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CASE REPORTS

First in human pulsed field ablation to treat scar-related ventricular tachycardia in ischemic heart disease: a case report

Alexandre Ouss[1] · Loes van Stratum[1] · Pepijn van der Voort[1] · Lukas Dekker[1]

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We describe a case of pulsed field ablation (PFA) for the treatment of postinfarction ventricular tachycardia (VT). A 69-year-old male presented for ablation of recurrent symptomatic VT. A total of more than 150 VT episodes within 2 months prior to ablation were terminated by ATP. The patient has suffered an anterior myocardial infarction 35 years ago treated conservatively. He has previously undergone two VT ablation procedures, 4 and 3 years earlier. Induction attempts prior to this third ablation led to ventricular fibrillation only. Isochronal late activation mapping was utilized to determine regions of slow conduction. An area of slow conduction was localized at the distal anteroseptum (Fig. 1). Ablation of the slow conduction area was performed using PFA generator (Farastar, Boston Inc.) by means of the 31-mm pentaspline catheter (Farawave, Boston Inc.) deployed in the flower-like pose introduced via the transseptal route. Ablation using 2000 Volts was performed with the biphasic waveform as developed for pulmonary vein isolation. A total of seven overlapping applications were delivered. All applications were confined to slow conducting areas in the dense scar area (< 0.5 mV). No ventricular arrhythmia occurred during ablation. Remap after ablation showed absent near-field electrograms, and, therefore, no identifiable slow conduction. ICD parameters (pacing and shock impedance, sensing and pacing threshold) remained unchanged after PFA. No complications occurred. At 6 months follow-up, the patient was free of VTs.

This is the first description of successful ablation with PFA for scar-related VT. The patient had provided informed consent prior to ablation for the use of PFA as an experimental treatment for the ventricular arrhythmia. The decision to use PFA was made because two previous ablations were extensive in the anteroseptal area with still residual slow conduction as determined during mapping. Repetitive application of the PFA energy leading to deep penetration of the ablative effect [1] played, probably, an important role in the clinical effect. Recent experimental data showed that effect of endocardial PFA in postinfarction scar extends from the subendocardium through collagen and fat to the epicardial layers. PFA produces deeper lesions compared to radiofrequency ablation [2, 3]. Clinical studies utilizing PFA through a focal catheter are awaiting as it may improve the outcomes of VT ablation.

✉ Alexandre Ouss
alexandre.ouss@catharinaziekenhuis.nl

[1] Heart Center, Catharina Hospital, Eindhoven, The Netherlands

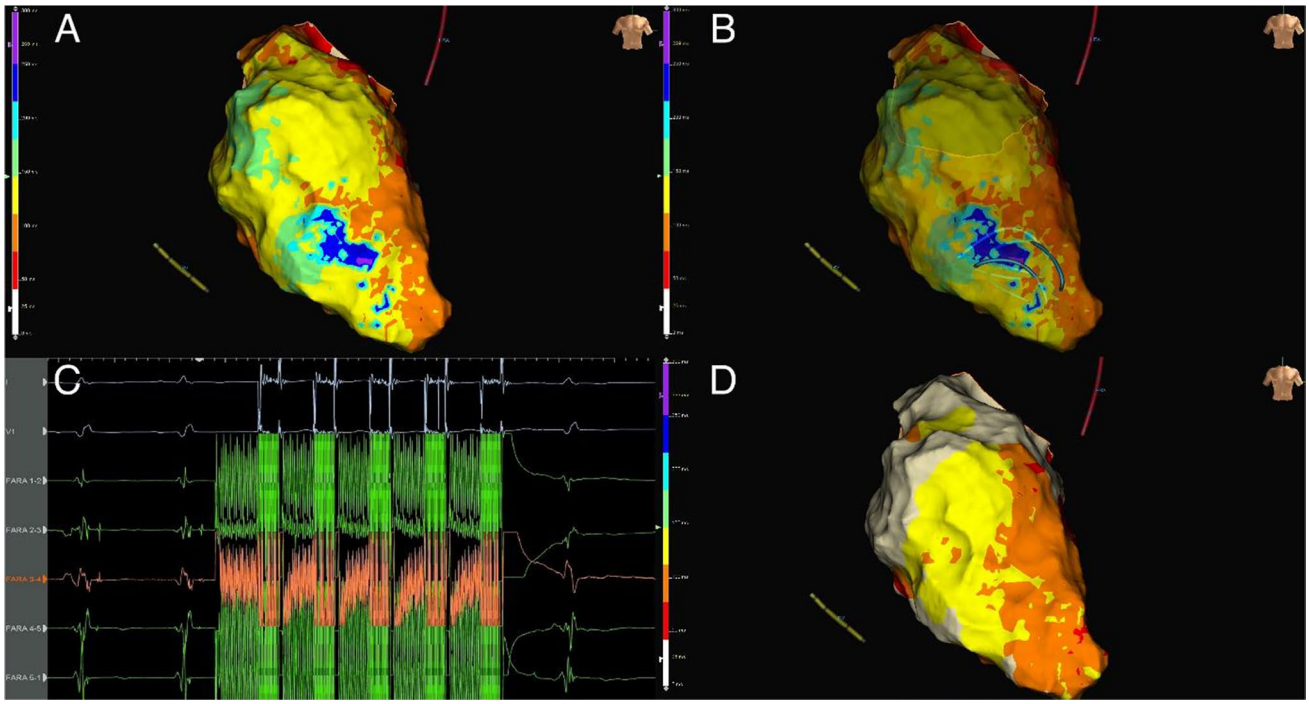

Fig. 1 High-resolution electroanatomical map of the left ventricle. **A** Isochronal late activation map of the left ventricle during atrial pacing demonstrating crowding of isochrones, which represents slow conduction, at the distal anteroseptum. **B** Isochronal late activation map of the left ventricle is made translucent to show the localization of the PFA applications by the pentaspline catheter (displayed as a circle). **C** Electrograms recorded by the pentaspline catheter showing disappearance of the near field delayed fractionated potentials immediately after ablation. **D** Activation map of the left ventricle after seven overlapping PFA applications showing the absence of isochronal crowding

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