

Left Atrial Substrate Ablation in Addition to Pulmonary Vein Isolation in Paroxysmal Atrial Fibrillation Using a Large 28-mm Cryoballoon

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We report a case of successful isolation of all pulmonary veins (PV) for symptomatic paroxysmal atrial fibrillation using a 23-mm cryoballoon with continued paroxysmal atrial fibrillation during a 3-month follow-up. Left atrial-to-PV-junction ablation was then performed 3 months after the first procedure using a larger 28-mm balloon despite unrecovered isolation of all four PV, thereby curing symptomatic atrial fibrillation in this case. (PACE 2009; 32:273–274)

ablation, atrial fibrillation

Introduction

Pulmonary vein isolation (PVI) using a novel cryoballoon technique has been shown to be an effective and safe alternative to standard radiofrequency ablation for treatment of paroxysmal atrial fibrillation.^{1,2} The level of PVI for various balloon techniques was identified to be around the pulmonary vein ostia using electroanatomic mapping³ and intracardiac ultrasound studies⁴ after balloon technique PVI.

Case Report

A 76-year-old man underwent PVI for drug refractory highly symptomatic paroxysmal atrial fibrillation despite ongoing amiodarone treatment. Baseline characteristics showed normal left ventricular (LV) function with mild LV hypertrophy due to decades of arterial hypertension with the interventricular septum measuring 14 mm in echocardiography and moderate enlargement of the left atrium with 43 mm.

The procedure was performed during local anesthesia with mild sedation. Fluoroscopically guided transseptal puncture was performed as described previously.¹ The steerable transseptal sheath (Flexcath, Cryocath, Montreal, Canada) was then advanced into the left atrium over the wire. Pulmonary vein angiography was performed using the steerable sheath, revealing small-diameter pulmonary veins (PV) as demonstrated in Figure 1

with very small caliber right inferior and left superior PV of less than 15 mm when compared to the 15-French outer diameter of the steerable transseptal sheath. The left inferior and right superior PV were of small caliber of 20 mm; therefore, a small-sized 23-mm balloon (Arctic Front, Cryocath) was chosen for PV isolation. We applied 2–3 ablation freezes, each 300 seconds, with good balloon occlusion. PV mapping with a circular decapolar mapping catheter was performed following ablation of all four PV, showing complete PV isolation in all four PV as described previously.¹

Paroxysmal atrial fibrillation reoccurred the following day with unchanged burden of paroxysmal atrial fibrillation with several symptomatic episodes per week during a 3-month follow-up despite continued amiodarone treatment.

A second PV isolation procedure was performed 3 months after the first procedure as described above, expecting recovered PV conduction as a potential cause of recurrence of atrial fibrillation following PVI.⁵ However, PV mapping showed unrecovered completely blocked PV during sinus rhythm. There were no ectopic atrial beats suggesting ablation targets other than pulmonary veins. It has been shown that a majority of non-PV foci triggering paroxysmal atrial fibrillation are located near the PV ostia or at the posterior left atrium.⁶ Larger isolation areas around the PV have been shown to be superior to smaller isolation areas in terms of clinical success.⁷ Thus, we decided to use the larger cryoballoon for isolation of the atrial-to-PV-junction region and abandoned mapping of non-PV foci. Additional ablation of all four atrial-to-PV-junctions was performed using a larger 28-mm cryoballoon (Arctic Front) with two additional ablation freezes per PV with good balloon occlusion in order to ablate atrial fibrillation substrate arising from proximal PVs and PV junction regions. No PV mapping was performed

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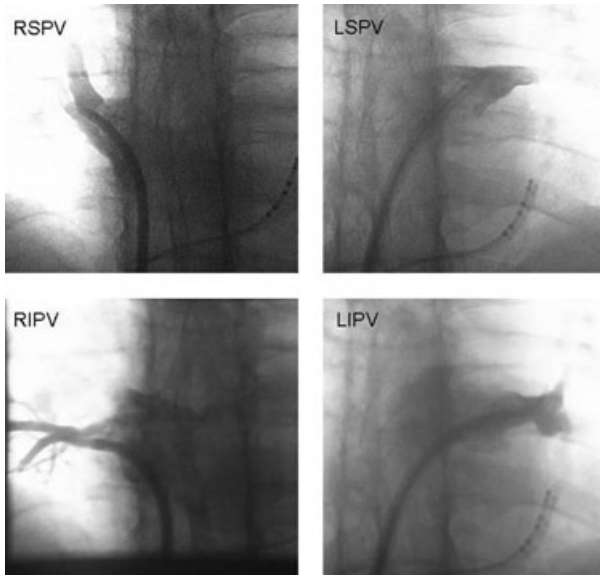


Figure 1. PV angiography using the steerable transseptal sheath in posterior-anterior projection. Right superior pulmonary vein (RSPV), right inferior pulmonary vein (RIPV), left superior pulmonary vein (LSPV), and left inferior pulmonary vein (LIPV). A hexapolar diagnostic catheter is located inside the coronary sinus.

following this ablation, since all four PVs were already isolated at the beginning of this procedure.

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Amiodarone was discontinued after 4 weeks following the second ablation procedure since the patient was completely free from symptomatic atrial fibrillation and palpitations. The patient remained free of symptomatic atrial fibrillation on clinical assessment, as well as standard electrocardiogram (ECG), Holter ECG every 2 months, and event recorder monitoring during a follow-up period of 6 months so far.

Discussion

Our case highlights that ablation of left atrium-to-PV-junction region is crucial for successful interventional treatment of paroxysmal atrial fibrillation.

Using a small-sized 23-mm cryoballoon, we were technically able to isolate all four PV, whereas the junction region remained unablated, even though PV diameter was judged small on previous angiography. Cure of atrial fibrillation was only achieved by ablation of proximal PV and left atrium-to-PV-junction regions using a larger 28-mm balloon. This case illustrates that PV diameter on angiography may not help in choosing balloon size for successful treatment. This observation has modified our current approach to primarily use the large size 28-mm cryoballoon in order to target proximal aspects of PVs and the PV junction region.