Ablation of circular arrhythmias using a 3D navigation system in patients with ventricular assist device: a case report

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Introduction: The ventricular assist device (VAD) is used as a "bridge to transplantation" for patients with heart failure. Patients with advanced heart failure have improved survival rates and quality of life when treated with implanted pulsatile - flow left ventricular assist devices as compared with medical therapy[1]. Systolic dysfunction associated with chronic tachyarrhythmias, known as tachycardia-induced cardiomyopathy, is a reversible form of heart failure characterized by left ventricular dilatation that is usually reversible once the tachyarrhythmia is controlled. Its development is related to both atrial and ventricular arrhythmias[2]. As 3D navigation systems for catheter ablation advance with time, we will be able to reduce fluoroscopy to a minimum, if not remove it from our electrophysiology labs. Studies show that catheter ablation for supraventricular tachycardias can be done with 3D navigation systems without using any fluoroscopy[3].

Case report: We will present two complex ablations with a 3D navigation system and very low fluoro dosage that we did in the past year. The first patient was a male, 59-years-old, with ischemic cardiomyopathy due to anteroseptal ST-elevated myocardial infarction (March 2018), cardiac resynchronization therapy with defibrillator (CRT-D) implantation (July 2019), ejection fraction (EF) 25% with a left ventricular assist device (LVAD) (February 2021). During the procedure, three clinical ventricular tachycardias (VT) were mapped and ablated. When ablating, the near-inflow tract of pump tachycardia is terminated, and CRT-D takes over with pacing. At the end of the procedure, we did induction of VT using the Michigan protocol, but we didn't manage to induce clinical VTs. Procedure time was more than 3 hours; fluoroscopy time was 4 minutes. The second patient was a female, 45-years-old, with toxic cardiomyopathy due to breast cancer treatment and biventricular assist device (BiVAD) implantation (November 2021) who came to our center with atrial flutter and 2:1 conduction, and we did an electrophysiology study. We confirmed typical atrial flutter and ablated cavotricuspid isthmus (CTI) with limited X-ray images (anterior-posterior, left and right anterior oblique views were taken and merged with the 3D navigation system). Atrial flutter was terminated, and cavotricuspid isthmus block was confirmed with differential pacing. Patient was released from the hospital in sinus rhythm. Procedure time was 90 minutes, and fluoroscopy time was 50 seconds.

Conclusion: The main goal of this case report is to show great perspective for a fluorofree future in electrophysiology labs (EP labs). As technology advances, there will be much more opportunity to reduce X-ray imaging in everyday practice. At this moment, there are a few 3D navigation systems, which make our job a lot easier. There are pros and cons for all those systems, but the most important thing to mention is that they give us a big chance for a fluorofree future in EP labs.

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LITERATURE

1. Slaughter MS, Rogers JG, Milano CA, Russell SD, Conte JV, Feldman D, et al; HeartMate II Investigators. Advanced heart failure treated with continuous-flow left ventricular assist device. N Engl J Med. 2009 Dec 3;361(23):2241-51. https://doi.org/10.1056/NEJMoa0909938
2. Umana E, Solares CA, Alpert MA. Tachycardia-induced cardiomyopathy. Am J Med. 2003 Jan;114(1):51-5. https://doi.org/10.1016/S0002-9343(02)01472-9
3. Casella M, Pelargonio G, Dello Russo A, Riva S, Bartoletti S, Santangeli P, et al. "Near-zero" fluoroscopic exposure in supraventricular arrhythmia ablation using the EnSite NavX™ mapping system: personal experience and review of the literature. J Interv Card Electrophysiol. 2011 Aug;31(2):109-18. https://doi.org/10.1007/s10840-011-9553-5