EP CASE REPORT

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Detection of therapeutic targets for recurrent atrial fibrillation using ^{123}I-metaiodobenzylguanidine scintigraphy

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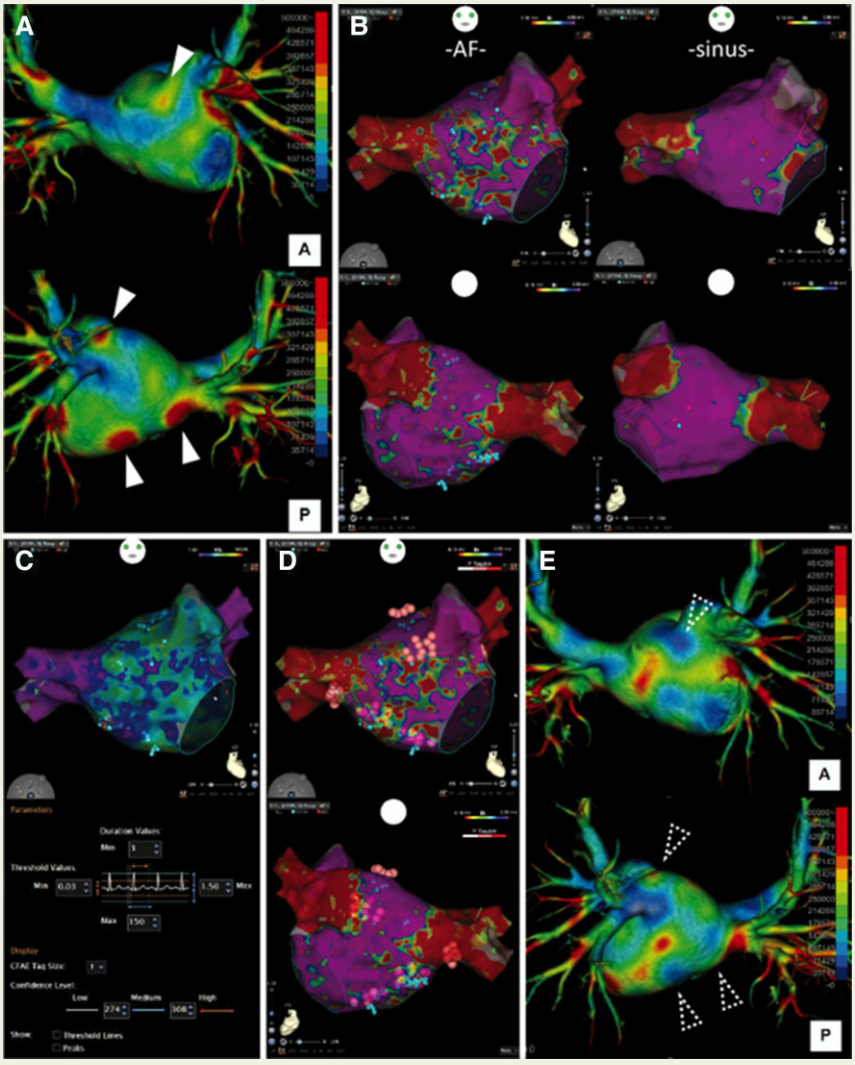
Case description



A 72-year-old man with symptomatic paroxysmal atrial fibrillation (AF), refractory to antiarrhythmic drugs, underwent third catheter ablation. We performed preoperative three-dimensional computed tomography and sympathetic innervation imaging with ^{123}I-metaiodobenzylguanidine (MIBG) using a novel solid-state whole-body scanner (VERITON, Spectrum Dynamics Ltd., Caesarea, Israel), with high sensitivity and high spatial resolution. A fusion image from both modalities was created to identify the exact accumulation site reflecting the peri-atrial sympathetic activation (*Panel A*, see Supplementary material online, *Appendix*). Left atrial voltage mapping and complex fractionated atrial electrogram (CFAE) mapping [in the interval confidence level (ICL) mode] were performed using the PENTARAY® high-density mapping catheter with the and CARTO® 3 navigation system (Biosense Webster, Irvine, CA, USA). After confirming the isolation of all pulmonary veins, both the voltage and CFAE-ICL maps were created in sinus rhythm and under AF induction (*Panel B*). The use of high-dose isoproterenol resulted in reproducible findings of a transition from premature atrial contraction of posterior left atrial wall origin to AF. In addition, the patient underwent a preoperative 24 h Holter ECG with an LF/HF ratio of 4.76, which indicated brief AF during daytime activities. The sites of discrete MIBG accumulation were almost identical to the areas identified by the CFAE-ICL map during AF but not during sinus rhythm. The detailed settings of the CFAE-ICL map are shown in *Panel C*. The ablation was performed using the THERMOCOOL SMARTTOUCH SF catheter (Biosense Webster). The four regions with MIBG accumulation and >80% of the maximum number of ICLs were the main targets (*Panel D*). Postoperative imaging with MIBG 3 months later revealed that the accumulations detected during preoperative evaluation had reduced or disappeared (*Panel E*). Six months later, no recurrence of AF has been observed.

Cardiac sympathetic nerve activity has been suggested to be involved in the development and maintenance of AF.[1] In patients with recurrent AF after PV isolation, understanding the AF substrates and triggers other than the PV is necessary to find effective targets. The intrinsic cardiac sympathetic nervous system comprises the epicardial atrial ganglionated plexus, fat pads, and associated fibres

that connect them.[2] Compared with PV isolation alone, defragmentation of regions using the ICL mode has been reported to improve the prognosis of persistent AF.[3]

We believe that the most important finding, in this case, was that the MIBG accumulation sites identified using VERITON were almost identical to the sites with a high number of fragmented potentials in the CFAE-ICL map. Furthermore, the MIBG accumulation sites targeted by ablation were evidently modified and noted to have disappeared in the postoperative evaluation. The new accumulation sites observed postoperatively might have been different from those involved in AF, as they were negative on the ICL map obtained during AF. The standard approach to GP ablation is to induce a vagal response with high-frequency stimulation, but the positive criteria are still controversial, and MIBG accumulation may be more helpful in selecting ablation targets.[4] Our observations suggest that the depiction of peri-atrial sympathetic nerve activity using VERITON is a novel and potential method for AF evaluation.

Supplementary material

Supplementary material is available at *Europace* online.

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Data availability

The data generated during this research will be shared upon reasonable request from the corresponding author.

Consent

Written informed consent was obtained from the patient for this study.

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