




## Pulse ablation by the flashing electric field as a new modality in the treatment of arrhythmias – case report

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**Introduction:** Pulse ablation by an electric field is a nonthermal ablative modality that uses a short-lived, strong electric field created around the catheter that creates microscopic pores in the cell membrane (electroporation). The left atrial auricle (LAA) has great arrhythmogenic and thrombogenic potential, so its independent isolation without occlusion carries the risk of thromboembolism. Since more than 90% of thrombi occurs in LAA, its occlusion significantly reduces the risk of thromboembolism and has been shown to be not inferior to vitamin K antagonists<sup>1,2</sup>. Here we present an example of the use of pulsed electric field ablation (PFA) for pulmonary vein isolation (PVI), posterior wall insulation (PWI) and electrical insulation of left atrial auricle (LAAI) with simultaneous occlusion with the device.

**Case report:** 76-year-old woman with persistent atrial fibrillation was referred to our center for the implantation of a left auricle occlude (LAAO) due to its high thromboembolic risk and contraindications to anticoagulant therapy. As her atrial fibrillation caused signs of heart failure we planned before installing LAAO, to do PFA PVI, PWI and LAAI in the same act. Initially, we used one of the 3D heart mapping systems that we used to display an electro-anatomical map of the left atrium, and to determine the quality of electrical activity in the left atrium. After that, we decided to use PFA to isolate all PV, PW and LAA. After the insulation of LAA, we decided to install the Amplatzer Amulet 31 mm device, which was then positioned in LAA under the control of angiography and transesophageal ultrasound (TEE) which confirmed the complete occlusion of LAA. At the end of this part of the procedure, we did an electrical cardioversion and shortly after we reached the sinus rhythm, atrial tachycardia (AT) cycle 320ms was initiated. As we had a stable cycle arrhythmia, we decided to map AT. The best response to entrainment we had the middle segment of the front of the left atrium. Reproducibly in the same region with a high-resolution catheter (HD grid) we received fragmented, low-amplitude signals. When introducing the PFA catheter (Farapulse) into the desired position, we mechanically interrupted the tachycardia, which restarts after about 10sec. It was decided before the new application to check the safety risks so that with a large output we stimulated one of the poles of the catheter to prove that we are not close to the conductive system, according to our map the conductive system is approximately 2.5 cm away from the focus of the arrhythmia. When we were convinced of the security aspects, we started with the PFA. After the delivery of the first impulse (2.0 kV) AT was interrupted. With repeated provocations of isoproterenol and aggressive stimulation protocols, we could no longer initiate atrial arrhythmias and the procedure was successfully completed.

**Conclusion:** The presented case represents our view of complete care for patients with persistent atrial fibrillation. Due to its excellent safety profile and efficiency, it is likely that the PFA will become the dominant modality of ablation in the left atrium in the foreseeable future. Concomitant PFA PVI, PWI, LAAI and LAAO implantation is safe and fast and procedure, which is an important aspect for patients with atrial fibrillation and high thromboembolic risk who are the most fragile patients in clinical practice.

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### LITERATURE

1. Verma A, Asivatham SJ, Deneke T, Castellvi Q, Neal RE 2nd. Primer on Pulsed Electrical Field Ablation: Understanding the Benefits and Limitations. *Circ Arrhythm Electrophysiol.* 2021 Sep;14(9):e010086. <https://doi.org/10.1161/CIRCEP.121.010086>
2. Reddy VY, Neuzil P, Koruth JS, Petru J, Funosako M, Cochet H, et al. Pulsed Field Ablation for Pulmonary Vein Isolation in Atrial Fibrillation. *J Am Coll Cardiol.* 2019 Jul 23;74(3):315-326. <https://doi.org/10.1016/j.jacc.2019.04.021>