The role of atrial remodeling for ablation of atrial fibrillation

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Background
Atrial fibrillation (AF) causes electrical, contractile, and structural remodeling of the atria. We investigated remodeling in patients undergoing AF ablation.

Methods
Concomitant ablation of permanent AF, lasting 1 to 240 months, was performed in 73 patients (49.3% men) with a mean age of 66 +/- 9.1 years undergoing mitral valve operations. Electrical (AF cycle length from surface electrocardiogram), contractile (force of contraction measured at right atrial muscle bundles), and structural (left atrial [LA] diameter from echocardiography) remodeling was assessed. Predictors for rhythm outcome were determined.

Results
Two patients died perioperatively, and 3 died during follow-up. The deaths were not ablation related. At the last follow-up (mean, 12 +/- 6.9 months), 47 patients (71.2%) were in sinus rhythm, 41 (62.1%) without antiarrhythmic drugs. Corresponding to cycle length (126 to 247 ms), force (2 to 18 mN/mm²), and LA diameter (37 to 79 mm), atrial remodeling exhibited a wide interindividual variability but no correlation between different remodeling levels. No relationship was found between remodeling and AF duration or LA hemodynamic load. Univariate analysis demonstrated higher force (7 +/- 4.2 vs 4 +/- 2.8 mN/mm², \( p = 0.078 \)), smaller LA diameter (51 +/- 7.1 vs 58 +/- 10.2 mm, \( p < 0.05 \)), and shorter AF duration (34 +/- 48.7 vs 73 +/- 63.0 months, \( p < 0.05 \)) associated with successful sinus rhythm restoration, whereas logistic regression analysis revealed AF duration (odds ratio, 1.01; 95% confidence interval, 1.00 to 1.02, \( p = 0.045 \)) and LA diameter (odds ratio, 1.12; 95% confidence interval, 1.02 to 1.23, \( p = 0.016 \)) as predictors.

Conclusions
Atrial remodeling exhibited a high interindividual variability but no relationship within different remodeling levels, with AF duration or with LA hemodynamic load. However, AF duration and structural remodeling, but not electrical or contractile remodeling, predicted rhythm outcome.