Archives of Cardiovascular Disease (2017) xxx, xxx—xxx

Available online at ScienceDirect www.sciencedirect.com

Elsevier Masson France EM|consulte www.em-consulte.com/en

CLINICAL RESEARCH

A comparison between multipolar mapping and conventional mapping of atrial tachycardias in the context of atrial fibrillation ablation

Comparaison entre cartographie multi-points et cartographie point-par-point des tachycardies atriales survenant après ablation de fibrillation atriale

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Received 23 August 2016; received in revised form 7 April 2017; accepted 18 April 2017

KEYWORDS
Multielectrode mapping;
Atrial tachycardia;
Atrial fibrillation;
Activation mapping

Summary
Background. — Activation mapping can be challenging and time-consuming in patients with multiple atrial tachycardias (ATs).
Aims. — To compare multielectrode mapping using a dedicated mapping catheter — PentaRay (Biosense Webster Inc.) — and the conventional technique for mapping ATs in the context of atrial fibrillation (AF) ablation.
Methods. — All procedures where PentaRay mapping of AT were used — after or during persistent AF ablation — were analysed. These were compared to a historical group — using conventional mapping.
Results. — A mean of 449 ± 520 points within 14 ± 6 min were acquired per AT in the PentaRay group ($n = 17$) versus 42 ± 18 points ($P < 0.0001$) within 33 ± 25 min ($P = 0.04$) in the conventional group ($n = 17$). All 25 AT isthmuses were easily identified and ablated in the PentaRay group

Abbreviations: AF, atrial fibrillation; AT, atrial tachycardia; ECG, electrocardiogram; LA, left atrium/atrial; MEM, multielectrode mapping; PV, pulmonary vein.

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http://dx.doi.org/10.1016/j.acvd.2017.04.005

Please cite this article in press as: Bun S-S, et al. A comparison between multipolar mapping and conventional mapping of atrial tachycardias in the context of atrial fibrillation ablation. Arch Cardiovasc Dis (2017), http://dx.doi.org/10.1016/j.acvd.2017.04.005

(100%) versus 20/23 (87%) in the conventional group ($P = 0.056$). The ablation time was shorter in the PentaRay group (760 ± 540 vs 1347 ± 962 s; $P = 0.037$). However, procedure and fluoroscopy times were not significantly different between the PentaRay and conventional groups: 253 ± 77 vs 267 ± 73 min ($P = 0.80$) and 13.1 ± 8.0 min vs 15.1 ± 10.0 min ($P = 0.98$), respectively. Recurrence occurred in less patients in the PentaRay group (0 vs 23.5%; $P = 0.033$) during a mean follow-up of nearly 1 year.

Conclusion. — In patients with multiple ATs, multielectrode PentaRay mapping was faster than the conventional technique, with less radiofrequency delivery and a better mid-term outcome.

MOTS CLÉS
Cartographie multi-électrodes ;
Tachycardies atriales ;
Fibrillation atriale ;
Cartographie d'activation

Résumé

Contexte. — La cartographie d'activation peut s'avérer difficile et chronophage en présence de multiples circuits de tachycardie atriale (TA).

Buts. — Comparer la cartographie multi-électrodes à l'aide d'un cathéter dédié PentaRay (Biosense Webster Inc.), avec la technique conventionnelle utilisant le cathéter d'ablation pour la cartographie des TA au cours des procédures d'ablation de fibrillation atriale (FA).

Méthodes. — Il s'agit d'une étude rétrospective monocentrique qui a analysé toutes les procédures utilisant le PentaRay pour la cartographie (temps de cartographie), durant ou après une ablation de FA persistante, en comparaison avec un groupe témoin historique utilisant le technique conventionnelle.

Résultats. — Une moyenne de 449 ± 520 points par TA ont été acquis en 14 ± 6 min dans le groupe PentaRay ($n = 17$) contre 42 ± 18 points ($p < 0{,}0001$) en 33 ± 25 min ($p = 0{,}04$) dans le groupe conventionnelle ($n = 17$). Tous les 25 isthmes critiques des TA purent être identifiés et ablatés avec succès dans le groupe PentaRay (100 %) contre 20/23 (87 %) dans le groupe NAV ($p = 0{,}056$). Le temps de radiofréquence fut significativement réduit dans le groupe PentaRay (760 ± 540 s vs 1347 ± 962 s dans le groupe conventionnelle; $p = 0{,}037$). Les temps procéduraux et de fluoroscopie ne différaient pas entre les deux groupes : respectivement 253 ± 77 contre 267 ± 73 min ($p = 0{,}80$) dans le groupe conventionnelle et 13,1 ± 8,0 min contre 15,1 ± 10,0 min ($p = 0{,}98$) dans le groupe conventionnelle. Quatre patients ont présenté une récidive dans le groupe NAV contre aucun dans le groupe PentaRay ($p = 0{,}033$), après un an de suivi.

Conclusion. — La cartographie multi-électrodes PentaRay est plus rapide et plus performante pour la cartographie des TA en comparaison avec la technique conventionnelle. Le temps d'ablation en est réduit avec cette technique, et le succès à moyen terme amélioré.

Background

Percutaneous radiofrequency catheter ablation is a validated technique for the treatment of patients with symptomatic paroxysmal/persistent atrial fibrillation (AF) according to recent guidelines [1]. The strategy for persistent AF ablation is still a subject of debate, Scherr et al. have reported the importance of periprocedural AF termination into sinus rhythm with or without an intermediate transformation into atrial tachycardias (ATs) [2]. The incidence of ATs after AF ablation ranges from 3 to 29%, according to different studies [3—5]. AT can be more symptomatic than the initial underlying AF, leading — in most cases — to a repeat radiofrequency catheter ablation procedure. Post-AF ablation ATs can manifest themselves with an electrocardiogram (ECG) suggesting atrial flutter [6], with different possible mechanisms: either macroreentrant or focal (localized microreentry or automaticity) [7]. Electrophysiological tools for AT ablation include entrainment and activation mapping using three-dimensional electroanatomical mapping systems. The conventional method consists of an operator-dependent acquisition of electrograms by a single pair of electrodes (using an ablation catheter) according to a chosen and predefined intracardiac reference. However, this method can be challenging and time-consuming in case of multiple successive AT circuits. Recently, a multipolar mapping catheter has been developed for multi-electrogram acquisition (PentaRay, Biosense Webster Inc., Diamond Bar, CA, USA). A recent study has reported the superiority of multielectrode mapping (MEM) — in terms of acute procedural success — in comparison with the conventional point-by-point strategy [8]. However, whether the long-term outcome of this strategy is superior to the conventional method is not yet known.

We aimed to compare MEM using a PentaRay catheter with the conventional ablation catheter technique for mapping AT, and assessed the long-term outcome of this strategy.

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