



Contents lists available at ScienceDirect

Indian Pacing and Electrophysiology Journal

journal homepage: www.elsevier.com/locate/IPEJ

Persistent left superior vena cava isolation in a patient with paroxysmal atrial fibrillation and absence of right superior vena cava



Guillermo Gutiérrez-Ballesteros^{*}, Juan Jiménez-Jáimez, Pablo Sánchez-Millán, Miguel Álvarez

Cardiac Arrhythmia and Electrophysiology Unit, Department of Cardiology, Hospital Universitario Virgen de las Nieves, Granada, Spain

ARTICLE INFO

Article history:

Received 11 March 2021

Received in revised form

12 July 2021

Accepted 16 July 2021

Available online 21 July 2021

Keywords:

Left superior vena cava isolation

Right superior vena cava absence

A 41-year-old man with previous pulmonary vein cryoablation and cavotricuspid isthmus (CTI) ablation was referred to our center for REDO procedure due to recurrences of atrial fibrillation (AF) and common atrial flutter (AFL). A transthoracic echocardiogram showed the presence of a persistent left superior vena cava (LSVC), right superior vena cava (RSVC) absence and a patent foramen ovale (PFO). We performed the procedure with Carto[®] navigation system (Biosense Webster, Diamond Bar, CA) and Carto-Univu[®] module. For ablation and for mapping Smarttouch[®] and Pentaray catheter[®] were used respectively. We began the procedure with a LSVC angiography through the left brachial vein for later integration into Carto-Univu[®] (**Fig. 1, Panel A**). Subsequently, through the PFO, the left atrium was mapped observing right inferior pulmonary vein reconnection with subsequent re-isolation. CTI re-ablation was also performed. Then, under isoprenaline infusion (2mcg/min), the LSVC was explored observing vena cava potentials (**Fig. 1, Panel B**). During the mapping into the LSVC an AF episode was induced by an ectopic beat arising from LSVC, so we decided to perform a circumferential ablation of LSVC (**Fig. 1, Panel C**). The ablation

height within the LSVC was decided based on previous studies [1,2], in the middle zone at the level of the left pulmonary vein common trunk (LPVCT) (**Fig. 1, Panel A**). The ablation parameters used were a power of 20 W and ablation index of 300. Before each application, we stimulated from the ablation catheter at 25 mA/2 ms to rule out left phrenic nerve capture. During the ablation in LSVC sinus rhythm was restored (**Fig. 1, Panel A and D**) and LSVC isolation was achieved after completing the ring (**Fig. 1, Panel E**). Subsequently, neither after isoprenaline nor after atrial stimulation recurrence of AF was observed. On follow-up the patient was AF free.

LSVC is present in about 0.5% of population and in 10% of patients with congenital heart disease [3]. LSVC usually is the precursor of the Vein of Marshall, which is a known source of AF extrapulmonary triggers [4] and its ablation can reduce AF recurrence [5].

Patients with AF and LSVC may require isolation of LSVC to control symptoms, being the variant with absence of RSVC the least frequently reported [2].

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

^{*} Corresponding author. Unidad de Arritmias y Electrofisiología Cardíaca, Avenida de las Fuerzas Armadas número 2, 3^a planta, CP: 18014, Granada, Spain.

E-mail address: h72gubag@icloud.com (G. Gutiérrez-Ballesteros).

Peer review under responsibility of Indian Heart Rhythm Society.

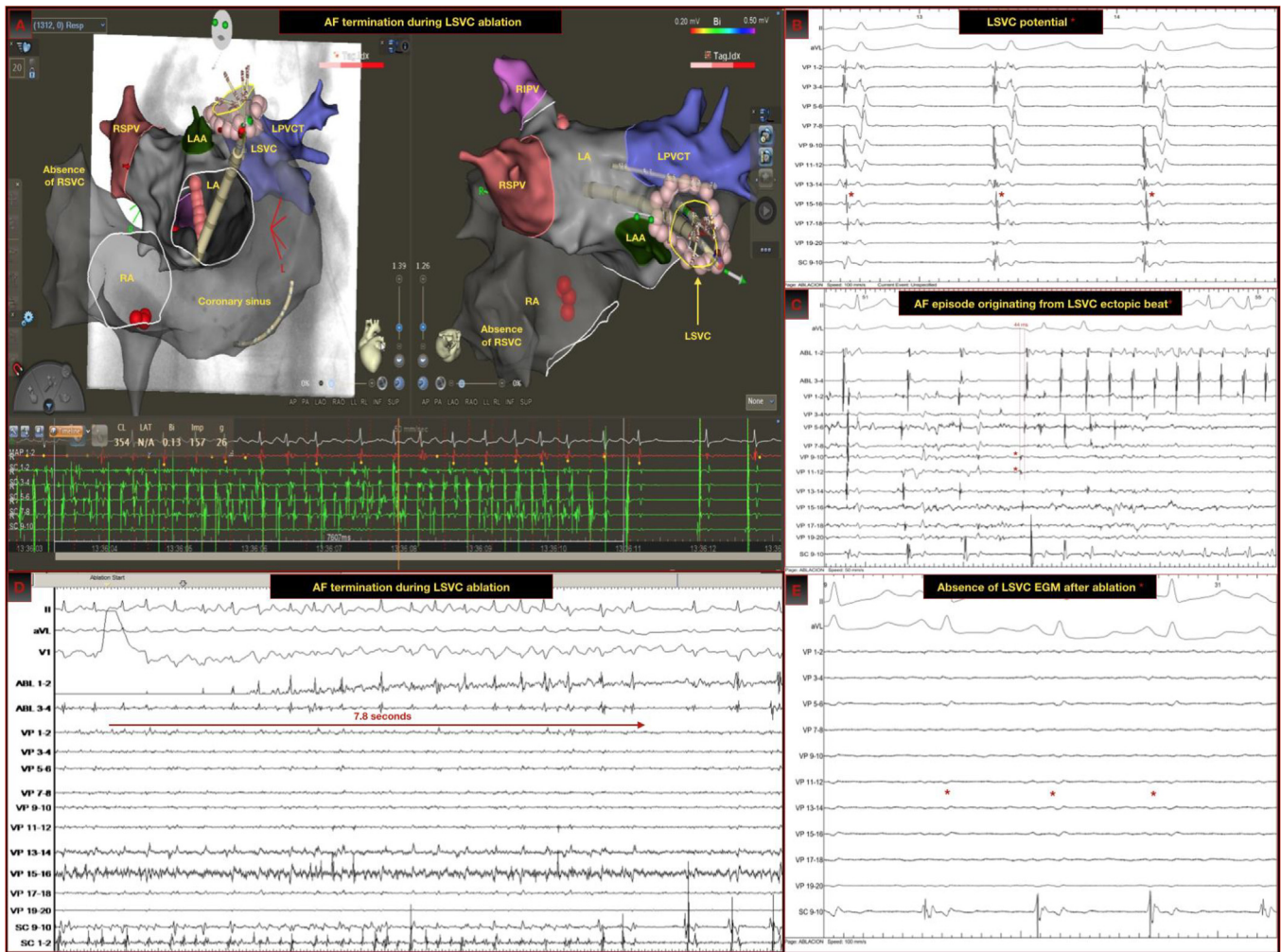


Fig. 1. Panel A and D: Electroanatomic mapping (EAM) reconstruction and AF termination during LSVC ablation. **Panel B:** LSVC potentials prior to ablation. **Panel C:** AF episode originating by LSVC ectopic beat. **Panel E:** Absence of LSCV potentials after completing ablation. VP 1–2 to VP 19–20: Pentaray EGM's located in LSVC. Abl: Ablation catheter placed in the LSVC ablation line. SC: Decapolar catheter in Coronary sinus, from proximal (SC 9–10) to distal (SC 1–2).

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ipej.2021.07.004>.

References

[1] Li-Fern Hsu, Jaïs P, Haïssaguerre M, et al. Atrial fibrillation originating from persistent left superior vena cava. *Circulation* 2004;109:828–32.
 [2] Kim YG, Han S, Kim YH, et al. Impact of persistent left superior vena cava on

radiofrequency catheter ablation in patients with atrial fibrillation. *Europace* 2019;21:1824–32.
 [3] Irwin RB, Graves M, Schmitt M. Left superior vena cava: revisited. *Eur Heart J Cardiovasc Imag* 2012;13:284–91.
 [4] Santangeli P, Marchlinski F. Techniques for the provocation, localization, and ablation of non–pulmonary vein triggers for atrial fibrillation. *Heart Rhythm* 2017;14:1087–96.
 [5] Valderrábano M, Peterson L, Swarup V, et al. Effect of catheter ablation with vein of Marshall ethanol infusion vs catheter ablation alone on persistent atrial fibrillation. The VENUS randomized clinical trial. *J Am Med Assoc* 2020;324(16): 1620–8.