

The use of a high definition multielectrode catheter to localize the trigger for the initiation of atrial fibrillation

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July 6, 2020

Abstract

Mapping of non pulmonary vein triggers for the initiation of atrial fibrillation can be complex and time consuming. We describe a technique where templates are created by pacing from different locations with the right and left atria during sinus rhythm whilst positioning a high definition (HD) Grid catheter along the posterior wall of the left atrium and recording the activation sequence. Following this AF is initiated using decremental atrial pacing and the administration of intravenous isoprenaline and the activation across the HD Grid is compared with the templates. In our case series this appears to easily locate the focus source for the initiation of AF.

Introduction

Although the majority of triggers for the initiation of atrial fibrillation (AF) originate from the pulmonary veins (PVs) non PV triggers also play a significant role in the initiation of AF and this may account for arrhythmia recurrences post PV isolation. [1,2] The mapping of non PV triggers may be complex and require many catheters as well as multiple episodes of initiation of AF. We describe a new technique using the activation sequence across a 24 pole flat array catheter (HD Grid, Abbott technologies, Mn, USA) positioned on the posterior wall of the left atrium (LA). This method compares the first beat which initiates AF with multiple templates which were created during pacing in sinus rhythm (SR).

Methods and results

In a total of 5 patients the HD Grid catheter was positioned along the posterior wall of the LA during SR. Pacing was performed using a circular Inquiry catheter (Abbott technologies, Mn, USA) from prespecified locations which included the left superior pulmonary vein, left inferior pulmonary vein, right superior pulmonary vein, right inferior pulmonary vein, posterior wall of the left atrium, left atrial appendage, right atrial appendage, crista terminalis and superior vena cava. Pacing as performed from all of the poles in order to create multiple activation templates across the HG Grid catheter. As shown in Figure 1 the different activation sequences were compared between pacing from the different locations. AF was then initiated using a combination of rapid atrial pacing and an infusion of isoprenaline. An example of this is shown in Figure 2. By examining the first beat which initiates AF with the activation template in the HD Grid and the coronary sinus in this example the trigger can be located in the LAA where there is activation from the superior to the inferior LA followed by early activation of the CS. This activation is significantly different from all other templates which were created with pacing during SR. This technique was repeated over 5 cases and appeared to locate the focus for the initiation of AF in all cases.

Conclusions

The use of a high definition mapping catheter with equidistant electrode spacing is a useful tool for helping to localize the focus for the initiation of AF. This is a very simple technique which only requires a single initiation. This could be used further for the mapping of non PV triggers.

References

1. Shah, D., Häissaguerre, M., Jaïs, P. & Hocini, M. Nonpulmonary vein foci: Do they exist? *PACE*. 26[Pt.II], 1631–1635 (2003).
2. Takigawa, M. *et al* . Impact of non-pulmonary vein foci on the outcome of the second session of catheter ablation for paroxysmal atrial fibrillation. *J Cardiovasc Electrophysiol*. 26 , 739–746 (2015)

Figure 1. Pacing templates from various locations with the LA and RA in order to create an activation template using the HD Grid Catheter

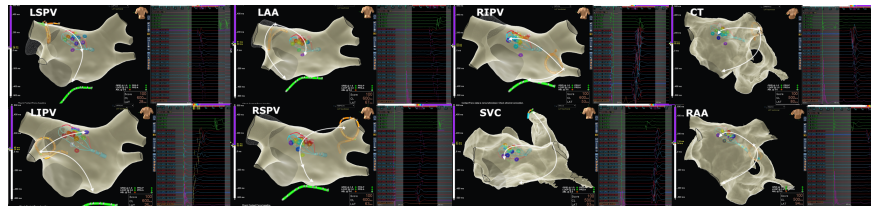


Figure 2 Initiation of AF using rapid atrial pacing and an isoprenaline infusion. The activation sequence across the HD Grid from superior left to inferior followed by rapid coronary sinus activation indicated that the trigger is originating from the left atrial appendage (LAA).

