

Action potential duration restitution kinetics during atrial fibrillation derived from optical mapping recordings in goat

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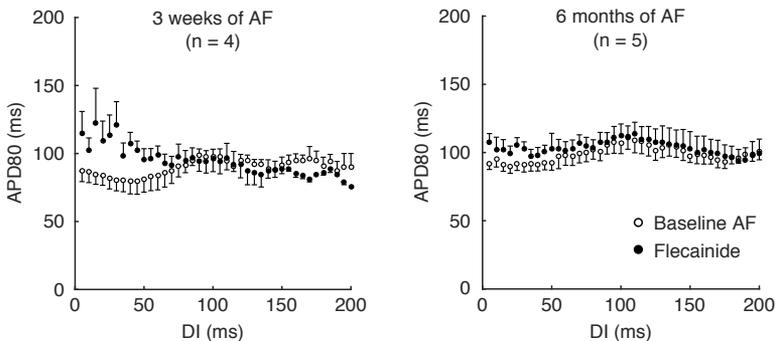
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Background: An action potential duration (APD) restitution curve plots the relation between APD and diastolic interval (DI). A steep slope in this curve is generally believed to be proarrhythmic. This relation is normally determined during pacing. Here, we present a method for reconstruction of restitution curves using optical mapping recordings acquired during atrial fibrillation (AF).

Methods and results: Optical mapping was performed during AF in perfused goat hearts after 3 weeks (3wAF, electrical remodeling, n=4) and 6 months of AF (6mAF, electrical and structural remodeling, n=5), in the absence and presence of the antiarrhythmic drug flecainide. Action potentials were detected using sensitive template matching. False positive detections were removed based on spatiotemporal filtering. After correction for drift, APD at 80% repolarization (APD80) and DI were determined and restitution curves created.

The obtained restitution curves show only limited dependency of APD80 on the preceding DI. The administration of flecainide resulted in significant ($P<0.05$) prolongation of DI in both 3wAF ($63\pm 15\text{ms}$ vs. $130\pm 27\text{ms}$) and 6mAF group ($64\pm 11\text{ms}$ vs. $127\pm 35\text{ms}$). No significant differences in APD80 were found after administration of flecainide in either the 3wAF ($84\pm 20\text{ms}$ vs. $87\pm 15\text{ms}$) or 6mAF group ($92\pm 14\text{ms}$ vs. $100\pm 13\text{ms}$).

Conclusions: Our analysis suggest that APD restitution kinetics do not play a role in AF maintenance in goat atria with electrical remodelling.



Mean restitution curves for the 3wAF and 6mAF group.