Revista Portuguesa de Cardiologia 42 (2023) 391–392

Revista Portuguesa de
Cardiologia
Portuguese Journal of Cardiology
www.revportcardiol.org

EDITORIAL COMMENT

Ups and downs in the mapping of macro-reentry arrhythmias. A revelation in a spark of light

Altos e baixos no mapeamento das arritmias de macro-reentrada. Uma revelação numa centelha de luz

Pedro Silva Cunha[a,b]

[a] *Arrhythmology, Pacing and Electrophysiology Unit, Cardiology Service, Santa Marta Hospital, Lisbon, Portugal*
[b] *Centro Hospitalar Universitário de Lisboa Central, Lisbon, Portugal*

Available online 7 March 2023

If you can see, look. If you can look, observe. José Saramago, ''Blindness.''

''*Se podes olhar, vê. Se podes ver, repara*''. José Saramago, ''Ensaio sobre a cegueira''.

It is said that when the Belgian surrealist artist René Magritte saw a painting by Giorgio de Chirico, he was fascinated because he considered it the first time that someone had achieved the visual representation of ''thought''. Afterwards, he developed a style in which he constantly challenges observers' preconditioned perceptions of reality.

In the pathophysiology of atrial reentry arrhythmias, it is recognised the presence of functional circuits (dependent on tissue electrophysiological properties) but also, in recent years, fixed anatomical circuits, dependent on regions of myocyte loss with replacement by fibrotic tissue (scars). Fibrosis can occur in various regions of the LA secondary to ablative or surgical therapy or as the result of a myopathic process, giving rise to multiple variants of atrial tachycardias.[1]

E-mail address: psilvacunha@gmail.com

Functional or anatomical factors enable the existence of slow electrical conduction, favoring the occurrence of re-entry circuits.[2,3] The regions of slow electrical conduction are called isthmuses. Most treatment strategies using catheter ablation are based on detecting isthmuses and their elimination through controlled local destruction of these groups of cells. Thus, the recognition and precise identification of isthmic regions are crucial to the success of ablative therapy.

One of the classic electrophysiological maneuvers for mapping macro-reentry tachycardias is entrainment. In this case, the operator delivers stimuli with a cycle faster than the cycle of the tachycardia under analysis, thus trying to capture the tachycardia, subsequently evaluating the return cycle and therefore understanding whether the catheter from which the stimuli are delivered is located in a region within the anatomical circuit of tachycardia. A frequent secondary effect of this exercise is the conversion of tachycardia, with the need for further re-induction attempts. These electrophysiological manipulations are essentially created to identify the arrhythmic circuit and only in a second phase, the slow conduction region.

In the above context, it is understandable that catheter treatment of macro-reentry tachycardias (flutters) in the

https://doi.org/10.1016/j.repc.2023.03.002

LA is challenging from an intellectual and technical point of view. In recent years, many electrophysiologists have abandoned performing entrainment maneuvers to focus on carefully analyzing the information acquired through three-dimensional (3D) mapping.

We must recognize that the evolution of 3D mapping systems has contributed significantly to understanding tachyarrhythmia mechanisms in determining the arrhythmic substrate and visualizing the circuit. These systems have evolved, not only in terms of analysis software but also in the elaboration of high-density catheters, which enable the simultaneous collection of a large number of intra-cavity electrograms (''time points''). In this way, it has been possible to add precise information about the circuits of reentry arrhythmias.

In this issue of the Portuguese Journal of Cardiology, Cortez-Dias et al.[4] report an exemplary case of the aspects described above. We are presented with the different steps in the careful analysis carried out and the rational selection that the authors make of the resources made available by the 3D mapping system.

Undoubtedly, these systems represent a window into the knowledge of electrophysiological mechanisms, but they also have significant limitations inherent to how technological algorithms analyze temporal events. The analysis based on SparkleMap (Abbott) is an attempt to overcome some of the limitations mentioned above since it is independent of the window of interest (a parameter defined by the interval preceding and after a reference point determined by the operator). Thus, a sequential strategy of careful analysis of the substrate (voltage mapping) and the circuit (activation mapping using SparkleMap) appears to be very efficient in ablating tachycardias using a reentry mechanism.

An effort must be made to overcome the preconditioning of perception. Therefore, when mapping this type of arrhythmia, operators must carefully analyze the information made available by the system, adequately interpreting its limitations.

In the aforementioned article, we are presented with a technical resource (SparkleMap) that represents another step toward improving the information displayed by the mapping systems.

Conflicts of interest

The author has no conflicts of interest to declare.

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