Letter to the Editor

The first reported case of pulmonary vein stenosis treated by percutaneous angioplasty with self-apposing drug-eluting stent implantation

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A 52-year-old male who had suffered from dyspnea on exertion since last year was diagnosed with recurrent paroxysmal atrial fibrillation (PAF). An echocardiography examination (ECHO) conducted during that period revealed borderline right ventricular systolic pressure (RVSP, 30–35 mm Hg), without any other abnormalities. Percutaneous radiofrequency (RF) ablation for PAF was performed. Despite the reduction of arrhythmic episodes, the symptoms noticeably developed a couple of weeks after the procedure. In addition, several episodes of hemoptysis were noted. A subsequent ECHO examination revealed a further increase of RVSP (55–60 mm Hg), therefore, pulmonary hypertension (PH) diagnosis was initiated. Computed tomography angiography (CTA) ruled out pulmonary embolism, but revealed stenosis of the left pulmonary veins (PVs) at their distal orifices (Fig. 1 PANEL A). High-resolution computed tomography (HRCT) showed a mosaic lung perfusion pattern suggestive of bronchiolitis obliterans (Fig. 1 PANEL B) which was not confirmed by functional tests. The mosaic lung perfusion pattern was therefore associated with significant PV stenosis. Other conditions such as sarcoidosis and fibrosing mediastinitis, which might have caused PV stenosis, were excluded. Pulmonary artery angiography with delayed imaging showed impaired filling of the left atrium (LA) after subselective contrast injection into the left pulmonary artery. Finally, right heart catheterization (RHC) revealed elevated systolic pulmonary artery pressure (SPAP, 60 mm Hg) and pulmonary capillary wedge pressure (PCWP, 34 mm Hg), consequently, percutaneous angioplasty of the left PVs was recommended.

A 5-F sheath was inserted in the femoral artery and a pigtail catheter was placed in the aortic bulb for pressure measurement and for facilitating transseptal puncture. A 8-F sheath was inserted in the femoral vein and LA was reached via the interatrial septum under transesophageal ECHO control. Directly assessed left atrial pressure (LAP) was within normal range (12 mm Hg). It allowed calculation of a pressure gradient between PVs and LA (PCWP–LAP) which turned out to be elevated (22 mm Hg). Contrast injections confirmed stenosis of the Left Inferior Pulmonary Vein (LIPV, Fig. 2 PANEL A) and the Left Superior Pulmonary Vein (LSPV, Fig. 2 PANEL B). A stiff guidewire was advanced into a multipurpose catheter (MP) to enhance back up support for angioplasty. Initially, dilatations of LIPV with a 8.0/40 mm Senri balloon were performed. Due to residual stenosis in LSPV a 3.5–4.5/22 mm Stentys self-apposing drug-eluting stent (DES), which expands up to 6.0 mm in diameter, was implanted. The procedure was finalized with good angiographic results being noted in both the LIPV (Fig. 2 PANEL C) and LSPV (Fig. 2 PANEL D). Repeated RHC measurements revealed significant decrease of SPAP (40 mm Hg), PCWP (18 mm Hg) and a pressure gradient between PVs and LA (6 mm Hg). The patient was discharged with Aspirin and Clopidogrel. Immediate symptom reduction was noted and was persistent at the 5 months follow-up.

Formerly, PV stenosis was a very rare, predominantly congenital disease [1]. In the last couple of years the incidence of this condition has dramatically risen due to the increasing number of catheter ablation procedures for PAF. According to various reports PV stenosis of different severity develops after 2–8% of such procedures [2,3]. Treatment of PV stenosis is based on percutaneous angioplasty. Stent implantation is often inevitable due to residual stenosis or restenosis after balloon angioplasty [4]. Although the mechanism of restenosis is much less studied than the one of a similar process in the arteries, neointimal proliferation in veins has also been observed [5,6]. Long term patency improvement after angioplasty for PV stenosis has been shown after DES implantation [7] in comparison with plain balloon angioplasty [8] and...
bare-metal-stent implantation [9]. However, DES application in the setting of PV stenosis is limited due to inadequate diameters of stents “off the shelf”. This is to our best knowledge the first report of PV angioplasty with self-apposing DES implantation. Currently, stents of this type with a capacity to expand up to 6 mm in diameter, therefore larger than available standard DES, are fitted in moderately large PVs. Apart from that, the rationale to use self-apposing DES in the treatment of PV stenosis is supported by a number of factors: firstly, due to the low-pressure technique of the stent placement, the risk of vessel rupture is minimized, which is particularly important while treating veins [2]. Secondly, the veins aren’t affected by atherosclerosis thus good alignment of self-apposing stent should be easily obtained, which is crucial to prevent in-stent thrombosis [10]. The potential advantage of self-apposing DES over standard DES in the setting of PV stenosis should be determined in a randomized trial prior to their routine use for this indication.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.ijcard.2014.10.058.

References


Fig. 1. PANEL A — Cardiac CT angiography; LIPV and LSPV (arrows). PANEL B — HRCT transverse plane — mosaic pattern of lungs perfusion.

Fig. 2. PANEL A — LIPV stenosis (arrow). PANEL B — LSPV stenosis (arrow). PANEL C — LIPV after balloon angioplasty (arrow). PANEL D — LSPV after self-apposing DES implantation (arrow).
