Abstract: P963

Extent and spatial distribution of left atrial arrhythmogenic sites, late gadolinium enhancement at MRI and low voltage areas in patients with persistent atrial fibrillation

Authors:
J Chen¹, T Arentz¹, H Cochet², S Kim³, Z Moreno-Weidmann¹, B Mueller-Edenborn¹, J Minners¹, H Lehrmann¹, D Trenk¹, J Allgeier¹, M Hocini¹, P Jais², M Haissaguerre², A Jadidi¹, ¹University Heart Center Freiburg-Bad Krozingen, Arrhythmia Department - Freiburg - Germany, ²LIRYC Institute, Bordeaux University, CHU Haut-Lévêque - Bordeaux-Pessac - France, ³Abbott - Minnesota - United States of America,

Topic(s):
Atrial Fibrillation - Pathophysiology and Mechanisms

Citation:

Background: Arrhythmia recurrence following pulmonary vein Isolation (PVI) is high in persistent atrial fibrillation (AF) due to atrial arrhythmogenic fibro-fatty substrate that can be identified as low voltage areas or atrial delayed Gadolinium enhancement (DE) at magnetic resonance imaging (MRI).

Methods: We assessed the spatial relationship of arrhythmogenic left atrial (LA) areas with rotational (RotA) or continuous activity (CA) to DE areas and low voltage area. Sixteen patients with persistent AF (6 long-standing) underwent DE-MRI (1.25 × 1.25 × 2.5 mm) prior to PVI. LA voltage-mapping was acquired in AF (> 1000 sites/LA) and the regional activation patterns of AF wavelets (145920 AF EGMs) were analyzed. Sites with rotational or continuous activities were characterized (voltage, duration) and their spatial relationship to DE and low voltage areas < 0.5 mV was assessed.

Results: DE and low voltage areas covered 55% and 24% (p<0.01) of total LA surface, respectively. DE was present at 61% of low voltage areas, whereas low voltage was present at 28% of DE areas. Rotational and continuous activities more frequently co-localized with low voltage areas than with DE areas (78% vs 63%). Regional bipolar voltage of rotational vs continuous activity was 0.64 ± 0.47 mV vs 0.58 ± 0.51 mV. All 28 rotational activities and 56 continuous activities areas contained electrograms with prolonged duration(115 ± 14 ms) displaying low voltage(0.34 ± 0.11 mV).

Conclusion: A small portion of DE and low voltage areas harbor the arrhythmogenic areas displaying repetitive rotational or continuous activity. Most continuous or rotational activities co-localized with low voltage areas, while there was less co-localization with DE areas. There is an important mismatch between DE areas and low voltage areas which needs to be considered when used as target for catheter ablation (see Figure 1).
Abstract:

Extent and spatial distribution of left atrial arrhythmogenic sites, late gadolinium enhancement at MRI and low voltage areas in patients with persistent atrial fibrillation.

Authors:

J Chen1, T Arentz1, H Cochet2, S Kim3, Z Moreno-Weidmann1, B Mueller-Edenborn1, J Minners1, H Lehrmann1, D Trenk1, J Allgeier1, M Hocini1, P Jais2, M Haissaguerre2, A Jadidi1

1 University Heart Center Freiburg-Bad Krozingen, Arrhythima Department - Freiburg - Germany, 2 LIRYC Institute, Bordeaux University, CHU Haut-Lévêque - Bordeaux-Pessac - France, 3 Abbott - Minnesota - United States of America

Topic(s):

Atrial Fibrillation - Pathophysiology and Mechanisms

Citation:

Funding Acknowledgements:

This work was funded by a research grant of the Gerda Müller Weber-Foundation / German Heart Foundation (Deutsche Herzstiftung).

Background: Arrhythmia recurrence following pulmonary vein Isolation (PVI) is high in persistent atrial fibrillation (AF) due to atrial arrhythmogenic fibro-fatty substrate that can be identified as low voltage areas or atrial delayed Gadolinium enhancement (DE) at magnetic resonance imaging (MRI).

Methods: We assessed the spatial relationship of arrhythmogenic left atrial (LA) areas with rotational (RotA) or continuous activity (CA) to DE areas and low voltage area. Sixteen patients with persistent AF (6 long-standing) underwent DE-MRI (1.25 x 1.25 x 2.5 mm) prior to PVI. LA voltage-mapping was acquired in AF (>1000 sites/LA) and the regional activation patterns of AF wavelets (145920 AF EGMs) were analyzed. Sites with rotational or continuous activities were characterized (voltage, duration) and their spatial relationship to DE and low voltage areas <0.5 mV was assessed.

Results: DE and low voltage areas covered 55% and 24% (p<0.01) of total LA surface, respectively. DE was present at 61% of low voltage areas, whereas low voltage was present at 28% of DE areas. Rotational and continuous activities more frequently co-localized with low voltage areas than with DE areas (78% vs 63%). Regional bipolar voltage of rotational vs continuous activity was 0.64 ± 0.47 mV vs 0.58 ± 0.51 mV. All 28 rotational activities and 56 continuous activities areas contained electrograms with prolonged duration (115 ± 14 ms) displaying low voltage (0.34 ± 0.11 mV).

Conclusion: A small portion of DE and low voltage areas harbor the arrhythmogenic areas displaying repetitive rotational or continuous activity. Most continuous or rotational activities co-localized with low voltage areas, while there was less co-localization with DE areas. There is an important mismatch between DE areas and low voltage areas which needs to be considered when used as target for catheter ablation (see Figure 1).