

# PentaRay entrapment in a mechanical mitral valve during catheter ablation of atrial fibrillation



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## Introduction

Mapping catheter entrapment in a mechanical mitral valve (MV) is a feared but seemingly rare complication.<sup>1,2</sup> Here, we describe entrapment, shearing-off, and retrieval of a bipole on the PentaRay mapping (PRM) catheter (Biosense Webster, Inc, Diamond Bar, CA) in a mechanical MV.

## Case report

A 32-year-old woman with a mechanical Carbomedics (Sorin Group, Milan, Italy) bileaflet MV for MV endocarditis in the setting of hypertrophic cardiomyopathy presented for catheter ablation of persistent, symptomatic atrial fibrillation). A PRM catheter was used in the left atrium for electroanatomic (EA) mapping on CARTO (Biosense Webster, Inc). Monoplane fluoroscopy was used owing to planned stereotaxis ablation. Despite careful monitoring and avoidance of ventricular electrograms, one of the spines of the PRM catheter became entrapped in the mechanical MV. Gentle traction and clockwise–counterclockwise rotation on the PRM catheter did not free the catheter tip. The sheath was advanced to provide support on the catheter and traction freed the PRM catheter from the MV. Subsequent inspection of the PRM catheter demonstrated that the distal bipole of one of the linear spines had sheared off. Fluoroscopy was used to locate the remaining catheter tip in the area of the antrum of the right inferior pulmonary vein. A steerable Agilis NxT (St Jude Medical, St Paul, MN) sheath was directed toward the catheter remnant and a 2.4 mm Jawz Biopsy Forcep (Agron Medical Devices, Athens, TX) was then advanced through the sheath and used to grasp the fragment while advancing the sheath and simultaneously retracting the biptome. Once the fragment was in the sheath, it was withdrawn to the right heart and the fragment remnant was successfully retrieved (Figure 1; see online supplement for Movie 1). The patient did not have any appreciable



**Figure 1** Retrieval of sheared PentaRay remnant. Still-frame fluoroscopy image in anteroposterior view demonstrating the Jawz Biopsy Forcep and steerable Agilis sheath directed toward the catheter remnant in the area of the antrum of the right inferior pulmonary vein.

hemodynamic or respiratory compromise either during or after the entrapment and retrieval. The fragment was matched to the spline of the PRM catheter to confirm complete fragment retrieval (Figure 2). Catheter ablation was then performed using circular mapping and ablation catheters. The patient tolerated the procedure well, without additional complications. A follow-up echocardiogram after ablation demonstrated normal bileaflet mechanical valve prosthetic function.

## Discussion

The case illustrates that care must be taken to avoid catheter entrapment, especially when catheter electrograms suggest proximity to the mitral annulus. Fluoroscopy in the RAO plane can help delineate catheter proximity to the mitral annulus. Intracardiac ultrasound could also be used to help prevent this complication either through live monitoring of the mapping catheter position or, more practically, by use in

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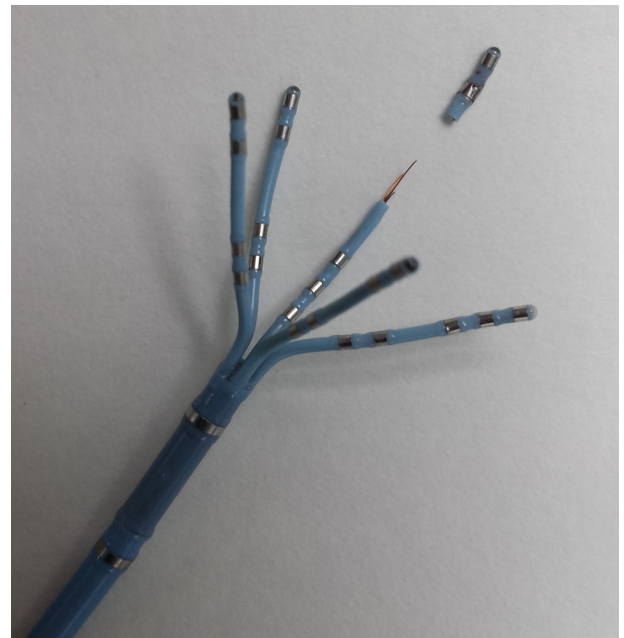
**KEY TEACHING POINTS**

- Abundant caution is necessary to avoid catheter entrapment when mapping in the left atrium with a PentaRay mapping catheter in patients with a mechanical mitral valve.
- Traction on an entrapped PentaRay catheter can lead to shearing of a distal bipole.
- Care must be taken during catheter ablation of atrial fibrillation in the setting of a mechanical mitral valve to avoid entrapment. Fluoroscopic (particularly in right anterior oblique) and electrogram monitoring are critical.

coordination with a mapping system to create a left atrial shell prior to mapping catheter insertion.

While traditionally described with entrapment of circular mapping catheters, many of the same disengagement techniques may apply to novel multielectrode mapping catheters. Gentle traction and clockwise–counterclockwise rotation may help disentangle the catheter.<sup>3</sup> Rapid ventricular pacing or adenosine could be used to prolong diastole, which may help free the catheter. Advancing a sheath for support and either advancing<sup>3</sup> or retracting the apparatus may be attempted.<sup>4</sup> Extraction techniques can also be used, either via retrograde aortic approach or via transseptal for entrapment on the atrial or ventricular aspect of the MV, respectively.<sup>2</sup> A surgical approach may be indicated for catheter removal, especially if damage occurs to the MV.

This case demonstrates the potential danger of mapping in the left atrium with a PRM catheter in patients with mechanical MVs. It highlights the importance of considering additional procedure imaging that might not be required for traditional cases and developing a plan of action to deal with such a complication, and the need to have equipment for retrieval readily available. It also underscores the need for caution when placing traction on the PRM catheter, given the propensity for shearing-off of the distal portion of the mapping spine(s).



**Figure 2** PenataRay mapping catheter. PentaRay catheter with 5 linear spines, each of which has 2 sets of 1-mm-spaced electrodes radiating from the end of the catheter. The sheared distal bipole is shown at top-right along with the corresponding remnant of the PentaRay catheter. It was important to match the sheared portion with the catheter to confirm complete removal.

## Appendix

### Supplementary data

Supplementary data associated with this article can be found in the online version at <http://dx.doi.org/10.1016/j.hrcr.2015.11.006>.

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