Cryoballoon pulmonary vein isolation and voltage mapping for symptomatic atrial fibrillation 9 months after Watchman device implantation

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Introduction

Left atrial appendage occlusion (LAAO) with the Watchman device (Boston Scientific, Natick, MA) is frequently performed as a nonpharmacologic, second-line therapy for stroke prevention in patients with atrial fibrillation (AF)[1,2] and contraindications to long-term anticoagulation. Although combined catheter pulmonary vein isolation (PVI) and Watchman procedures may be performed successfully for patients with symptomatic AF, a simultaneous approach is not always feasible or in some cases PVI may not be clinically indicated at the time of Watchman implantation. Staged radiofrequency PVI and left atrial (LA) catheter ablation following Watchman device placement has been shown to be feasible[3–5]; however, other modalities for PVI have not been reported in the postimplant population.

Case report

A 64-year-old man with a past medical history of obesity, hypertension, paroxysmal AF, and spontaneous intracranial hemorrhage presented to our institution for elective catheter ablation for treatment of symptomatic AF. Nine months prior to presentation, the patient underwent successful implantation of a 30 mm Watchman LAAO device. The patient's postimplantation transesophageal echocardiogram (TEE) imaging showed normal left ventricular ejection fraction, appropriate seating/compression of the Watchman device within the ostium of the left atrial appendage (LAA), and no residual leak around the device. Surveillance TEE imaging at 45 days and 6 months demonstrated stable position of the Watchman device and no evidence of peri-device leak.

The patient stopped warfarin at 45 days and discontinued dual antiplatelet therapy at 6 months as per manufacturer-recommended guidelines. At 6-month clinical follow-up, the patient complained of fatigue and palpitations, and subsequently elective direct current cardioversion was attempted but was unsuccessful. After discussion of risks and benefits, the patient opted to undergo PVI procedure and repeat attempt at direct current cardioversion.

Written informed consent was obtained prior to the procedure. Members of the anesthesia staff intubated the patient and performed general anesthesia during the case. Bilateral common femoral vein access was obtained via Seldinger technique. A decapolar catheter was placed in the coronary sinus and an 8F intracardiac echocardiographic (ICE) probe was advanced into the right atrium. A long sheath (Agilis; St. Jude Medical, Minneapolis, MN) was advanced over a guidewire into the superior vena cava. The guidewire was exchanged for a transseptal needle and transseptal puncture was performed under ICE and fluoroscopic guidance. A bolus of heparin was administered and the activated clotting time was maintained between 300 and 350 seconds during the procedure. A transesophageal thermometer was inserted to avoid potential cryothermal injury to the esophagus.

Transseptal access was used to advance a PentaRay mapping catheter (5 radiating splines with 10 pairs of 3F, 1-mm-tip and 2-mm center-to-center–spaced electrodes; Biosense Webster Inc, Diamond Bar, CA) into the left atrium through the long sheath. Once the catheter was in the left atrium, a 3-dimensional electroanatomic map of the left atrium and pulmonary veins was constructed using the Carto 3 mapping system (Biosense Webster Inc).

Next, the PentaRay mapping catheter was removed from the left atrium and the long sheath was exchanged for a FlexCath Advance steerable sheath over a stiff guidewire placed within the left superior pulmonary vein. A 28-mm cryoballoon catheter (Artic Front Advance; Medtronic, Minneapolis, MN) was then advanced through the long sheath into the left atrium. The Carto 3 system was used to visualize the Achieve mapping catheter (Medtronic) and to guide positioning into each pulmonary vein. Adequate pulmonary vein occlusion was assessed by contrast injection and 1–2 freezes between

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KEY TEACHING POINTS

- Cryoballoon ablation is a feasible alternative to radiofrequency catheter for pulmonary vein isolation (PVI) ablation in patients with pre-existing Watchman devices.
- Caution should be taken with regard to the timing of PVI post-Watchman implantation owing to interpatient variability in time to endocardialization of the device surface and potential risk of ablation-related thrombus formation.
- Three-dimensional electroanatomic mapping provides enhanced knowledge of left atrial anatomy and assists in locating pulmonary veins prior to cryoballoon deployment.
- High-amplitude left atrial appendage–like electrograms may be observed on the surface of endocardialized Watchman devices.

180 and 240 seconds long were delivered to each pulmonary vein (Figure 1). Entrance and exit block was confirmed in all 4 pulmonary veins by pacing from the decapolar and the Achieve mapping catheters. After confirmation of PVI, the patient was successfully cardioverted to sinus rhythm with a 200 J external shock. The cryoballoon catheter was exchanged for the PentaRay mapping catheter and a bipolar endocardial voltage map of the LA cavity and pulmonary veins was created. Surprisingly, bipolar voltage recordings obtained with the splines of the PentaRay catheter directly over the endothelialized surface of the Watchman device were normal in amplitude and even LAA-like (Figure 2).

The LA dwell time for the procedure was 58 minutes. ICE imaging was utilized throughout the case and there was no evidence of intracardiac thrombus formation or pericardial effusion during the procedure. Heparin infusion was discontinued after catheters and sheaths were removed from the left atrium. The patient experienced no complications during the procedure and was discharged home in stable condition the following day.

TEE imaging performed 2 weeks post-PVI showed stable Watchman device position and no evidence of peri-device leak. The patient was seen in follow-up 1 month postprocedure without recurrent AF, bleeding events, or thromboembolic symptoms. The patient received apixaban 5 mg twice daily for 2 months following the PVI procedure.

Discussion

Current guidelines recommend PVI as a treatment option for patients with symptomatic drug-refractory paroxysmal AF. Approval of the Watchman device and other LAAO technologies in the future will undoubtedly increase the number of patients with clinical indications for PVI who have pre-existing LAAO devices. Several observational studies have shown that catheter-based PVI and LA ablation may be feasible when performed at least 45 days after Watchman device placement,[3,4,6] although the optimal time for ablation postimplant remains unclear, and thrombus formation on the surface of the Watchman device following ablation has also been reported,[5] as well as new and increased peri-device leaks following radiofrequency catheter ablation in the area of the Watchman device.[7] Additional risks of extensive radiofrequency (RF) catheter ablation post–LAAO device implantation include inadvertent ablation over the endothelialized device surface owing to distortion of the normal anatomy of the appendage–ridge interface, device

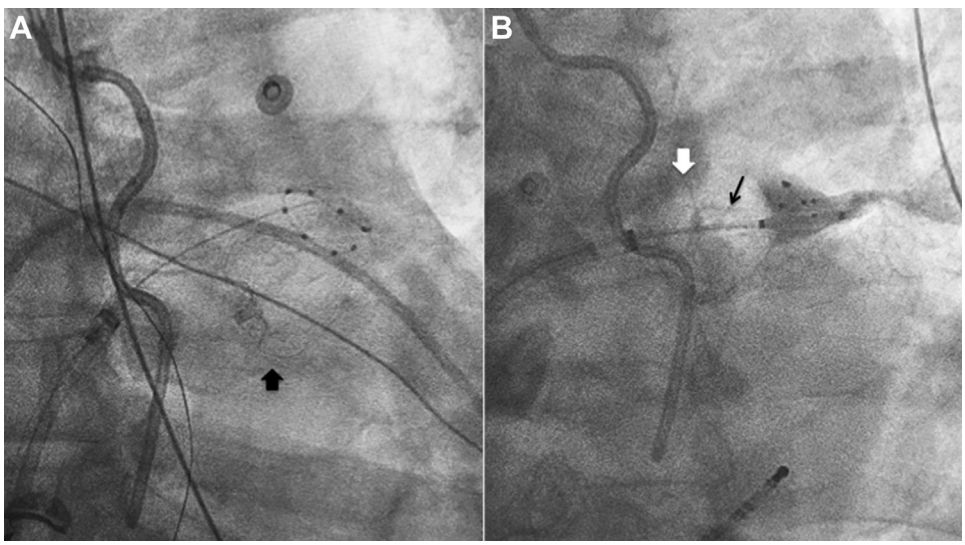

Figure 1 **A:** Left anterior oblique (LAO) view of the patient's existing Watchman device and Achieve circular mapping catheter positioned within the left superior pulmonary vein. **B:** LAO view following inflation of the 28 mm cryoballoon at ostium of the left upper pulmonary vein and contrast injection showing adequate seal. Black arrows indicate Watchman device; white arrow indicates inflated cryoballoon.