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Case Snippet

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Overcoming Anatomic Barriers in the Right Ventricular Outflow Tract with 4D Intracardiac Echocardiography and Robotic Magnetic Navigation System

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Abstract

We report a 56 year old female with monomorphic PVCs of 23% burden and associated LV dysfunction (EF 40-45%). Cardiac MRI and FDG PET scan did not show evidence of inflammation or ischemia. In light of this clinical picture – EP study performed with activation mapping showed a technically challenging PVC localized to the RVOT with the earliest area of the activation seen in the free wall within a deep trabeculation. This case required 4D ICE guidance and precision technique with robotic magnetic navigation.

Case Synopsis

We report a 56 year old female with frequent monomorphic PVCs of outflow tract origin. PVC burden was 23% with associated LV dysfunction (EF 40-45%). Cardiac MRI with delayed hyper enhancement ,T1/T2 weighted imaging along with cardiac FDG PET scan did not show evidence of prior injury, inflammation or ischemia. Patient had significant symptoms from palpitations and shortness of breath. In light of the clinical picture – patient was taken to the EP lab for possible mapping and ablation. RV activation map was done. The PVC localized to the RVOT freewall region. Robotic magnetic navigation (RMN) system (Stereotaxis) was used for mapping and ablation purposes. We also placed a 4D-ICE catheter (NuVision) into the RV and using the distal 360 degree distal tip dialing we were able to visualize the RVOT in greater anatomic detail. The earliest area of the activation localized to the free wall with a deep trabeculation that could only approached by looping the ablation catheter from the pulmonary valve. It was impossible to reach the deep crevice without the visual from the 4D ICE. We were able to reverse loop the RMT open irrigated catheter to get behind the trabeculation where the earliest signal was 30msec pre-QRS. Radiofrequency energy application at 40 watts for a total of 240 seconds completely eliminated the PVC. There was no further recurrence of PVC on Isoproterenol, calcium and phenylephrine.

Key Words

Atrial Fibrillation, Robotic Magnetic Navigation, PVC.

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Discussion

Often times the heavily trabeculated RVOT with deep pouches can create challenges in successfully delivering RF energy during ablation procedures. These structures are not well visualized with a regular 2D ICE even parked at the RVOT. The 360 degree wide scanning capability of the 4D ICE dramatically enhances the visualization of the RVOT anatomy. If delivering appropriate dose of RF in this region becomes difficult and what looks like an obvious site and difficulty eliminating the arrhythmias – mapping on the other side of the septum along with an attempt to visualize the RVOT better using 4D ICE may a reasonable option to consider. RMN provides greater stability and navigation capabilities in overcoming the anatomic barriers for successful ablation.

References

1. Saremi F, Ho SY, Cabrera JA, Sanchez-Quintana D. Right Ventricular Outflow Tract imaging with CT and MRI: Part 2, Function. AJR 2013; 200:W51–W61 (https://www.ajronline.org/doi/pdfplus/10.2214/AJR.12.9334. Accessed on 2-7-2022)

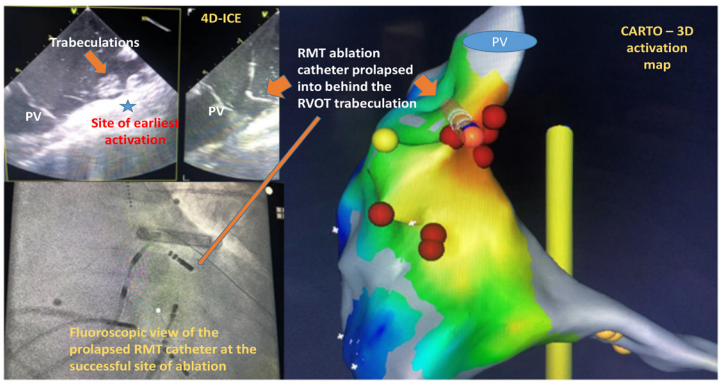

Figure 1: Top Left: 4-D intracardiac echocardiography (ICE) showing superior quality with mobile structures such as trabeculations (orange arrow), behind which lies the site of earliest activation (blue star) for this technically challenging right ventricular outflow tract (RVOT) originating PVC. Bottom Left: Fluoroscopy showing 4-D ICE guided looping of the robotic magnetic (RMN) catheter from the pulmonary valve to approach the activation site from behind the trabeculation and provide a more stable navigation. Right: Catheter tip seen in the CARTO Mapping system looping from the area of the pulmonary valve to achieve appropriate lesion sets.