Cardiac Imaging

# Pulmonary Vein Parasystolic Activity Following Circumferential Isolation in a Patient with Paroxysmal Atrial Fibrillation

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A 50-year-old man with symptomatic, drug refractory paroxysmal atrial fibrillation (AF) underwent circumferential pulmonary vein (PV) isolation. All antiarrhythmic drugs were discontinued for at least five half-lives before the procedure. Following a double transseptal puncture, the three-dimensional geometry of the left atrium was reconstructed using the CARTO system for isolation of large areas around both ipsilateral PVs (Biosense Webster, Inc., Diamond Bar, CA, USA) with a 3.5-mm-tip ablation catheter (Thermo Cool Navi-Star, Biosense Webster, Inc., Diamond Bar, CA, USA). The PV antrum was identified by a combination of venography, electrogram, and the drop-off site of the mapping catheter during its withdrawal from the vein. Radiofrequency (RF) ablation was performed during sinus rhythm under coronary sinus pacing. RF energy was delivered along the ipsilateral PV antrum at 43° C, with a maximal energy output of 25-30 W and an external irrigated flow rate of 17-30 mL/min. Each target site was ablated until the local electrogram amplitude decreased by ≥80% or to <0.1 mV. Successful PV isolation was defined by loss of PV potentials (entrance block) and failure to capture left atrium (exit block) during pacing from the decapolar circular mapping catheter (Lasso, Biosense Webster, Inc., Diamond Bar, CA, USA). All PVs were considered arrhythmogenic. After a large circumferential lesion had been created around the left PVs (Figure 1), an ectopic focus arising from the left superior PV with exit block at the left atrium-PV junction was observed (Figure 2). The intrinsic dissociated PV rhythm was regular, with a cycle length of 2540 ms. Pacing from the coronary sinus failed to capture the left superior PV (loss of PV potentials from the Lasso bipoles, entry block) without affecting the ectopic activity in the vein (Figure 3). The patient remained free of AF during a 3-month blanking period.

AF initiation often occurs from arrhythmogenic foci arising from PV muscular sleeves.[1,2] Dissociated activity persists in 12% of PVs following ablation.[3] This spontaneous and automatic rhythm is usually slow (2300 ± 1100 ms) or, less commonly, may be rapid and repetitive.[3] Weerasooriya et al have shown that the presence of dissociated activity does not increase the risk of AF recurrence during follow up.[3] This phenomenon demonstrates that the atrial sleeves present in the PVs display an automatic rhythm that can be characterised as parasystole. Focal impulse formation, surrounded by an area that protects any other non-parasystolic activity, is the hallmark of parasystole.[4] Although mathematically related ectopic intervals are considered as the

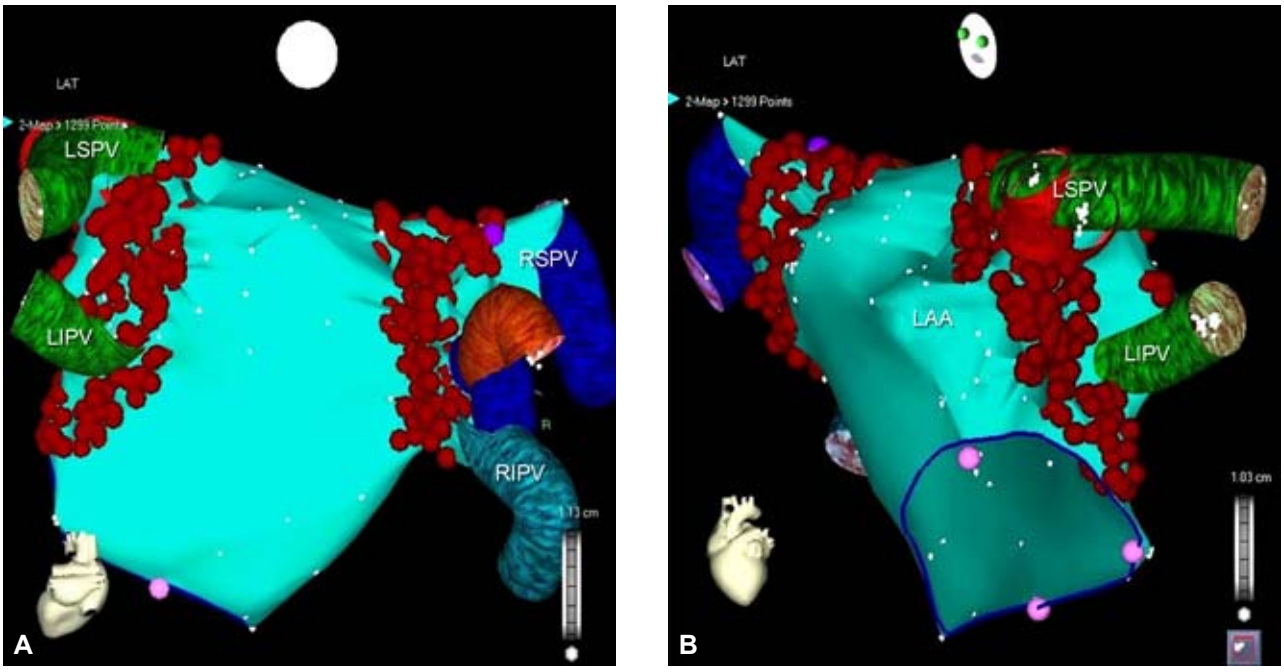


**Figure 1.** Three-dimensional reconstruction of the left atrium using the CARTO system in (A) posterior-anterior view and (B) left anterior oblique view, after circumferential ablation around both ipsilateral veins. LAA - left atrial appendage; LIPV - left inferior pulmonary vein; LSPV - left superior pulmonary vein; RIPV - right inferior pulmonary vein; RSPV - right superior pulmonary vein.

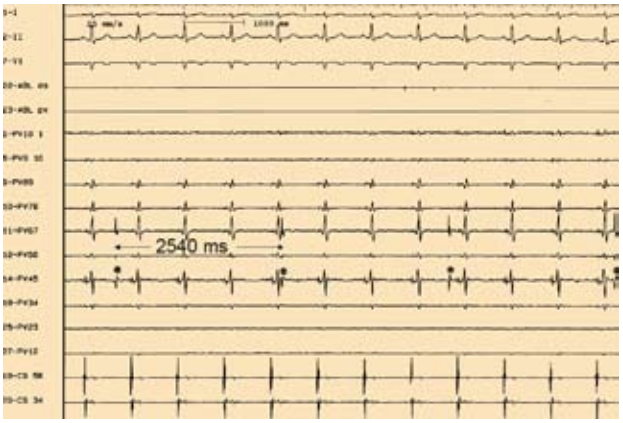


**Figure 2.** Mapping within the left superior pulmonary vein (Lasso bipoles, PV1-2 through PV10-1) following circumferential ablation showing a regular dissociated vein rhythm with a cycle length of 2540 ms (asterisks). Paper speed 25 mm/s. CS – coronary sinus; ABL – ablation catheter.

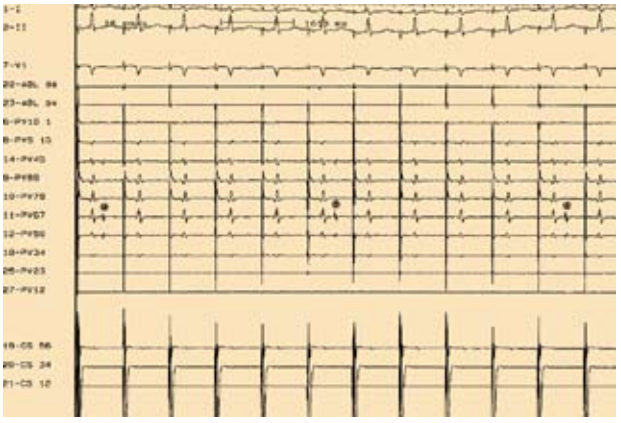

**Figure 3.** Mapping within the left superior pulmonary vein during coronary sinus pacing showing loss of pulmonary vein potentials (entry block). The dissociated vein activity (asterisks) is unaffected. Electrograms are as in figure 2.

classic criterion for parasystole, irregularity of ectopic discharge is the rule rather than the exception.[4]

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