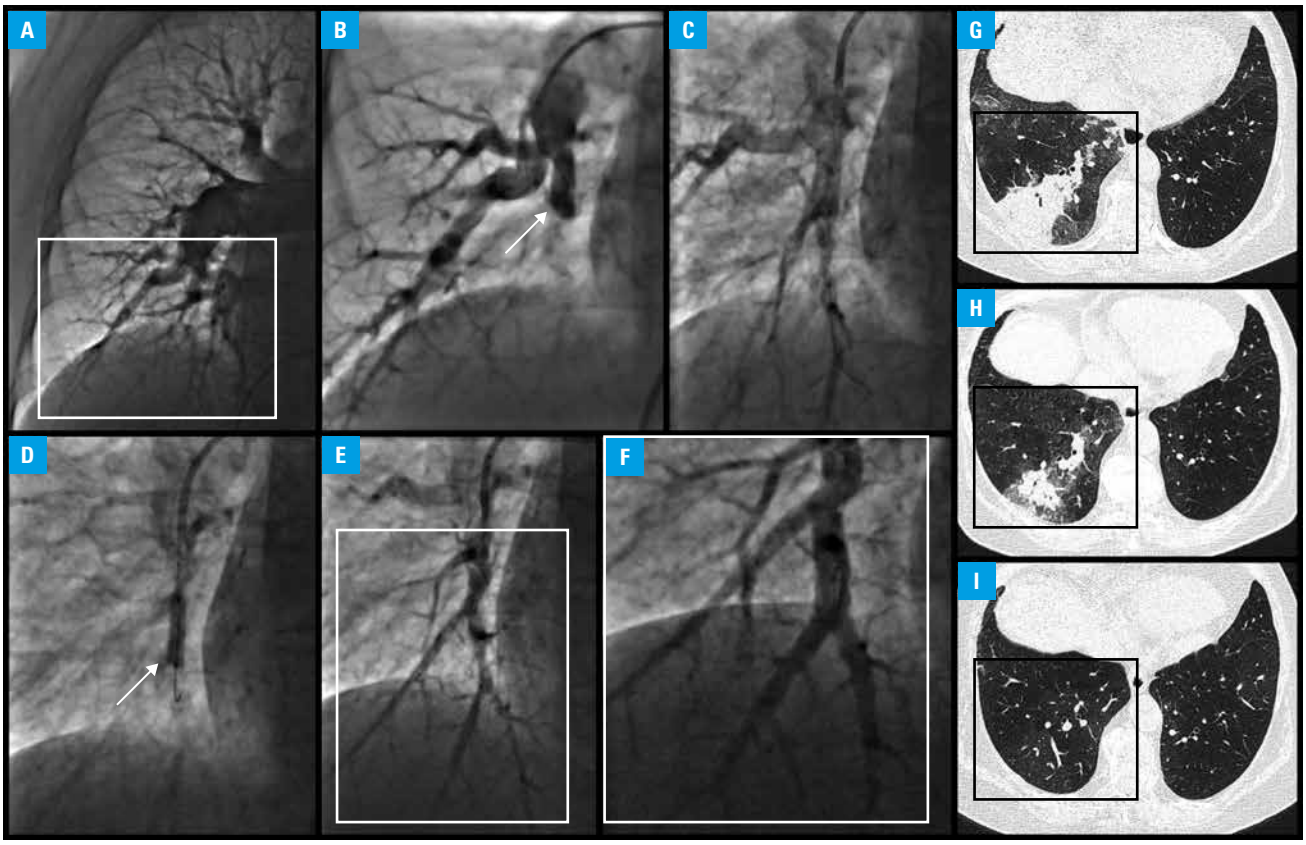

FIGURE 1 **A** – pulmonary angiography of the right lung (box); **B** – total occlusion of segmental artery 9 (arrow); **C** – initial dilation at the site of occlusion provides only partial flow restoration; **D** – after final dilation hemoptysis occurs and treatment with balloon occlusion (arrow) is applied, resulting in resolution of symptoms; **E** – no signs of vessel rupture (box) are present; **F** – follow-up angiography at 1 month shows excellent outcome of the procedure (box); **G** – high-resolution computed tomography shows wedge-shaped consolidation in the treated segment (box); **H** – partial resolution seen on the third postprocedural day (box); **I** – complete resolution on a follow-up scan at 1 month (box)

3 Kopeć G, Stępniewski J, Waligóra M, et al. Staged treatment of central and peripheral lesions in chronic thromboembolic pulmonary hypertension. Pol Arch Med Wewn. 2016; 126: 97-99.

4 Kopeć G, Waligóra M, Stępniewski J, et al. In vivo characterization of changes in composition of organized thrombus in patient with chronic thromboembolic pulmonary hypertension treated with balloon pulmonary angioplasty. Int J Cardiol. 2015; 186: 279-281.

5 Roik M, Wretowski D, Irzyk K, Łabyk A, et al. Familial chronic thromboembolic pulmonary hypertension in a mother and a son: successful treatment with refined balloon pulmonary angioplasty. Pol Arch Med Wewn. 2016; 126: 1014-1016.