TERMINATION OF PERSISTENT ATRIAL FIBRILLATION BY ABLATING SITES THAT CONTROL LARGE ATRIAL AREAS

Abstract

Aims: Persistent atrial fibrillation (AF) has been explained by multiple mechanisms which, while they conflict, all agree that more disorganized AF is more difficult to treat than organized AF. We hypothesized that persistent AF consists of interacting organized areas which may enlarge, shrink or coalesce, and that patients whose AF areas enlarge by ablation are more likely to respond to therapy.

Methods and results: We mapped vectorial propagation in persistent AF using wavefront fields (WFF), constructed from raw unipolar electrograms at 64-pole basket catheters, during ablation until termination (Group 1, N = 20 patients) or cardioversion (Group 2, N = 20 patients). Wavefront field mapping of patients (age 61.1 ± 13.2 years, left atrium 47.1 ± 6.9 mm) at baseline showed 4.6 ± 1.0 organized areas, each separated by disorganization. Ablation of sites that led to termination controlled larger organized area than competing sites (44.1 ± 11.1% vs. 22.4 ± 7.0%, $P < 0.001$). In Group 1, ablation progressively enlarged unablated areas (rising from 32.2 ± 15.7% to 44.1 ± 11.1% of mapped atrium, $P < 0.0001$). In Group 2, organized areas did not enlarge but contracted during ablation (23.6 ± 6.3% to 15.2 ± 5.6%, $P < 0.0001$).

Conclusion: Mapping wavefront vectors in persistent AF revealed competing organized areas. Ablation that progressively enlarged remaining areas was acutely successful, and sites where ablation terminated AF were surrounded by large organized areas. Patients in whom large organized areas did not emerge during ablation did not exhibit AF termination. Further studies should define how fibrillatory activity is organized within such areas and whether this approach can guide ablation.